Chapter 6: Great Lakes Region - Affected Environment

1
2

CONTENTS

Northern Border Security Program PEIS 6-2 September 2011

Northern Border Security Program PEIS 6-3 September 2011

Northern Border Security Program PEIS 6-4 September 2011

FIGURES

Northern Border Security Program PEIS 6-5 September 2011

Northern Border Security Program PEIS 6-6 September 2011

TABLES

Northern Border Security Program PEIS 6-7 September 2011

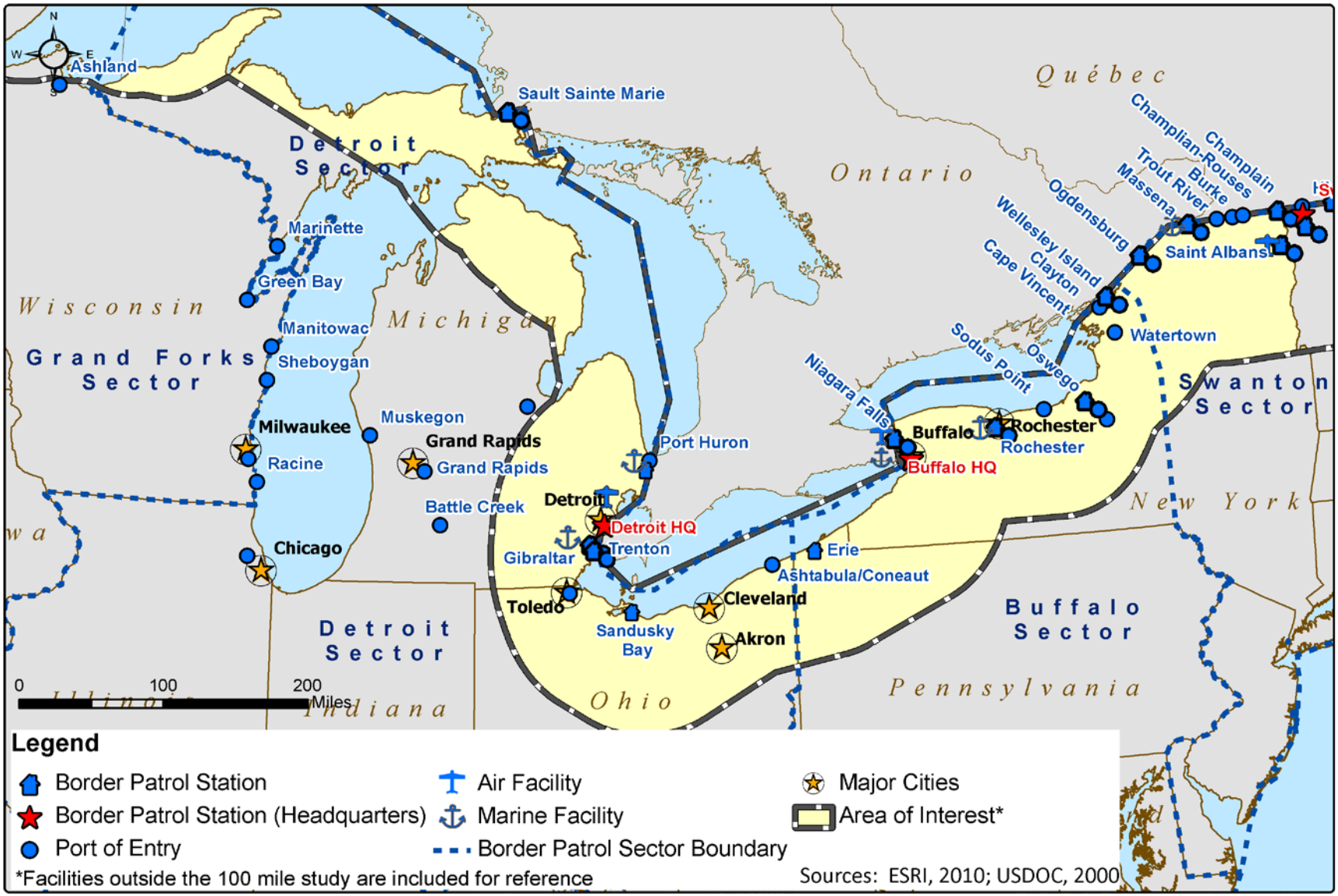
Northern Border Security Program PEIS 6-8 September 2011

6 GREAT LAKES REGION

6.1 INTRODUCTION

This chapter analyzes potential environmental effects in the Great Lakes Region arising from U.S. Customs and Border Protection (CBP) actions related to its homeland-security mission. The chapter will address ongoing activities and long-range planning for security enhancement measures. The Great Lakes Region includes the areas of Wisconsin, Michigan, Ohio, Pennsylvania, and New York that fall within about 100 miles of the Northern Border. Figure 6.1-1 displays the territory and CBP facilities of the region.

Figure 6.1-1. The Great Lakes Region and U.S. Customs and Border Protection Facilities



The Great Lakes Region is dominated by four major metropolitan areas (Detroit, Michigan; Toledo, Ohio; Cleveland, Ohio; and Buffalo, New York), all five Great Lakes (Superior, Michigan, Huron, Ontario, and Erie) and their shoreline environments, and four ecoregion provinces (see Figure 6.1-1).

Land within the Great Lakes Region is a combination of privately owned land, state trust land, national forest area (Hiawatha, Huron, Manistee, Ottawa, Chequamegon, Nicolet, and Allegheny National Forests), national lakeshore area (Apostle Islands, Pictured Rocks, and Sleeping Bear Dunes National Lakeshores), and Native American land (Allegany, Bay Mills, Cattaraugus, Cayuga, Grand Traverse, Hannahville, Isabella, Lac Court Oreilles, Lac du Flambeau, Menominee, Oil Springs, Potawatomi, Red Cliff, Tonawanda, and Tuscarora Indian Reservations).

U.S. Border Patrol in the Great Lakes Region

The U.S. Border Patrol (USBP) in the Great Lakes Region employs several hundred agents, who operate from 14 stations (see Figure 6.1-1). The 14 stations include the Sault Sainte Marie, Port Huron, Detroit, Trenton, Erie, Buffalo, Niagara Falls, Rochester, Oswego, Wellesley Island, Ogdensburg, Massena, Burke, and Champlain Stations. They are divided among three sectors: Detroit, Buffalo, and Swanton.

The Great Lakes Region is characterized most notably by its long freshwater border. Large portions of the border lie within the Great Lakes and are well beyond the line of sight from shore. Much of the shoreline, particularly near metropolitan areas, is privately owned. These conditions present a challenge for observation, which leads to use of diverse surveillance methods including electronic surveillance, aerial and waterborne patrols, and the more typical on- and off-road-vehicle, snowmobile, and pedestrian patrols. The need to access private property requires a reliance on partnerships with private entities (communities, landowners, interboundary groups), for both law enforcement and intelligence missions.

Both CBP and the U.S. Forest Service (USFS) are acting pursuant to a memorandum of understanding (MOU) signed in 2006 between the Department of Homeland Security (DHS), the Department of Agriculture (USDA), and the Department of the Interior (DOI). The MOU sets out a framework for cooperation and provides for DHS access to USFS lands to implement its security mission. Section 6.8 on Land Use describes this MOU in more detail.

6.2 AIR QUALITY

6.2.1 INTRODUCTION

The Great Lakes study area contains many air quality control regions (AQCR) and Class I areas that could experience impacts due to the proposed action and alternatives in this Programmatic Environmental Impact Statement (PEIS). (Class I areas are Federal lands, designated by Congress as of August 7, 1977, that have air quality restrictions under Section 162(a) of the Clean Air Act (CAA) that are more stringent than the standards that apply elsewhere.) However, the mere presence of a sensitive area, such as a nonattainment, maintenance, or Class I areas, does not guarantee that that area would be impacted by U.S. Customs and Border Protection (CBP) activities. Chapter 3, Section 3.2 provides more detailed information on national standards and requirements used to describe and determine effects to air quality resources.

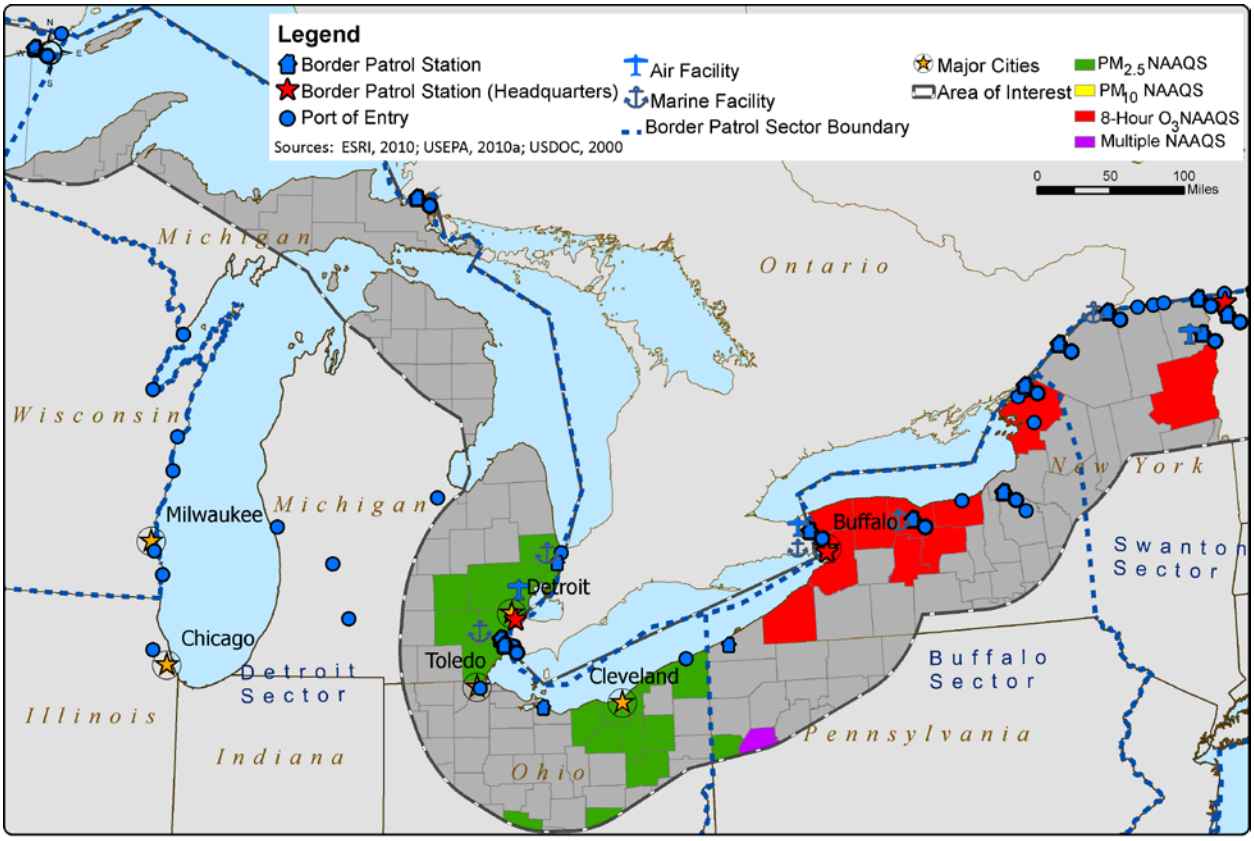
6.2.2 AFFECTED ENVIRONMENT

6.2.2.1 National Ambient Air Quality Standards and Attainment Status

Nonattainment areas within 100 miles of the border are shown in Figure 6.2-1. Inversions become even more problematic in urban areas, where vehicle exhaust, smoke from wood stoves, and industrial processes are more concentrated (MDEQ, 2010; IDEQ, 2010). Major cities usually have high traffic volumes and large industrialized areas that can contribute to elevated O_3 and $PM_{2.5}$ (particulate matter that is 2.5 micrometers in diameter and smaller). The Great Lakes Region has more major cities than do any of the other Northern Border regions. Although there are several nonattainment areas, they are scattered throughout the major cities: Buffalo, Syracuse, and Niagara, New York; Chicago, Illinois; Detroit, Michigan; and Cleveland, Ohio (USEPA, 2010a).

Federal regulations designate AQCRs that were once classified as nonattainment but have lowered levels of pollutants through the use of regional controls, as maintenance areas. Consistent with the nonattainment areas, Figure 6.2-2 shows higher concentrations of maintenance areas scattered throughout central New York, northern Pennsylvania, lower Michigan, and northern Ohio.

