

2 Alabama Current and Future Conditions

2.1 Current Conditions

Understanding the current condition of the population, economy, infrastructure, and natural environment in Alabama supports the determination of areas or communities that are more vulnerable to natural hazards. This section outlines the current conditions across these sectors and highlights areas of potential or inherent vulnerability.

2.1.1 Demographics

2.1.1.1 Population

Alabama has an estimated total population of 4,874,747 people and is the 23rd largest state in the United States in terms of total population.¹ Given the population size and geography, the average population density of the state is 96.2 people per square mile. However, the population density varies throughout the State by county where the maximum population density is 593 people per square mile in Jefferson County and the minimum population density is 12.1 people per square mile in Wilcox County.^{2,3,4} A map displaying population density per county can be seen in **Figure 2-1**.

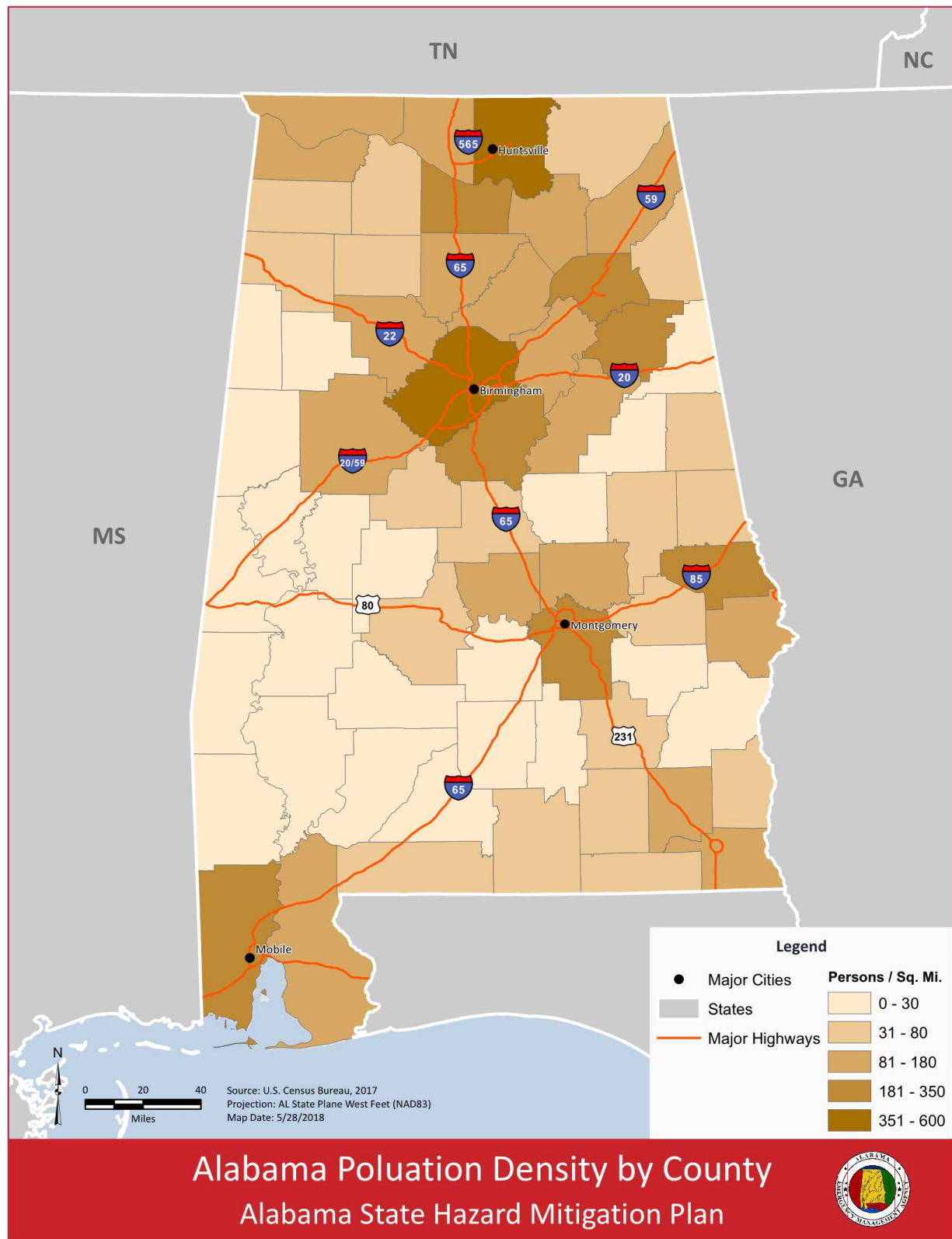
¹ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017. U.S. Census Bureau, December 2017. Retrieved at: <https://factfinder.census.gov>.

² Ibid.

