

APPENDIX D

Existing & Emerging Conditions

- D-1 Population, Demographics & Employment
- D-2 Natural Areas & Environmental Conditions
- D-3 Existing Land Use and Development
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 - ◆ D-4.1 - Water & Wastewater Utilities
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Population, Demographics & Employment

Population Growth (Historic and Projected)

Since 2000 Brunswick County has added nearly 63,000 residents, increasing from around 73,717 residents in 2000 to 136,693 residents in 2020. As the county has grown, it's growth rate has moderated, yet it still ranks as the fastest growing county in North Carolina and among the fastest growing in the United States. The county outgrew the state of North Carolina by 350% from 2015 to 2020 and the US by 380% during the period.

	2000	2010	2015	2020
United States	281,421,906	308,745,538	321,416,821	331,449,281
Growth Rate		1.0%	0.8%	0.6%
North Carolina	8,049,313	9,580,681	10,042,802	10,386,227
Growth Rate		1.9%	1.0%	0.7%
Capture Rate		5.6%	3.6%	3.4%
Brunswick County	73,717	108,069	122,211	136,693
Growth Rate		4.7%	2.6%	2.4%
Capture Rate		2.2%	3.1%	4.2%

We believe the Covid pandemic and resulting real estate shifts will significantly benefit Brunswick County and the coast of North and South Carolina alike. With more Baby Boomers shifting into retirement and a massive increase in remote working, Brunswick County and its temperate climate (including four seasons) and coastal orientation stand to benefit significantly.

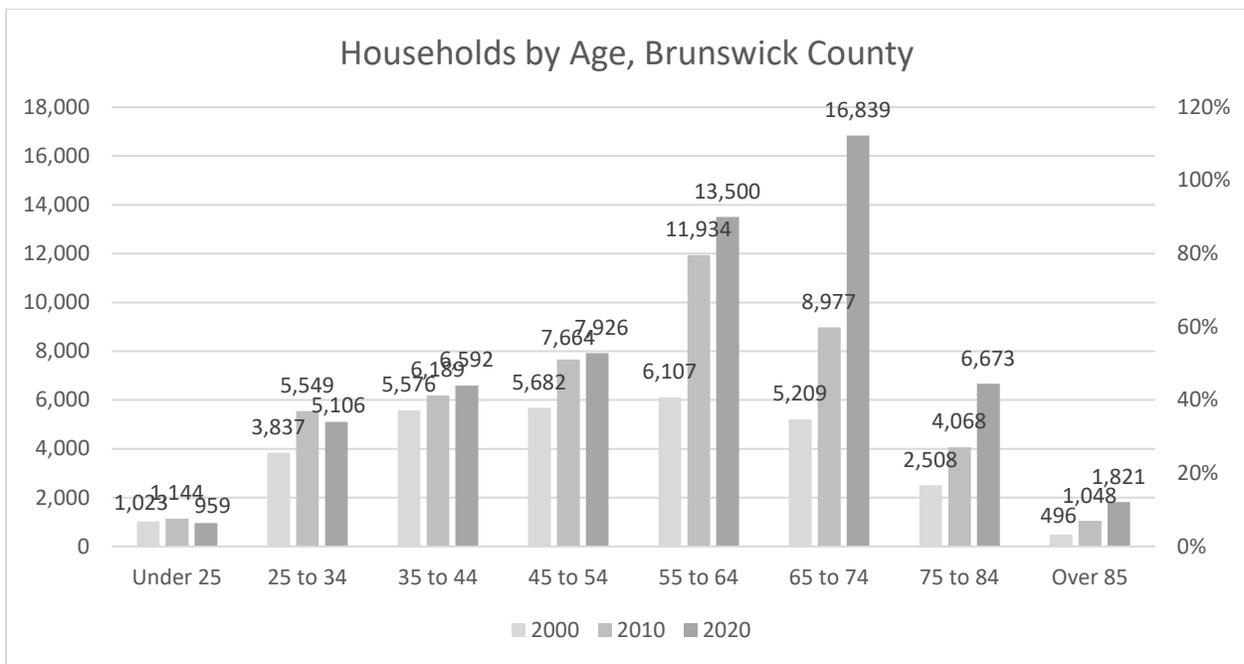
North Carolina Office for State Budget & Management forecasts for Brunswick County appear to be largely on target in the long-term, showing the county growing to around 230,000 residents by 2040. We've taken some liberty with when growth occurs, increasing short-term growth rates following Covid and aligning with more Boomers retiring, and moderated growth rates longer-term, resulting in a net change of around 5,000 people by 2040.



	2020	2025	2030	2035	2040
United States	331,449,281	344,234,377	355,100,730	364,862,145	373,527,973
Growth Rate	0.6%	0.8%	0.6%	0.5%	0.5%
North Carolina	10,386,227	11,046,200	11,673,849	12,174,771	12,658,927
Growth Rate	0.7%	1.3%	1.2%	0.9%	0.8%
Capture Rate	3.4%	5.2%	5.8%	5.1%	5.6%
Brunswick County	136,693	156,551	179,294	205,340	235,171
Growth Rate	2.4%	2.8%	2.8%	2.8%	2.8%
Capture Rate	4.2%	3.0%	3.6%	5.2%	6.2%

Population by Age

Much of the growth in Brunswick County has occurred among more mature households, particularly those between 55 and 84. Indeed, households under the age of 55 have grown by approximately 28% since 2000, while growth among households over 55 has increased by 171% during the same period.



While the growth of these more mature households creates solid opportunities to grow medical, personal services, retail, and other local-serving goods, it does far less to assist growth in export types of industries; those that can bring more money into the local economy from outside.

Similarly, a look at population growth by age tells the same story, with younger persons, those under the age of 55, growing between 28% and 54% from 2000 to 2020, and those above 65 growing between 219% and 280% during the period. Again, these more mature populations create greater demand for medical, services, and retail jobs, but also do less to create export jobs.

	2000	2010	2015	2020	Growth, 2000 - 2020
Under 5	4,005	6,264	5,156	5,281	32%
5 to 9	4,358	7,343	5,279	5,576	28%
10 to 14	4,521	3,780	5,770	6,423	42%
15 to 19	4,257	4,644	6,629	5,667	33%
20 to 24	3,471	5,076	5,647	5,333	54%
25 to 34	8,494	11,987	10,926	12,474	47%
35 to 44	10,287	12,095	12,522	13,186	28%
45 to 54	10,630	14,255	14,609	15,157	43%
55 to 64	10,740	19,655	21,116	24,969	132%
65 to 74	8,107	15,335	24,185	29,130	259%
75 to 84	3,498	6,048	8,471	11,163	219%
85 and Above	775	1,728	2,333	2,944	280%

Today nearly 50% (49.7%) of all Brunswick County residents are above the age of 55 and close to a third (31.5%) are over 65 years of age. These rates are nearly double that of the state of North Carolina (29.2% and 16.3%, respectively) and further indicate the attractiveness of the county as a retirement destination.

Population by Income

In terms of incomes, growth has unsurprisingly occurred among more affluent households, with growth rates being strongest among households earning more than \$150,000, increasing by 171% since 2010 and 572% since 2000. Growth among lower-income households (those earning under \$25,000 annually) has been negative over the last decade, as overall income increases due to inflation have pushed most residents out



of these lowest income brackets. Of concern is the slower growth among households earning less than \$50,000 annually, which has grown much slower than the county overall. Included in these households are many service workers, including personal services, medical workers, retail workers, and others in more moderate-paying jobs. This indicates many of these households may be commuting to work in Brunswick while living in other adjacent counties.

	2000	2010	2015	2020	Growth '00 to '20	Growth '10 to '20
Under \$15,000	5453	8278	7,980	6,325	16%	-24%
\$15,000 to \$24,999	4,744	6,321	4,667	4,660	-2%	-26%
\$25,000 to \$34,999	4,632	4,227	6,240	5,446	18%	29%
\$35,000 to \$49,999	5,458	7,503	7,371	8,004	47%	7%
\$50,000 to \$74,999	5,646	8,917	8,408	12,137	115%	36%
\$75,000 to \$99,999	2,267	5,292	5,982	8,692	283%	64%
\$100,000 to \$149,999	1,424	4,015	5,321	8,680	510%	116%
\$150,000 and Above	814	2,020	3,890	5,472	572%	171%

In terms of median household incomes, Brunswick County has seen solid growth, particularly relative to the state of North Carolina overall, with median incomes in the county outgrowing the state and, as of 2020, above the state average for the first time. The influx of affluent retirees to the area, as well as suburban growth of Wilmington into northern portions of the county, have contributed to these strong incomes.

	2000	2010	2015	2020	Growth '00 to '20	Growth '10 to '20
Median Income						
Brunswick County	\$35,888	\$43,884	\$46,640	\$59,763	67%	36%
North Carolina	\$39,184	\$43,326	\$47,830	\$56,642	45%	31%



Race and Ethnicity

Brunswick County has seen minor changes in terms of its racial composition since 2000, with the county remaining more than 80% Non-Hispanic White. Perhaps the most significant shifts racially have been the slight decline in the share of Black or African-American residents (down from 12.4% to 8.3% in 2020) and the growth of Hispanic residents (up from 1.5% in 2000 to 5.4% in 2020).

	2000	2010	2015	2020
Not Hispanic				
White	84.7%	81.1%	81.2%	81.0%
Black	12.4%	11.2%	10.6%	8.3%
American Indian	0.6%	0.3%	0.3%	0.5%
Asian	0.2%	0.4%	0.6%	0.7%
Native Hawaiian	0.0%	0.0%	0.4%	0.1%
Two or More Races	0.6%	2.0%	2.0%	4.0%
Hispanic	1.5%	4.9%	4.8%	5.4%

Permanent and Seasonal Populations

The county functions as a major vacation destination but also functions as a second home area, both for weekend or summer use, but also for snowbirds living part-time in the Northeast or Midwest and part-time in the county. Noell Consulting Group utilized previous county estimates together with US Census data for seasonal units and hotel/lodging data to estimate potential seasonal population counts in the county. As can be seen below, we estimate Brunswick's seasonal population is somewhere around 321,570 residents at its peak, which is around 2.4 times the permanent population of the county. We estimate the county has seen a 73% growth in its seasonal population since 2000, slightly under its overall permanent population growth of 85% during the same time period.

	2000	2010	2015	2020
Permanent Population	73,717	108,069	122,211	136,693
Seasonal Population	185,847	255,445	315,608	321,568



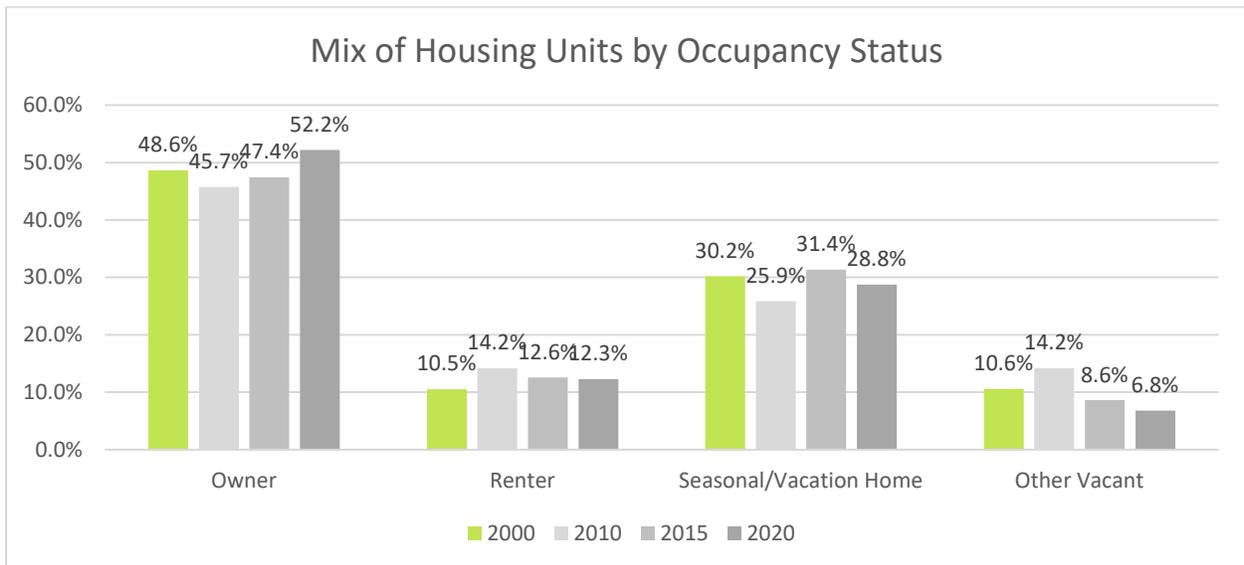
Looking ahead, we estimate the county’s seasonal population will grow by around 78% from 2020 through 2040, with the permanent population growing by around 72%.