Figure 6.2-1. Nonattainment Areas in the Great Lakes Region

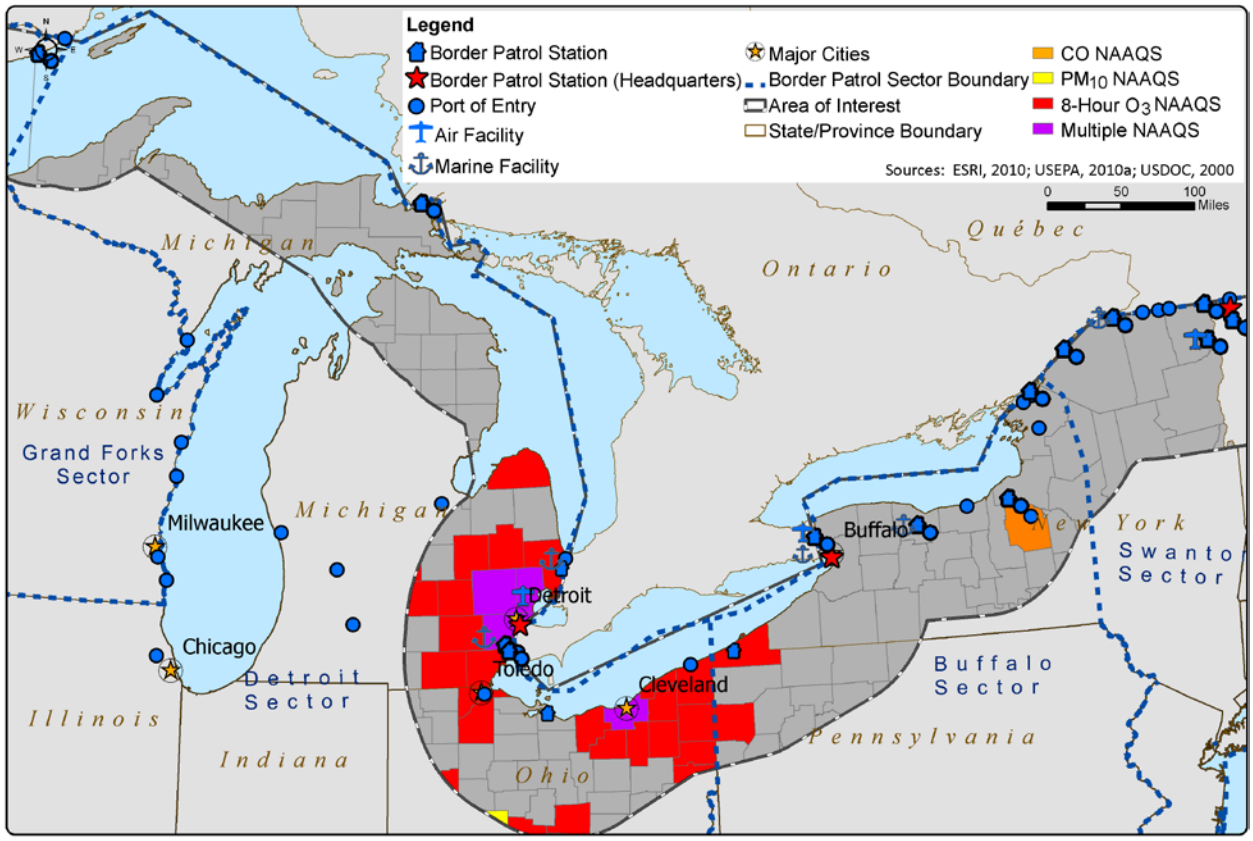


Notes:

NAAQS: National Ambient Air Quality Standards

PM_{10}: particulate matter that is 10 micrometers in diameter and smaller

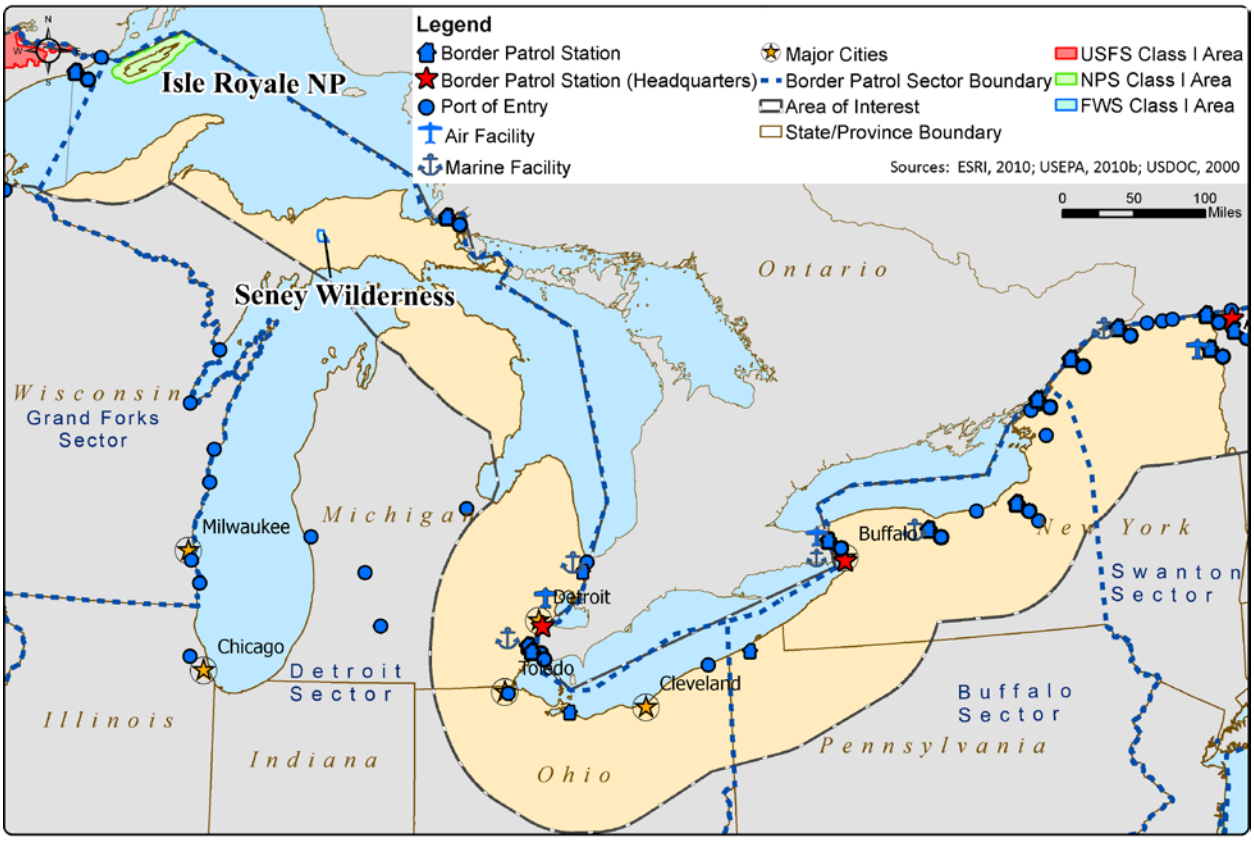
Figure 6.2-2. Maintenance Areas in the Great Lakes Region



6.2.2.2 Class I Areas

The CAA protects areas where air quality exceeds national standards established by the U.S. Environmental Protection Agency (EPA) by measures to prevent significant deterioration of air quality (PSD). The more stringent restrictions in effect in Class I areas are largely meant to maintain unimpaired visibility in areas such as “national parks, national wilderness areas, national monuments, national seashores, and other areas of special natural, recreational, scenic, or historic value.” In general, "clean air areas" are protected through ceilings on the additional amounts of certain air pollutants over a baseline level. The PSD increment amounts vary based on the area’s classification. Class I areas and major CBP facilities in the Great Lakes Region are shown on the map in Figure 6.2-3.

Figure 6.2-3. Class I Areas in the Great Lakes Region



Notes:

USFS: United States Forest Service

NPS: National Park Service

FWS: U.S. Fish and Wildlife Service

6.3 BIOLOGICAL RESOURCES

6.3.1 INTRODUCTION

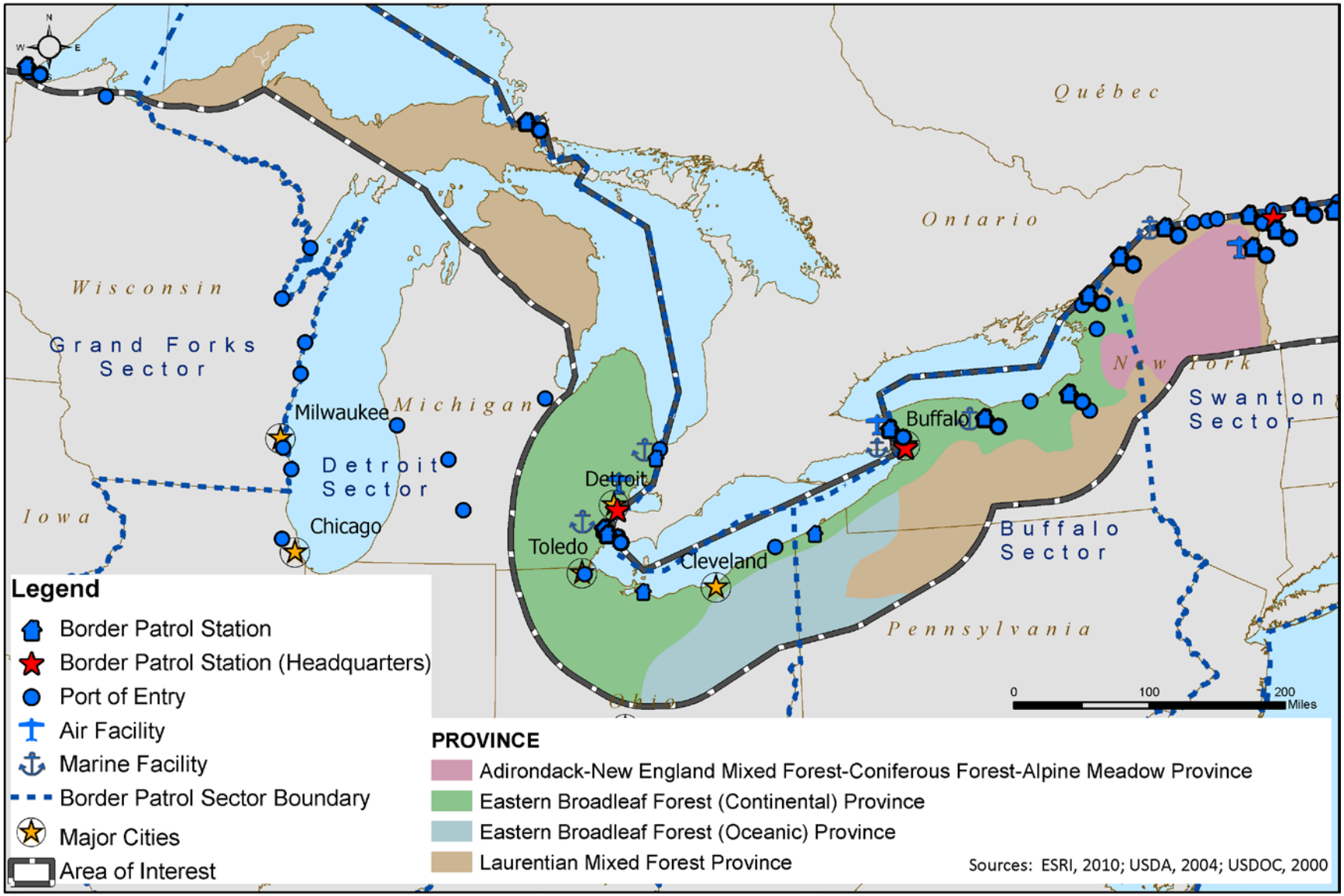
The Great Lakes Region encompasses portions of the following states: Wisconsin, Michigan, Ohio, Pennsylvania, and New York. Biologically, the region can be divided into four major ecoregions:

- Eastern Broadleaf Forest (Continental),
- Eastern Broadleaf Forest (Oceanic),
- Adirondack-New England Mixed-Forest Coniferous Forest-Alpine Meadow, and
- Laurentian Mixed Forest.

Generally, these ecoregions continue north of the U.S.–Canada border (Figure 6.3-1). For a complete description of each ecoregion, see Appendix L.

Map resources for the ecoregion map in this section are based on the U.S. Census Bureau, USGS, and Economic and Social Research Institute (ESRI) databases. Each ecoregion has a unique set of biological, climatic, and topographical characteristics along with unique challenges and opportunities for U.S. Customs and Border Protection. The description of the biological resources for the Great Lakes Region follows.

Figure 6.3-1. Ecoregions of the Great Lakes Region



6.3.2 AFFECTED ENVIRONMENT

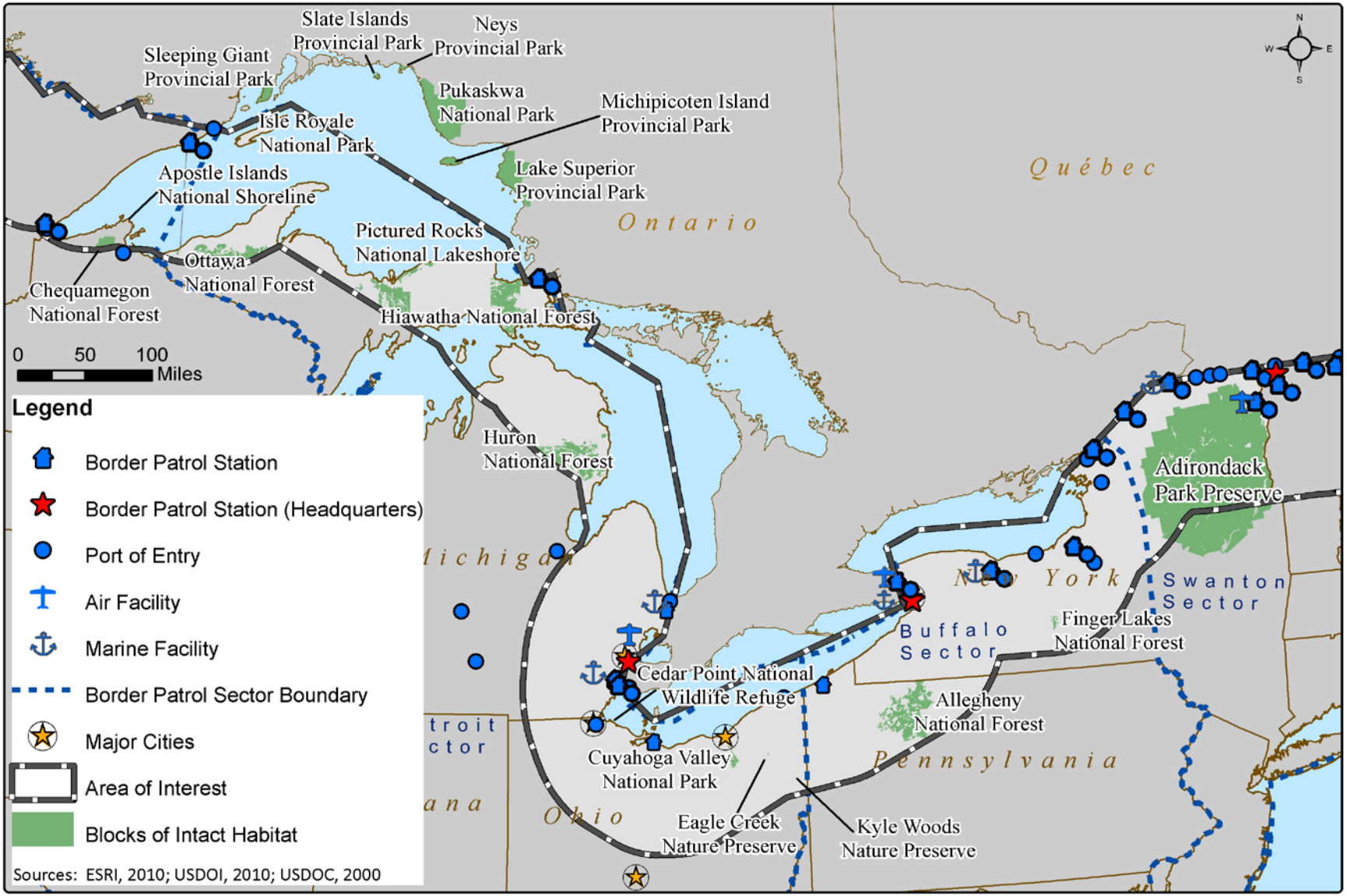
6.3.2.1 Blocks of Regionally Significant Habitat

The blocks of regionally significant habitat listed below and shown in Figure 6.3-2 are relatively undeveloped and intact habitat protected as wilderness, state parks, and state and national forests. "Intact habitat" refers to areas of largely unfragmented habitat with few alterations or disturbances, such as improved roads or other development. Most areas listed are protected by law (wilderness areas, national parks), while others may occupy private lands and often cross state and country boundaries.