³ 2017 U.S. Gazetteer Files. U.S. Census Bureau, December 2017. Retrieved at: <https://www.census.gov/geo/maps-data/data/gazetteer2017.html>.

⁴ Densities were calculated by dividing the area of dry land per county by population estimates.

Figure 2-1: Alabama Population Density by County



2.1.1.2 Population Characteristics

Specific characteristics of the population of the State help describe the situation of the State and can also help to identify vulnerabilities that exist within the population.

Income can be an important factor to consider during the planning process. Alabama has a median household income of \$44,758 which is lower than the national median income of \$55,322.⁵ Alabama has wide variation of median household income per county, ranging from \$20,428.00 (Shelby County) to \$72,310.00 (Sumter County).⁶

Mobility is an important population characteristic to consider for hazard mitigation planning as it can affect community members' resources and can present a challenge in educating the public on the hazards facing the community. One measure of population mobility is the type of housing, as homeowners are less likely to move as renters. In Alabama, an average of 31.5% of residents are renters, compared to the national average of 36.4%, implying that residents in Alabama are less mobile than the rest of the country.⁷

In Alabama, 59% of the population is urban compared to 81% of the United States.⁸ There are considerations for addressing risks in both urban and rural areas. Alabama will need to address these considerations, especially to identify mitigation solutions in the large areas of dispersed, rural communities.

Diversity is an important characteristic in understanding the vulnerabilities introduced by hazards and how to mitigate these vulnerabilities. Understanding the diversity in areas is critical because language barriers and unique community needs can impact the identification of vulnerabilities and implementation of actions to reduce risk. In Alabama, the racial and ethnic composition is 66.19% White (not Hispanic), 26.35% Black (not Hispanic), 1.24% Asian (not Hispanic), 4.00% Hispanic, and 2.22% Other.⁹ Compared to the national average, Alabama has a higher percentage Black population (by approximately 15%) and a lower percentage Hispanic population (by approximately

⁵ U.S. Census Bureau, 2016. Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars) 2012-2016 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1901&prodType=table.

⁶ Ibid.

⁷ U.S. Census Bureau, 2016. Occupancy Characteristics 2012-2016 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S2501&prodType=table.

⁸ U.S. Census Bureau, 2010. Urban and Rural Universe: Total Population 2010 Census Summary File 1. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_SF1_P2&prodType=table.

⁹ U.S. Census Bureau, 2016. ACS Demographic and Housing Estimates 2012-2016 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP05&prodType=table.

13%).¹⁰ Another indicator of diversity can be language. In Alabama, there is one federally recognized tribal government, the Poarch Band of Creek Indians, who are located in Atmore and in Alabama about 0.45% of the population is Native American or Alaskan native.¹¹¹² Overall, 1.2% of Alabama's households are limited English speaking. Language spoken at home can indicate diversity and limited English speaking households which can result in direct language barriers that need to be considered and addressed in planning.

Alabama faces population vulnerabilities in their older adult and young child populations. Older adults often are less mobile and are more likely to have chronic diseases that make them more sensitive to disruptions in their living situations. Young children often cannot care for themselves and may not be able to communicate their needs during a hazard or disaster events, requiring special planning for their needs. Overall, 15.3% of Alabamans are aged 65 or older and 6.0% of Alabamans are aged 5 or younger, which is consistent with the national average.¹³ While Alabama has a proportionately sized vulnerable population due to age, over one fifth of Alabamans are in age groups more vulnerable to the effects of hazards and disasters.

Another important population vulnerability for consideration in hazard mitigation planning is persons with disabilities or access and functional needs. Disabled people may require special planning considerations during and following a disaster, especially if they have mobility issues or require regular medical treatment. Disabled people in Alabama make up 16.3% of the total population, which is approximately 4% higher than the national average (12.5%).¹⁴ Being nearly one fifth of the population, the unique planning characteristics for disabled people are important to consider throughout the hazard mitigation process.

¹⁰ Ibid.

¹¹ U.S. Census Bureau, 2016. ACS Demographic and Housing Estimates 2012-2016 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP05&prodType=table.

¹² National Conference of State Legislatures, 2018. Federal and State Recognized Tribes. Retrieved at: <http://www.ncsl.org/research/state-tribal-institute/list-of-federal-and-state-recognized-tribes.aspx>.

¹³ U.S. Census Bureau, 2016. Age and Sex 2012-2016 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S0101&prodType=table.

¹⁴ U.S. Census Bureau, 2016. Disability Characteristics 2012-2016 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1810&prodType=table.