	2020	2025	2030	2035	2040
Permanent Population	136,693	156,551	179,294	205,340	235,171
Seasonal Population	321,568	381,082	436,443	499,847	572,461

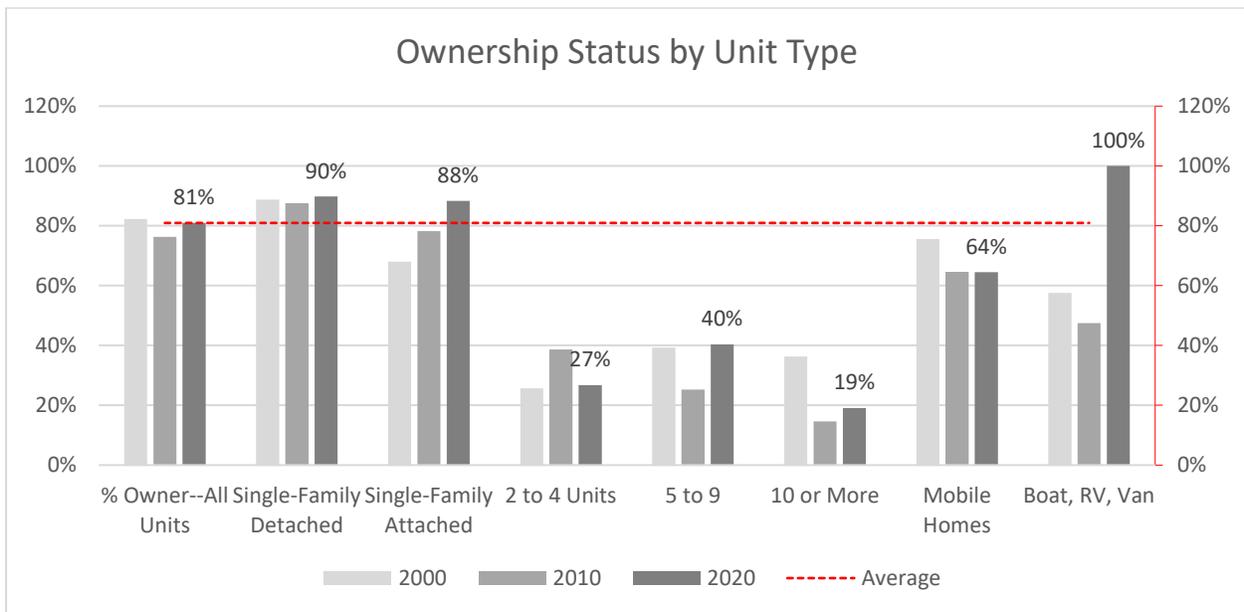
Brunswick County Housing

Given the large seasonal population seen in the county, it’s not surprising that a solid share of the housing in Brunswick County is utilized for seasonal or vacation use. As can be seen below, Census data indicates around 29% of all housing units in the county are used as second or vacation homes, a number that has remained quite steady over the past two decades.

A little more than half of the units in the county are owner-occupied year-round and only around 12.3% are occupied by renters year-round, with the balance (6.8%) being vacant. Encouraging is the dropping vacancy rate, which peaked during the 2010 recession at 14.2% and has steadily declined since then.



Among occupied units year-round (permanent residents), roughly 81% are owner-occupied, which is a very high level and reflective of the higher home prices found in the county. As can be seen in the graphic below, 90% of the single-family detached houses and 88% of single-family attached houses are owner-occupied, with renters being the dominant tenure in buildings with 2 or more units in a structure (duplexes, apartment buildings, etc.). Around two-thirds of mobile homes in the county are owner-occupied.



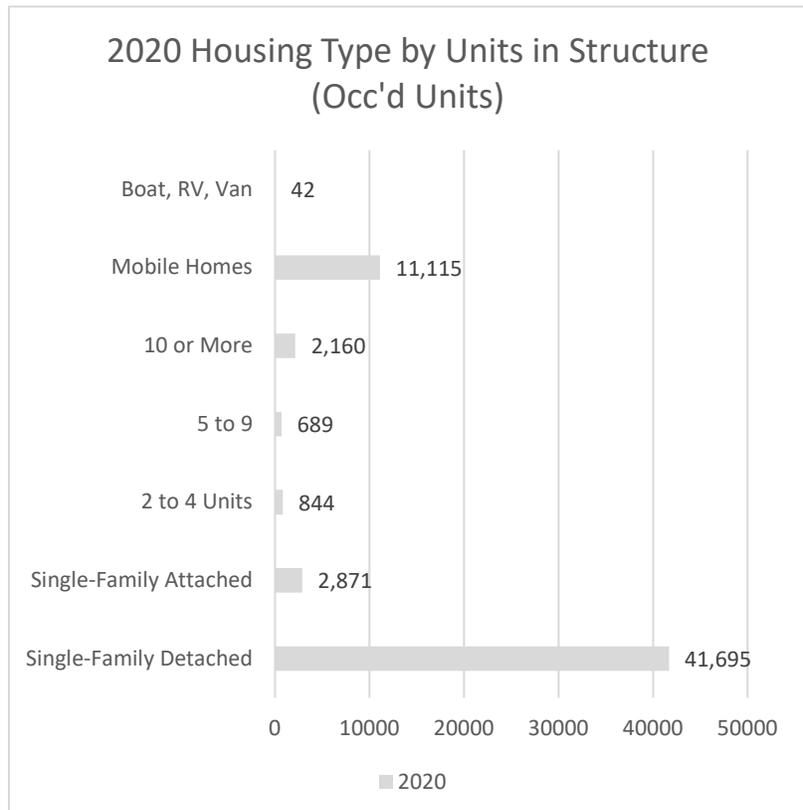
Home ownership rates have remained relatively high in the county overall since 2000, with rates among more affluent households (those earning more than \$75,000 annually) remaining around or above 90%. Even among more moderate-earning households, home ownership is relatively high, with those earning between \$35,000 and \$75,000 having home ownership rates around 80% or so. These rates likely remain high given the lack of rental apartment product in the county and the likely need for many in personal services, medical, etc. needing to commute from outside of the county.



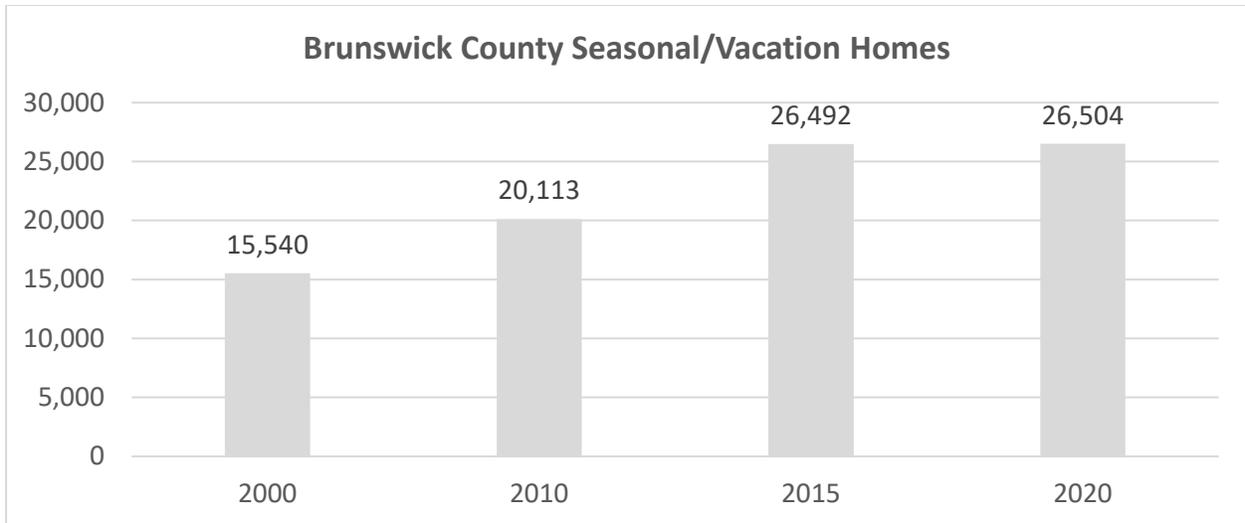
	2000	2010	2015	2020	
Under \$15,000	69%	54%	61%	57%	Single-family detached homes are by far the dominant housing type in Brunswick County, accounting for 70% of all occupied housing units in the area. Mobile homes are the second largest unit type in the county,
\$15,000 to \$24,999	74%	66%	76%	68%	
\$25,000 to \$34,999	83%	69%	69%	70%	
\$35,000 to \$49,999	83%	81%	81%	80%	
\$50,000 to \$74,999	91%	85%	86%	83%	
\$75,000 to \$99,999	92%	89%	89%	90%	
\$100,000 to \$149,999	94%	95%	88%	93%	
\$150,000 and Above	91%	92%	91%	95%	

accounting for 19% of all units, with multifamily properties with five or more units (typical multifamily product) accounting for only 5% of units in the county. Over time, as the local population continues to age, and as housing affordability continues to be a challenge in the county, the need for more multifamily properties will increase.

As can be seen at left, nearly 41,700 single-family detached units are occupied in Brunswick County today, with mobile homes accounting for the biggest share of remaining units, or around 11,115 total units. Fewer than 3,000 multifamily units exist in the county today, a potentially significant hole when considering issues relating to housing affordability in Brunswick.

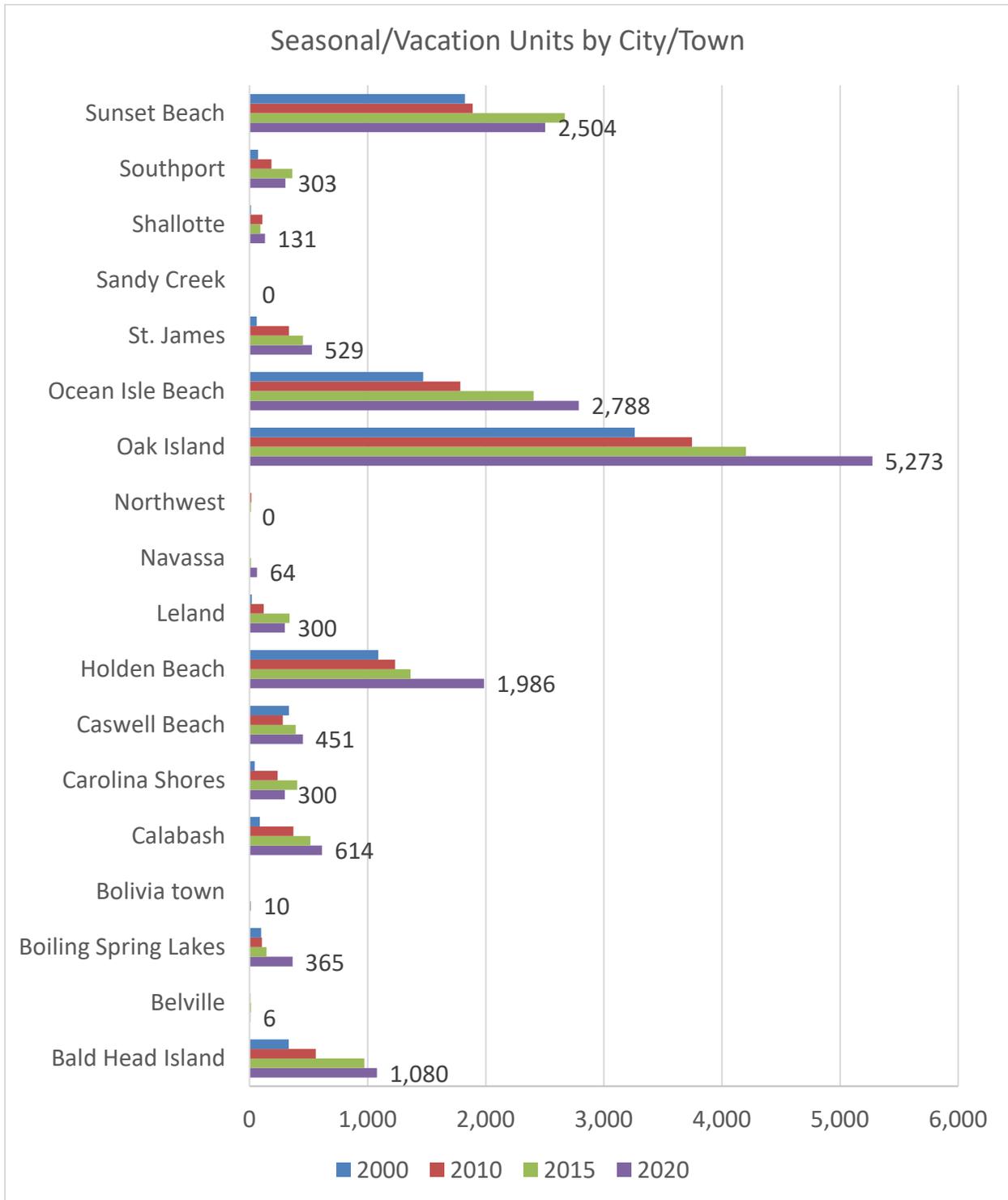


As noted earlier, Brunswick County has seen solid growth in its number of seasonal and/or vacation homes. As shown below, the count of these homes has increased from around 15,540 in 2000, to more than 26,500 in 2020



As can be seen on the following page, the greater share of these homes, and indeed the greatest growth, has occurred along the coast in Oak Island, Ocean Isle Beach, Holden Beach, and Sunset Beach. Bald Head Island, which is tougher to access, also has a higher concentration of vacation or seasonal homes, although at a smaller level than these other beach communities. As you get further from the coast itself, the share of seasonal or vacation homes drops steadily with little to none of these units existing in Northwest, Bolivia, Sandy Creek, and Navassa.





