3.0 Physical and Biological Environmental Setting

3.1 Introduction

The NiSource system covered by this MSHCP spans 14-states ranging from Louisiana to New York, with system components located in southern, northeastern, Midwestern, and Mid-Atlantic states. This chapter provides background information on the environmental setting and the environmental data sources used in subsequent sections of this plan for analysis. It begins by introducing some of the key project-wide datasets used. This chapter also summarizes existing land use within the covered lands and the existing conservation lands crossed by the project, as well as a brief summary of climate information.

3.2 Data Collection

As described in Chapter 1, this MSHCP covers a large, primarily linear geographic area. Thus, it was important to obtain base data layers that were available and consistent across the project. The following data sets were used to help assess the project area:

- Ecoregion Data: Omernik's Ecoregion data from the Environmental Protection Agency (2007);
- Watershed Data: Hydrologic Unit Maps from U.S. Geological Survey (USGS) (2007);
- Land Use Data: National Land Cover Dataset (NLCD) from USGS (US Dept. of Interior 2006); and
- Conservation Lands Data: Primarily Gap Analysis Program (GAP) data, but also state land ownership layers for states where GAP analysis has not been completed.

Metadata for each of these data layers is described in detail in **Appendix D,** as well as additional data sets used for species-specific analyses.

3.3 Ecoregions

The covered lands cross 23 ecoregions, as defined by Omernik's Level III ecoregional data framework (**Figure 3-1**). In light of the scope and nature of the project, Omernik's Level III ecoregional descriptions are used as the foundation for describing the physical environmental setting of the project. Omernik's system is available in different scales, which allows for more in-depth descriptions on a species-specific level, where necessary. *See* Chapter 6.

Omernik's Level III ecoregional data was compiled based on the premise that ecological regions can be identified through analysis of patterns and composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity. These phenomena include geology, physiography, vegetation, climate, soils,

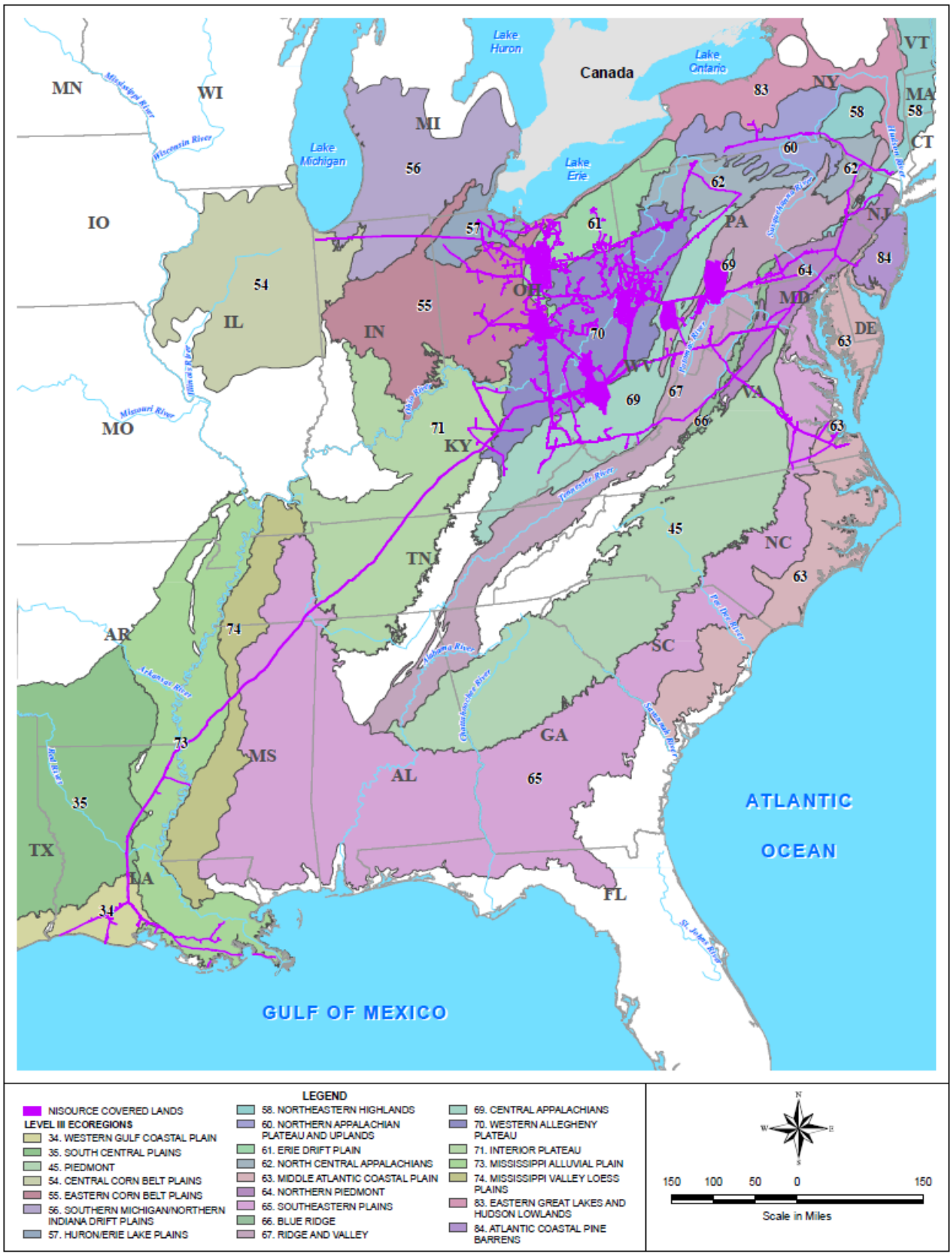

Figure 3-1 Level III Ecoregions Crossed by NiSource's Facilities

land use, wildlife, and hydrology (Environmental Protection Agency [EPA] 2007). The following 23 descriptions are taken from Omernik's Level III ecoregional descriptions and include the assigned ecoregional number for reference (EPA 2002). They describe the landscape setting of this MSHCP, starting at the southwest boundary and ending at the northeast boundary of the project.