2.1.2 Economy & Infrastructure

2.1.2.1 Economy

Alabama has the 27th largest economy in the United States with a 2017 GDP of \$211.0 billion.¹⁵ Alabama's economy has been growing, 1.2% in 2017 compared with the national change of 2.1%.¹⁶

The largest industry in Alabama in 2017 was government and government enterprises, which accounted for 16.7% of the Alabama GDP. The second largest industry was finance, insurance, real estate, rental, and leasing which accounted for 16.2% of the GDP accordingly.¹⁷ The fastest growing industries in Alabama are mining, quarrying, and oil and gas extraction and professional and business services which account for 0.44 and 0.35 percentage point of the total growth in GDP respectively.¹⁸

Alabama's labor market has an estimated 2,032,800 non-farm jobs and 2,081,900 total employed persons.¹⁹ Alabama's largest employing sectors include government (385,800 as of March 2018) and trade, transportation, and utilities (380,500 employees as of March 2018).²⁰ While the unemployment rate of the State (as of March 2018) was less than the national average, at 3.8%, this still leaves 185,240 people more vulnerable without a steady source of income.²¹

2.1.2.2 Infrastructure

2.1.2.2.1 Roads, Highways, and Bridges

The quality of roads and bridges may impact the effect of a disaster, or the ability to evacuate during a disaster. Over 102,000 miles of public roads exist in the State of Alabama, 75% of which are rural roads maintained by the Alabama Department of Transportation (ALDOT).²² Approximately 9% of the State's roads are in concerning condition, rated poor or very poor, implying that they have ruts, cracks, and potholes where it is critical to be repaired.²³

Alabama's has 15,986 bridges that span over 485 miles. ALDOT owns approximately one third of the State's bridges, county governments own about one half of the State's bridges, and local

¹⁵ U.S. Department of Commerce Bureau of Economic Analysis, 2018. Alabama. Retrieved at: <https://www.bea.gov/regional/bearfacts/pdf.cfm?fips=01000&areatype=STATE&geotype=3>.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Alabama Department of Labor Market Information Division, 2018. Local Area Unemployment Statistics. Retrieved at: <http://www2.labor.alabama.gov/LAUS/>

²² American Society of Civil Engineers, 2015. Report Card for Alabama's Infrastructure. Retrieved at: <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-AL-Report-Card-2015-Full-Report-FINAL-web.pdf>.

²³ Ibid.

governments own the rest. Approximately one fifth of the State's bridges are in concerning condition, with 8.63% of the bridges being classified as structurally deficient and 12% of the bridges being classified as functionally obsolete. Moreover, 16% of the State's bridges are posted as reduced weight or closed to traffic. Approximately \$84 million in state and federal funding goes towards improvement of bridges annually, and over the past ten years bridge condition has been improving in the State.

2.1.2.2.2 Other Transportation Infrastructure

Alabama has 80 public use airports, 6 of which are used for commercial flights.²⁴ The aviation system in the State is managed by the Federal Aviation Administration and ALDOT and receive annual inspections for safety. Overall, Alabama has a very accessible airport network, with 80% of the population living within one hour of a commercial airport.²⁵

Alabama has one deep water port in the City of Mobile and several other major ports with access through internal waterways to the Gulf of Mexico. The Port of Mobile has a container capacity of 350,000 TEU per year which makes it the 12th largest port in the USA by volume.²⁶ Other major ports in Alabama include: Birmingham, Decatur, Tuscaloosa, Florence, Guntersville, and Montgomery. Many of these ports include industry supply shipment.

Alabama's railroad system is primarily freight; however, it also includes one passenger Amtrak line. Alabama is ranked 21st for total rail miles in the United States.²⁷ The freight network in Alabama is primarily Class 1 (72%), which have annual revenues of at least \$452.7 million, followed by Class 3 (20%), which have less than 100 miles of track, and Class 2 (8%), which have annual revenues of at least \$36.2 million, and primarily transports coal.²⁸

There are fourteen public transportation systems and four major privately-owned transportation systems in Alabama.²⁹ Alabama does not provide state funding for public transportation systems, so the fourteen public transportation systems are locally funded.³⁰ The four major public transportation systems in the state include: Birmingham Jefferson County Transit Authority, Montgomery Area Transit System, Mobile – The Wave Transit System, and the City of Huntsville – Public Transportation Division.³¹ The four major privately-owned transportation systems in the

²⁴ American Society of Civil Engineers, 2015. Report Card for Alabama's Infrastructure. Retrieved at: <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-AL-Report-Card-2015-Full-Report-FINAL-web.pdf>.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

²⁸ American Society of Civil Engineers, 2015. Report Card for Alabama's Infrastructure. Retrieved at: <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-AL-Report-Card-2015-Full-Report-FINAL-web.pdf>.

²⁹ Ibid.

³⁰ Ibid.