	2000	2010	2020
Brunswick County	73,717	108,069	136,693
Bald Head Island	173	75	209
Growth Rate		-5.7%	0.4%
Belville	285	1,884	2,696
Growth Rate		56.1%	2.1%
Boiling Spring Lakes	2,972	4,982	6,156
Growth Rate		6.8%	1.9%
Bolivia	148	137	177
Growth Rate		-0.7%	-8.6%
Calabash	711	1,864	2,057
Growth Rate		16.2%	3.2%
Carolina Shores	1,482	2,863	4,391
Growth Rate		9.3%	4.7%
Caswell Beach	370	626	578
Growth Rate		6.9%	9.9%
Holden Beach	787	760	978
Growth Rate		-0.3%	0.5%
Leland	1,938	11,925	21,903
Growth Rate		51.5%	7.2%
Navassa	479	1,809	2,135
Growth Rate		27.8%	2.6%
Northwest	671	677	778
Growth Rate		0.1%	2.7%
Oak Island	6,571	6,818	8,118
Growth Rate		0.4%	2.6%
Ocean Isle Beach	426	754	743
Growth Rate		7.7%	1.9%
St. James	804	2,790	5,889
Growth Rate		24.7%	9.1%
Sandy Creek	246	221	212
Growth Rate		-1.0%	2.7%
Shalotte	1,381	3,361	4,205
Growth Rate		14.3%	2.0%
Southport	2,351	2,778	3,860
Growth Rate		1.8%	4.5%
Sunset Beach	1,824	3,333	3,994
Growth Rate		8.3%	1.6%

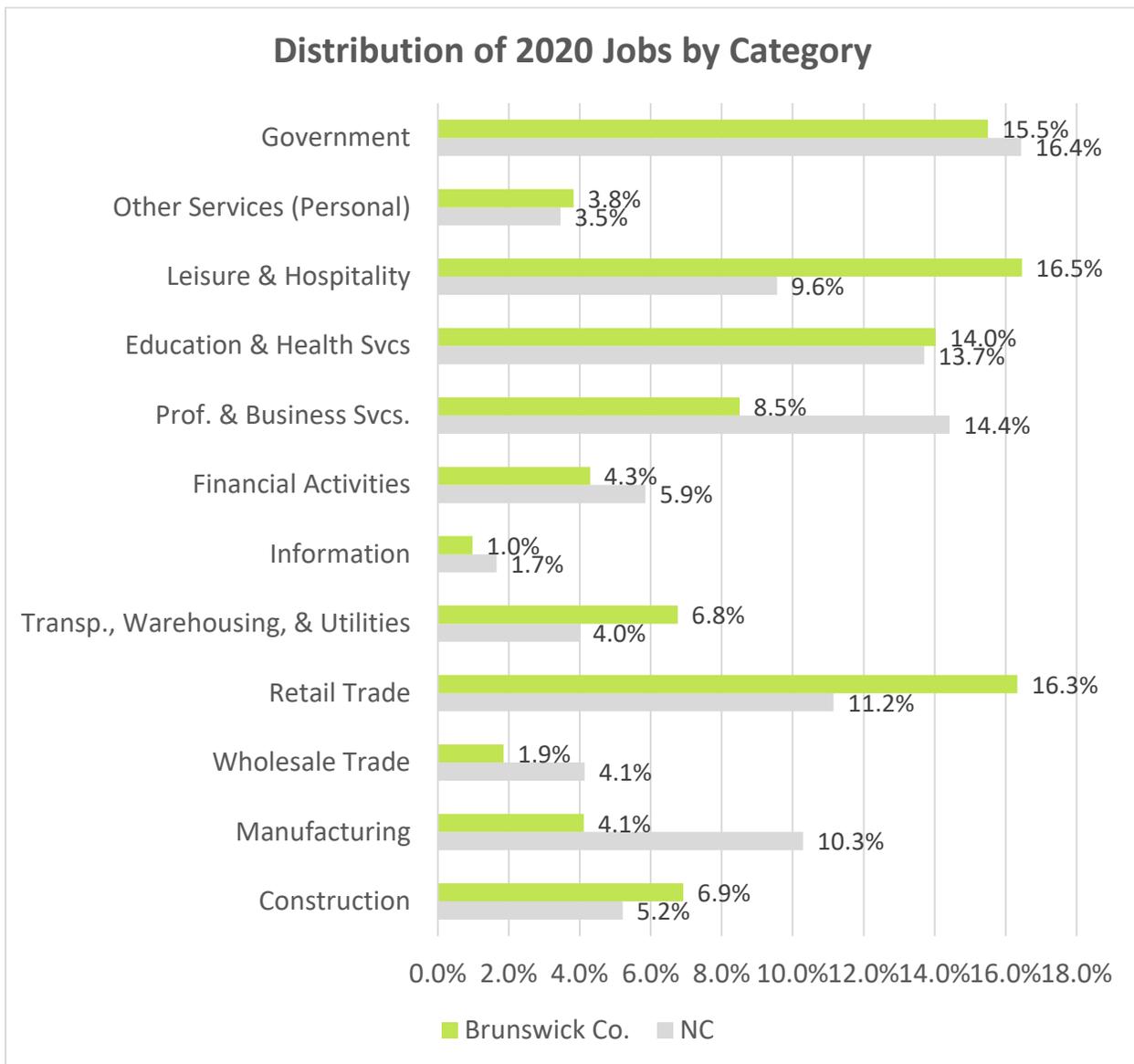
Approximately 85% of the population growth in Brunswick County over the past decade has occurred in the 18 towns located in the county, up from less than 70% the preceding decade. Growth has been strongest in Leland, which accounted for more than a third of this growth, or around 10,000 new residents between 2010 and 2020.

St. James also accounted for a solid share of this growth, more than doubling in population and adding 3,100 new residents during the period.



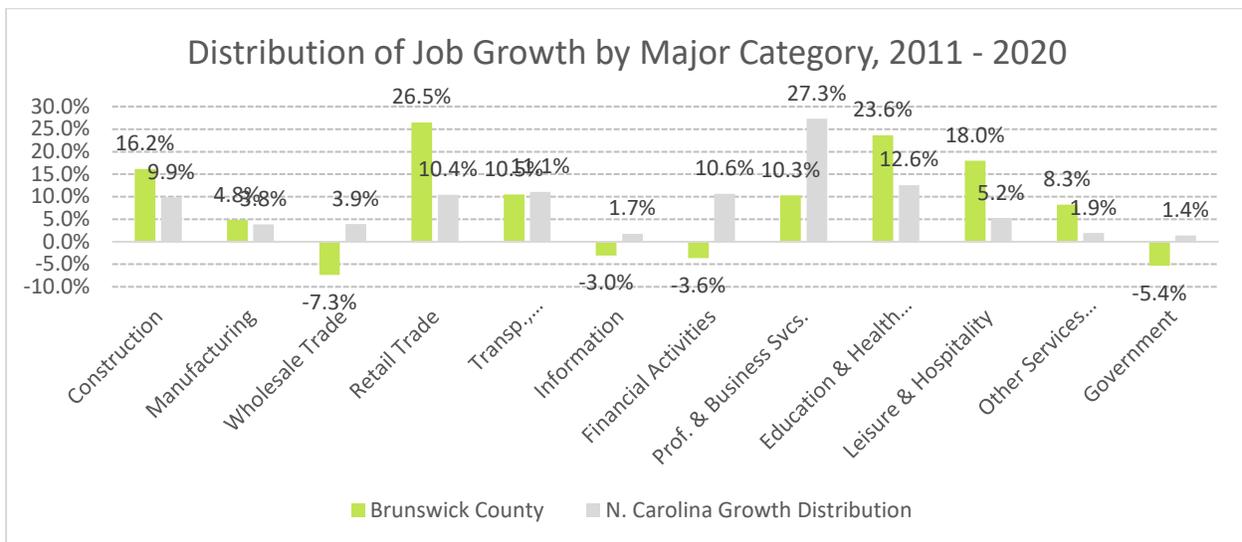
Economy

As alluded to previously, Brunswick County’s economy is heavily rooted in local-serving and moderately-paying industries, including retail, personal services, and health care, as well as those relating directly to the vacation market, such as leisure and hospitality jobs.



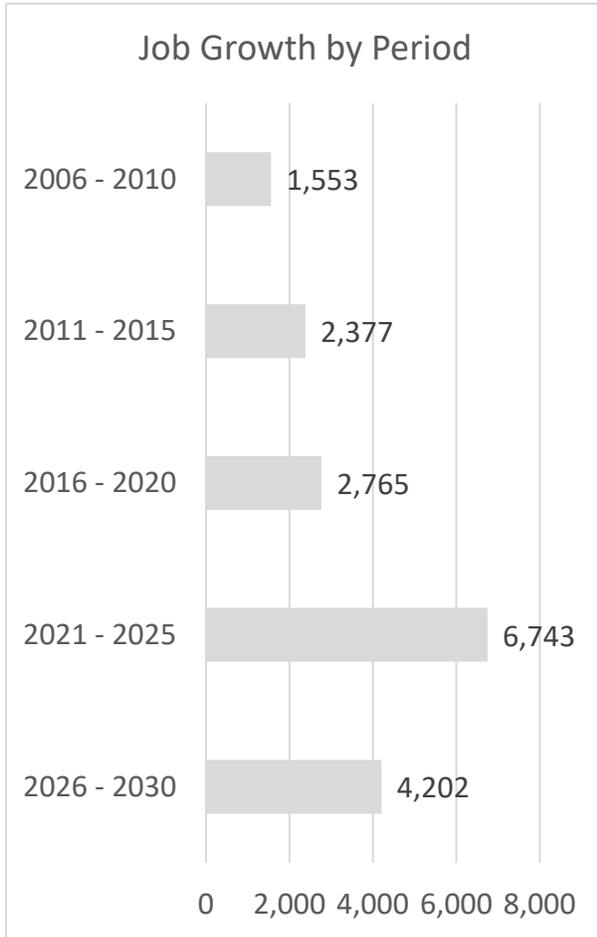
When compared to the state of North Carolina overall, nearly a third of local jobs are found in Retail Trade and Leisure & Hospitality, 50% more than is found in the state overall (20% combined). Lacking in the county are more export-serving industries, such as Professional & Business Services (8.5% in the county vs. 14.4% in NC), Financial Activities (4.3% vs. 5.9%) and Manufacturing (4.1% vs. 10.3%) overall.

Indeed more than 67% of all job growth in the county between 2011 and 2020 occurred in three categories: Retail Trade, Education & Health Care, and Leisure & Hospitality. These same three categories accounted for 28% of all growth in the state of North Carolina. Most of the jobs in these economic sectors are also moderately-paying, indicating a significant growth in need for moderately-priced housing, including rental product for these workers.



Absent from the growth in the county are jobs in Professional & Business Services and Financial Activities, which accounted for only around 6.5% of jobs added in the county in the last decade, but 38% of all jobs added in the state. These jobs tend to be higher-paying than personal services, retail, medical, etc.





Job growth in the county over the past fifteen years has been blunted by two recessions (2008 to 2010, and 2020) and, as a result has been moderate overall, with the area adding only around 6,500 jobs between 2006 and 2020. Indeed, most of the population and household growth has occurred among retirees, with fewer workers moving into the county for jobs. Looking ahead, job growth in the area is expected to pick up coming out of the Covid recession, with the area adding around 6,750 jobs from 2021 through 2025 and 4,200 jobs from 2026 through 2030.

Of significant note is the potential to capture remote workers, given the county's solid climate and coastal orientation and amenities. These workers may not show up in job growth as their jobs are still located in areas such as Cleveland, New York Chicago, etc., but these workers will opt to live in the county, increasing needs for local services and housing.

Natural Systems & Environmental Conditions

One of the primary purposes of a CAMA Land Use Plan is to establish a rational and coordinated local management program for coastal resources. Identification and recognition of Areas of Environmental Concern (AECs) and other environmental assets is critical to the plan. All such assets are described in the subsections that follow.

Areas of Environmental Concern (AECs)

AECs are areas of natural importance designated by the NC Coastal Resources Commission (CRC). The State Guidelines for Areas of Environmental Concern (15A NCAC 7H) require that local land use plans give special attention to the protection of appropriate AECs because of their environmental, social, economic, and aesthetic value.

Four categories of AECs have been established by the CRC:

1. Estuarine and Ocean System

This system is the broad network of brackish sounds, marshes, and surrounding shores. CAMA permits are required for development in the four subcomponents of this system, which include:

- **Coastal Wetlands.** These areas are considered to be unsuitable for all development activities and other land uses that alter their natural functions. They are defined as any salt marsh or other marsh subject to regular or occasional flooding by tides (including wind tides) and contains one or more of the following plant species: *Cord Grass*, *Black Needlerush*, *Glasswort*, *Salt Grass*, *Sea Lavender*, *Bulrush*, *Saw Grass*, *Cat-tail*, *Salt Meadow Grass*, and *Salt Reed Grass*.
- **Estuarine Waters.** These areas are the dominant component of the entire estuarine and ocean system and provide important habitat for a diverse range of shellfish, birds, and other marine wildlife. Conservation of estuarine waters is usually the highest priority use for these areas. Development activities which are water dependent and require water access and cannot function elsewhere for example, access and navigation channels, structures to prevent erosion, piers, boat docks, marinas, wharfs and mooring pilings may be allowed within this AEC provided they are consistent with CAMA regulations. It should be noted that Brunswick County prohibits floating home development anywhere in its waterways, public trust waters, and along the shorelines of the County to prevent consumption of the County's limited estuarine surface waters. A floating home or structure is any structure, not a boat, supported by means of flotation, designed to be used without a permanent foundation, which is used or intended for human habitation or commerce. A structure will be considered a floating structure when it is inhabited or used for commercial

purposes for more than thirty days in any one location. A boat may be deemed a floating structure when its means of propulsion has been removed or rendered inoperative and it contains at least 200 square feet of living space area.