3.3.1 Western Gulf Coastal Plain (34)

The NiSource system crosses the Western Gulf Coastal Plain in southwestern Louisiana. The principal distinguishing characteristics of the Western Gulf Coastal Plain are its relatively-flat coastal plain topography and natural vegetation of mainly grassland. Inland from the region, the plains become more irregular and have mostly forest or savanna-type vegetation. Because of these characteristics, a higher percentage of the land is cropland, compared to land in bordering ecological regions. Recent urbanization and industrialization have become concerns in this region.

3.3.2 Mississippi Alluvial Plain (73)

The NiSource system crosses the Mississippi Alluvial Plain in southeastern and northeastern Louisiana, and in northwestern Mississippi. This riverine ecoregion is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief. Soils are typically finer textured and more poorly drained than the upland soils of adjacent Mississippi Valley Loess Plains, although there are some areas of coarser, better-drained soils.

Winters are mild and summers are hot, with temperatures and precipitation increasing from north to south. Bottomland deciduous forest vegetation covered the region before much of it was cleared for cultivation. Presently, most of the northern and central parts of the region are in cropland and receive heavy treatments of insecticides and herbicides. Soybeans, cotton, and rice are the major crops.

3.3.3 South Central Plains (35)

The NiSource system crosses a small portion of the South Central Plains in central Louisiana. Locally termed the "piney woods," this region of mostly irregular plains was once blanketed by oak-hickory-pine forests, but is now predominantly in loblolly and shortleaf pine. Only about one-sixth of the region is in cropland, whereas about two-thirds are in forests and woodland. Lumber and pulpwood production are major economic activities.

3.3.4 Mississippi Valley Loess Plains (74)

The NiSource system crosses a small region of the Mississippi Valley Loess Plains in north-central Mississippi. This ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of irregular plains, some gently rolling hills, and near the Mississippi River, bluffs. Thick loess is one of the distinguishing characteristics. The bluff hills in the western portion contain soils that are deep, steep, silty, and erosive. Flatter topography is found to the east, and streams tend to have less gradient and siltier substrates than in the Southeastern Plains ecoregion. Oak-hickory and oak-hickory-pine forest was the natural vegetation.

Agriculture is now the dominant land cover in the Kentucky and Tennessee portion of the region, while in Mississippi there is a mosaic of forest and cropland.

3.3.5 Southeastern Plains (65)

The NiSource system crosses the Southeastern Plains ecoregion in northeastern Mississippi, southern Tennessee, and in southeastern Virginia. These irregular plains have a mosaic of cropland, pasture, woodland, and forest. Natural vegetation was predominantly longleaf pine, with smaller areas of oak-hickory-pine and southern mixed forest.

The Cretaceous or Tertiary-age sands, silts, and clays of the region contrast geologically with the older metamorphic and igneous rocks of the Piedmont ecoregion, and with the Paleozoic limestone, chert, and shale found in the Interior Plateau ecoregion. Elevations and relief are greater than in the Southern Coastal Plain ecoregion, but generally less than in much of the Piedmont. Streams in this area are relatively low gradient and sandy bottomed.

3.3.6 Interior Plateau (71)

The NiSource system crosses the Interior Plateau ecoregion in central Tennessee, western Kentucky, and southwestern Ohio. The Interior Plateau is a diverse ecoregion extending from southern Indiana and Ohio to northern Alabama. Rock types are distinctly different from the coastal plain sediments and alluvial deposits to the west, and elevations are lower than the Appalachian ecoregions to the east. Mississippian- to Ordovician-age limestone, chert, sandstone, siltstone, and shale compose the landforms of open hills, irregular plains, and tablelands. The natural vegetation is primarily oak-hickory forest, with some areas of bluestem prairie and cedar glades. The region has a diverse fish fauna.

3.3.7 Central Corn Belt Plains (54)

The NiSource system crosses the Central Corn Belt Plains in northwest Indiana. Extensive prairie communities intermixed with oak-hickory forests were native to the glaciated plains of the Central Corn Belt Plains. Beginning in the nineteenth century, the natural vegetation was gradually replaced by agriculture. Farms are now extensive on the dark, fertile soils of the Central Corn Belt Plains and mainly produce corn and soybeans. Cattle, sheep, poultry, and hogs are also raised, but they are not as dominant as in the drier Western Corn Belt Plains to the west. Agriculture has affected stream chemistry, turbidity, and habitat.

3.3.8 Southern Michigan/Northern Indiana Drift Plains (56)

The NiSource system crosses the Southern Michigan/Northern Indiana Drift Plains in northern Indiana. Bordered by Lake Michigan on the west, this ecoregion is less agricultural than the Central and Eastern Corn Belt Plains to the south, and it is better drained and contains more lakes than the flat agricultural Huron/Erie Lake Plains to the east. The region is characterized by many lakes and marshes as well as an assortment of landforms, soil types, soil textures, and land uses. Broad till plains with thick and complex deposits of drift, paleobeach ridges, relict dunes, morainal hills, kames, drumlins, meltwater channels, and kettles occur. Oak-hickory forests, northern

swamp forests, and beech forests were typical. Feed grain, soybean, and livestock farming, as well as woodlots, quarries, recreational development, and urban-industrial areas, are now common.

3.3.9 Eastern Corn Belt Plains (55)

The NiSource system crosses the Eastern Corn Belt Plains in northeast Indiana, and western Ohio. The Eastern Corn Belt Plains are primarily a rolling till plain with local end moraines. It had more natural tree cover and has lighter colored soils than the Central Corn Belt Plains. The region has loamier and better-drained soils than the Huron/Erie Lake Plain, and richer soils than the Erie Drift Plain. Glacial deposits of Wisconsinan age are extensive. They are not as dissected nor as leached as the pre-Wisconsinan till which is restricted to the southern part of the region. Originally, beech forests were common on Wisconsinan-age soils, while beech forests and elm-ash swamp forests dominated the wetter pre-Wisconsinan soils. Today, extensive corn, soybean, and livestock production occurs and has affected stream chemistry and turbidity.