³¹ American Society of Civil Engineers, 2015. Report Card for Alabama's Infrastructure. Retrieved at: <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-AL-Report-Card-2015-Full-Report-FINAL-web.pdf>.

state include: Greyhound Lines, UAB Blazer Express, Auburn's Tiger Transit, and Birmingham Door to Door Shuttle Service.³²

2.1.2.2.3 Dams

According to the U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID), Alabama has 2,241 dams and notably does not have a Dam Safety program.³³ The majority of the dams are for recreational or fish and wildlife usage. Approximately 196 of these dams are high hazard potential and 449 of these dams are medium hazard potential. Only 2% of all dams in Alabama have been inspected.

2.1.2.2.4 Energy

Alabama's energy is produced through petroleum, natural gas, coal, and other renewable sources. Alabama produces a modest amount of crude oil, 120,000 barrels of crude oil per day from three refineries.³⁴ For electricity production, natural gas is the primary fuel used (36%), followed by coal (30%), nuclear power (27%), and renewables (7%).³⁵ Natural gas has recently surpassed the traditional coal for electricity production. Moreover, Alabama ranked 6th in 2016 for the total electricity produced from renewable resources (including hydroelectric) at 143,022 GWh.³⁶ About 80% of renewable production in Alabama comes from hydroelectric power.³⁷

2.1.2.2.5 Drinking Water, Stormwater, and Wastewater

Drinking and wastewater systems in the state of Alabama are regulated by the Alabama Department of Environmental Management. Drinking water is provided mainly through small, municipal water system (comparable to the rest of the United States) and is ranked in the top 10% in terms of quality.³⁸ Much of the drinking water system in the state has well exceeded its lifetime and needs major repairs.

There are approximately 250 utility networks operating wastewater treatment plants in the state. Like the drinking water systems, much of the wastewater system has outdated its intended lifetime. Damage to pipes can adversely affect the environment, as sanitary sewer overflows are a common occurrence during storm events.

³² Ibid.

³³ Ibid.

³⁴ Ibid.

³⁵ Ibid.

³⁶ U.S. Energy Information Administration, 2018. Electric Power Monthly. Retrieved at: <http://www.eia.gov/electricity/monthly>.

³⁷ American Society of Civil Engineers, 2015. Report Card for Alabama's Infrastructure. Retrieved at: <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-AL-Report-Card-2015-Full-Report-FINAL-web.pdf>.

³⁸ American Society of Civil Engineers, 2015. Report Card for Alabama's Infrastructure. Retrieved at: <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-AL-Report-Card-2015-Full-Report-FINAL-web.pdf>.

2.1.3 Natural Environment

2.1.3.1 Geography

Alabama is located in the southeastern part of the United States. It is surrounded by four states: Tennessee to the north, Georgia to the east, Mississippi to the west, and Florida and the Gulf of Mexico to the south. The total area of the State of Alabama is 50,645.33 square miles, making it the 30th largest state in the United States of America³⁹. Alabama is comprised of 67 counties and 11 major metropolitan areas.