- **Public Trust Areas.** Public trust areas include waters of the Atlantic Ocean and submerged tidal lands below the mean high water (MHW) or normal water line on shore to the state's official boundary three miles offshore. The water and submerged tidal lands are held in trust for the public to use through such activities as fishing, swimming, and boating. The state's policy is to ensure that the public is able to maintain access to these waters. Structures and activities in public trust areas must not be detrimental to the public trust rights and the biological and physical functions of the estuary or ocean. Projects which would directly or indirectly block or impair existing navigation channels, increase shoreline erosion, deposit spoils below normal high water, cause adverse water circulation patterns, violate water quality standards, or cause degradation of shellfish waters are considered incompatible with the management policies of public trust areas.
- **Coastal Shorelines.** The estuarine shoreline is the non-ocean shoreline, extending from the normal high water level or normal water level along the estuarine waters, estuaries, sounds, bays, fresh and brackish waters and public areas (15NCAC 7H.0209). Coastal Shorelines include all lands within 75 feet of the normal high water line of public trust waters located inland of the dividing line between coastal fishing waters and inland fishing waters. Generally, development in this area must not cause significant damage to any estuarine resources, must not interfere with public access to navigable waters or public resources, have limited hard (impervious) surfaces, preserve natural barriers to erosion, and must take steps to prevent pollution of the estuary by sedimentation and runoff.

2. Ocean Hazard Areas.

Oceanfront beaches and dunes protect buildings and the environment behind them by absorbing the force of wind and waves. It should be noted that the ocean beaches and shorelines are located in incorporated beach communities. The Ocean Hazard Areas include the following:

- **Ocean Erodible AEC.** This covers North Carolina's beaches and any other oceanfront lands that are subject to long-term erosion and significant shoreline changes. This AEC exhibits a substantial possibility of excessive erosion and significant shoreline fluctuation.
- **Inlet Hazard AEC.** This covers the lands next to ocean inlets, which are often highly unstable and subject to high rates of erosion or accretion.
- **Unvegetated Beach AEC.** These beach areas have no stable natural vegetation present. These areas may be designated as an Unvegetated Beach Area on a permanent or temporary basis as provided for in 15A NCAC 07H .0304(3).

3. Public Water Supply AECs.

The Small Surface Water Supply Watershed AEC protects coastal drainage basins that contain a public water supply classified as A-II by the NC Environmental Management Commission. Currently, only two such watersheds in the state have been designated as AECs: the Fresh Pond and adjacent catchment area at the Nags Head and Kill Devil Hills border on Bodie Island in Dare County and the Toomer's Creek near Wilmington in New Hanover County. There are no Small Surface Water Supply Watershed AECs in Brunswick County.

Public Water Supply Wellfields are areas of rapidly draining sands extending from the earth's surface to a shallow groundwater table that supply public drinking water. The Cape Hatteras Well Field on Hatteras Island between Frisco and Buxton is the only designated Public Water Supply Wellfield AEC in North Carolina.

4. Natural and Cultural Resources.

Natural and Cultural Resources AECs include natural and cultural resources of more than local significance in which uncontrolled or incompatible development could result in major or irreversible damage to scientific, educational, associative values or aesthetic qualities of natural systems cultural resources. These areas include coastal complex natural areas, coastal areas that sustain remnant species, unique coastal geologic formations and significant coastal archaeological resources and significant coastal historical archeological resources. Any person can nominate an area as a natural or cultural resource AEC. However, the CRC makes the final decision on designation.

Soils

A detailed soils survey was issued for Brunswick County in November 1986. That report, Soil Survey of Brunswick County, North Carolina, identifies 38 soils series located in the County. The soils series are located on Figure D-2.1 Soil Map, and their characteristics are summarized in Table D-2.1.

Thirty-three of the 38 soil series have severe limitations for septic tank usage. The Blanton(BnB) and Norfolk (NoB) soil types have moderate limitations for septic tank usage but can accommodate conventional septic tank systems. However, these two soils series occupy only small areas, 5.2% of the County's total area.

The soils with moderate limitations for septic tank usage are primarily scattered along the U.S. 17 corridor. It is significant that 15 of the soil series in Brunswick County are hydric soils. Those 15 include: Bohicket silty clay loam, Carteret loamy fine sand, Croatan muck, Dorovan muck, Duckston fine sand, Grifton fine sandy loam, Lafitte muck, Leon fine sand, Lumbee fine sandy loam, Muckalee loam, Murville mucky fine sand, Pantego mucky loam, Rains fine sandy loam, Torhunta mucky fine sandy loam, and Woodington fine sandy loam. A total of 54.5% of the County's soils are hydric. A hydric soil is a soil which is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (anaerobic is defined as a situation in which molecular oxygen is absent from the environment). These soils may meet the definition of §404 wetland areas if found in combination with certain hydrophytic vegetation and require permitting by the U.S. Army Corps of Engineers' Wilmington Office prior to any disturbance.

About 75,598 acres, or about 14 percent of Brunswick County, meets the soil requirements for prime farmland. This farmland is mainly in the south-central, western, and north-eastern parts of the County. The main crops are corn, soybean, and tobacco.

Figure D-2.1 Soil Characteristics

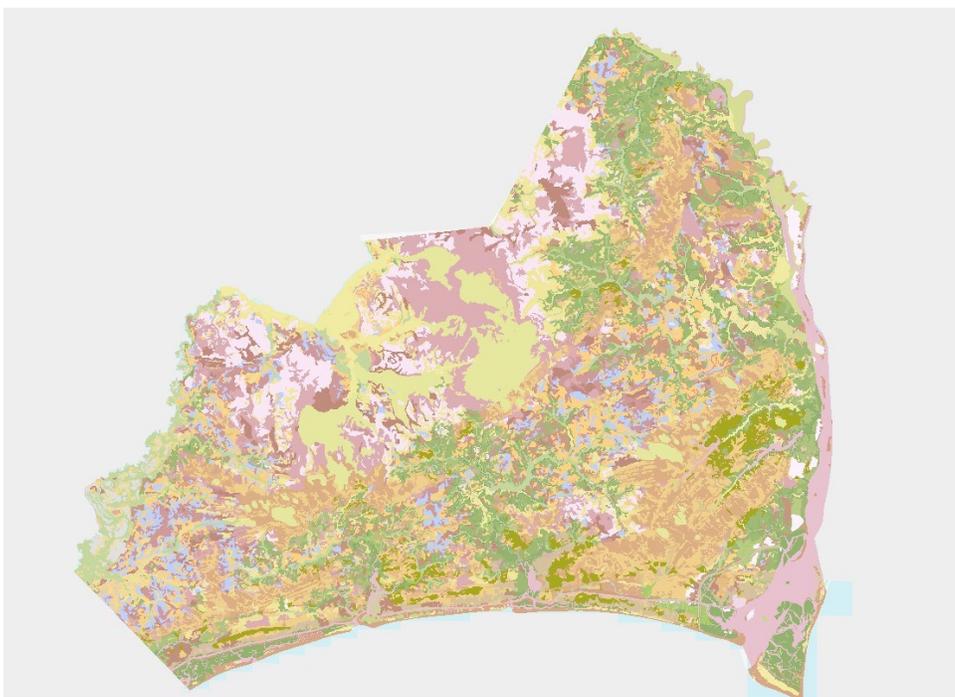


Table D-2.1 Soil Characteristics

Map Symbol	Soil Series	Slope	Depth to Seasonal High H ₂ O Table (ft)	Flooding Frequency (Surface)	Dwellings without Basements	Streets & Roads	Septic Tanks	Total Acreage	% of Each Soil
BaB	Baymeade fine sand	1-6%	4.0 - 5.0	None	Slight	Slight	Severe: poor filter	55,973	10.2%
BDC	Baymeade and Marvyn soils	6-12%	4.0 - 5.0 <6.0	None	Moderate: wetness, slope Moderate: slope	Moderate: slope	Severe: poor filter Moderate: percs slowly, slope	7,762	1.4%
BnB	Blanton fine sand	0-5%	5.0 - 6.0	None	Slight	Slight	Moderate: wetness	16,127	2.9%
BO*	Bohicket silty clay loam		+3 - 0	Frequent	Severe: flooding, ponding, shrink-swell	Severe: low strength, ponding, flooding	Severe: flooding, ponding, percs slowly	13,427	2.5%
BrB	Bragg fine sandy loam	2-6%	>6.0	None	Slight	Moderate: slope	Severe: percs slowly	2,165	0.4%
CA*	Carteret loamy fine sand		+ 3 - 1.0	Frequent	Severe: flooding, ponding	Severe: ponding, flooding	Severe: flooding, ponding, poor filter	1,085	0.2%
CH	Chowan silt loam		0 - 0.5	Frequent	Severe: flooding, wetness, low strength	Severe: low strength, wetness, flooding	Severe: flooding, wetness, percs slowly	5,033	0.9%
Co	Corolla fine sand		1.5 - 3.0	Rare	Severe: flooding	Moderate: flooding, wetness	Severe: wetness, poor filter	989	0.2%
CT*	Croatan muck		0 - 1.0	Rare	Severe: flooding, wetness, low strength	Severe: wetness, low strength	Severe: wetness, percs slowly	29,703	5.4%
DO*	Dorovan muck		+1 - 0.5	Frequent	Severe: flooding, ponding, low strength	Severe: ponding, flooding, low strength	Severe: flooding, ponding, poor filter	16,717	3.0%
Du*	Duckston fine sand		1.0 - 2.0	Occasional	Severe: flooding, wetness	Severe: flooding	Severe: flooding, wetness, poor filter	311	0.1%
Fo	Foreston loamy fine sand		2.5 - 3.5	None	Slight	Slight	Severe: wetness	26,692	4.9%
GoA	Goldsboro fine sandy loam	0-2%	2.0 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	29,830	5.4%
Gt*	Grifton fine sandy loam		0.5 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness	3,533	0.6%
Jo	Johns fine sandy loam		1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	3,116	0.6%
KrB	Kureb fine sand	1-8%	>6.0	None	Slight	Slight	Severe: poor filter	16,573	3.0%
LA*	Lafitte muck		0 - 0.5	Frequent	Severe: flooding, low strength	Severe: flooding, low strength	Severe: flooding	1,415	0.3%
Lo*	Leon fine sand	0-2%	0 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness, poor filter	45,611	8.3%
Lu*	Lumbee fine sandy loam		0 - 1.5	Rare	Severe: flooding, wetness	Severe: wetness	Severe: wetness	4,127	0.7%
Ly	Lynchburg fine sandy loam		0.5 - 1.5	None	Severe: wetness	Severe: wetness	Severe: wetness	22,023	4.0%
Ma	Mandarin fine sand		1.5 - 3.5	None	Moderate: wetness	Moderate: wetness	Severe: wetness	15,415	2.8%
Mk*	Muckalee loam		0.5 - 1.5	Frequent	Severe: flooding, wetness	Severe: wetness, flooding	Severe: flooding, wetness	28,444	5.2%
Mu*	Murville mucky fine sand		0 - 1.0	None	Severe: ponding	Severe: ponding	Severe: ponding, poor filter	39,490	7.2%
NeE	Newhan fine sand	2-30%	>6.0	None	Severe: slope	Severe: slope	Severe: poor filter, slope	4,415	0.8%
NhE	Newhan fine sand, dredged	2-30%	>6.0	None	Severe: slope	Severe: slope	Severe: poor filter, slope	3,510	0.6%
NoB	Norfolk loamy fine sand	2-6%	4.0 - 6.0	None	Slight	Slight	Moderate: wetness	12,521	2.3%
On	Onslow fine sandy loam		1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	3,439	0.6%
PaA	Pactolus fine sand	0-2%	1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness, poor filter	3,994	0.7%
Pn*	Pantego mucky loam		0 - 1.5	None	Severe: wetness	Severe: wetness	Severe: wetness	12,176	2.2%
Pt	Pits							818	0.1%
Ra*	Rains fine sandy loam		0 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness	19,991	3.6%
Tm	Tomahawk loamy fine sand		1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	4,975	0.9%
To*	Torhunta mucky fine sandy loam		0.5 - 1.5	None	Severe: wetness	Severe: wetness	Severe: wetness, poor filter	47,771	8.7%
Ur	Urban land							740	0.1%
WaB	Wando fine sand	0-6%	4.0 - 6.0	None	Slight	Slight	Severe: poor filter	8,305	1.5%
WdB	Wando-Urban Land Complex	0-6%	4.0 - 6.0	None	Slight	Slight	Severe: poor filter	634	0.1%
Wo*	Woodington fine sandy loam		0.5 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness	35,619	6.5%
YaB	Yaupon silty clay loam	0-3%	2.0 - 4.0	None	Severe: wetness	Severe: low strength, shrink-swell	Severe: percs slowly, wetness	3,012	0.5%

*Hydric soils.

NOTE: These figures include all unincorporated and incorporated areas of the County.
Source: Soil Survey of Brunswick County, North Carolina.

Natural Hazards

Due to its geographic location, the coastal region is susceptible to a variety of natural hazards such as flooding, hurricanes, and storm surge. These hazards are summarized below.