3.3.10 Huron/Erie Lake Plain (57)

The NiSource system crosses the Huron/Erie lake Plans in northwestern Ohio. The Huron/Erie Lake Plain is a broad, fertile, nearly-flat plain punctuated by relic sand dunes, beach ridges, and end moraines. Originally, soil drainage was typically poorer than in the adjacent Eastern Corn Belt Plains, and elm-ash swamp and beech forests were dominant. Oak savanna was typically restricted to sandy, well-drained dunes and beach ridges. Today, most of the area has been cleared and artificially drained and contains highly productive farms producing corn, soybeans, livestock, and vegetables. Urban and industrial areas are also extensive. Stream habitat and quality have been degraded by channelization, ditching, and agricultural activities.

3.3.11 Central Appalachians (69)

The NiSource system crosses the Central Appalachian ecoregion in portions of southeastern Kentucky, southern West Virginia, northwestern Virginia, and western Pennsylvania. The Central Appalachian ecoregion, stretching from central Pennsylvania to northern Tennessee, is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The rugged terrain, cool climate, and infertile soils limit agriculture, resulting in a mostly-forested land cover. The high hills and low mountains are covered by a mixed mesophytic forest with areas of Appalachian oak and northern hardwood forest. Bituminous coal mines are common, and have caused the siltation and acidification of streams.

3.3.12 Western Allegheny Plateau (70)

The NiSource system crosses the Western Allegheny Plateau ecoregion in northeastern Kentucky, southeastern Ohio, northwestern West Virginia, and southwestern Pennsylvania. The hilly and wooded terrain of the Western Allegheny Plateau was not muted by glaciation and is more rugged than the agricultural till plains of ecoregions to the north and west, but is less rugged and not as forested as the Central Appalachians Ecoregion to the east and south. Extensive mixed mesophytic forests and mixed oak forests originally grew in the Western Allegheny Plateau and, today, most of

its rounded hills remain in forest. Dairy, livestock, and general farms, as well as residential developments, are concentrated in the valleys. Horizontally-bedded sedimentary rock, underlying the region, has been mined for bituminous coal.

3.3.13 Erie Drift Plains (61)

The NiSource system crosses the Erie Drift Plains ecoregion in northeastern Ohio and northwestern Pennsylvania. Once largely covered by a maple-beech-birch forest, much of the Erie Drift Plain is now in farms, many associated with dairy operations. The Eastern Corn Belt Plains, which border the region on the west, are flatter, more fertile, and therefore more agricultural. The glaciated Erie Drift Plain is characterized by low rounded hills, scattered end moraines, kettles, and areas of wetlands, in contrast to the adjacent unglaciated ecoregions (Western Allegheny Plateau and North Central Appalachians) to the south and east that are hillier and less agricultural. Areas of urban development and industrial activity occur locally. Lake Erie's influence substantially increases the growing season, winter cloudiness, and snowfall in the northernmost areas.

3.3.14 Ridge and Valley (67)

The NiSource system crosses the Ridge and Valley ecoregion along the northern Virginia state boundary into eastern West Virginia, central and eastern Pennsylvania, and southeastern New York. This northeast-southwest trending, relatively low-lying, but diverse ecoregion is located between generally higher, more rugged mountainous regions with greater forest cover. As a result of extreme folding and faulting events, the region's roughly parallel ridges and valleys have a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Present-day forests cover about 50% of the region. The ecoregion has a diversity of aquatic habitats and species of fish.

3.3.15 Blue Ridge (66)

The NiSource system crosses the Blue Ridge ecoregion in north central Virginia and southern Pennsylvania. The Blue Ridge extends from southern Pennsylvania to northern Georgia, varying from narrow ridges to hilly plateaus to more massive mountainous areas, with high peaks reaching over 2000 meters. The mostly forested slopes; high-gradient, cool, clear streams; and rugged terrain occur primarily on metamorphic rocks, with minor areas of igneous and sedimentary geology. Annual precipitation of over 200 centimeters can occur in the wettest areas.

The southern Blue Ridge is one of the richest centers of biodiversity in the eastern United States. It is one of the most floristically-diverse ecoregions, and includes Appalachian oak forests, northern hardwoods, and, at the highest elevations, Southeastern spruce-fir forests. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities are also significant.

3.3.16 Piedmont (45)

The NiSource system crosses the Piedmont ecoregion in northeastern Virginia. Considered the non-mountainous portion of the old Appalachians Highland by

physiographers, the northeast-southwest trending Piedmont ecoregion comprises a transitional area between the mostly mountainous ecoregions of the Appalachians to the northwest and the relatively-flat coastal plain to the southeast. It is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks, with moderately dissected, irregular plains and some hills. The soils tend to be finer-textured than in coastal plain regions. Once largely cultivated, much of this region has reverted to successional pine and hardwood woodlands, with an increasing conversion to an urban and suburban land cover.

3.3.17 Middle Atlantic Coastal Plain (63)

The NiSource system crosses the Middle Atlantic Coastal Plain in the northernmost portion of Delaware and eastern New Jersey. The Middle Atlantic Coastal Plain ecoregion consists of low elevation flat plains, with many swamps, marshes, and estuaries. Forest cover in the region, once dominated by longleaf pine in the Carolinas, is now mostly loblolly and some shortleaf pine, with patches of oak, gum, and cypress near major streams. Its low terraces, marshes, dunes, barrier islands, and beaches are underlain by unconsolidated sediments. Poorly drained soils are common, and the region has a mix of coarse and finer textured soils. Less cropland occurs in the southern portion of the region than in the central and northern parts.