Selected regionally significant blocks that represent this region include:

- Adirondack Park Preserve (New York)
- Allegheny National Forest (Pennsylvania)
- Apostle Islands National Lakeshore (Wisconsin)
- Cedar Point National Wildlife Refuge (Ohio)
- Chequamegon National Forest (Wisconsin)
- Cuyahoga Valley National Recreation Area (Ohio)
- Eagle Creek State Nature Preserve (Ohio)
- Finger Lakes National Forest (New York)
- Great Lakes: Lake Superior, Lake Michigan, Lake Huron, Lake Erie, Lake Ontario
- Hiawatha National Forest (Michigan)
- Huron National Forest (Michigan)
- Isle Royale National Park (Michigan)
- Kyle (Arthur) Woods State Nature Preserve (Ohio)
- Lake Superior Provincial Park (Ontario, Canada)
- Michipicoten Island Provincial Park (Ontario, Canada)
- Neys Provincial Park (Ontario, Canada)
- Ottawa National Forest (Michigan)
- Pictured Rocks National Lakeshore (Michigan)
- Porcupine Mountains State Park (Michigan)
- Pukaskwa National Park (Ontario, Canada)
- Rifle River Recreation Area (Michigan)
- Slate Islands Provincial Park (Ontario, Canada)
- Sleeping Giant Provincial Park (Ontario, Canada)

Figure 6.3-2. Blocks of Intact Habitat in the Great Lakes Region



6.3.2.2 Sensitive Habitats

Within a 100-mile zone adjacent to the U.S.–Canada border in this region are several ecological communities representing sensitive habitats. The sensitive habitats described here occur in many of the larger habitat areas listed in Section 6.3.2.1, and are home to many of the threatened and endangered species listed in the next section. For example, Isle Royale National Park is an island in Lake Superior occupied by boreal forests and houses many protected species, such as the American marten (*Martes americana*) and common trees such as balsam fir (*Abies balsamea)* and white cedar (*Thuja occidentalis)*. Some descriptive habitats below, such as old growth/mature forest, span many regional boundaries and are more general in meaning. Others, such as Great Plains ponderosa pine woodlands (plant communities dominated by ponderosa pines), define more specific ecological associations.

Conifers in the boreal forests at Isle Royale National Park

Source: (Kowalchuk, 2010b).

Many of these habitats are very fine in scale and form a patchwork of biologically sensitive and diverse areas. The list of sensitive habitats is based on those enumerated and described by the World Wildlife Fund (2001c), ecological system descriptions within the NatureServe.org database, and each state's respective natural resources agency (NatureServe, 2010).

- Alpine Meadow—alpine meadows are open areas on Adirondack ecoregion mountains, generally above 3,500 feet elevation, where cold temperatures and high winds favor a community of ground-layer plants that can tolerate such conditions;
- Black Swamp Forest—forest remnants remaining from extensive post-glacial lake plains southwest of Lake Erie;
- Bogs—wetland type that accumulates acidic peat with deposits of dead plant material;
- Boreal forests—predominately coniferous forest of the Northern Hemisphere;
- Calcareous fens—rarest wetland community in Wisconsin, with input of alkaline mineral-rich groundwater;
- Cedar/tamarack swamps—forested wetland characterized by one or both of these tree species;

Tamarack swamp

Source: (Brotkowski, 2008a).

- Cold-air talus woodland—talus areas with large, ice-cooled boulders where the microclimate supports black and red spruce, heaths, and evergreen shrubs;
- Flowages—series of connected lakes;
- Freshwater estuaries—ecological communities where lake and river waters mix;
- Great Lakes beaches and shorelines—Great Lakes beach community adjacent to margins of all five lakes, often with sparsely vegetated dunes;

Beach along Lake Michigan

Source: (Brotkowski, 2008b).

- Hardwood swamps—deciduous forested wetland;
- Inland lake shorelines—beaches of inland lakes characterized by water-level fluctuations preventing development of stable shoreline plant communities, and supporting a more-specialized biota adapted to sandy or gravelly shorelines;
- Limestone bluff cedar-pine forests—forests of these species on limestone bedrock;
- Riverine marsh—riverside deep marsh wetland type;
- Sedge meadow—wetland dominated by sedges growing on saturated soils typically composed of peat or muck; and

Sedge meadow

Source: (Kowalchuk, 2010c).

- Wet prairie—wet grassland habitat, dominated by sedges and rushes.

6.3.2.3 Threatened and Endangered Species

Federally listed threatened and endangered species are protected by the Endangered Species Act (ESA) of 1973. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend.

Appendix M lists the threatened or endangered species by county in the Great Lakes region. Species are listed as threatened or endangered at either the Federal or state level or both; some non-threatened or endangered species are categorized as "conservation concern" or "special concern" species.

Some states differ in how they list and protect threatened and endangered species. The following list gives the specific agencies and listing differences (if applicable) in the Great Lakes Region.

- Michigan's endangered species act protects all state-listed species of plants and animals (NANFA, 2011). The Michigan Department of Natural Resources (DNR) maintains the list of endangered, threatened and extirpated species.
- New York has an endangered species law that protects wild animals. The New York State Department of Environmental Conservation (DEC) maintains this list of endangered, threatened, and special concern fish and wildlife species (NANFA, 2011).
- Ohio has endangered species laws to protect animals and plants (NANFA, 2011). The Ohio Department of Natural Resources, Wildlife Division has legal authority over these species.
- Pennsylvania has separate laws protecting endangered species of animals, plants and fish (NANFA, 2011). The Pennsylvania Department of Conservation and Natural Resources (DCNR) has legal authority over these species.
- Wisconsin has an endangered species law that protects animals and plants. The law does not require recovery plans, although the Wisconsin Department of Natural Resources (DNR) sometimes prepares them (NANFA, 2011).

Following are examples of some of the threatened and endangered species in the Great Lakes Region:

The Indiana bat (*Myotis sodalis*) is a forest-dwelling bat species that hibernates in caves in eastern and midwestern states, and has experienced a population decline of over 50 percent in recent decades. As with several other species of "tree bats" (species that breed in forests, but in some cases may spend part of their annual cycle in caves), many conservation issues are of current concern for the Indiana bat, including development.

Indiana bat

Source: (USDOI, 2008c).

The piping plover (*Charadrius melodus*), a federally-listed bird species, occurs in this region along the shores of lakes Superior, Michigan, Huron, Erie, and Ontario. Since this species nests on wide, flat, and open sandy beaches, human activities that alter or disturb their habitat may affect populations nesting in the area or migrating through the area. Since the piping plover is a federally listed species, the U.S. Fish and Wildlife Service (USFWS) and the states have existing plans in place for monitoring or recovery of this species' populations. Wisconsin, Michigan, Ohio, and New York include the bird as endangered on their states' lists as well. The USFWS has designated critical habitat for this species within this region. Critical habitat for the region's breeding population was designated in May of 2001, and includes extensive stretches of shoreline in Wisconsin, Michigan, Ohio, Pennsylvania, and New York.

Piping Plover, *Charadrius melodus*

Source: (Nieminen, 2006).

The Hines emerald dragonfly (*Somatochlora hineana)* is a federally endangered species. This dragonfly requires a rare wetland environment characterized by dolomite bedrock, groundwater seeps, crayfish burrows, marginal flow, and seasonal drying (USDOI, 2001). The life span of the Hine's emerald dragonfly is approximately four to five years, developing from egg, to larvae, to adult. Most of this time is spent in wetlands during the larval stage. Adult flight takes place during the summer months in wetlands and meadows near breeding habitat. Current populations live in isolated areas in Wisconsin, Illinois, Michigan, and Missouri. Within the 100-mile project area, critical habitat has been designated in Michigan at several sites near Lake Huron and Lake Michigan.

Female Hine's emerald dragonfly

Source: (Brotkowski, 2000).

6.3.2.4 Wildlife Typically Found in the Region

In boreal and coniferous forest habitats in the northernmost portion of the Great Lakes Region in Wisconsin, Michigan, and New York, many passerine species typical of these habitats are found, including more than 25 species of warblers (family Parulidae), thrushes such as the hermit thrush (*Catharus guttatus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), and birds especially

typical of coniferous forest, such as black-backed woodpecker (*Picoides arcticus*), and gray jay (*Perisoreus canadensis*).

White-tailed deer, *Odocoileus virginianus*

Source: (Hillebrand, 2008b).

The woodlands of the Northern Border are characterized by long winters and a short growing season. Common mammal species include black bear (*Ursus americanus*), white-tailed deer (*Odocoileus hemionus*), moose (*Alces alces*), fisher (*Martes pennanti*), coyote(*Canis latrans*), bobcat (*Lynx rufus*), fox (*Urocyon* spp.or *Vulpes* spp.), shrews (*Sorex* spp..), red squirrel (*Tamiasciurus hudsonicus*), and skunk (*Mephitis* spp. *or Spilogale* spp.). Amphibians include redbacked salamander (*Cinereus argenteus)*, spotted salamander (*Ambystoma maculatum*), red-spotted newt (*Notophthalmus viridescens*), and American toad (*Bufo americanus*). Common garter snakes (*Thamnophis* spp.*)* and wood turtles (*Glyptemys* spp.) are also adapted to this northern climate (Bailey, 1995; EOE, 2009; NYDEC, 2011; OHDNR, 2010; PADCNR, 2010; MIDNR, no date; WIDNR, 2011).

Wood turtle, *Glyptemys insculpta*

Source: (Smith, 2007).

6.3.2.5 Vegetative Habitat Typically Found in the Region

Vegetative cover within the Laurentian Ecoregion province is dominated by forested habitats. Mixed forest stands are composed of several species of conifers, particularly white pine (*Pinus*

strobus) in the Great Lakes Region, along with a mix of deciduous species. Typical vegetative cover consists of mixed pines (white, red, and jack pines) with aspen, sugar maple, and oak-hickory. Mixed forest stands are common, with the particular species in the assemblages highly dependent on soils. Deciduous trees typically favor nutrient-rich soils, while conifers thrive in poor soils. Pine trees are common in areas altered by fire. Shrub and herbaceous layers add to the vegetative diversity in each of these forests (Bailey, 1995; EOE, 2009).

Vegetative cover within the Eastern Broadleaf Forest (Continental) Province is also dominated by forested habitats. Typical vegetative cover consists mainly of oak-hickory forests with maple-beech forests along with elm (*Ulmus* spp.*)* in wetter areas. This province typically has a well-developed understory of flowering dogwood (*Cornus florida)*, sassafras (*Sassafras albidum)*, and hop hornbeam (*Ostrya virginiana)* as well as other shrubs, evergreens, and wildflowers. Existing wetland types include cattail marshes, wooded wetlands/swamps, and wet meadows (EOE, 2009).

The Adirondack-New England Mixed Forest Coniferous Forest-Alpine Meadow ecoregion is a mountainous region that transitions between true spruce-fir forest in the north to deciduous forests in the south. Growth form and species of this forested ecoregion are similar to those ecoregions further north, but red spruce (*Picea rubens)* occurs here instead of white spruce (*Picea glauca)*. Vegetation zonation is present, with both elevation and latitudinal aspects. Mountain slopes at lower elevations are usually covered with mixed forest, typically composed of spruce, fir, maple (*Acer* spp.*)*, and birch (*Betula* spp.*)*.

Vegetative cover within the Eastern Broadleaf Forest (Oceanic) ecoregion includes forested and wetland habitats. Typical vegetative cover includes oak-hickory and maple-beech forests. Wetter forests often have a well-developed understory made up of flowering dogwood (*Cornus florida)*, sassafras (*Sassafras albidum)*, and hop hornbeam (*Ostrya virginiana)* along with evergreens and wildflowers (Bailey, 1995; EOE, 2009; NYDEC, 2011; OHDNR, 2010; PADCNR, 2010; MIDNR, no date; WIDNR, no date).

6.3.2.6 Wetlands and Waterways

Wetland types within this region include:

- Beaches;
- Bogs;
- Emergent wetlands (marshes, fens, wet meadows, sedge meadows, wet prairies);
- Ephemeral/vernal ponds;
- Floodplain forests;
- Hardwood and coniferous swamps;
- Lacustrine wetlands (lakes);
- Palustrine emergent wetlands (marshes, fens, wet meadows, sedge meadows, wet prairies);
- Palustrine forested/scrub-shrub wetlands;

- Palustrine open water (ponds);
- Riverine habitat (rivers and streams); and
- Shallow/open-water communities

Wetland types are distributed widely throughout this region, but lake habitat is especially abundant because this province incorporates shoreline along all five of the Great Lakes. Wetland habitats in this region have been disturbed, largely due to agricultural practices and urbanization. These habitats are especially sensitive to disturbances such as channelization and ditching.

6.3.2.7 Aquatic Resources in the Region

Aquatic resources are highly regarded within this region, luring outdoor enthusiasts to the region for hunting and fishing. Abundant lakes, rivers, ponds, wetlands—the remnants of glacial recession—form dominant features on the landscape. All of the Great Lakes (Superior, Michigan, Huron, Erie and Ontario) border portions of this province.