Special Flood Hazard Areas

Based on the Flood Insurance Rate Maps (FIRMs) for Brunswick County, approximately 42% of the County is located in a flood hazard area. The State of North Carolina, as part of the state’s flood mapping program, completed updated Flood Insurance Rate Maps for the Cape Fear and Lumber River Basins. The locations of flood zone areas within the County are shown on Figure D-2.2. Forty-two and one half percent (42.5%) of the County’s flood hazard area falls within an A floodzone, approximately 39% of the flood hazard area falls within an AE zone, 2.4% falls within the AEFW zone, and 13.1% falls within the VE zone. The flood plain designations listed above are defined as follows:

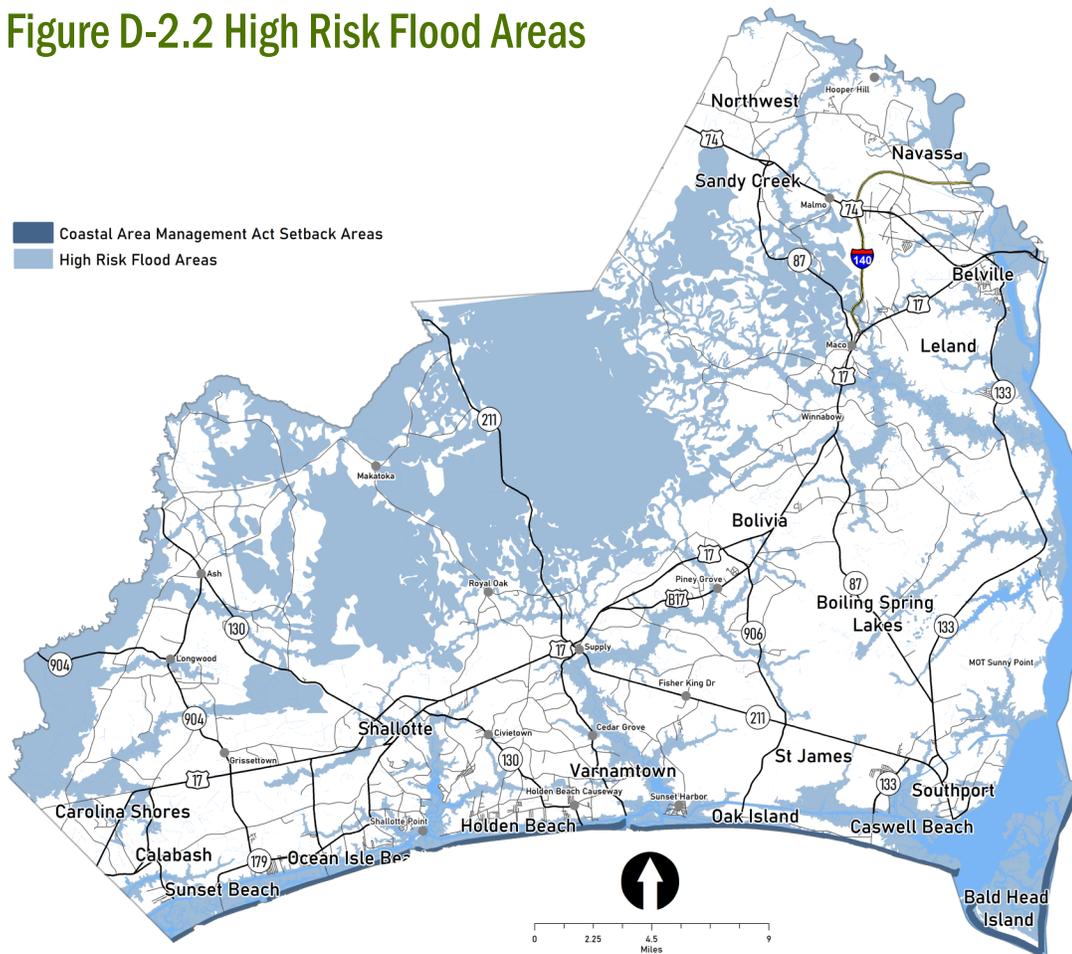
AE zones: Special flood hazard areas inundated by the 100-year flood (one percent chance of a 100-year flood event in alluvial plains or riverine systems);

AEFW zones: The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free from encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights;

VE zones: Special flood hazard areas inundated by the 100-year flood (one percent chance of a hundred year flood event); coastal floods with velocity hazards (typically 3 foot wave action); and

500-year Floodplain: Areas subject to a 0.2 percent chance of flooding in any given year.

Figure D-2.2 High Risk Flood Areas



Storm Surge

While a considerable amount of Brunswick County lies within the floodplain, the greatest threat is flooding resulting from storm surge and local ponding of water. Figure D-2.3 shows the general areas of Brunswick County that may be affected by hurricane-generated storm surge.

Low-lying coastal areas are especially vulnerable to damage from erosion, waves, and storm surge. Many factors affect flood risk, including but not limited to current weather patterns, natural changes in the environment, recent development, date of construction, history of flooding, and flood map changes. Flood risk changes over time and may be reflected on future flood maps.

Figure D-2.3 Storm Surge Hurricane Inundation

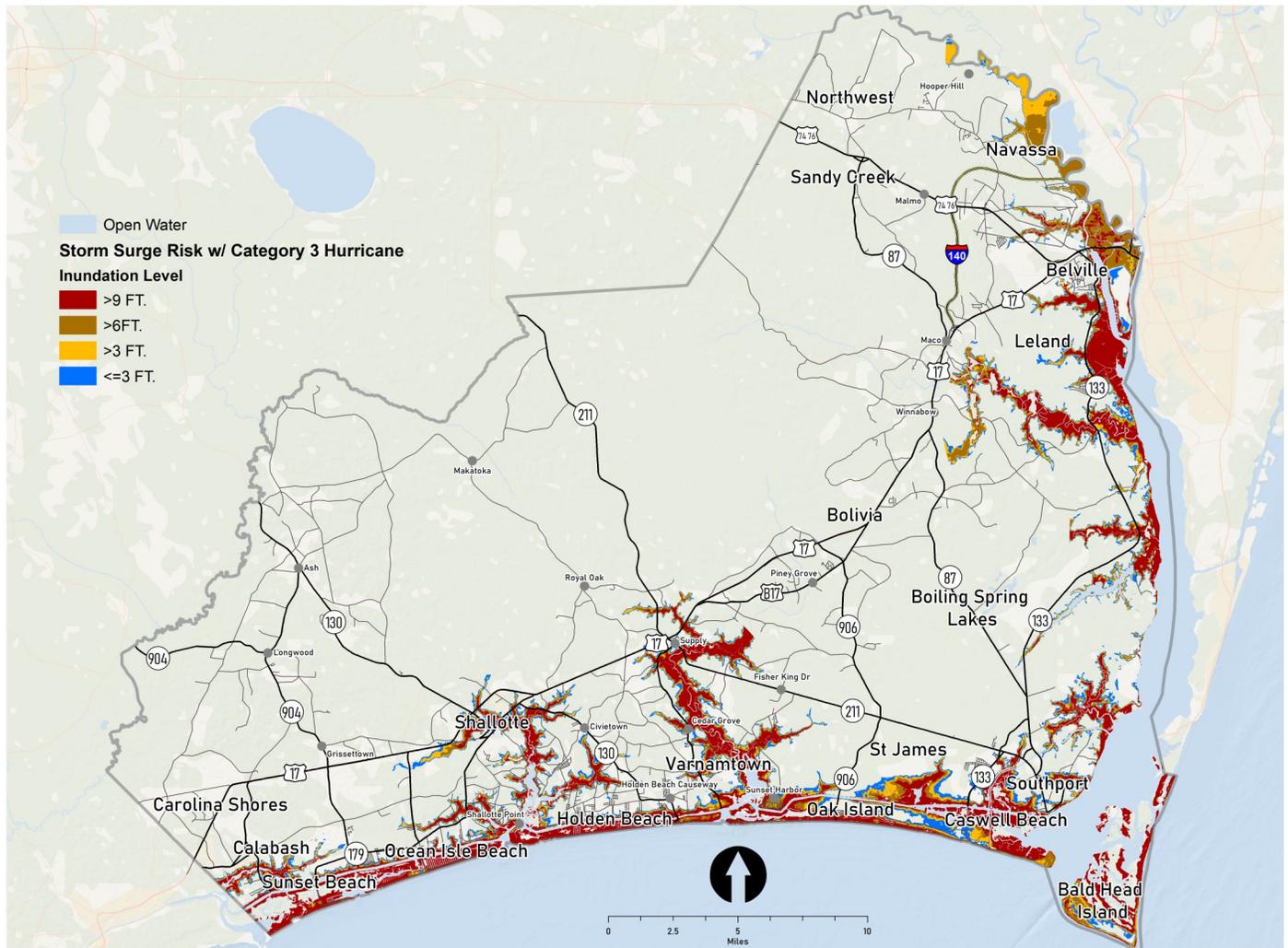


Table D-2.2 Storm Surge Hurricane Inundation

Brunswick County Storm Surge Hurricane Inundation			Saffir-Simpson Winds Scale Ratings:
	Acres	% of Total	
Category 1 & 2	51,947.18	9.06%	
Category 3	68,290.97	11.90%	
Category 4 & 5	105,546.50	18.40%	

- Category 1 hurricane = sustained winds of 74-95 mph, Storm surge 4-5 feet.
- Category 2 hurricane = sustained winds of 96-110 mph, Storm surge 4-5 feet.
- Category 3 hurricane = sustained winds of 111-129 mph, Storm surge 9 - 12 feet.
- Category 4 hurricane = sustained winds of 130-156 mph, Storm surge 13 - 18 feet.
- Category 5 hurricane = sustained winds of 157+ mph, Storm surge greater than 18 feet.

Man-Made Hazards

The greatest concentrations of hazardous materials are the storage of gasoline and fuel oil. In addition to fuel storage, chemicals and pesticides are stored at a limited number of areas. The EPA requires that facilities report certain chemical substances located on site. Specifically, under this regulatory requirement, facilities with chemicals on the EPA's list of Extremely Hazardous Substances present in a quantity equal to or in excess of their established Threshold Planning Quantity or a 500-pound threshold (whichever number is less), as well as any hazardous chemical present on site in a quantity equal to or greater than 10,000 pounds must be included on an annual report called the Tier II. This report must be submitted by March 1st of each year to the North Carolina Emergency Response Commission, the Local Emergency Planning Committee, and the local fire department with jurisdiction over the reporting facility.

The second potential hazard would be the possibility of contamination of the Cape Fear River from the Port of Wilmington in the event of a large oil or chemical spill or from damage to a tanker traveling by Southport to the Port of Wilmington. Also, explosives are occasionally shipped on the Cape Fear River along the Southport shoreline to the Sunny Point Military Ocean Terminal. There is also a "blast zone" along the railroad line servicing the terminal. This rail line extends south through Brunswick County between NC 87 and NC 133. In any case, damage to marine life and the estuarine shoreline as well as Brunswick County could be extensive.

Although not presently a concern, there is the potential for the establishment of off-shore drilling operations that could present a hazard to Brunswick County beaches. Even though oil tankers which pass through Brunswick County to the Port of Wilmington probably present a greater threat to the County than that of an off-shore drilling operation, the presence of such would still be a concern to Brunswick County if one were constructed.

Environmentally Fragile Areas & Significant Natural Heritage Areas

Fragile areas are considered to include coastal wetlands, ocean beaches and shorelines, estuarine waters and shorelines, public trust waters, natural resource fragile areas, areas sustaining remnant species, unique geological formations, registered natural landmarks, swamps, prime wildlife habitats, areas of excessive slope, areas of excessive erosion, scenic points, archaeological sites, and historical sites.

- **Non-Coastal Wetlands.** Non-coastal wetlands include all other wetlands not classified as coastal wetlands. These noncoastal wetlands are not covered by CAMA regulations (unless the Coastal Resource Commission designates them as a natural resource AEC) but are protected by the Clean Water Act. Consequently, the US Army Corps of Engineers is responsible for regulating these "Section 404" or freshwater wetlands. Authorization must be obtained from the Corps prior to disturbing such wetlands. As with coastal wetlands, the precise location of non-coastal wetlands can only be determined through a field investigation and analysis. Wetlands generally include swamps, marshes, bogs, and similar areas". Wetlands have both upland and aquatic characteristics, and thus you often have a richer flora and fauna than other environments. Within Brunswick County, there are approximately 282,728 acres of wetlands. These wetlands vary in their characteristics. The location of the wetland areas within the County's jurisdiction is shown on Figure D-2.4, and a summary of wetland acres for the County as a whole, is provided in Table D-2.3. Tables D-2.4, d-2.5, and D-2.6 provide wetland area summaries for each river subbasin. The map of wetland location is intended to be used for general location purposes only. On-site analysis must be performed in order to determine the exact location of all wetlands. Section §404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highway and airports), and conversion of wetlands to uplands for farming and forestry. The basic premise of the program is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded.