3.3.18 Northern Piedmont (64)

The NiSource system crosses the Northern Piedmont ecoregion in northern Virginia, central Maryland, southeastern Pennsylvania, and central New Jersey. The Northern Piedmont is a transitional region of low rounded hills, irregular plains, and open valleys. It is underlain by a mix of metamorphic, igneous, and sedimentary rocks, with soils that are mostly Alfisols and some Ultisols. Potential natural vegetation here was predominantly Appalachian oak forest as compared to the mostly oak-hickory-pine forests of the Piedmont ecoregion to the southwest. The region now contains a higher proportion of cropland compared to the Piedmont.

3.3.19 Atlantic Coastal Pine Barrens (84)

The NiSource system crosses the Atlantic Coastal Pine Barren ecoregion in eastern New Jersey. This ecoregion is distinguished by its coarser-grained soils, cooler climate, and Northeastern oak-pine potential natural vegetation. The climate is milder than the Northeastern Coastal Zone to the north that contains Appalachian Oak forests and some Northern hardwoods forests. The physiography of this ecoregion is not as flat as that of the Middle Atlantic Coastal Plain, but it is not as irregular as that of the Northeastern Coastal Zone.

3.3.20 North Central Appalachians (62)

The NiSource system crosses the North Central Appalachian ecoregion in northern Pennsylvania and southeastern New York. More forest cover than most adjacent ecoregions, the North Central Appalachians ecoregion is part of a vast, elevated plateau composed of horizontally bedded sandstone, shale, siltstone, conglomerate, and coal. It is made up of plateau surfaces, high hills, and low mountains, which unlike the ecoregions to the north and west, was largely unaffected by

continental glaciation. Only a portion of the Pocono Mountains section in the east has been glaciated. Land use activities are generally tied to forestry and recreation, but some coal and gas extraction occurs in the west.

3.3.21 Northern Appalachian Plateau and Uplands (60)

The NiSource system crosses the Northern Appalachian Plateau and Uplands along the southern state border of New York. The Northern Appalachian Plateau and Uplands comprise a transition region between the less irregular, more agricultural and urbanized Erie/Ontario Drift and Lake Plain and Eastern Great Lakes and Hudson Lowlands ecoregions to the north and west and the more mountainous and forested, less populated North Central Appalachians and Northeastern Highlands ecoregions to the south and east. Much of this region is farmed and in pasture, with hay and grain for dairy cattle being the principal crops, but large areas are in forests of oak and northern hardwoods.

3.3.22 Northeastern Highlands (58)

The NiSource system crosses the Northeastern Highlands ecoregion in southern New York. The Northeastern Highlands comprise a relatively sparsely populated region characterized by nutrient-poor soils blanketed by northern hardwood and spruce fir forests. Land-surface form in the region grades from low mountains in the southwest and central portions to open high hills in the northeast. Many of the numerous glacial lakes in this region have been acidified by sulfur depositions originating in industrialized areas upwind from the ecoregion to the west.

3.3.23 Eastern Great Lakes and Hudson Lowlands (83)

The NiSource system crosses the Eastern Great Lakes and Hudson Lowlands ecoregion in south-central New York. This glaciated region of irregular plains bordered by hills generally contains less surface irregularity and more agricultural activity and population density than the adjacent Northeastern Highlands and Northern Appalachian Plateau and Uplands. Although orchards, vineyards, and vegetable farming are important locally, a large percentage of the agriculture is associated with dairy operations. The portion of this ecoregion in close proximity to the Great Lakes experiences an increased growing season, more winter cloudiness, and greater snowfall.

3.4 Watersheds

The MSHCP analyzed 25 aquatic species. In order to conduct some assessments of and determine potential mitigation for these aquatic species, this MSHCP also utilizes USGS hydrologic units. Similar to ecoregions, hydrologic units can be divided into smaller units so different scales can be used for more detailed analysis as needed. A map (**Figure 3-2**) and table (**Table 3-1**) of all of the hydrologic units (watersheds) crossed by the project are provided below. The United States is divided and sub-divided into successively smaller hydrologic units from the smallest (cataloging units) to the largest (regions) (USGS 2007). 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.

The first level of classification divides the United States into 21 major geographic areas, or regions. Eighteen of the regions occupy the land area of the conterminous United States (USGS 2007). The MSHCP covered lands fall within eight of these regions. The key regions include the Mid-Atlantic (17.43% of covered lands), Ohio (58.98% of covered lands), and Lower Mississippi (10.47% of covered lands).

The second level of classification divides the 21 regions into 221 subregions. A subregion includes the area drained by a river system, a reach of a river and its tributaries in that reach, a closed basin(s), or a group of streams forming a coastal drainage area (USGS 2007). The MSHCP covered lands cross 36 subregions. *See* **Table 3-1** for a list of the subregion watersheds crossed. Subregions correspond to the three digit watersheds HUC.

3.5 Existing Land Use

Existing land use is important to consider when determining: whether a species may be present within a given area; threats to species; the need for connectivity, and, the suitability of minimization and mitigation options. NiSource used the NLCD land-use data layer for the purposes of this analysis (US Dept. of Interior 2006).[1] A summary of land-use types is provided below in **Table 3-2**.

The most prevalent land-use type in the covered lands area is Deciduous Forest (49.30%), followed by Cultivated Crops (17.72%), Pasture/Hay (13.53%), and Developed – Open Space (6.47%). The remainder of the area is covered by eleven other types, none exceeding 3% of the total area. A description of each land-use-cover class is included in the table.

3.6 Existing Conservation Areas within Covered Lands

Another component of determining the environmental setting of the project was to investigate what existing conservation lands were crossed by the covered lands. These areas may contain habitat for species that will be addressed in this MSHCP. Likewise, lands adjacent to existing conservation lands may be important to consider in mitigation efforts.