2.1.3.1.1 Geology

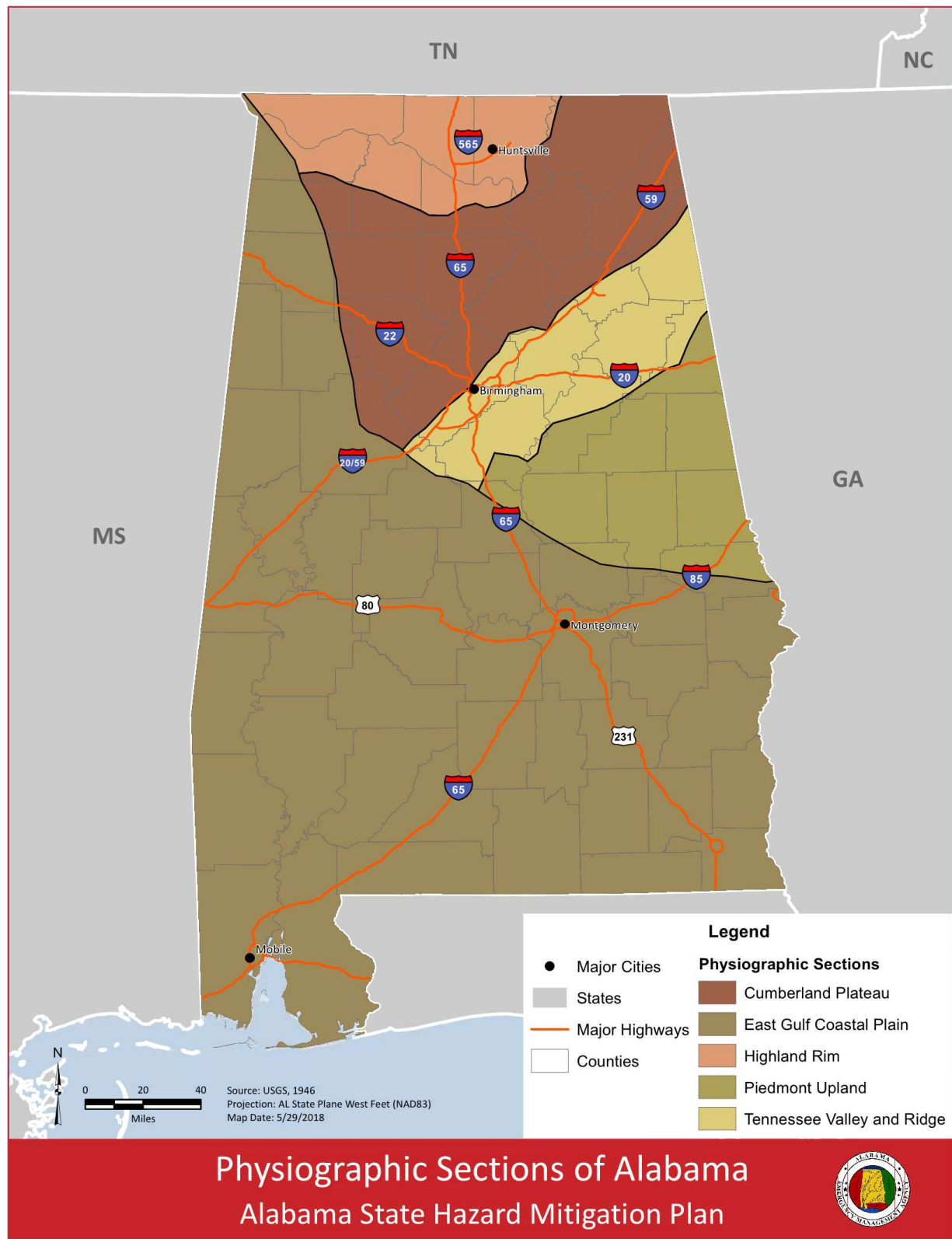
Generally, Alabama's varied topography can be summarized as mountainous in the northeast portion of the state, where the tail end of the Appalachian Mountains is located within the state and moving southwest to slope down to the coastal plains, where the state's coastline is. The highest point in the State is Cheaha Mountain at 2,407 feet above sea level and the lowest point is the coast of the Gulf of Mexico. There are five physiographic sections in the State of Alabama: Piedmont Upland Section, Tennessee Valley and Ridge Section, Cumberland Plateau Section, Highland Rim Section, and East Gulf Coastal Plain Section (Figure 2-2).⁴⁰ The Piedmont Upland Section, Tennessee Valley and Ridge Section, and Cumberland Plateau Section encompass the Appalachian Highlands Region of the State, the Highland Rim Section encompasses the Interior Plains Region of the State, and the East Gulf Coastal Plain Section encompasses the Atlantic Plain Region of the State.⁴¹

³⁹ U.S. Census Bureau, 2018. Quick Facts Alabama. Retrieved at: <https://www.census.gov/quickfacts/AL>.

⁴⁰ Encyclopedia of Alabama, 2013. Physiographic Sections of Alabama. Retrieved at: <http://www.encyclopediaofalabama.org/article/h-1362>.

⁴¹ Ibid.

Figure 2-2: Physiography of Alabama



2.1.3.1.2 *Rivers and Watersheds*

Water is a critical component to the natural environment of Alabama. The State of Alabama has over 132,000 miles of rivers and streams, including 14 major watersheds (Figure 2-3).⁴² One-tenth of the water in the United States originates in or passes through the state.⁴³ Moreover, Alabama is known for its river biodiversity, containing 22% of North American crayfish species, 27% of North American fish species, 28% of North American freshwater snails, 57% of freshwater turtles, and 61% of North American freshwater mussels. The state ranks number one in the United States for the number of species of each of these animals. The rivers in Alabama are a valuable resource for the state as they supply drinking water for approximately 56% of Alabama's population⁴⁴, hold 16 hydroelectric power dams⁴⁵, and provide space for the recreation industry that is valued at \$1 billion in the state.⁴⁶

⁴² Alabama Rivers Alliance, 2018. About Alabama's Rivers. Retrieved at: <https://alabamarivers.org/about-alabamas-rivers/>; Auburn University, 2016. Rivers of Alabama. Retrieved at: <http://aaes.auburn.edu/wrc/resource/rivers-of-alabama/>.