Figure D-2.4 Heritage Areas

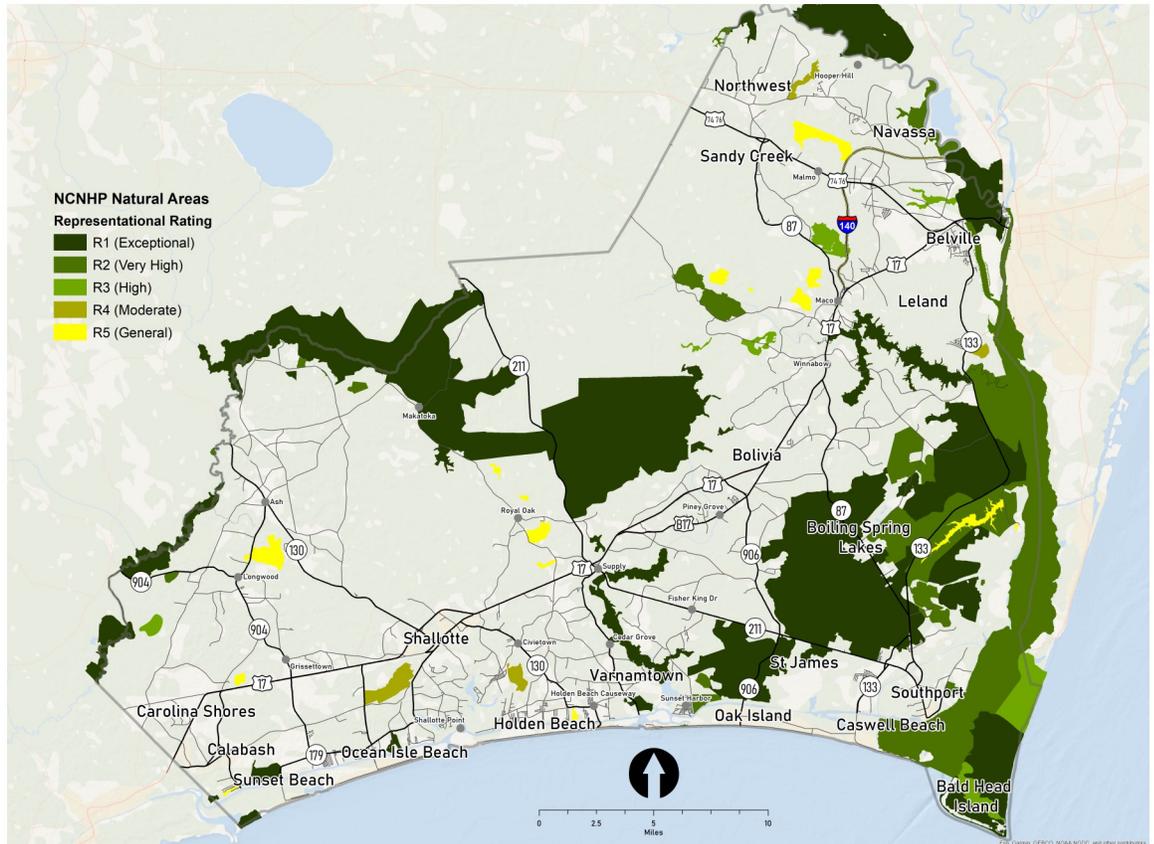


Figure D-2.5 Protected Areas

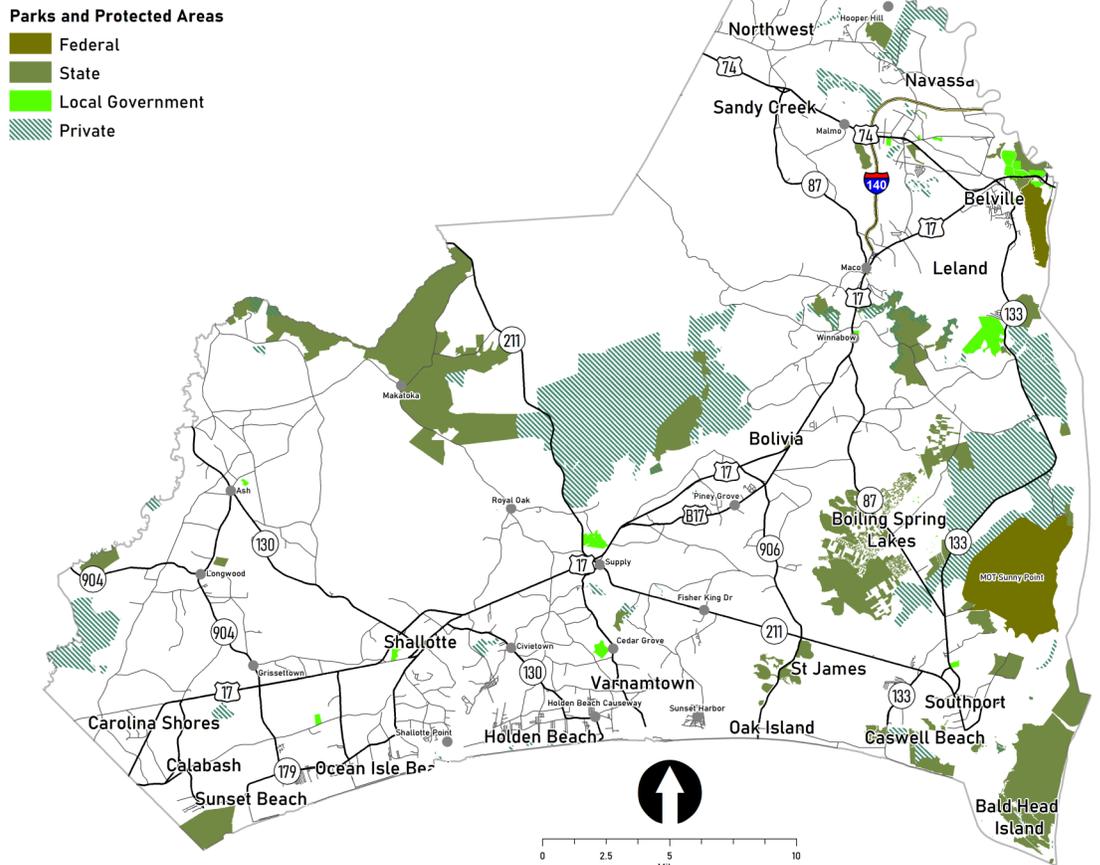


Table D-2.3 Wetland Types

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	5,531.19	0.96%
Cleared Bottomland Hardwood	106.95	0.03%
Cleared Depressional Swamp Forest	152.74	0.03%
Cleared Estuarine Shrub/Scrub	55.20	0.01%
Cleared Hardwood Flat	62.83	0.01%
Cleared Headwater Swamp	13.59	0.00%
Cleared Pine Flat	314.37	0.05%
Cleared Pocosin	117.97	0.02%
Cutover Bottomland Hardwood	409.47	0.07%
Cutover Depressional Swamp Forest	485.88	0.08%
Cutover Estuarine Forest	2.41	0.00%
Cutover Estuarine Scrub/Scrub	40.18	0.01%
Cutover Hardwood Flat	240.52	0.04%
Cutover Headwater Swamp	48.84	0.01%
Cutover Pine Flat	1,091.62	0.19%
Cutover Pocosin	513.65	0.09%
Cutover Riverine Swamp Forest	1.23	0.00%
Depressional Swamp Forest	5,204.82	0.91%
Drained Bottomland Hardwood	452.33	0.08%
Drained Depressional Swamp Forest	452.80	0.08%
Drained Hardwood Flat	582.41	0.10%
Drained Headwater Swamp	2.51	0.00%
Drained Pine Flat	22,315.10	3.89%
Drained Pocosin	7,654.63	1.33%
Drained Riverine Swamp Forest	695.94	0.12%
Estuarine Forest	78.64	0.01%
Estuarine Shrub/Scrub	729.22	0.13%
Freshwater Marsh	6,472.43	1.13%
Hardwood Flat	2,490.00	0.43%
Headwater Swamp	1,813.90	0.32%
Human Impacted	1,614.20	0.28%
Managed Pineland	101,576.75	17.71%
Pine Flat	26,740.47	4.66%
Pocosin	33,430.97	5.83%
Riverine Swamp Forest	45,960.27	8.01%
Salt/Brackish Marsh	15,272.77	2.66%
TOTAL	282,728.78	49.29%

NOTE: These figures include all unincorporated and incorporated areas of the County.
Source: North Carolina GIA and National Wetlands Inventory.

Table D-2.4 Wetland—Subbasin 03-06-17

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	3,041.83	0.53%
Cleared Bottomland Hardwood	32.48	0.01%
Cleared Depressional Swamp Forest	33.61	0.01%
Cleared Estuarine Shrub/Scrub	12.69	0.00%
Cleared Hardwood Flat	19.46	0.00%
Cleared Headwater Swamp	11.19	0.00%
Cleared Pine Flat	89.67	0.02%
Cleared Pocosin	20.98	0.00%
Cutover Bottomland Hardwood	178.07	0.03%
Cutover Depressional Swamp Forest	147.24	0.03%
Cutover Estuarine Scrub/Scrub	11.00	0.00%
Cutover Hardwood Flat	95.22	0.02%
Cutover Headwater Swamp	25.67	0.00%
Cutover Pine Flat	371.32	0.06%
Cutover Pocosin	150.60	0.03%
Depressional Swamp Forest	2,215.93	0.39%
Drained Bottomland Hardwood	432.08	0.08%
Drained Depressional Swamp Forest	19.87	0.00%
Drained Hardwood Flat	114.44	0.02%
Drained Headwater Swamp	0.77	0.00%
Drained Pine Flat	9,810.87	1.71%
Drained Pocosin	3,670.29	0.64%
Drained Riverine Swamp Forest	89.08	0.02%
Estuarine Forest	18.22	0.00%
Estuarine Shrub/Scrub	319.42	0.06%
Freshwater Marsh	6,039.20	1.05%
Hardwood Flat	1,065.94	0.19%
Headwater Swamp	804.98	0.14%
Human Impacted	1,153.21	0.20%
Managed Pineland	34,114.23	5.95%
Pine Flat	9,737.02	1.70%
Pocosin	13,465.97	2.35%
Riverine Swamp Forest	17,872.41	3.12%
Salt/Brackish Marsh	8,664.73	1.51%
TOTAL	113,849.70	19.87%

*Refer to Map 12 for locations of subbasins.

NOTE: These figures include all unincorporated and incorporated areas of the County within Subbasin 03-06-17.
Source: North Carolina GIA and National Wetlands Inventory.

Table D-2.5 Wetland—Subbasin 03-07-59

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	1,116.46	0.20%
Cleared Bottomland Hardwood	61.12	0.01%
Cleared Depressional Swamp Forest	57.11	0.01%
Cleared Estuarine Shrub/Scrub	42.51	0.00%
Cleared Hardwood Flat	18.05	0.00%
Cleared Headwater Swamp	2.12	0.00%
Cleared Pine Flat	168.63	0.03%
Cleared Pocosin	78.22	0.01%
Cutover Bottomland Hardwood	140.65	0.03%
Cutover Depressional Swamp Forest	129.56	0.02%
Cutover Estuarine Forest	2.41	0.00%
Cutover Estuarine Shrub/Scrub	29.18	0.01%
Cutover Hardwood Flat	64.79	0.01%
Cutover Headwater Swamp	17.74	0.00%
Cutover Pine Flat	523.25	0.09%
Cutover Pocosin	283.04	0.05%
Cutover Riverine Swamp Forest	1.23	0.00%
Depressional Swamp Forest	1,834.39	0.32%
Drained Bottomland Hardwood	6.72	0.00%
Drained Depressional Swamp Forest	17.62	0.00%
Drained Hardwood Flat	44.24	0.01%
Drained Pine Flat	822.03	0.14%
Drained Pocosin	411.57	0.07%
Drained Riverine Swamp Forest	14.90	0.00%
Estuarine Forest	60.41	0.01%
Estuarine Shrub/Scrub	409.81	0.07%
Freshwater Marsh	291.57	0.05%
Hardwood Flat	529.62	0.09%
Headwater Swamp	600.65	0.11%
Human Impacted	181.68	0.03%
Managed Pineland	26,987.42	4.71%
Pine Flat	8,617.46	1.50%
Pocosin	9,997.04	1.74%
Riverine Swamp Forest	7,455.78	1.30%
Salt/Brackish Marsh	6,608.04	1.15%
TOTAL	67,627.02	11.80%

*Refer to Map 12 for locations of subbasins.

NOTE: These figures include all unincorporated and incorporated areas of the County within Subbasin 03-07-59.

Source: North Carolina GIA and National Wetlands Inventory.

Table D-2.6 Wetland—Subbasin 03-07-57

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	1,372.90	0.24%
Cleared Bottomland Hardwood	13.35	0.00%
Cleared Depressional Swamp Forest	62.02	0.01%
Cleared Hardwood Flat	25.32	0.00%
Cleared Headwater Swamp	0.28	0.00%
Cleared Pine Flat	56.08	0.01%
Cleared Pocosin	18.77	0.00%
Cutover Bottomland Hardwood	90.75	0.02%
Cutover Depressional Swamp Forest	209.08	0.04%
Cutover Hardwood Flat	80.51	0.01%
Cutover Headwater Swamp	5.43	0.00%
Cutover Pine Flat	197.05	0.03%
Cutover Pocosin	80.01	0.01%
Depressional Swamp Forest	1,154.49	0.20%
Drained Bottomland Hardwood	13.52	0.00%
Drained Depressional Swamp Forest	415.31	0.07%
Drained Hardwood Flat	423.72	0.07%
Drained Headwater Swamp	1.74	0.00%
Drained Pine Flat	11,682.20	2.04%
Drained Pocosin	3,572.77	0.62%
Drained Riverine Swamp Forest	591.96	0.10%
Freshwater Marsh	141.65	0.02%
Hardwood Flat	894.44	0.16%
Headwater Swamp	408.26	0.07%
Human Impacted	279.31	0.05%
Managed Pineland	40,475.10	7.06%
Pine Flat	8,385.99	1.46%
Pocosin	9,967.97	1.74%
Riverine Swamp Forest	20,662.86	3.60%
TOTAL	101,282.90	17.70%

*Refer to Map 12 for locations of subbasins.