Appendix E provides the best consistently available data on conservation lands owned by federal, state, and local governments and nongovernmental organizations that are crossed by the MSHCP's covered lands. GAP data were used to compile this information. In states where GAP data were not available, a similar dataset was used (i.e., Conservation Management Institute, 2000; Ducks Unlimited, 2004; Environmental Resource Research Institute, 1998; Indiana State University et al., 2002; Kentucky Fish & Wildlife Information System, 2001; Maryland Department of Natural Resources and University of Maryland Eastern Shore, 2002a, 2002b, and 2002c; Natural Resource Analysis Center and West Virginia Cooperative Fish and Wildlife Research Unit, West Virginia University, 2002; New York State Gap Analysis Project, 2000; Tennessee

[1] NLCD data published in 2001 represent the most recent, consistent land cover dataset available. The NLCD data are re-evaluated for change detection analysis using Landsat imagery approximately every 10 years.

Wildlife Resources Agency, 1997; US Geological Survey, National Wetlands Research Center, 2000).

Although the conservation lands listed in **Appendix E** represent those lands included in the GAP data or similar datasets, there may be other conservation lands crossed by NiSource's facilities that are not included in the table. Similarly, inclusion of properties in **Appendix E** merely denotes that the land is owned or managed by a federal, state, local or non-profit entity. It does not mean that the land necessarily contains conservation values, is managed for conservation, or that the conservation objective is consistent with endangered species management. For instance, although **Appendix E** contains numerous wildlife management areas, forests and preserves, it also includes resort parks, sports complexes, horse farms, and fairgrounds.

Table 3-3 below summarizes the information from **Appendix E**, by state, in four categories: federal, state, local, and NGO. In states where a particular landowner type of conservation land is not crossed, that type is not included in the table.

3.7 Climate

National Climatic Data Center climate data for three annual metrics is provided below for the area covered by the NiSource natural gas system: (1) mean annual precipitation (**Figure 3-3**), (2) mean daily average temperature (**Figure 3-4**), and (3) median freeze-free period (**Figure 3-5**). Climate varies across the project area based on latitude, distance from the ocean or mountains, and topography of a particular area.

Over the term of the ITP, it is possible that the area covered by the NiSource natural gas system may experience the effects attributable to climate change. For the purposes of the MSHCP, relevant global climate change impacts may include rising sea levels, changes in the range and distribution of plants and animals, earlier blooming of trees, lengthening of growing seasons, changes in amount, timing, or intensity of precipitation, and later freezing and earlier thawing of ice on rivers and lakes. Responses of terrestrial species to warming trends generally include poleward and elevational range shifts of flora and fauna, and changes in the timing of growth stages (i.e., phenological changes), especially the earlier onset of spring events, migration, and lengthening of the growing season.

The extent of climate change effects, and whether these effects will prove to be harmful or beneficial, will vary by region, over time, and with the ability of different societal and environmental systems to adapt to or cope with the change. Scientists generally believe that most areas in the United States will continue to warm, although some areas will likely warm more than others. It remains very difficult to predict which parts of the country will become wetter or drier, but, in general, scientists expect increased precipitation and evaporation, and drier soil in the middle parts of the country. Northern regions are expected to experience the most warming (EPA 2008a, EPA 2008b, EPA 2008c). Further details are furnished in Chapter 10 of this MSHCP.