These aquatic resources support a diverse fishery. Notable fish species include the lake sturgeon (*Acipenser fulvescens)*, walleye (*Sander vitreus)*, northern pike (*Esox lucius)*, muskellunge (*E. masquinongy)*, the non-native coho (*Oncorhynchus kisutch*, chinook salmon (*O.tshawytscha)*, smallmouth bass (*Micropterus dolomieu)*, largemouth bass (also known as black bass, *M. salmoides*), brook trout (*Salvelinus fontinalis)*, lake trout (*S. namaycush)*, yellow perch (*Perca flavescens)*, white sucker (*Catostomus commersonii)*, and creek chub (*Semotilus atromaculatus)*. Various native reptiles, amphibians, waterbirds, aquatic insects, mussels, and crustaceans also thrive in these waters (DOC, 2010).

Several major rivers run through the project area within the northeastern part of this ecoregion, including the Allegeny, St. Lawrence, Black, and Raquette rivers in New York, the Grand, Cuyahoga, Sandusky, and Maumee rivers in Ohio, the Shiawassee, Ontonagon, and Au Sable rivers in Michigan, as well as numerous smaller rivers, streams, and tributaries. In addition to the Great Lakes, numerous smaller lakes and ponds also occur (Bailey, 1995; EOE, 2009).

Inland lake in Wisconsin

Source: (Brotkowski, 2010).

6.4 GEOLOGY AND SOILS

6.4.1 INTRODUCTION

The geology and soils in Great Lakes Region in the Northern Border study area vary widely throughout the region. Geology can be described as the study of the earth's history through rock formations. The topography of a given area on earth can be described as its surface, shape, or features.

This section addresses the geologic conditions in the Great Lakes Region and describes the potential impacts of U.S. Customs and Border Protection (CBP) program alternatives on geologic resources. The study area contains significantly different topographic features ranging from the Great Lakes uplands to the Appalachian Mountains of New York. Geologic formations include glaciated landscapes, plateaus, moraines, and granitic mountain ranges.

6.4.2 AFFECTED ENVIRONMENT

6.4.2.1 Physiographic Provinces

Three physiographic divisions span the Great Lakes Region in the Northern Border area. These divisions are subdivided into provinces as well as some sections (Figure 6.4-1, Table 6.4-1).

The Laurentian Upland, Superior Upland (province) is the westernmost physiographic division in the Great Lakes Region along the Northern Border. To the east, the Interior Plains, Central Lowland is divided into two sections: the Eastern Lake and the Till Plains. The Appalachian Highlands physiographic division occupies the rest of the Great Lakes Region. Four provinces make up the Highlands: the Appalachian Plateaus, the Adirondacks, St. Lawrence Valley, and Valley and Ridge. Table 6.4-1 provides details on the geology of these areas and Appendix N features the geologic time scale showing the ages of the geologic time periods with which rock formations are dated. Appendix N features a geologic time scale showing the ages of the geologic time periods with which rock formations are dated.

6.4.2.2 Geologic Conditions

The geologic conditions within the Great Lakes Region are extremely complex, resulting from tectonic and related activities (e.g., faulting) and glacial activities along with erosive actions of wind and water. The Great Lakes Region contains consolidated geologic formations consisting of sedimentary, igneous, and metamorphic rocks. The Great Lakes Region also contains unconsolidated geologic formations consisting of alluvium, terrace deposits, glacial deposits, and other mixtures of sands, silts, and clays with various mixtures of rocks. The geologic formations are shown on Figure 6.4-2.

Figure 6.4-1. Physiographic Provinces, Divisions, and Sections of the Great Lakes Region

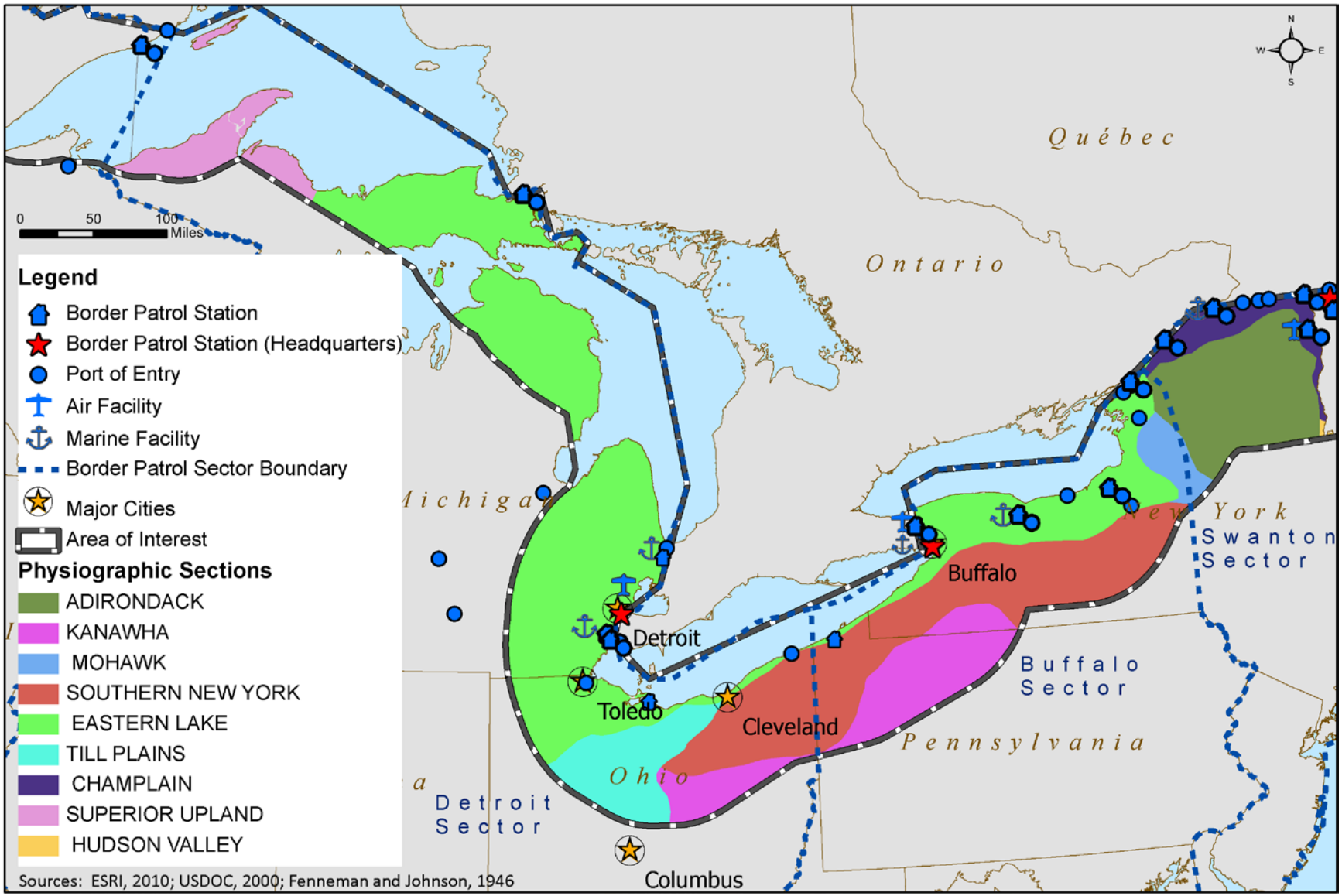
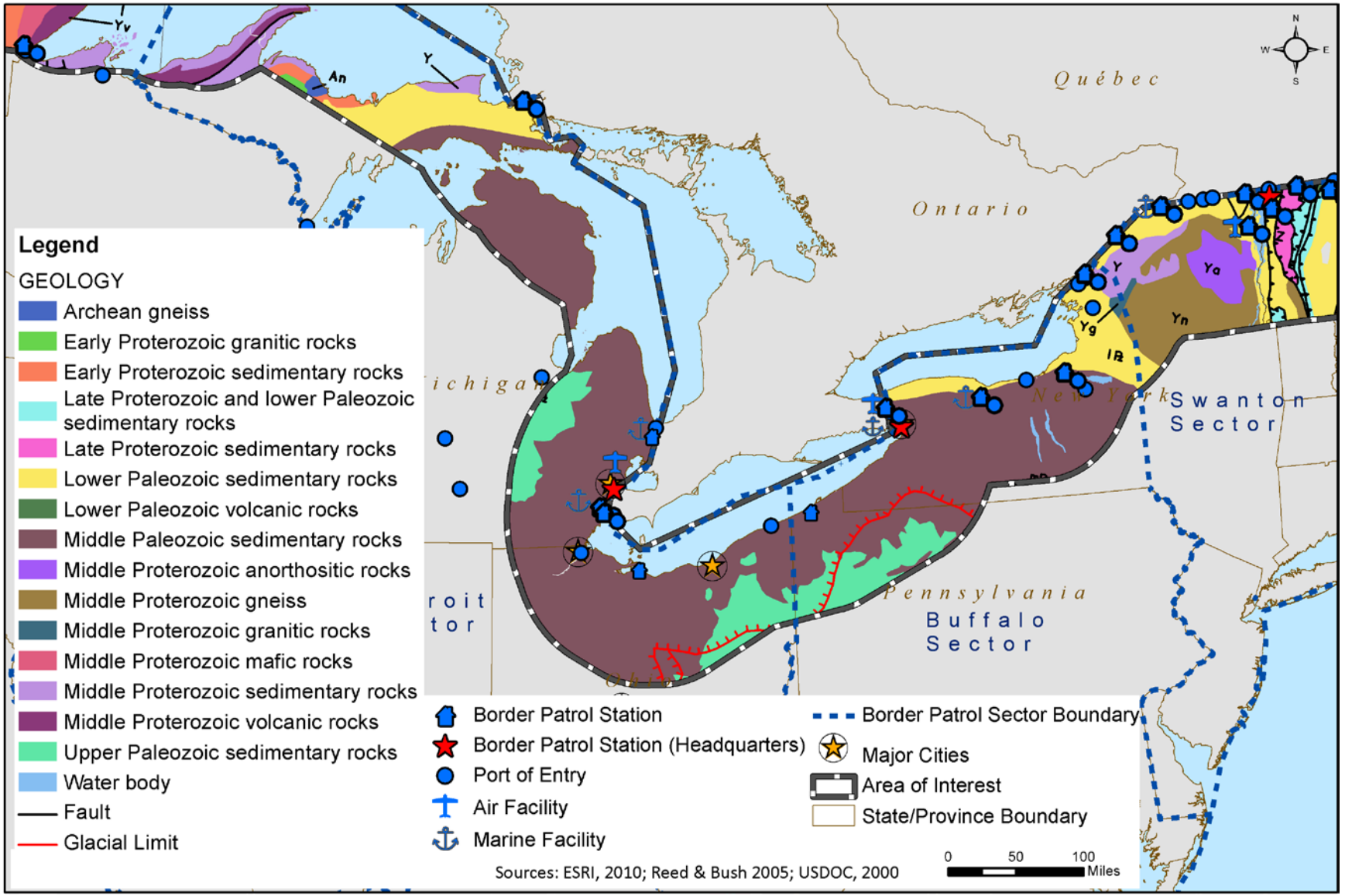


Table 6.4-1. Physiographic Provinces in the Great Lakes Region

Division	Province	Section	Terrain Texture including Topography	Geologic Structure and History	Generalized Rock Types
Laurentian Upland	Superior Upland	N/A	Elevation ranges from 600 to 2,280 ft. (183 to 695 m). Characterized by elevated linear features trending southwest-northeast along the Lake Superior shore and parallel ranges of Meabi and Vermillion to the north (USDOI, 1994).	Geologically known as the Canadian Shield, the Superior Upland is the largest American surface exposure of the ancient (2.6 to 1.6 billion years old) core of the North American continent (USDOI, 2000).	Mostly Precambrian metamorphic rocks and overlying Paleozoic rocks (Cambrian) covered by a thin veneer of glacial deposits from melting glaciers at the end of the Pleistocene (USDOI, 2004).
Interior Plains	Central Lowland	Eastern Lake	Level to rolling till plains, outwash plains, and lake plains. Areas of bedrock-controlled moraines, lake terraces, dunes, and swamps (WICCI, No Date).	Maturely dissected and glaciated cuestas and lowlands with moraines, morainic lakes, and lacustrine plains (Fenneman, 1928).	Glacial till over Cretaceous marine sediments (USDOI, No Date).
Interior Plains	Central Lowland	Till Plains	Young till plains without lakes and with some narrow and low moraines (Fenneman, 1928).	Glacial drift, not dissected by streams; two subsections: younger Wisconsin drift, older Illinoian drift (Fenneman, 1928).	Glacial till.
Appalachian Highlands	Appalachian Plateaus	Southern New York	A mature glaciated plateau of moderate relief (Fenneman, 1928).	Mature dissected part of Appalachian Plateaus once covered by continental ice (Fenneman, 1928).	Crystalline rocks and marble overlain by glacial till.
Appalachian Highlands	Appalachian Plateaus	Kanawha Plateau	A mature plateau of moderate to strong relief and fine texture (Fenneman, 1928).	Ancient unglaciated mountains with relatively high relief that developed over 480 million years ago.	Shales and sandstones, many vertically bedded.
Appalachian Highlands	Appalachian Plateaus	Mohawk Plateau	A maturely dissected glaciated plateau of diverse altitudes and varied relief, (Fenneman, 1928).	Ancient glaciated mountains with relatively high relief that developed over 480 million years ago.	Metamorphic and igneous rocks.
Appalachian Highlands	Adirondack	N/A	Subdued mountains bordered by dissected peneplain (Fenneman,	Part of ancient Grenville continental province (USDOI,	Uplifted complex of Pre-cambrian metamorphic rock

Division	Province	Section	Terrain Texture including Topography	Geologic Structure and History	Generalized Rock Types
			1928).	2000).	once covering them, Paleozoic sedimentary strata now flank these older rocks (USDOI, 2000).
Appalachian Highlands	St. Lawrence Valley	Champlain	Champlain has greater relief than average in St. Lawrence Valley province (Fenneman, 1928).	Rolling lowland, glaciated with partial cover of young marine plain.	Contact of Paleozoic and Precambrian rocks; metamorphic and igneous (Fenneman, 1928).
Appalachian Highlands	Valley and Ridge	Hudson Valley	Long ridges and valleys, some areas of high relief.	Created during formation of Appalachian Mountains; rivers eroded the valleys.	Mostly sedimentary rock, uplifted through mountain-building.