NOTE: These figures include all unincorporated and incorporated areas of the County within Subbasin 03-07-57.
Source: North Carolina GIA and National Wetlands Inventory.

- Heritage Areas and Protected Lands.** Natural resource fragile areas are generally recognized to be of educational, scientific, or cultural value because of their natural features. Features in these areas serve to distinguish them from the vast majority of the landscape. These areas include complex natural areas, areas that sustain remnant species, pocosins, wooded swamps, prime wildlife habitats, or registered natural landmarks. The North Carolina Natural Heritage Program of the Division of Parks and Recreation works to identify and facilitate protection of the most ecologically significant natural areas remaining in the state. Natural areas may be identified because they provide important habitat for rare species or because they contain outstanding examples of the rich natural diversity of this state. There are numerous significant protected lands and natural heritage areas in Brunswick County. The County is an environmentally rich area. Major areas include the Green Swamp, Town Creek marshes and swamp, Juniper Creek area, Boiling Spring Lakes wetlands complex, Blue Pond area, and Eagle Island. All of the significant natural heritage areas and protected lands are identified in Tables D-2.5, D-2.6, and D-2.7 and delineated on Figures D-2.4 and D-2.7.

Table D-2.7 Heritage Areas

Map Ref. #	Significant Natural Area Site	Site Number	Acres	% of Total
1	Alligator Branch Sandhill and Flatwoods	S.USNCHP*1617	920.69	0.160%
2	Bald Head Island	S.USNCHP*806	11.25	0.002%
3	Battery Island	S.USSERO1*205	113.33	0.020%
4	Battle Royal Bay	S.USNCHP*1080	877.00	0.153%
5	Big Cypress Bay and Ponds	S.USNCHP*84	135.04	0.024%
6	Big Neck Road at Millpond Bay	S.USNCHP*1574	10.57	0.002%
7	Bird Island	S.USNCHP*88	108.25	0.019%
8	Blue Pond	S.USNCHP*96	29.78	0.005%
9	Bluff Island and East Beach	S.USNCHP*999	4,308.01	0.751%
10	Boiling Spring Lakes Limesink Complex	S.USNCHP*105	2,050.09	0.357%
11	Boiling Spring Lakes Wetlands Complex	S.USNCHP*104	25,045.10	4.366%
12	Boone Neck Maritime Forest	S.USNCHP*872	308.34	0.054%
13	Brantley Island	S.USNCHP*854	0.48	0.0001%
14	Brunswick River/Cape Fear River Marshes	S.USNCHP*119	1,583.90	0.276%
15	Bryant Mill (Greenbank) Bluff	S.USNCHP*1045	486.90	0.085%
16	Camp Branch Savanna Remnant	S.USNCHP*141	43.50	0.008%
17	Colkins Neck Remnant	S.USNCHP*1303	7.87	0.001%
18	Cumbee Pond and Sandhills	S.USNCHP*1076	84.08	0.015%
19	Fall Swamp/Middle River Limesink Complex	S.USNCHP*1030	387.86	0.068%
20	Fort Caswell Dunes and Marshes	S.USNCHP*1866	198.13	0.035%
21	Funston Bays	S.USNCHP*1928	1,774.58	0.309%
22	Goose Pond Limesinks	S.USNCHP*1949	65.58	0.011%
23	Green Swamp	S.USNCHP*314	17,847.53	3.111%
24	Henrytown Savanna	S.USNCHP*334	329.98	0.058%
25	Hog Branch Ponds	S.USNCHP*1427	185.41	0.032%
26	Juniper Bay Savanna	S.USNCHP*1903	194.96	0.034%
27	Juniper Creek Floodplain	S.USNCHP*373	11,949.31	2.083%
28	Juniper Creek/Driving Creek Aquatic Habitat	S.USNCHP*2048	78.24	0.014%
29	Little Blue Pond/Black Pond	S.USNCHP*801	44.09	0.008%
30	Lockwood Folly River Tidal Wetlands	S.USNCHP*1576	2,755.24	0.480%
31	Long Bays Savanna and Carolina Bays	S.USNCHP*416	1,135.93	0.198%
32	Lower Black River Swamp	S.USNCHP*1857	128.28	0.022%
33	Lower Cape Fear River Aquatic Habitat	S.USNCHP*421	13,512.90	2.356%

Table D-2.7 Heritage Areas continued

Map Ref.#	Significant Natural Area Site	Site Number	Acres	% of Total
34	Lower Cape Fear River Bird Nesting Islands	S.USNCHP*422	321.77	0.056%
35	Middle Island	S.USNCHP*807	16.26	0.003%
36	Motsu Brunswick Forest Natural Area	S.USNCHP*1900	21.98	0.004%
37	Motsu Northwest Natural Area	S.USNCHP*453	1,778.09	0.310%
38	Myrtle Head Savanna	S.USSERO1*161	72.48	0.013%
39	Neils Eddy Landing	S.USNCHP*1619	0.30	0.0001%
40	Orton Pond	S.USSERO1*297	14,281.83	2.490%
41	Orton Powerline Loosestrife Site	S.USNCHP*1290	3.06	0.001%
42	Pleasant Oaks/Goose Landing Plantations	S.USNCHP*569	3,038.06	0.530%
43	Pretty Pond Limesink Complex	S.USNCHP*833	312.38	0.054%
44	Prospect Ridge White Cedar Forest	S.USNCHP*2073	81.29	0.014%
45	Rabontown Limesinks	S.USNCHP*2072	362.49	0.063%
46	Rattlesnake Branch Sandhills	S.USNCHP*1945	276.37	0.048%
47	Regan Ridge and Swale Boggy Openings	S.USNCHP*1573	134.78	0.023%
48	Sandy Branch Sand Ridge and Bay Complex	S.USNCHP*1115	1,109.20	0.193%
49	Scippio Swamp Ridge and Swale Boggy Openings	S.USNCHP*1578	360.95	0.063%
50	Secession Maritime Forest	S.USNCHP*645	104.55	0.018%
51	Shalotte Creek Sandhills	S.USNCHP*1620	483.58	0.084%
52	Spring Creek Ponds	S.USNCHP*680	603.64	0.105%
53	Sunset Beach Wood Stork Ponds	S.USNCHP*696	61.21	0.011%
54	Town Creek Aquatic Habitat	S.USNCHP*1813	287.60	0.050%
55	Town Creek Marshes and Swamp	S.USNCHP*1516	3,184.28	0.555%
56	Turkey Branch Sandhill	S.USNCHP*2074	4.22	0.001%
57	Waccamaw Island Savanna	S.USNCHP*757	117.43	0.020%
58	Waccamaw River Aquatic Habitat	S.USNCHP*845	177.12	0.031%
59	Waccamaw River Beech Island Swamps	S.USNCHP*1864	37.28	0.006%
60	Waccamaw River Cross Swamp Bottomlands	S.USNCHP*1854	103.89	0.018%
61	Waccamaw River Oxbow Site	S.USNCHP*758	288.64	0.050%
62	Waccamaw River Reeves and Gore Lake Bottomlands	S.USNCHP*1855	429.68	0.075%
63	Waccamaw River Ridge and Swale Boggy Openings	S.USNCHP*802	74.39	0.013%
64	Wards Lake	S.USNCHP*765	48.26	0.008%
65	White Spring Ponds Complex	S.USNCHP*1456	1,120.16	0.195%
66	Winnabow Savanna and Sandhill	S.USNCHP*1066	539.58	0.094%
67	Zeke's Island Estuarine Sanctuary	S.USNCHP*797	1,633.37	0.285%
	TOTAL		118,182.41	20.602%

NOTE: These figures include all unincorporated and incorporated areas of the County.
Source: North Carolina GIA, North Carolina Parks & Recreation, Holland Consulting Planners, Inc.

- **Primary Nursery Areas.** Primary nursery areas are designated in rule by the Marine Fisheries Commission and are those areas in the estuarine system where initial post-larval development takes place. These are areas where populations are uniformly early juveniles.

Table D-2.8 Protected Areas

Map Ref. #	Protected Site	Acres	% of Total
1	Beaver Dam Creek	142.32	0.146%
2	Adm. NC-SC Boundary (Bird Island)	27.59	0.005%
3	Cul Res Historic Brunswick Town	78.90	0.014%
4	Cul Res NC Battleship Site	2.16	0.0004%
5	Eagle Island	1,522.76	0.265%
6	EHNR Zeke Island Estuarine Sanctuary	1,060.71	0.185%
7	ENR Marine Fisheries Submerged Lands Section	0.04	0.00001%
8	ENR Estuarine Preserve	7.13	0.001%
9	ENR Roan Island	0.11	0.00002%
10	Green Swamp Preserve	13,552.20	2.362%
11	Lockwood Folly Township Park	14.14	0.002%
12	Northwest Township District Park	35.84	0.006%
13	Pleasant Oaks Plantation	2,229.90	0.389%
14	Prks Bald Head Island Natural Area	4,825.81	0.841%
15	Shalotte Township District Park	20.12	0.004%
16	Smithville Township District Park	25.48	0.004%
17	Town Creek	1,528.74	0.266%
18	UNCW Ecological Botanical Gardens	105.80	0.018%
19	Wells Tract	109.92	0.019%
20	WRC 904 Bridge/Pipeway Access Area	1.93	0.0003%
21	WRC South Pelican Island 39-37 (NHA)	18.32	0.003%
22	WRC Sunset Harbor Access-Lockwood Folly	0.44	0.0001%
23	WRC Town Creek Access Area	0.78	0.0001%
24	WRC Unnamed Island Snows March #1 39-33	52.59	0.009%
	WRC Unnamed Island Sunny Point 39-28	23.08	0.004%
	TOTAL	25,386.82	4.426%

NOTE: These figures include all unincorporated and incorporated areas of the County.

Source: North Carolina GIA, North Carolina Parks & Recreation, Holland Consulting Planners, Inc.

Environmental Composite Map

Under the updated CAMA Planning Guidelines, there is a requirement for the preparation of an Environmental Composite Map (Figure D-2.6). This map is intended to work in conjunction with the Land Suitability Maps discussed in Section 2 of this plan and was the basis for the delineation of the “Open Space - Conservation 1” place type on the Future Land Use & Conservation Map (see Future Land Use & Conservation Map, Figure 3.1). The Environmental Composite Map breaks down land masses within the County into three categories based on natural features and environmental conditions. The categories utilized are as follows:

- **Class I** – Land that contains only minimal hazards and limitations that can be addressed by commonly accepted land planning and development practices. Class I land will generally support the more intensive types of land uses and development.
- **Class II** – Land that has hazards and limitations for development that can be addressed by restrictions on land uses, special site planning, or the provision of public services such as water and sewer. Land in this class will generally support only the less intensive uses, such as low density residential, without significant investment in services.
- **Class III** – Land that has serious hazards and limitations. Land in this class will generally support very low intensity uses, such as conservation and open space.

The Environmental Composite Model was prepared in a similar fashion to the Land Suitability Map. An overlay analysis was performed, breaking the County into one acre cells utilizing only map layers determined to be environmental factors. The layers used and their assigned classes are outlined below:

Layer	Class I	Class II	Class III
Coastal Wetlands			X
Exceptional or Substantial Non-Coastal Wetlands			X
Beneficial Non-Coastal Wetlands		X	
Estuarine Waters			X
Soils with Slight or Moderate Septic Limitations	X		
Soils with Severe Septic Limitations			X
Flood Zones		X	
Storm Surge Areas		X	
HQW Watersheds		X	
Water Supply Watersheds		X	
Significant Natural Heritage Areas		X	
Protected Lands			X