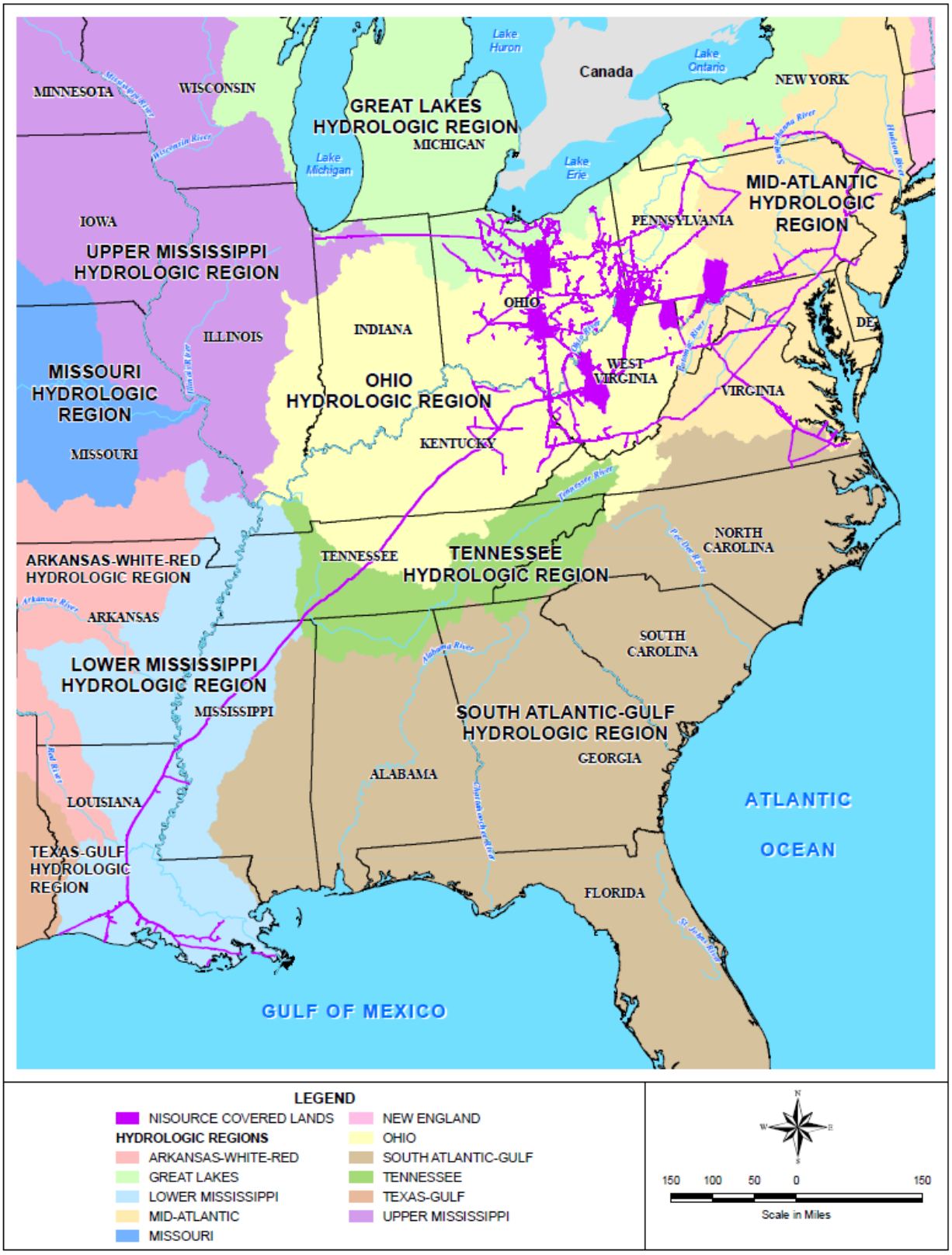

Figure 3-2 Hydrological Units

Table 3-1 Subregional Watersheds Crossed by the Covered Lands Area

Subregion HUC Code	Subregion Watershed Name	Region Watershed Name	Acres by Subregion Watershed	Percent of Covered Lands by Region
0202	Upper Hudson	Mid-Atlantic Region	13,524.61	
0203	Lower Hudson-Long Island	Mid-Atlantic Region	38,452.71	
0204	Delaware	Mid-Atlantic Region	178,837.88	
0205	Susquehanna	Mid-Atlantic Region	737,123.11	
0206	Upper Chesapeake	Mid-Atlantic Region	38,437.73	
0207	Potomac	Mid-Atlantic Region	767,752.73	
0208	Lower Chesapeake	Mid-Atlantic Region	226,865.96	20.45%
0301	Chowan-Roanoke	South Atlantic-Gulf Region	99,903.68	1.02%
0404	Southwestern Lake Michigan	Great Lakes Region	13,026.69	
0405	Southeastern Lake Michigan	Great Lakes Region	26,440.27	
0410	Western Lake Erie	Great Lakes Region	440,960.96	
0411	Southern Lake Erie	Great Lakes Region	147,015.45	
0412	Eastern Lake Erie-Lake Erie	Great Lakes Region	554.01	
0413	Southwestern Lake Ontario	Great Lakes Region	4,686.07	
0414	Southeastern Lake Ontario	Great Lakes Region	16,950.87	6.64%
0501	Allegheny	Ohio Region	190,954.33	
0502	Monongahela	Ohio Region	784,607.76	
0503	Upper Ohio	Ohio Region	1,795,649.21	
0504	Muskingum	Ohio Region	1,315,179.15	
0505	Kanawha	Ohio Region	760,992.88	
0506	Scioto	Ohio Region	467,479.04	
0507	Big Sandy-Guyandotte	Ohio Region	321,948.04	
0508	Great Miami	Ohio Region	32,924.40	
0509	Middle Ohio	Ohio Region	286,531.80	
0510	Kentucky-Licking	Ohio Region	229,902.54	
0511	Green	Ohio Region	69,034.71	
0513	Cumberland	Ohio Region	50,042.57	64.45%
0604	Lower Tennessee	Tennessee Region	69,441.70	0.71%
0712	Upper Illinois	Upper Mississippi Region	34,516.06	0.35%
0801	Lower Mississippi-Hatchie	Lower Mississippi Region	20,350.05	
0803	Lower Mississippi-Yazoo	Lower Mississippi Region	123,368.93	
0804	Lower Red-Ouachita	Lower Mississippi Region	40,896.24	
0805	Boeuf-Tensas	Lower Mississippi Region	77,964.47	
0806	Lower Mississippi-Big Black	Lower Mississippi Region	1,802.32	
0808	Louisiana Coastal	Lower Mississippi Region	233,324.20	
0809	Lower Mississippi	Lower Mississippi Region	125,763.39	6.37%
Total			**9,783,206.51**	**100.00%**

Table 3-2 Land Use Cover Classes in the Covered Lands Area

Land Use Cover Class	Class Code	Total Acres	%	Class Description
Open Water	11	142,788	1.46	All areas of open water, generally with less than 25% cover of vegetation or soil.
Developed, Open Space	21	633,101	6.47	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% 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	22	241,657	2.47	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20%-49% of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	23	777,666	7.95	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50%-79% of the total cover. These areas most commonly include single-family housing units.
Developed, High Intensity	24	27,423	0.28	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% to100% of the total cover.
Barren Land (Rock/Sand/Clay)	31	26,628	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% of total cover
Deciduous Forest	41	4,823,334	49.30	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest	42	218,225	2.23	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest	43	124,262	1.27	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.

Land Use Cover Class	Class Code	Total Acres	%	Class Description
Shrub/Scrub	52	44,635	0.46	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.
Grassland/Herbaceous	71	112,413	1.15	Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay	81	1,323,925	13.53	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
Cultivated Crops	82	1,733,599	17.72	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
Woody Wetlands	90	152,127	1.55	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands	95	101,424	1.04	Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Totals		**9,783,207**	**100**	

Table 3-3 Conservation Lands Crossed by the Covered Lands

State	Owner Type	Acres
Delaware	Local	72
Indiana	State	751
	Local	424
	NGO	81
Kentucky	Federal	11,004
	State	943
Louisiana	Federal	18,741
	State	9,673
	Private/Federal WRP[1]	4,276
Maryland	Federal	475
	State	66,716
	Local	6,374
	NGO	414
Mississippi	Federal	1,887
	State	1,027
New Jersey	State	1,357
	Local	438
	NGO	176
New York	State	11,286
North Carolina	None	0
Ohio	Federal	41,603
	State	39,413
	Local	20,559
	NGO	335
Pennsylvania	Federal	17,270
	State	164,768
	Local	2,216
	NGO/Local	123
Tennessee	Federal	710
	State	4,938
Virginia	Federal	19,768
	State	6,779

State	Owner Type	Acres
West Virginia	Federal	37,005
	State	41,530
	Local	96
	NGO	459