Figure 6.4-2. Geology of the Great Lakes Region

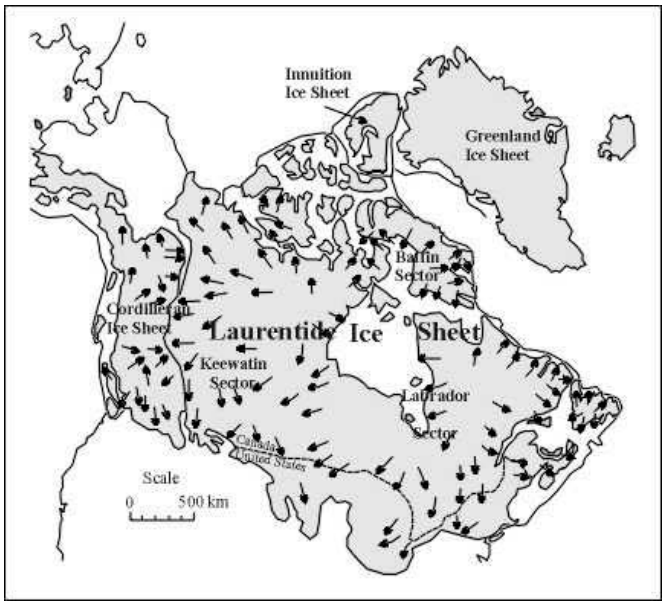


Regional Glaciation

During the Wisconsin glaciation, which ended around 10,000 years ago, the Laurentide Ice Sheet covered all of the Great Lakes Region. In addition to the ice sheet, mountain glaciers also expanded in high elevations.

The effects of glacial advances are readily apparent in the northern United States. Polished and striated outcroppings, rounded hills, moraines, valley fills of glacial till and outwash, and other typical glacial features are evidence of Pleistocene glaciation. All along the Northern Border, till deposits, erratics, and moraines are common (Nelson, 2003). Till, a sedimentary deposit derived from glacial erosion, was deposited throughout the northern United States as the ice sheets receded.

Figure 6.4-3 Extent of the Laurentide Ice Sheet.



Seismicity and Tectonics

Seismic activity in the Great Lakes Region is rare (Figure 6.4-4). Seismic hazards are described in terms of minimum peak horizontal ground acceleration values. This value is defined by USGS as the fastest speed of horizontal particle movement at ground level because of an earthquake.

The cause of the seismic activity in northern New York is not completely understood since geologists have not been able to associate specific faults to earthquakes in the region. The types of earthquakes occurring here are intraplate quakes. The commonly accepted reason for this kind of earthquake is that ancient faults are releasing strain due to modern-day stresses. The ancient faults may date from the creation or separation of the supercontinent, Pangaea, although the activity occurring today is not due to plate boundary movement. The potential for damaging earthquakes in this region is low, but possible (Kafka, 2004).

Landslides

The Great Lakes Region has a very low incidence of landslides; most result from water action and human activities (Figure 6.4-5). Some locations are susceptible: the Great Lakes coastal areas, and the southernmost portion of the study area in Pennsylvania. Land cover in these areas decreases the incidence rate.

Figure 6.4-4. Seismicity in the Great Lakes Region

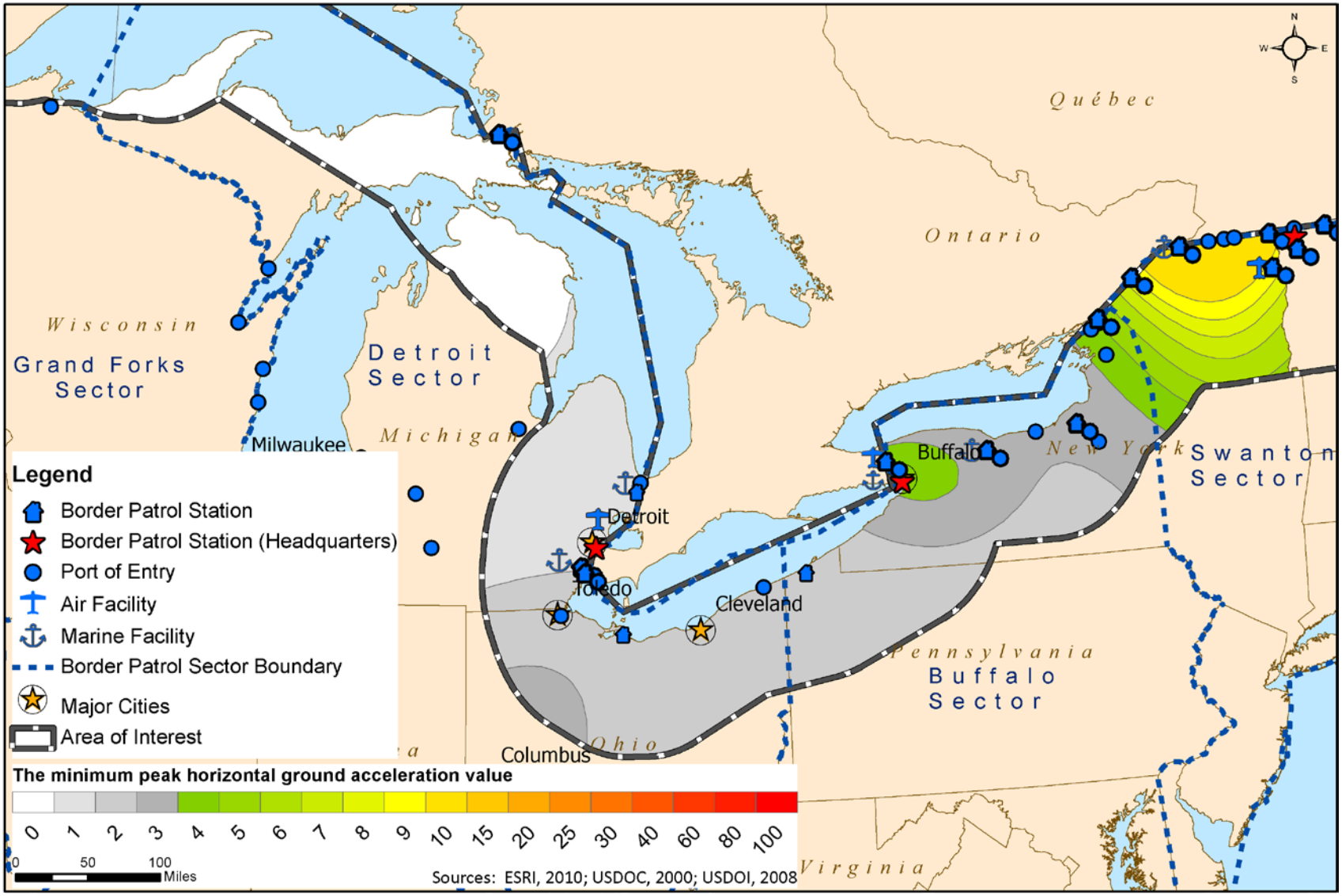
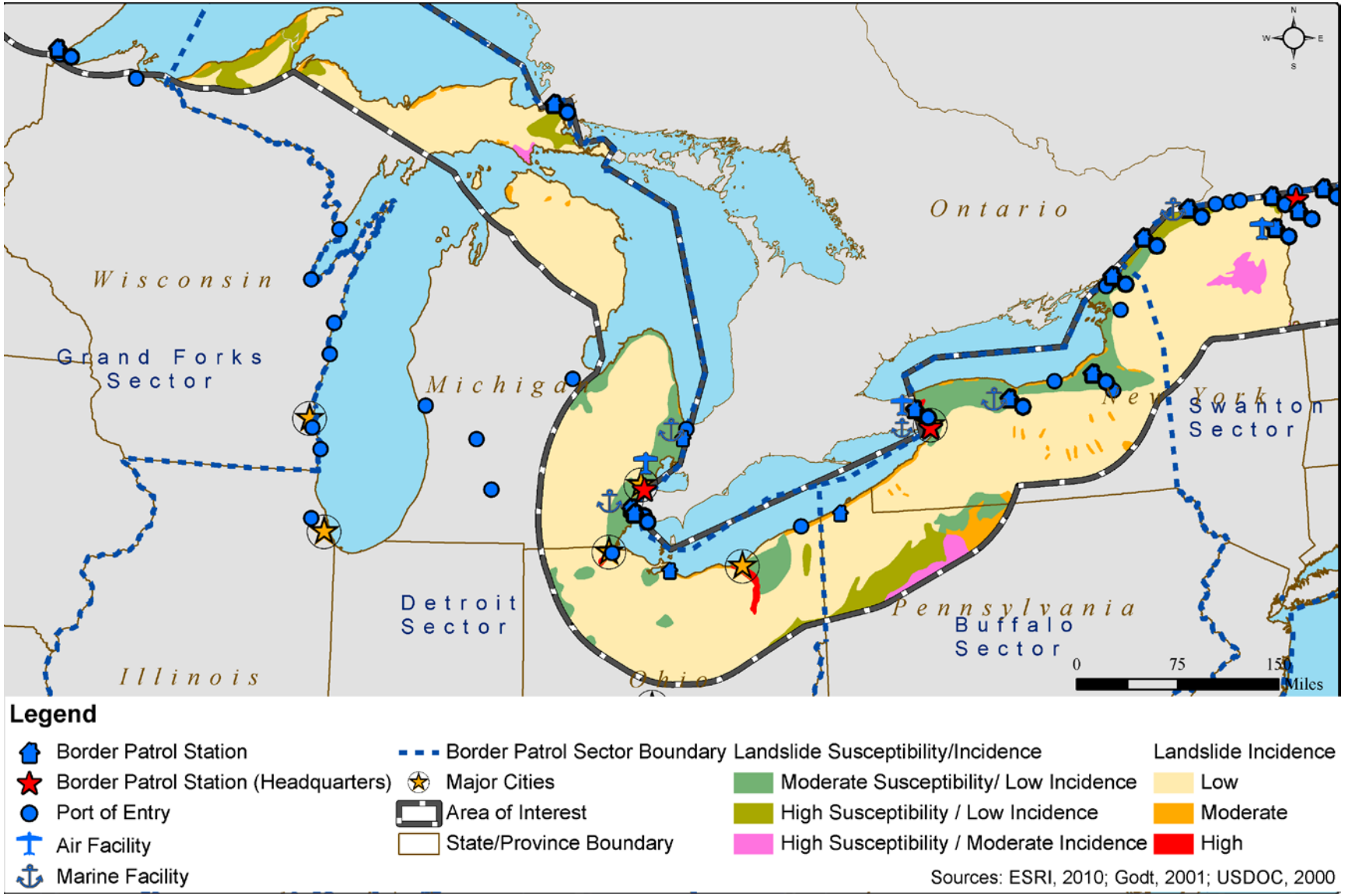


Figure 6.4-5. Great Lakes Region Landslide Incidence

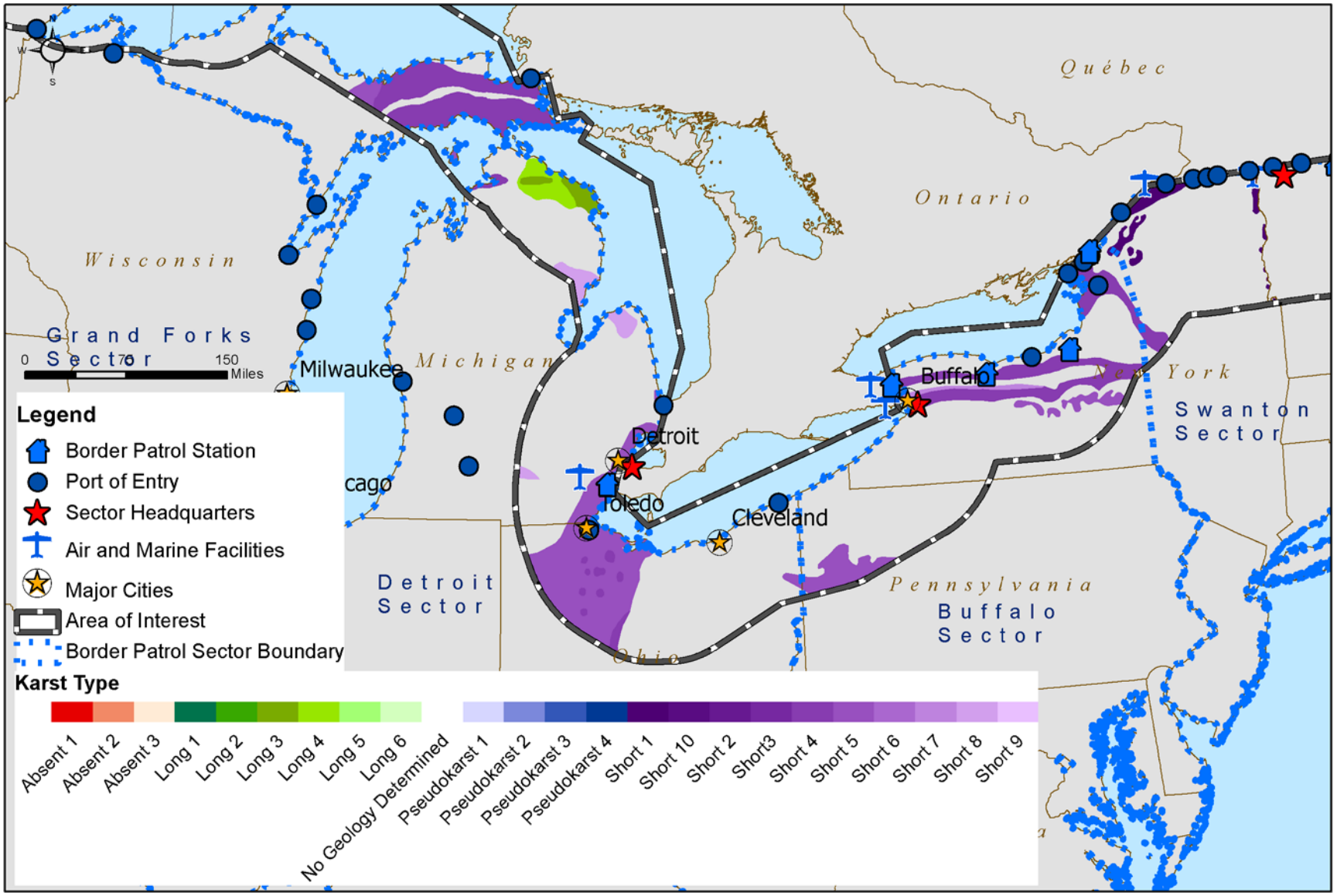


Karst Topography

In the Great Lakes Region, karst landscapes are spread throughout the Great Lakes Region (Figure 6.4-6 and Figure 6.4-7). These areas are mostly short (less than 1,000 ft. long) features in various types of carbonate rock. The northern section of the lower peninsula of Michigan contains karst features classified as long, which occur in areas of mixed carbonate rock. These areas have features that exceed 1,000 ft. in length and can range from 50 ft. to 250 ft. in depth.