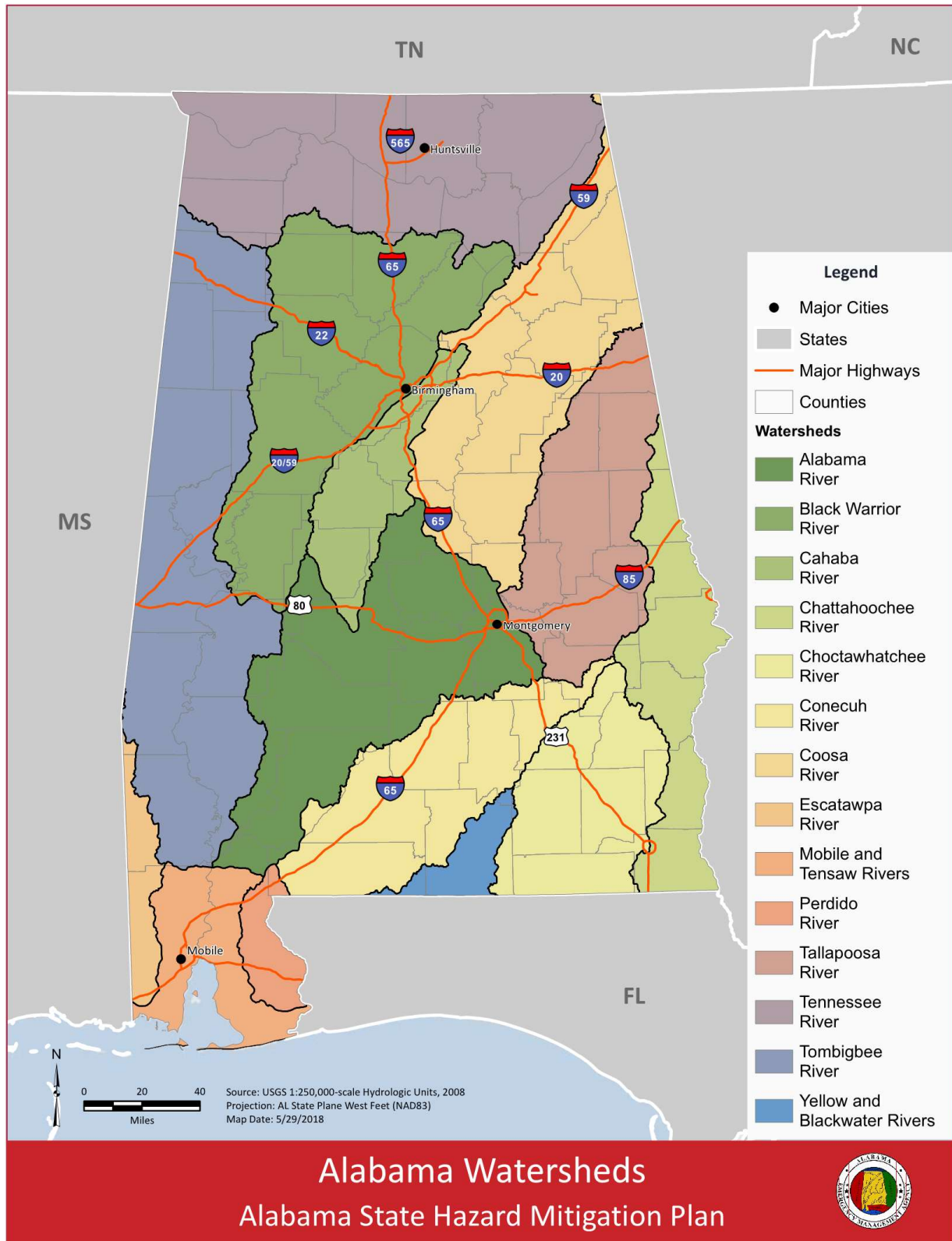
⁴³ Alabama Rivers Alliance, 2018. About Alabama's Rivers. Retrieved at: <https://alabamarivers.org/about-alabamas-rivers/>.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid.

Figure 2-3: Alabama Watersheds



2.1.3.1.3 *Coastline*

Alabama's coastline extends for 60 miles along the southern border of the state and includes an additional 600 miles of bay, coastal river, and bayou tidal shoreline.⁴⁷ The geography of this area has been determined by unique coastal geology processes where sea level fluctuations and wind have eroded and built up sand along the coastline. Additionally, human influence has impacted the geography of the coastline through use and development. Wetland infill, coastal construction, and dredging for ship channels have enhanced beach erosion and removed habitat for native species.⁴⁸

2.1.3.1.4 *Ecosystems*

The ecosystems of Alabama illustrate its terrestrial and aquatic biodiversity. There are 64 terrestrial ecosystems in Alabama, including 25 forest/woodland ecosystems, 11 wetland ecosystems, 7 glades prairies, and dozens of additional aquatic ecosystems.⁴⁹

2.1.3.2 *Climate*

The climate of Alabama can be generalized as having mild winters, hot summers, and year round precipitation.⁵⁰ Temperatures are generally higher and there tends to be more precipitation in the southern portion of the state.⁵¹ The City of Mobile, located in the southern portion of Alabama, has an average minimum daily temperature of 39.9°F in January, an average maximum daily temperature of 91.2°F, and an average of 65.9 inches of rain per year.⁵² In comparison, the City of Huntsville, located in northern Alabama, has an average minimum daily temperature of 29.3°F, an average maximum daily temperature of 86.5°F, and an average of 57.0 inches of rain per year.⁵³ The warmer, wetter conditions of the south can be attributed to the effects of the Gulf of Mexico.