Owner Type:
Federal = federally owned lands (e.g., Forest Service, Fish and Wildlife Service, Army Corps of Engineers, Tennessee Valley Authority)
State = state-owned lands (e.g., state forests, state parks, state wildlife areas)
Local = locally owned lands (e.g. county parks, city parks, municipal recreation areas)
NGO = lands owned by non-governmental organizations (e.g. lands owned by The Nature Conservancy, local land trust properties)
WRP = Wetlands Reserve Program

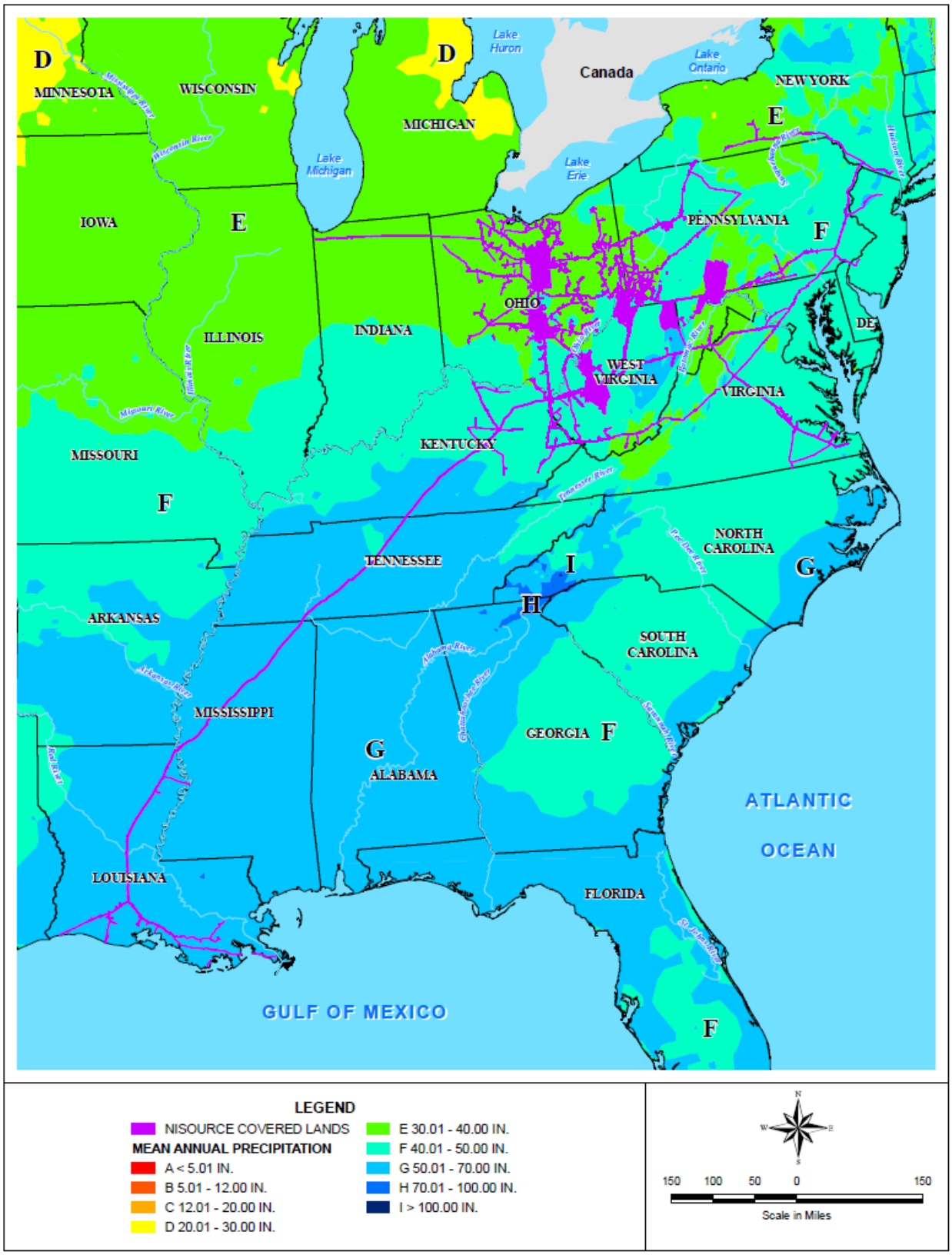

Figure 3-3 Mean Annual Precipitation

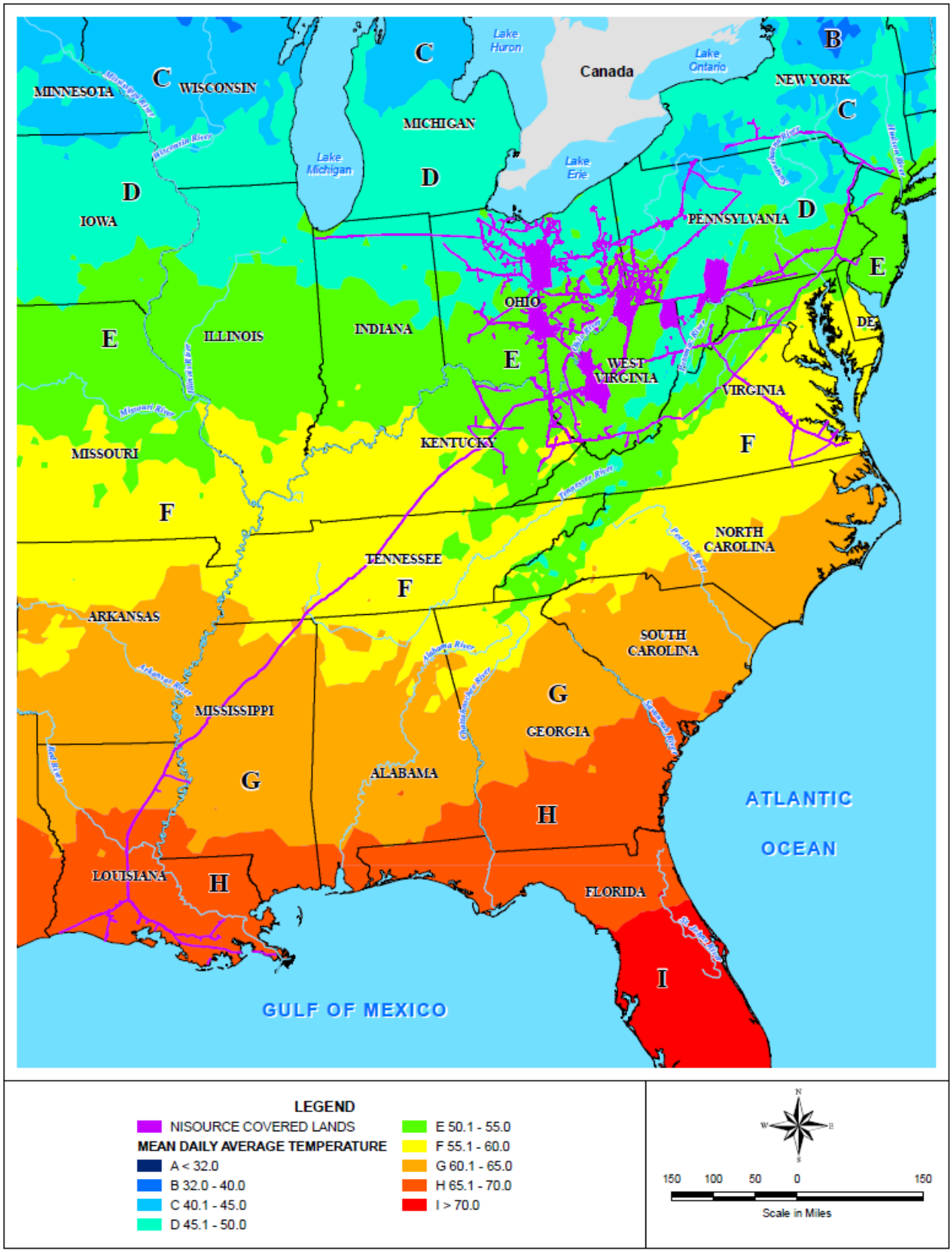

Figure 3-4 Mean Daily Average Temperature

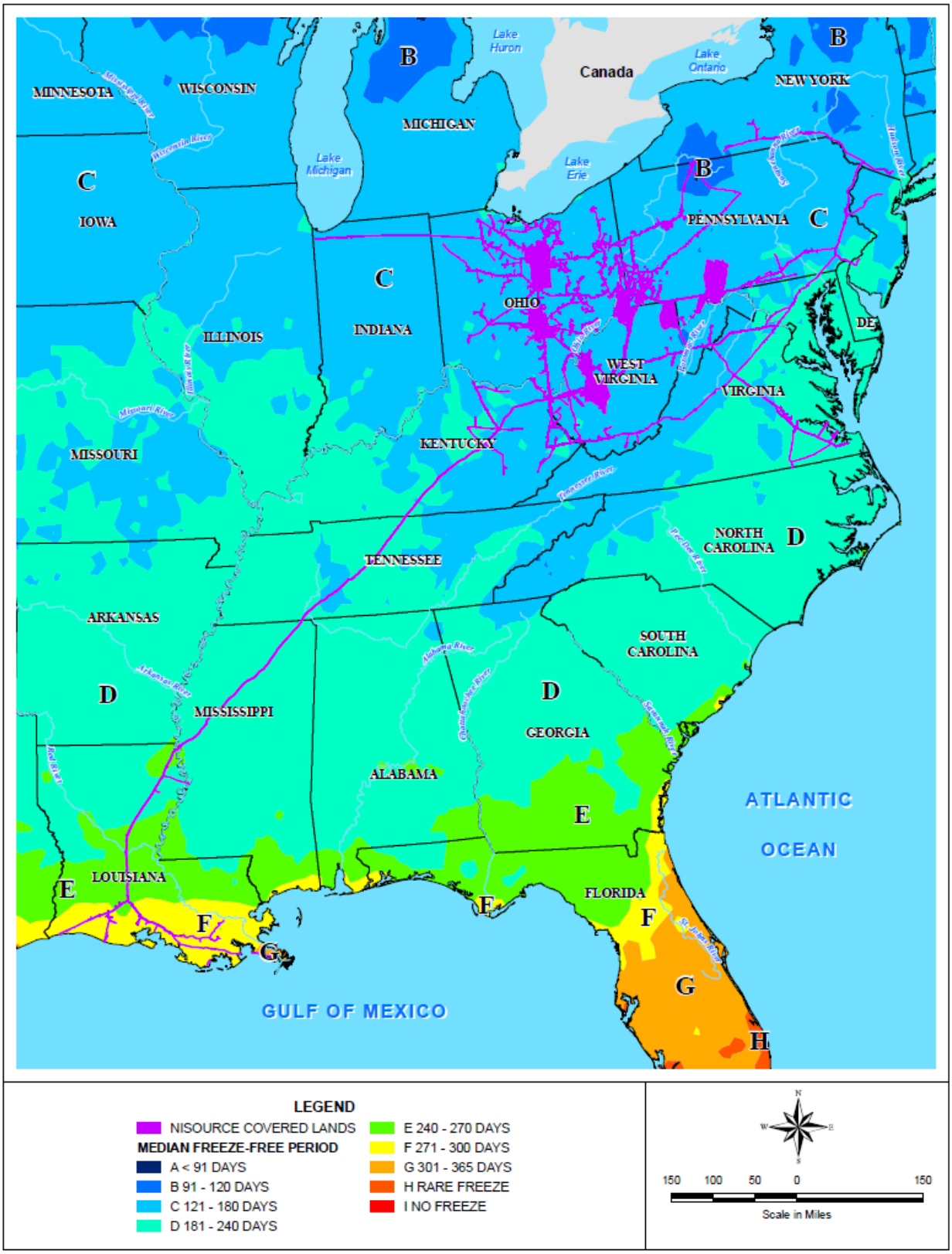

Figure 3-5 Median Length of Freeze Free Period