Figure 6.4-6. An example of karst topography in the Great Lakes Region

Figure 6.4-7. Karst Topography in the Great Lakes Region



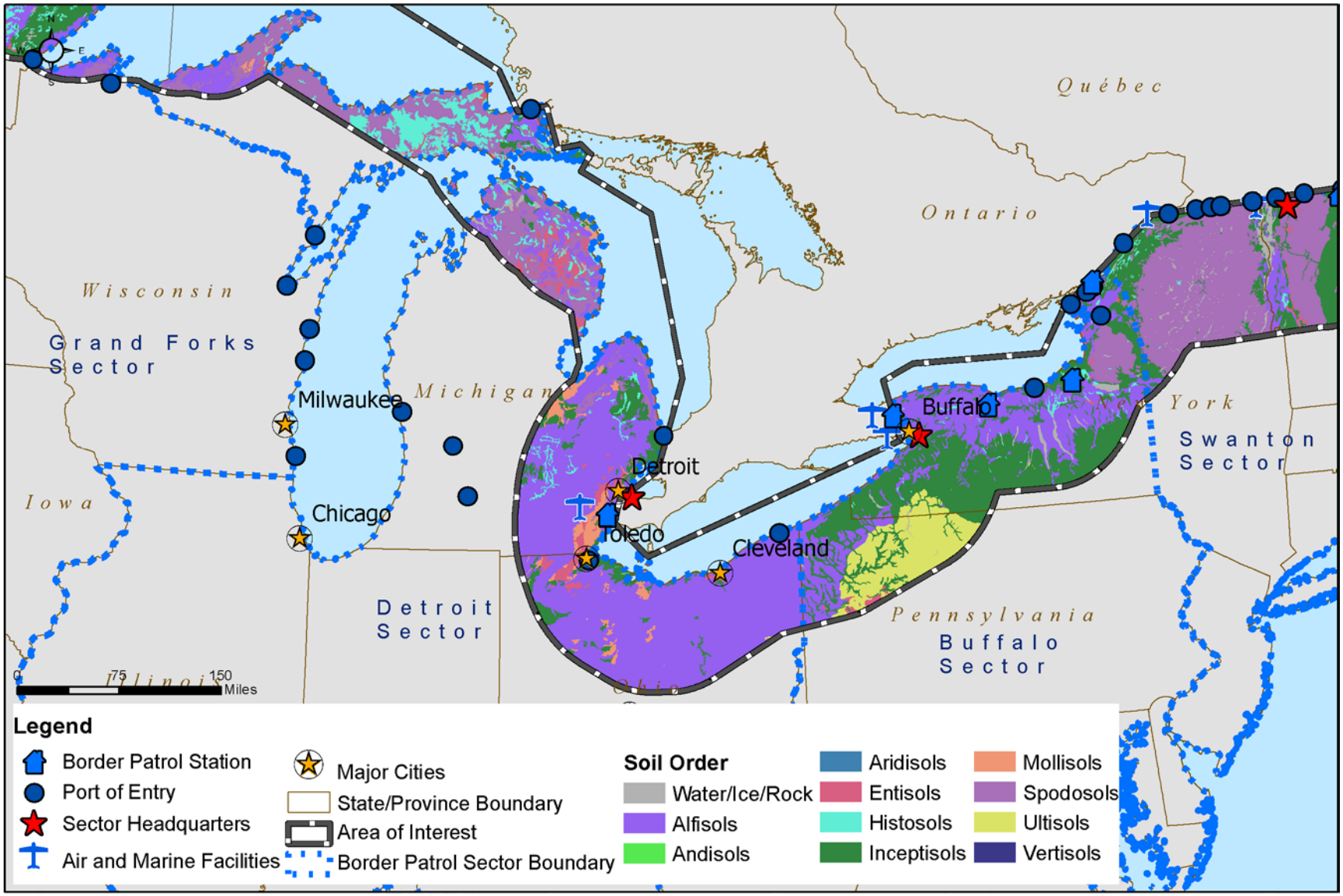
6.4.2.3 Soils

In the Great Lakes Region, seven major soil groups, or "orders," occur (Figure 6.4-8). In this region, soils contain a wide range of particle sizes due to the expanse of the region and geological variation. In this region, alfisols, spodosols, and inceptisols dominate. Alfisols span portions of the entire region, especially in Michigan, Ohio, Pennsylvania, and New York. The primary component of this soil order is clay, which results from mineral weathering. Alfisols do not have a high erosion potential (University of Wisconsin, 1999). Small areas of northern Minnesota and Michigan also contain histosols and entisols. The histosols in the region are mainly found in areas of poor drainage. This water accumulation decomposes organic materials and creates peaty and mucky conditions. Histosols have a low weight-bearing capacity and, if drained of water, land subsidence may occur (University of Idaho, No Date[g]). Entisols are soils that do not fit into any of the other 12 soil orders. These are young soils and have only an A horizon. Entisols are the most extensive soils in the world and can be very diverse based on the parent material from which they develop (University of Idaho, No Date[d]). This soil order is often the transition layer between soils and non-soil parent rock.

Spodosols are found in northern Michigan and Wisconsin as well as New York and are acidic soils of forested areas. They are not agriculturally productive without management due to their high acidity, but have sub-layers of humus, or stable organic matter (University of Idaho, No Date[b]). Spodosol textures are sandy to loamy and sometimes have clay (University of Wisconsin, 1999). Ultisols and inceptisols are mainly found in Pennsylvania and New York. Ultisols are soils with a high acid content, low fertility, and have been leached of minerals by the processes of weathering. Low soil fertility is due to a lack of nutrients in the soil resulting in the decreased ability to support plant life. While not productive as agricultural lands, ultisols are often found in highly productive forested areas (University of Idaho, No Date[c]). They can be found in any climate that has periods of time when precipitation exceeds the evapotranspiration rate and the soil's water storage capacity. A small organic layer followed by clays is typical of this soil order (University of Wisconsin, 1999). Inceptisols are the second most common soil type in the world. They are often found on steep slopes and typically do not have extensive development with regard to soil horizons (University of Idaho, No Date[a]). These soils are found in almost all climates with the exception of arid climates. Mass movement (landslides and falls) and soil erosion are two processes that typically occur in this soil order (University of Wisconsin, 1999).

Mollisols are found at limited locations in the Great Lakes Region, mostly in Ohio and Michigan. These soils are common in grassland regions and are extremely agriculturally productive. In the United States, this is the most common soil order. The thick upper horizon (or layer) is a result of the decayed organic materials (University of Idaho, No Date[e]). The development of this order is most often related to the weathering of sedimentary parent rock, and in some cases the weathering of glacial deposits. Mollisol soil texture can vary to a great degree from sandy to fine loams (See table 3.4.2-1). This soil order is prone to erosion, especially by water in cultivated areas (University of Wisconsin, 1999).

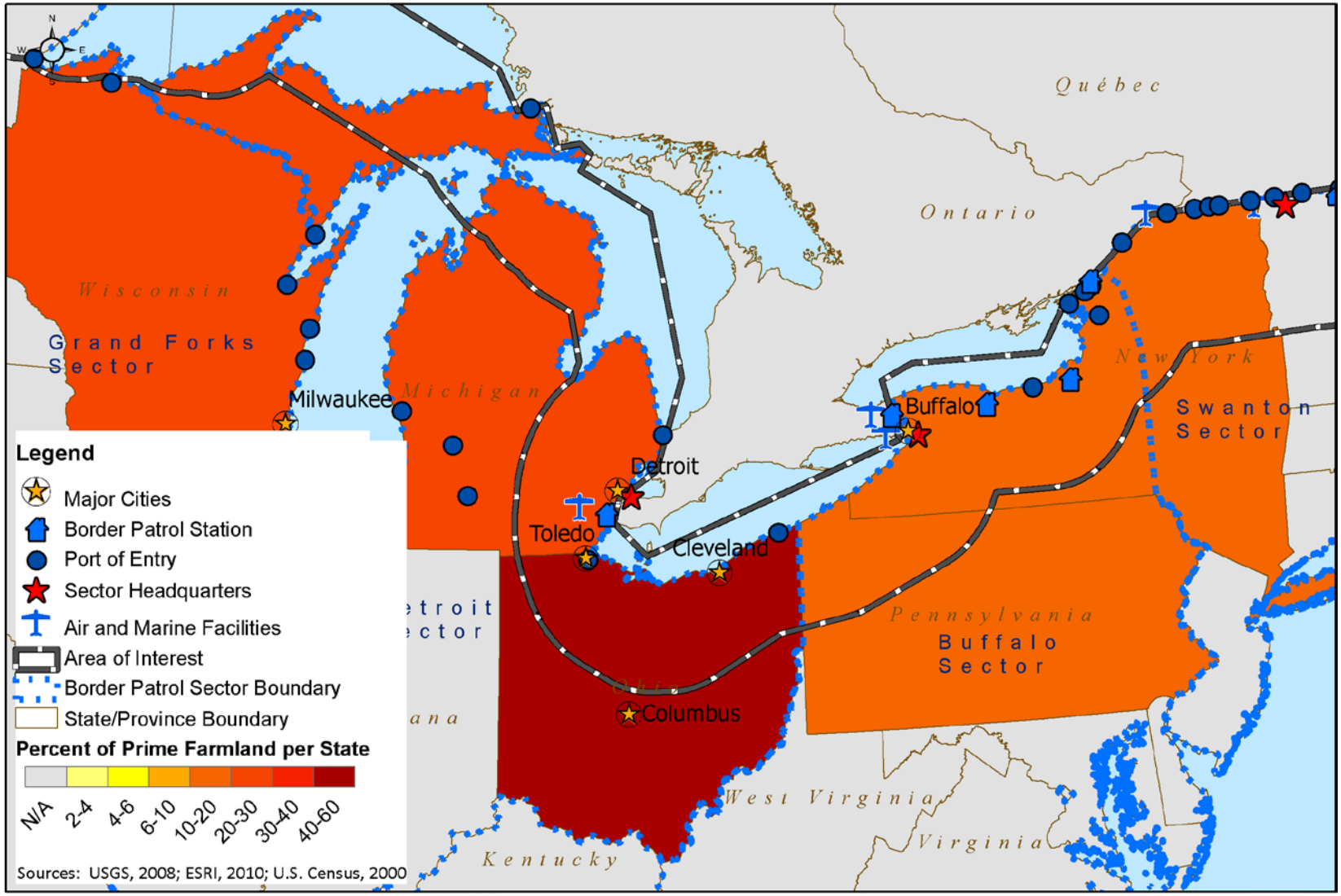
Figure 6.4-8. Soil Orders in the Great Lakes Region



6.4.2.4 Prime and Unique Farmland

In the Great Lakes Region, Prime and Unique Farmland is extensive (Figure 6.4-9). The highest percentage occurs in Ohio, with 40 to 60 percent of the land designated as Prime and Unique Farmland. Michigan and Wisconsin are second in the region with 20 to 30 percent of land designated as such. Pennsylvania and New York designate 10 to 20 percent of land as Prime and Unique Farmland.

Figure 6.4-9. Prime and Unique Farmland in the Great Lakes Region



6.5 WATER RESOURCES

6.5.1 INTRODUCTION

Water resources are distributed widely throughout the 100-mile Programmatic Environmental Impact Statement (PEIS) study corridor in the states of Wisconsin, Michigan, Ohio, Pennsylvania, and New York. For the purposes of this study, this resource area consists of hydrologic and groundwater resources (aquifers, subterranean watercourses, and recharge areas), surface water and waters of the United States (lakes, ponds, rivers, streams, and channels), and floodplains. Water resources include several beneficial elements, such as water supply quantity and quality, habitat for aquatic organisms, recreation, and flood storage capacity, which are subject to effects from proposed activities.

6.5.2 AFFECTED ENVIRONMENT

6.5.2.1 Groundwater

Groundwater resources are sources of water that result from precipitation infiltrating the ground surface. Groundwater is contained in either confined reservoirs or unconfined aquifers. When the water table or piezometric surface reaches an elevation above the ground surface, groundwater will reappear above the ground surface as either streams, surface bodies of water, or wetlands. This exchange between surface water and groundwater is known as recharge and is an important feature of the hydrologic cycle.

Groundwater has a variety of beneficial uses. In the Great Lakes Region, as in the rest of the country, groundwater is a primary source for a wide variety of water uses including irrigation, domestic water supply, fish propagation, commercial water supply, industrial uses, and livestock. Table 6.5-1 shows the categories of groundwater use for states within the Great Lakes Region.

Table 6.5-1. Water Use in the Great Lakes Region in 2005

State	Irrigation Use (%)	Public Water Supply (%)	Industrial Use (%)	Rural Domestic, Livestock (%)
Wisconsin	4.7	6.4	86.1	2.8
Michigan	2.7	9.8	86.5	3.0
Ohio	0.4	12.5	85.4	1.7
Pennsylvania	0.3	15.0	76.9	7.8
New York	0.5	24.6	72.6	2.3

Source: (Kenny et al., 2009).