2.2 Future Conditions

The changing conditions in Alabama have an impact on the future vulnerability of population, property, and the environment from natural hazards. This section identifies the changes in population and land use in Alabama. Each hazard profile, in Section 3.2 of this plan, identifies the impact of the changing land use on the risk from each hazard.

⁴⁷ Encyclopedia of Alabama, 2012. Alabama's Coastline. Retrieved at: <http://www.encyclopediaofalabama.org/article/h-2049>

⁴⁸ Ibid.

⁴⁹ Encyclopedia of Alabama, 2013. Physiographic Sections of Alabama. Retrieved at: <http://www.encyclopediaofalabama.org/article/h-1362>.

⁵⁰ Encyclopedia of Alabama, 2012. Climate. Retrieved at: <http://www.encyclopediaofalabama.org/article/h-1283>.

⁵¹ Ibid.

⁵² Encyclopedia of Alabama, 2012. Climate. Retrieved at: <http://www.encyclopediaofalabama.org/article/h-1283>.

⁵³ Ibid.

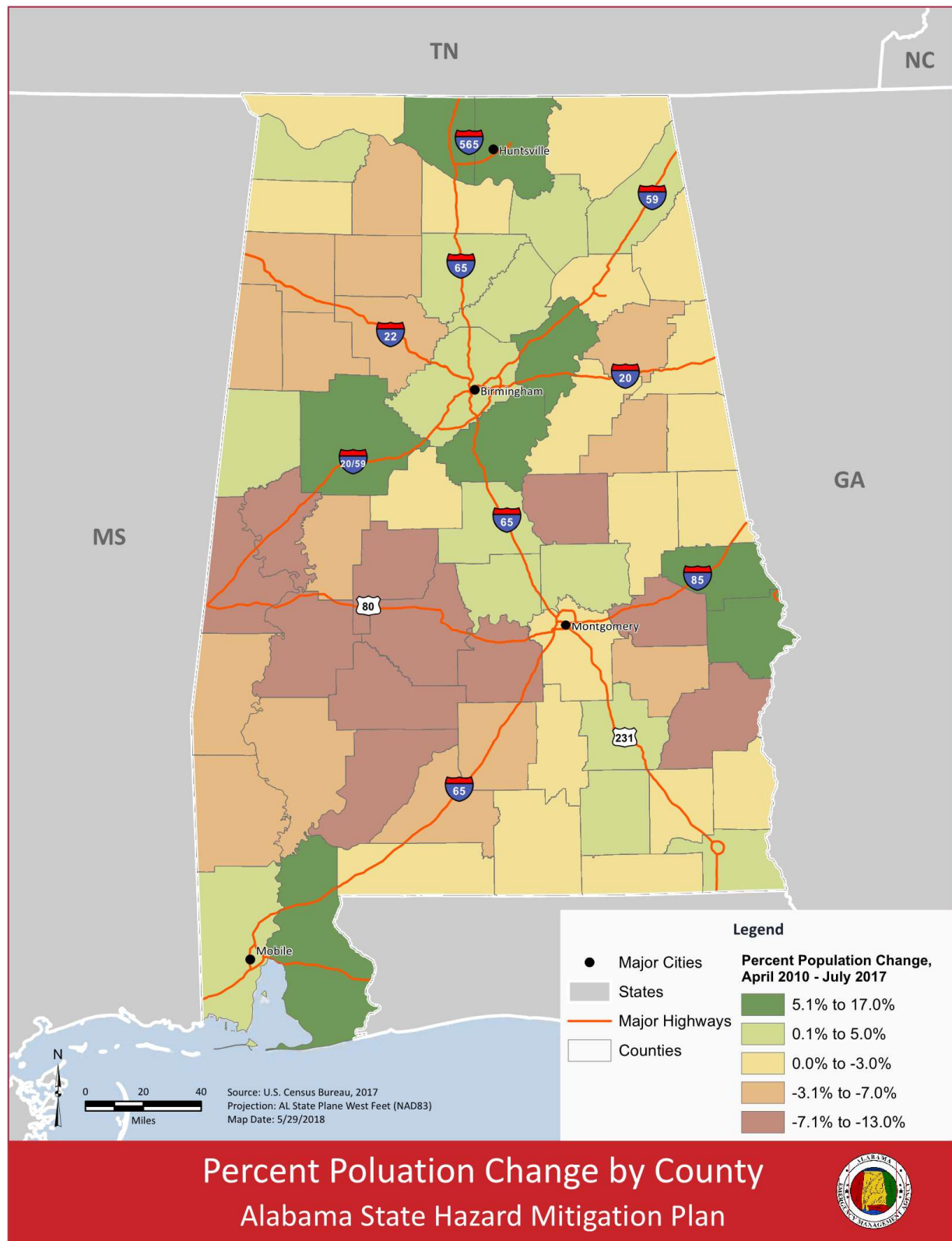
2.2.1 Population Trends

Overall the population of Alabama is increasing, but at a comparatively lower rate than much of the United States. From 2010 – 2017, the population of Alabama increased by approximately 1.86%, 94,612 people, while the population of the United States increased by approximately 5.30% with an average⁵⁴ of 318,694 per state. However, within the State of Alabama the rate of population change is variable (Figure 2-4). Only 22 out of the 67 counties in Alabama have increased in population from 2010 – 2017; and of those 22, nine are changes of less than 1,000. The three counties with the highest percentage of population change—Baldwin County, Lee County, and Limestone County—account for over two-thirds of the population increase for the State.⁵⁵

⁵⁴ Average of All 50 States, Puerto Rico, and the District of Columbia.

⁵⁵ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017. U.S. Census Bureau, December 2017. Retrieved at: <https://factfinder.census.gov>.

Figure 2-4: Percent Population Change in Alabama by County, April 2010 – July 2017



Alabama's population is only expected to continue to increase. It is predicted that by 2040, there will be a 16.9% population increase compared to the 2010 census.⁵⁶ The top five counties in terms of population size are anticipated to be (in order): Jefferson County, Madison County (up from 3rd largest), Mobile County (down from 2nd largest), Baldwin County (up from 7th largest), and Shelby County.⁵⁷ The largest population increase is anticipated to be 64.9% in Baldwin County.⁵⁸

As the State's population increases, there will be a greater chance that people will be exposed to different hazards and require State resources for protection and recovery. The larger population increases in coastal counties (Baldwin and Mobile) are particularly concerning due to the significant exposure of this region to coastal hazards, including hurricanes and sea level rise.