Groundwater occurs in porous geologic formation layers called aquifers, which may be large and regional, such as the Ogallala Aquifer, which underlies many states in the Great Plains. Aquifers may also be very small and localized.

Several principal aquifers are found in the Great Lakes Basin: the Cambrian-Ordovician Aquifer System, Silurian-Devonian Aquifers, Mississippian Aquifers, Pennsylvanian Aquifers, and

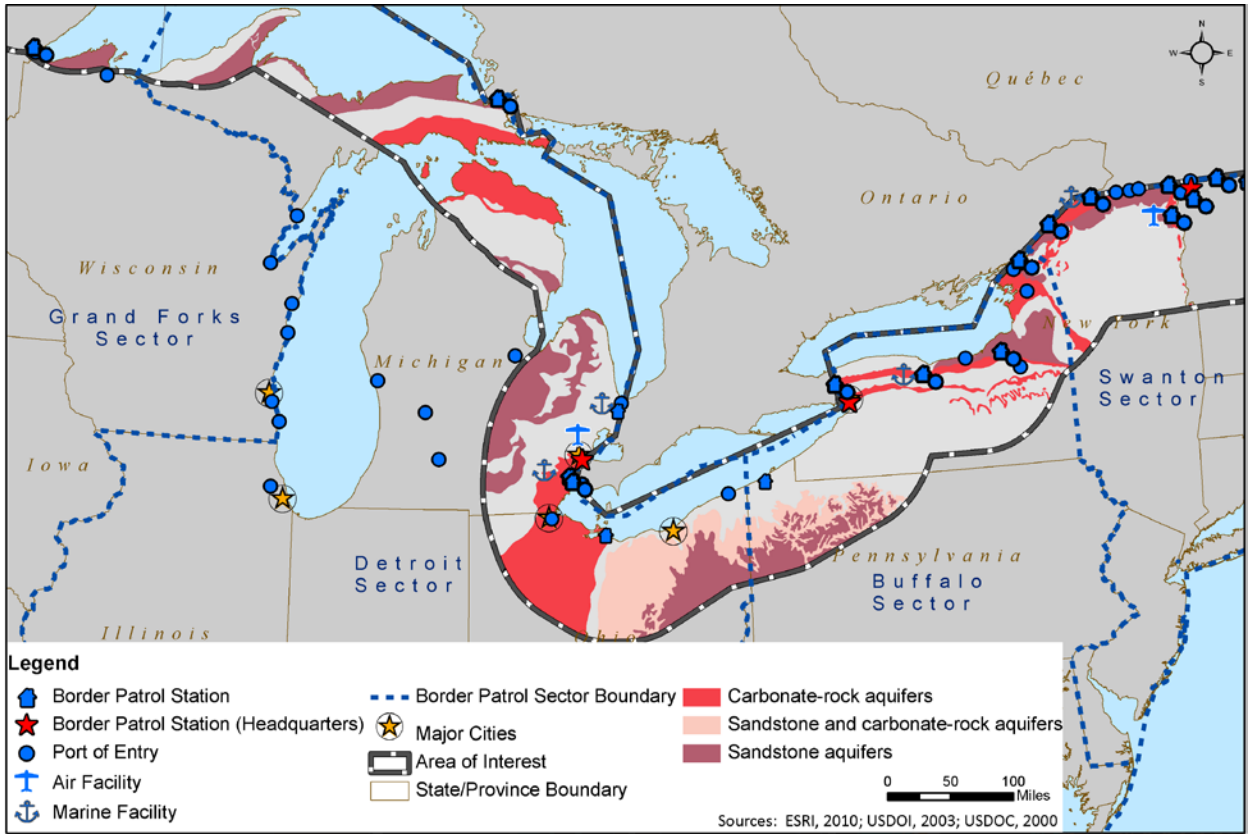
aquifers of alluvial and glacial origin (the "surficial aquifer system"). The surficial aquifer system overlies much of the area covered by Wisconsinan glaciations (USDOI, 2006).

Less regionally extensive aquifers or aquifer systems are also included in this group; the New York Sandstone Aquifers (Cambrian), the New York and New England carbonate rock aquifers (Silurian and Devonian), and the Marshall Aquifer in Michigan (Mississippian) (USDOI, 2006).

Geologic structural basins and arches control aquifer depth. As the depth to the top of the aquifers increases, water quality degrades, and water use from these aquifers declines.

Water demand is mostly met using surface water, including direct withdrawals from the Great Lakes. Total water use in the Great Lakes Basin for both Canada and the United States is approximately 850,000 Mgal/d, and total ground-water use in the Great Lakes Basin is about 1,500 Mgal/d (USDOI, 2006). In 1998, approximately 70 percent of the total groundwater withdrawal came from aquifers in the Lake Michigan and Lake Erie Basins. The areas of largest groundwater withdrawal are in the Chicago-Milwaukee area near the Great Lakes Basin boundary.

Figure 6.5-1. Great Lakes Region Groundwater Aquifers



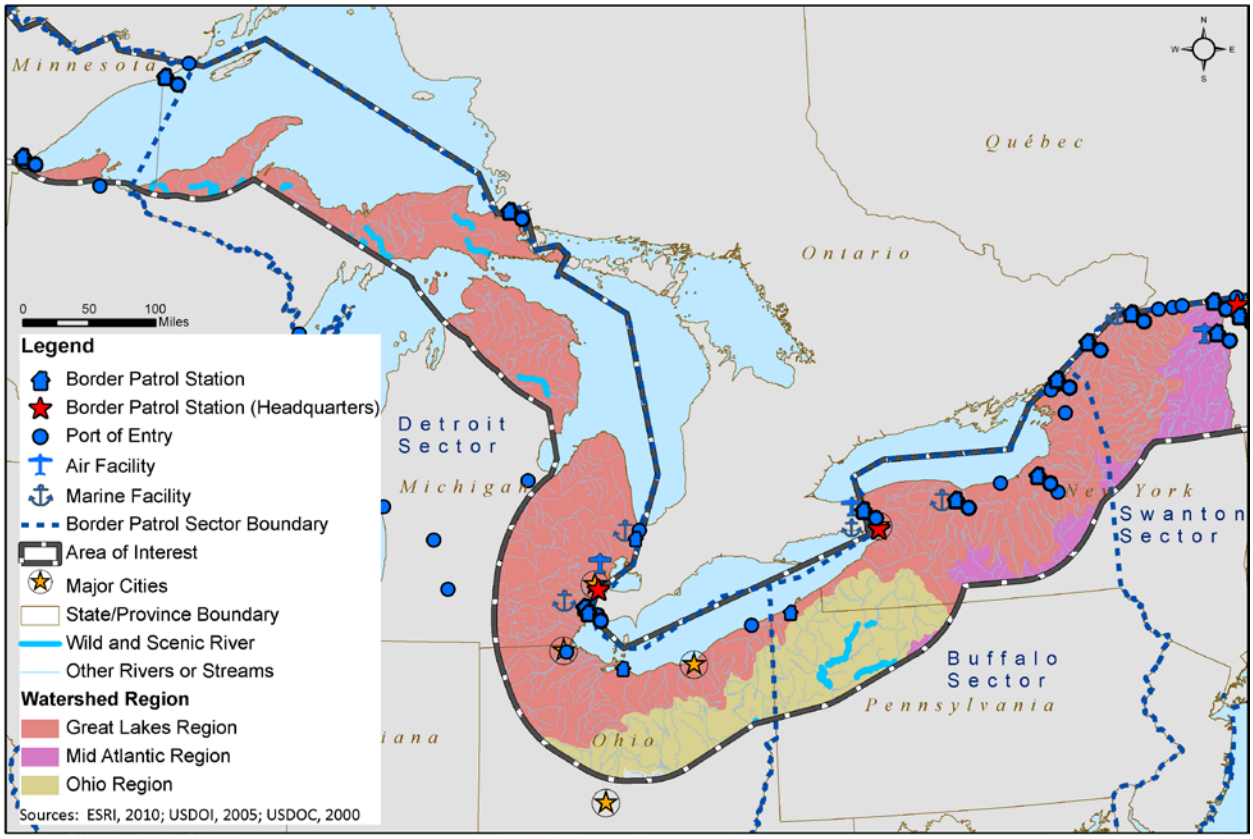
6.5.2.2 Surface Waters and Waters of the United States

Surface water is water found in lakes, rivers, ponds, wetlands, and oceans. It is the most abundant and visible form of water resource, with the greatest variety of uses. In addition to irrigation, domestic water supply, fish propagation, commercial water supply, industrial uses,

and livestock, surface water supports recreation, fish and wildlife habitat, hydropower, and transportation. Section 6.3.2.7 provides a discussion of the regional affected environment for aquatic resources. Surface water is often identified by the basin or watershed in which it is found. A watershed is simply the topographic area defined by the drainage of a single body of water.

There are nine designated Wild and Scenic Rivers within the 100-mile corridor of the Great Lakes Region; seven in Michigan and two in Pennsylvania. Figure 6.5-2 shows these Wild and Scenic Rivers as well as the other river basins found within the 100-mile corridor for the Great Lakes Region.

Figure 6.5-2. River Basins in the Great Lakes Region



Surface water resources in this region are dominated by the Great Lakes system. This system is the largest freshwater system on earth, covering 94,000 square miles, draining more than 200,000 square miles and storing an estimated six quadrillion gallons of surface water (GLIN, 2008). This is 21 percent of the world's fresh water supply and 84 percent of the United States' water supply. More than 30 million people live in the basin, about 10 percent of the American population and 30 percent of the Canadian population. Nearly 25 percent of the total Canadian agricultural production and seven percent of the American agricultural production are located in the basin (USEPA, 2008).

Despite their large size, the Great Lakes are sensitive to pollution. The main sources of pollution are soil and farm chemical runoff from agricultural lands, city wastes, industrial discharges, and leachate from disposal sites. The large surface area of the lakes also makes them vulnerable to

direct atmospheric pollutants that fall with rain or snow and as dust on the lake surface (USEPA, 2008).

With early settlement, logging removed protective shade from streams and, together with sawdust from sawmills, clogged them with debris. Plowing left exposed soils, which washed away more easily, burying stream and river mouth habitats. Heavy fishing depleted the abundant fish stocks and populations of fish began to disappear (EPA, 2008).

The untreated wastes of early industrialization degraded many rivers. Urbanization that accompanied industrial development added to degradation of water quality, creating nuisance conditions such as bacterial contamination, decay, and floating debris. Contaminated drinking water and polluted beaches contributed to human epidemics of waterborne diseases such as typhoid fever (USEPA, 2008).

Figure 6.5-3. Industrial pollution site, Calumet River
US Environmental Protection Agency, Region V

Source: (EPA, 2008).

After the turn of the 20th century, new chemicals such as polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethane (DDT) were used on soils to enhance production. The combination of synthetic fertilizers, existing sources of nutrient-rich organic pollutants such as untreated human wastes from cities, and phosphate detergents caused an acceleration of biological production (eutrophication) in the lakes (USEPA, 2008).

Public concern about deterioration of water quality in the Great Lakes was formalized in the first Great Lakes Water Quality Agreement between Canada and the United States in 1972. Throughout the rest of the 1970s, nuisance conditions occurred less frequently as floating debris and oil slicks began to disappear. Dissolved oxygen levels improved, eliminating odor problems. Beaches reopened after improved sewage control and algal mats disappeared as nutrient levels declined (USEPA, 2008).

6.5.2.3 Floodplains

Floodplain management seeks to preserve the flood storage capacity for the river corridor. This may be achieved in several ways. Local communities often have floodplain management or zoning ordinances that restrict development within the floodplain. The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP). FEMA

also provides floodplain management assistance, including mapping of 100-year floodplain limits, to over 20,000 communities. The information provided by FEMA's flood management program is useful to CBP planners who seek to avoid effects from flooding. This is most relevant for CBP's border facilities, such as ports of entry (POE) that are planned at locations where rivers define the Northern Border. The Detroit River, St. Mary's River, and St. Clair River in Michigan and the St. Lawrence River and Niagara River in New York are rivers of this type in the Great Lakes Region.

6.5.2.4 Transboundary Water Agreements

The International Boundary Waters Treaty Act

This treaty prohibits bulk water removal from boundary basins, requires permitting for water projects that would affect the level or flow of boundary waters, and provides sanctions and penalties for violation.

Great Lakes Water Quality Agreement

The agreement, signed in 1972 and renewed in 1978, expresses the commitment of Canada and the United States to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin Ecosystem and includes a number of objectives and guidelines to achieve these goals. It reaffirms the rights and obligation of Canada and the United States under the Boundary Waters Treaty.

6.6 NOISE

6.6.1 INTRODUCTION

The study area contains many soundscapes and noise-sensitive receptors that could experience impacts due to the alternatives that U.S. Customs and Border Protection (CBP) is considering. However, the mere presence of a noise-sensitive area, such as a national park, residence, or school, does not guarantee that it would be significantly impacted by CBP's activities or that the overall impacts would be major under the National Environmental Policy Act (NEPA). As with other topics in this Programmatic Environmental Impact Statement (PEIS), the programmatic approach to describing noise is driven by the planning objective of the document and the potential for actual impacts.

6.6.2 AFFECTED ENVIRONMENT

Sound is a physical phenomenon consisting of vibrations that travel through a medium like air and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's quality of life, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Because the human ear responds differently to different frequencies, "A-weighting" was developed to approximate the frequency response of the human ear. The A-weighting curve has been widely adopted for environmental noise measurement and is standard in many sound level meters. The dBA levels of common sounds of daily life are provided in Table 6.6-1.

Table 6.6-1. Common Sound Levels

Outdoor	Sound level (dBA)	Indoor
Snowmobile	100	Subway train
Tractor	90	Garbage disposal
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Notes: dBA = A-weighted decibel. Sound level provided is as generally perceived by an operator or a close observer of the equipment or situation listed.

Source: Harris, 1998.

The dBA noise metric describes steady noise levels, although very few noises are, in fact, constant. Therefore, the measurement day-night sound level (DNL) has been developed. DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (L_{eq}) is often used to describe the overall noise environment. L_{eq} is the average sound level in dB.

6.6.2.1 Regulatory Review

The Noise Control Act of 1972 (PL 92-574) directs Federal agencies to comply with applicable Federal, state, interstate, and local noise control regulations. In 1974, the USEPA provided information suggesting continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals.

State and local governments have the opportunity to regulate noise in their jurisdictions. These regulations are typically guidelines for activities that generate noise and the hours that such activities may be performed. Noise is typically regulated at the local level. A municipal noise ordinance might address the hours that heavy equipment can be operated, the distance heavy equipment can be operated in proximity of noise-sensitive receptors (i.e., schools, hospitals, churches, and residences), and the duration of operation of a single noise source considered to be annoying to the public, such as a diesel-powered generator. Some set specific not-to-exceed noise levels, and others are simple nuisance noise ordinances.

A number of sources of noise may be addressed for rural areas, such as parades, vendors, social engagements with music, and animal noises. Construction noise is typically exempt from noise ordinances in rural areas. In addition, noise regulations in an urban setting take into account the constant noise sources of urban living, such as large heating, ventilation, and air conditioning (HVAC) units, public transportation (trains and buses), emergency vehicles, and heavy traffic. Because urban noise levels are already relatively high, adding a source for an extended period can be highly annoying to some people, hours of construction and operation of heavy equipment are often limited. A typical ordinance in a major city will restrict construction related noise sources between the hours of 10:00 p.m. and 7:00 a.m.

6.6.2.2 CBP Noise Sources

The CBP operates 24 hours a day and 7 days a week. The level of operation can be determined by the measures required to secure the border or necessary for normal facility activities. Table 6.6-2 lists CBP's operations and describes of the noise levels of these activities.

Table 6.6-2. CBP Noise Sources

Operation	Description
Use of mobile surveillance systems (MSS) and surveillance towers	Very little noise is generated by the motor. In remote areas, standby generators may be used to supplement electric power.
Firing ranges and armories	CBP conducts small-arms training at many of its ports of entry (POE) and border patrol stations (BPS). Small-arms weapon fire is clearly audible in areas surrounding these ranges during training activities. Usually these activities are limited to daytime hours.
Maritime patrols	Boating noise is typically audible during marine patrols near the shoreline. This noise is widespread and at most locations only sporadic. The watercraft used are generally selected for their noise-suppression features because of the nature of their mission.
Patrols by foot, horse, off-road vehicle (ORV), and snowmobile	Foot and horse patrols are typically quiet. Noise from ORVs and snowmobiles is audible for a mile or more in remote, quiet areas. This noise is widespread and at most locations only sporadic. Areas near POEs and BPSs may have more concentrated noise associated with these activities.
Added and expanded POEs and checkpoints	This action may require construction, which would end at the completion of the project.
Operation of expanded BPS	Additional personnel would be required for addition or expansion of newly constructed facilities. The possibility of canine facilities, firing ranges, and patrol vehicles may be required for operations at some new/expanded facilities.
Aircraft operations	Air operations at CBP are diverse: Helicopters, fixed-wing aircraft, and unmanned aerial systems (UAS) may be used regularly at some locations, although not all aircraft are used simultaneously. Along with regular operations, training exercises are also a source of aircraft noise at some facilities.
Construction activities	CBP conducts both large and small construction projects. Each has some level of heavy equipment and truck transport noise.
Maintenance activities	Maintenance operations at CBP are as diverse as the facilities themselves. The noise associated with these actions can involve training to maintain each category listed above. These noise sources may be one major repair using heavy equipment, monthly routine maintenance, or daily maintenance in the case of dogs, horses, and vehicles.

Source: USDHS, 2010.

6.6.2.3 Non-CBP Noise Sources

The sources of noise along the West of the Rockies border vary greatly, although most of the region is rural or remote. Sounds dominating the rural areas are aircraft overflights, bird and animal vocalizations, and very light traffic. Farming is a major activity in some of the rural areas identified with the project area. Farming is seasonal in this region and may create major sources of noise during planting, and even more during harvest in August through October, when several large combines may operate concurrently. Although the majority of land is rural, this region has the most major cities, including

Chicago, Illinois; Detroit, Michigan; Cleveland, Ohio; and Buffalo, New York. Cities have significantly higher levels of noise than do more remote areas. A complete list of counties with their population and current background noise levels can be found in Appendix O. Notably, these levels are estimated average background levels based on population. Actual site-specific levels may vary base on location..

6.6.2.4 Background Noise Levels

Estimated background noise levels for areas within 100 miles of the border are shown in Figure 6.6-1 and described in Table 6.6-3. The majority of areas within 100 miles of the border would be classified as remote or rural residential and are isolated, far from major sources of sound.

Townships and small cities are scattered throughout the 100-mile buffer area; however, more remote land areas cover most of the project area. These smaller cities can be described as rural-residential and quiet-commercial.

Figure 6.6-1. Background Noise Levels in the Great Lakes Region

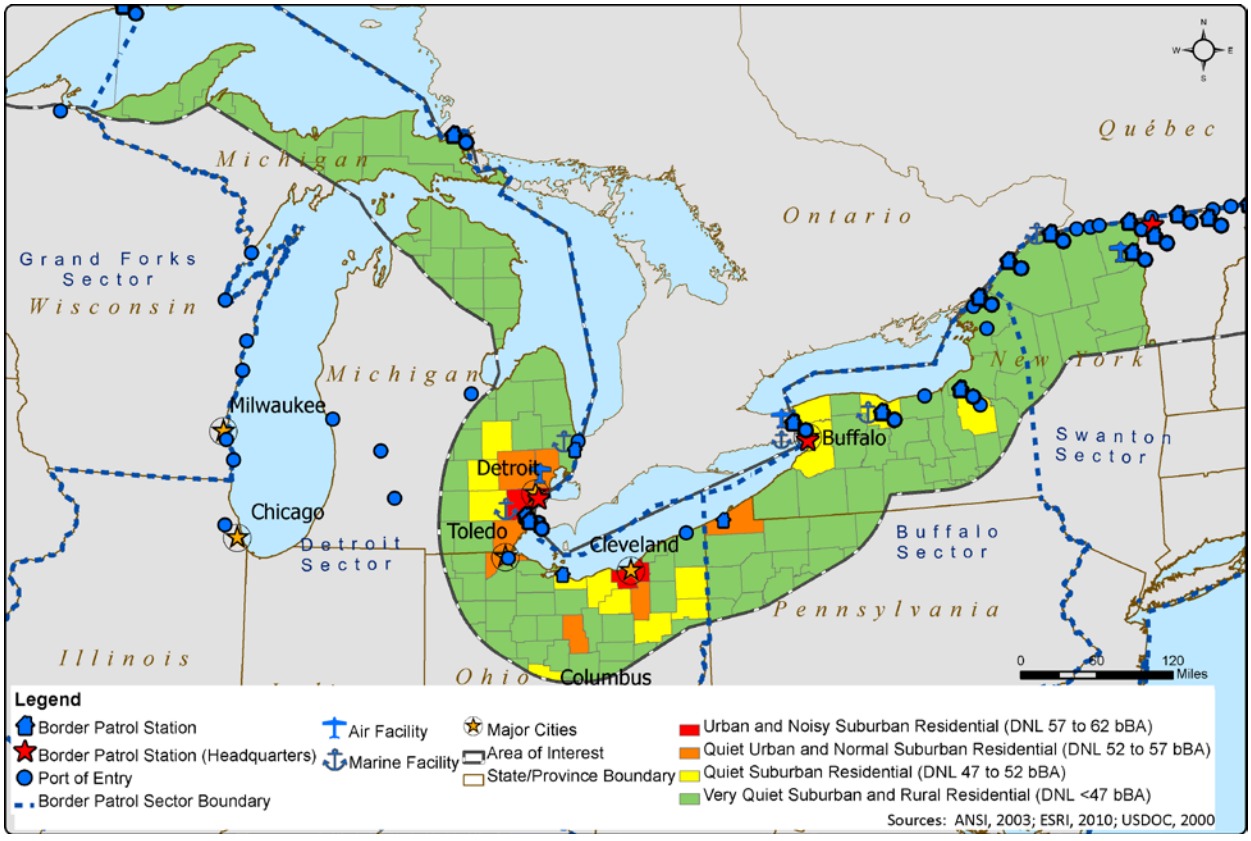


Table 6.6-3. Description of Background Noise Levels

Intensity Level	Example Land Use Category	Average Residential Intensity (people per acre)	Leq (dBA)		
			DNL	Daytime	Nighttime
Low	Quiet suburban residential	2	49	48	42
Medium-low		4	52	53	47
Medium	Quiet urban residential	9	55	56	50
Medium-high	Quiet commercial, industrial, and normal urban residential	16	58	58	52
High		20	59	60	54

Source: ANSI, 2003.

6.6.2.5 National Parks

The National Park Service (NPS) recognizes the natural soundscape of each national park unit as an inherent resource, and manages this resource in order to "restore degraded soundscapes to the natural conditions wherever possible, and protect natural soundscapes from degradation due to noise" (USDOI, 2000). Non-impairment of natural soundscapes is mandated by the Organic Act of 1916 and is part of the NPS management goals and objectives. Each region of the project area has locations of special interest such as national parks. The only national park within 100 miles of the border in the Great Lakes Region is Isle Royale National Park in Michigan, which has a total area of 539,281acres (USEPA, 2010).

6.7 CLIMATE CHANGE AND SUSTAINABILITY

6.7.1 INTRODUCTION

According to the 2009 U.S. Global Change Research Program (USGCRP) report, "Global Climate Change Impacts in the United States," documented impacts to the Nation from climate change include increased average temperatures, more frequent heat waves, high-intensity precipitation events, sea-level rise, more prolonged droughts, and more acidic ocean waters, among others. Global and national temperature changes are not distributed evenly. Greater increases occur at high, northern latitudes (CEQ, 2011). In 2010, the Department of Homeland Security (DHS) identified global climate change as a long-term trend and global challenge that threatens America's national-security interests (USDHS, 2010).

Sustainability and smart growth are approaches to human activity that aim to meet the needs of the present without compromising the ability of future generations to meet their own needs. For U.S. Customs and Border Protection (CBP), the concepts of sustainability and smart growth include the ability to adjust to changing geopolitical realities while preserving the environment and working to improve the quality of life for American residents and visitors.

To reduce environmental impacts and address the challenge of limited resources, the DHS prepared a "Strategic Sustainability Performance Plan" to promote sustainable planning, design, development, and operations. The guidelines aim to decrease energy use, minimize reliance on traditional fossil fuels, protect and conserve water, and reduce the environmental impact of materials use and disposal. CBP's overarching goal is to size, plan, and carry out proposed development in a manner that is sustainable and that works to preserve and protect limited resources.

6.7.2 AFFECTED ENVIRONMENT

6.7.2.1 Climate Regions of the Northern Border—Overview

The climate along the Northern Border is characterized by mild summers and very cold to extremely cold winters. January is the coldest month. July is the warmest month throughout the entire project area, and its temperature can fluctuate 20-30 degrees Fahrenheit between day and evening (Idcide, 2010). Precipitation is evenly distributed throughout the year. The average annual precipitation across the entire Northern Border is approximately 31 inches. There is one recognized climatic zone within the Great Lakes Region: Humid Continental Climate. A discussion of this zone is provided in the following subsection.

6.7.2.2 Climate in the Great Lakes Region

Humid Continental Climate

The Humid Continental Climate is found in the interior regions of continents within temperate regions of the midlatitudes. Regions with this climate experience variable weather conditions due to their location within the midlatitudes and year-round influence of the polar front. They are located between polar-type and tropical-type air masses where collisions of these air masses cause precipitation from the uplift of the moist and less dense tropical air mass.

These regions have great variability in seasonal temperatures because they are in the middle of the continent and are typically removed from the moderating influences of oceans. During the winter, Arctic air masses sweep into the northern portions of these regions, bringing extremely cold temperatures.

In North America, the Gulf of Mexico and the Caribbean Sea are sources of moisture for the maritime tropical air masses that carry humid air up into the eastern and central regions of the country, causing most of the humidity and precipitation that occur in these areas.

A diversity of ecosystems is found in the Humid Continental Climate. Mixed broadleaf deciduous forest is common in the southern and eastern portions. Grasslands may be found toward the West where the precipitation is less. The Humid Continental Climate has two subtypes, described below.

Humid Continental Climate (Warm Summer Subtype)

The Warm Summer Subtype can be found in the eastern and midwestern regions of the United States and is characterized by hot, humid summers and occasional cold waves in the winter.

Humid Continental Climate (Cool Summer Subtype)

The Cool Summer Subtype can be found in the New England, Great Lakes, and upper-Midwest regions of the United States and is characterized by cooler summers and very cold temperatures in the winter (Ritter, 2006).

6.7.2.3 Climate Change in the United States—Midwest Regional Assessment

In the twentieth century, the northern portion of the Midwest, including the upper Great Lakes, warmed by almost 4 degrees Fahrenheit (2 degrees Celsius), while the southern portion, along the Ohio River valley, cooled by about 1 degree Fahrenheit (0.5 degree Celsius). Annual precipitation increased; in some areas, average precipitation increased as much as 20 percent. Much of the precipitation increase resulted from a rise in the number of days with heavy and very heavy precipitation events. Moderate to very large increases in the number of days with excessive moisture occurred in the eastern portion of the basin.

During the twenty-first century, models project that temperatures will increase throughout the Midwest and at a greater rate than was observed in the twentieth century. Even over the northern portion of the region, where the greatest level of warming has occurred, an accelerated warming trend is projected. Temperatures are expected to increase by 5 degrees Fahrenheit to 10 degrees Fahrenheit (3 degrees Celsius to 6 degrees Celsius). The average minimum temperature is likely to increase as much as 2 degrees Fahrenheit (1 degree Celsius) more than the maximum temperature is expected to increase. Precipitation is likely to continue its upward trend at a slightly accelerated rate; 10 to 30 percent increases are projected across much of the region. Despite the increases in precipitation, increases in temperature and other meteorological factors are likely to lead to a substantial increase in evaporation, causing a soil moisture deficit, reduction in lake and river levels, and more drought-like conditions in much of the region. In addition, increases in the amount of precipitation produced by heavy and extreme precipitation are very likely (USGCRP, 2010).