2.2.2 Land Use Trends

Alabama's land is becoming more developed. From 1982 to 2012, the percentage of developed non-federal land went from 5.23% to 9.25%.⁵⁹ A portion of this land use change is due to the decrease in number of farms and decrease in amount of farmland.⁶⁰ Additionally, the increase in land development may be due to an increase in housing in the state. From 2010 to 2016, Alabama saw a 3% increase in housing units within the state.

Compared with the rest of the Gulf Coast, the two Alabama Counties with access to the coast are ranked in the middle range of amount of land developed in the Gulf Coast region, existing in the range of 20-40 square miles from 1996 to 2010. Moreover, it ranked amongst the highest for net loss (-150 to -275 square miles from 1996 – 2010), fairly high for net wetland loss (-10 to -40 square miles from 1996 – 2010), and a mid-range percentage for land use change percent (10% – 20%).⁶¹ It can be noted for all of the coastal counties, in contrast to just the two with access to the coast, percentage land use change is even higher, at 25.3% for the time period of 1996 – 2010.⁶² These patterns of development, in conjunction with population trends, are likely to make the coastal regions of the state much more vulnerable to hazards.

Sea level rise threatens to be one of the largest factors to change land use in Alabama in the coming years. The combination of global sea level rise with natural and human induced land

⁵⁶ Kirby, Brendan, 2015. Alabama in 2040: Check out population forecasts for all 67 counties. Retrieved at: https://www.al.com/news/index.ssf/2015/04/alabama_in_2040_check_out_popu.html.

⁵⁷ Kirby, Brendan, 2015. Alabama in 2040: Check out population forecasts for all 67 counties. Retrieved at: https://www.al.com/news/index.ssf/2015/04/alabama_in_2040_check_out_popu.html.

⁵⁸ Ibid.

⁵⁹ United States Department of Agriculture National Resources Conservation Service, 2017. National Resources Inventory. Retrieved at: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri/>.

⁶⁰ Farmland Information Center, 2018. Alabama Statistics. Retrieved at: <https://www.farmlandinfo.org/statistics/alabama>.

⁶¹ National Oceanic and Atmospheric Administration, 2010. Gulf of Mexico Regional Land Cover Change Report. Retrieved at: <https://coast.noaa.gov/data/digitalcoast/pdf/landcover-report-gulf-coast.pdf>.

⁶² National Oceanic and Atmospheric Administration Office for Coastal Management, 2017. Alabama. Retrieved at: <https://coast.noaa.gov/states/alabama.html>.

subsidence is reducing the amount of useable land next to the Gulf of Mexico (see **Sections 5.2.10** and **5.2.11** for more information).

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