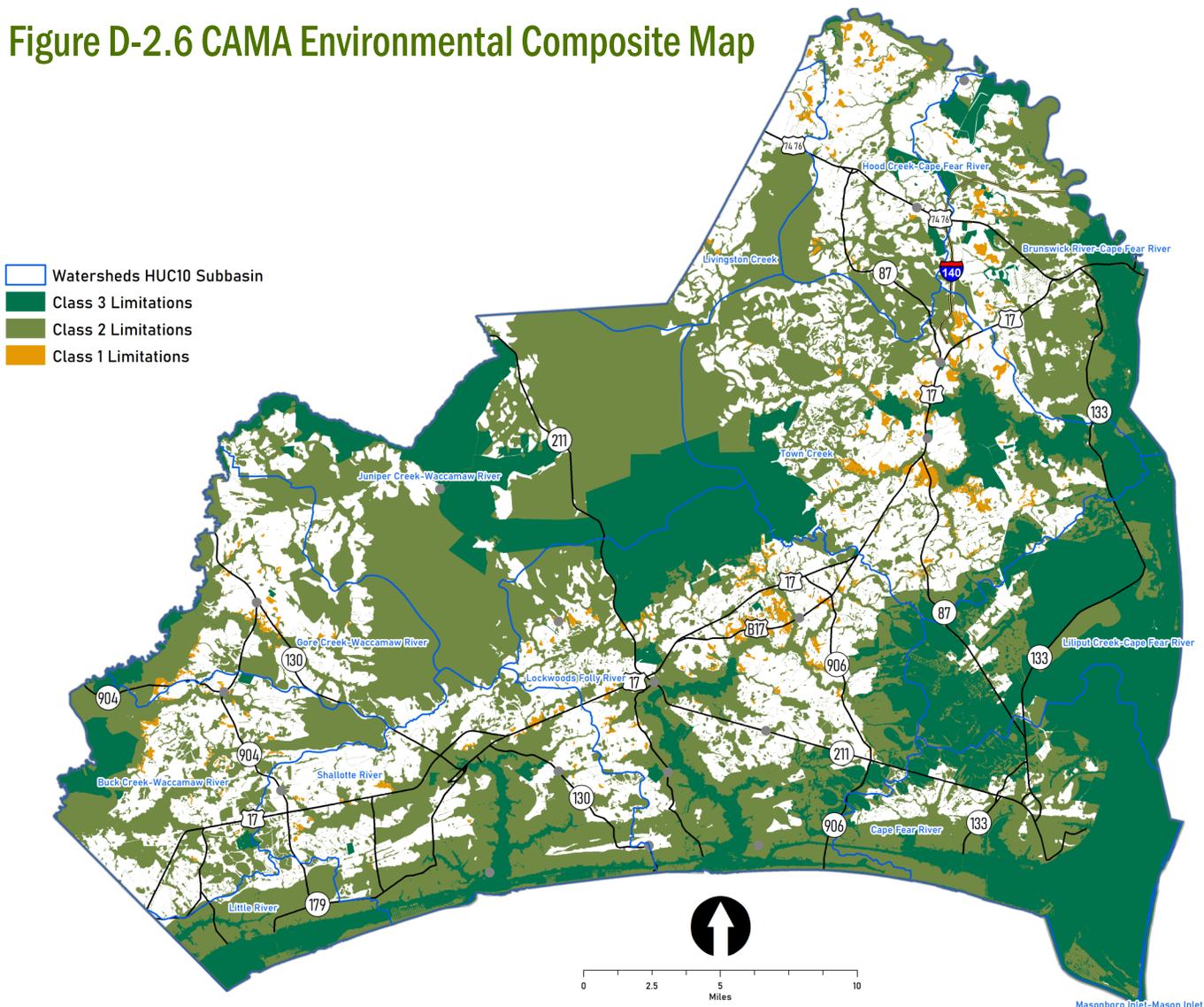
Table D-2.9 Brunswick County Environmental Composite Map Layers

For a given cell, the computed value of the cell will be determined by the highest class theme that contains the cell. For example, if a cell is in a coastal wetland (Class III) and in a storm surge area (Class II) and intersects a soil with a slight or moderate septic limitation (Class I), the cell value will be Class III. In other words, if a cell does not meet the criteria for Class III, but qualifies as Class II, it has Class II for a value. If a cell does not qualify for either Class III or Class II, then it is Class I by default. This order enables the modeler to leave out themes that are not associated with Classes II or III to simplify the model (yielding the same results). The class acreages are summarized to the right:

Table D-2.10 Brunswick County Environmental Composite Class Acreage Summary

	Acres	% of Total
Class I	215,995.38	39.4%
Class II	55,161.65	10.1%
Class III	277,056.50	50.5%
Total	548,213.53	100.0%

Figure D-2.6 CAMA Environmental Composite Map



Water Quality Classifications

The North Carolina Division of Water Resources assigns water quality classifications to all named waters of the State of North Carolina. The classifications are based upon the existing or contemplated best usage of the various streams and segments of streams within a basin, as determined through studies, evaluations, and comments received at public hearings.

Water classifications vary widely throughout Brunswick County. The NC Division of Water Resources provides an interactive map for all waterbodies in the County, including their subbasins and assigned classification and can be found at: <https://deq.nc.gov/about/divisions/water-resources/water-planning/classification-standards/classifications>. There are high quality waters within Brunswick County but no outstanding resource waters. Figure D-2.9 delineates the important fisheries areas and water quality monitoring sites in Brunswick County. The state water classification system is broken down as follows:

Primary Freshwater and Saltwater Classifications*

Class—Best Uses

C (Fresh Water) and SC (Tidal Salt Water)—Aquatic life propagation/protection and secondary recreation

B (Fresh Water) and SB (Tidal Salt Water)—Primary recreation and Class C uses

SA (Tidal Salt Water)—Waters classified for commercial shellfish harvesting

WS (Water Supply Watershed)—There are five WS classes ranging from WS-I through WS-V. WS classifications are assigned to watersheds based on land use characteristics of the area. Each water supply classification has a set of management strategies to protect the surface water supply. WS-I provides the highest level of protection and WS-V provides the least protection. A Critical Area (CA) designation is also listed for watershed areas within a half-mile and draining to the water supply intake or reservoir where an intake is located.

Supplemental Classifications

Class—Best Uses

Sw (Swamp Waters)—Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen.

Tr (Trout Waters)—Provides protection to fresh waters for natural trout propagation and survival of stocked trout.

HQW (High Quality Waters)—Waters possessing special qualities including excellent water quality, Native or Special Native Trout Waters, critical habitat areas, or WS-I and WS-II water supplies.

ORW (Outstanding Resource Waters)—Unique and special surface waters that are unimpacted pollution and have some outstanding resource values.

NSW (Nutrient Sensitive Waters)—Areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

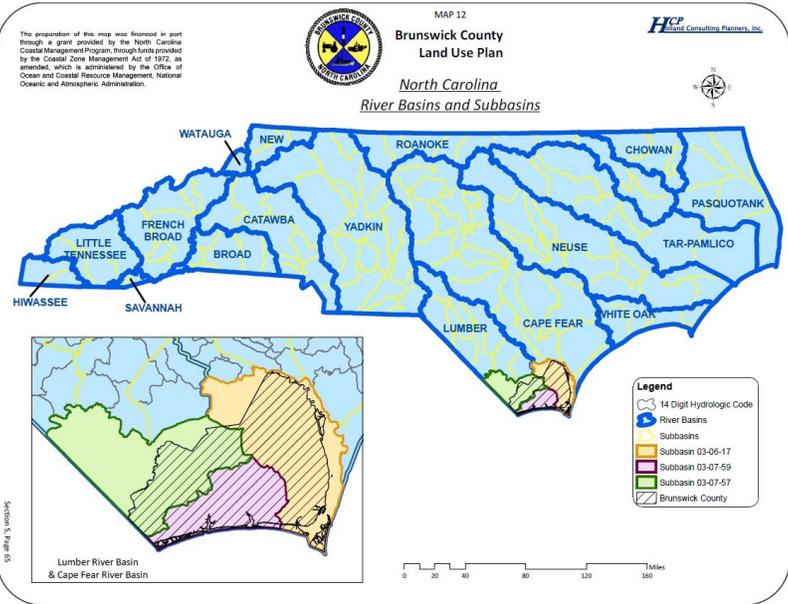


Figure D-2.7 River Basins and Subbasins

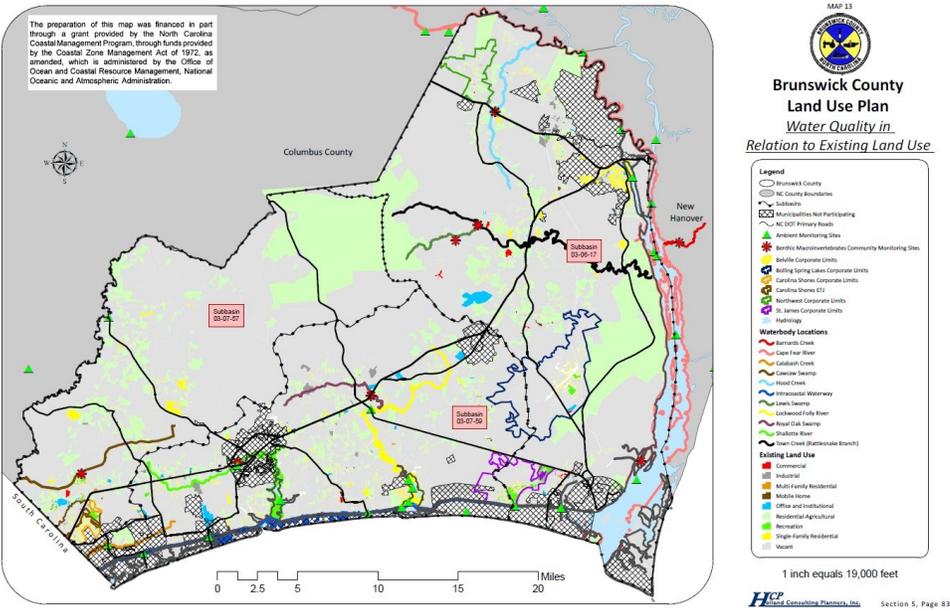


Figure D-2.8 Water Quality in Relation to Existing Land Use

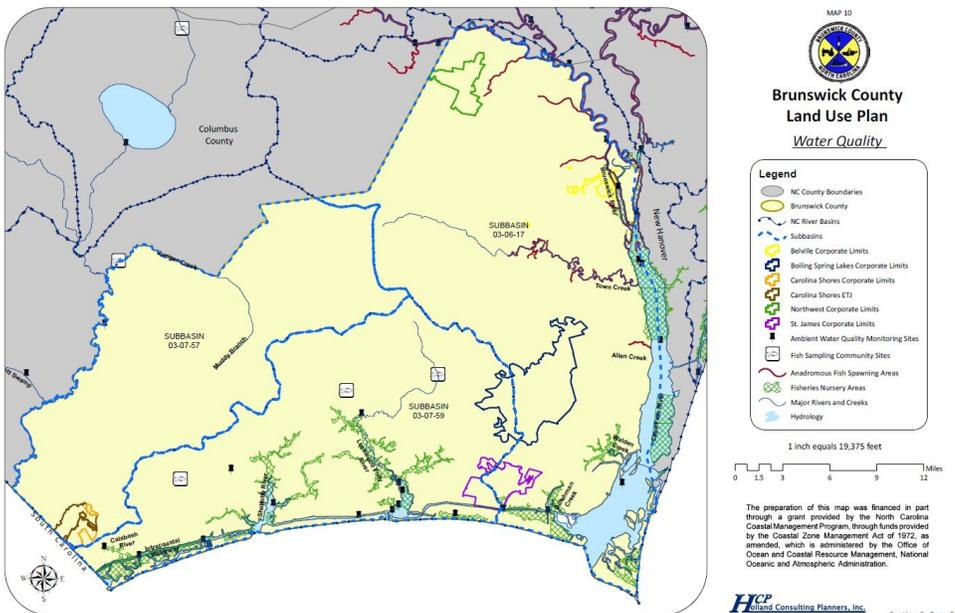


Figure D-2.9 Water Quality Map

Water Quality Assessment

Brunswick County includes portions of the Cape Fear River Basin and the Lumber River Basin. The Basinwide Plan receives an assessment every two years prepared by the NC Division of Water Resources in 2022, are the primary sources for water quality information on Brunswick County's estuarine and public trust waters. Brunswick County includes portions of the following subbasins: 03-07-57, 03-07-59 (Lumber River Basin), and 03-06-17 (Cape Fear River Basin). Figure D-2.7 delineates the subbasins, and the following provides a summary of existing conditions in the three subbasins, which geographically include some areas located outside of Brunswick County.

Subbasin 03-07-57 (Lumber River Basin)

Most of the land use in this subbasin is either forest or agriculture. All tributary streams tend to be intermittent, with little or no flow during dry summer months. For this reason, most of the DWR sampling in this subbasin focused on the Waccamaw River. Many of the Carolina Bays that are in this subbasin were drained for agricultural uses.

There are four National Pollutant Discharge Elimination Systems (NPDES) wastewater discharge permits with a total permitted flow of MGD. The largest discharger is Tabor City WWTP (1.1 MGD). There are 15 registered swine operations in this subbasin.

The 1994 Lumber River Basinwide Plan identified several stream segments as impaired. These include the Waccamaw River, Muddy Branch, Bear Branch, Gore Creek (Gore Lake), Toms Fork, Monie Swamp, and Caw Caw Swamp. The planned management strategy for these waters was to investigate sources of impairment, to continue existing nonpoint source control programs, and to conduct fish tissue monitoring and investigate sources of mercury in the Waccamaw River. DWR also recognized the need to more accurately determine natural versus impacted swamp conditions.

In addition, management strategies to maintain adequate levels of oxygen in stream were recommended. These strategies were aimed at new dischargers into the Waccamaw River watershed.

Table D-2.11 Subbasin 03-07-57 (Lumber River Basin)

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	1,372.90	0.24%
Cleared Bottomland Hardwood	13.35	0.00%
Cleared Depressional Swamp Forest	62.02	0.01%
Cleared Hardwood Flat	25.32	0.00%
Cleared Headwater Swamp	0.28	0.00%
Cleared Pine Flat	56.08	0.01%
Cleared Pocosin	18.77	0.00%
Cutover Bottomland Hardwood	90.75	0.02%
Cutover Depressional Swamp Forest	209.08	0.04%
Cutover Hardwood Flat	80.51	0.01%
Cutover Headwater Swamp	5.43	0.00%
Cutover Pine Flat	197.05	0.03%
Cutover Pocosin	80.01	0.01%
Depressional Swamp Forest	1,154.49	0.20%
Drained Bottomland Hardwood	13.52	0.00%
Drained Depressional Swamp Forest	415.31	0.07%
Drained Hardwood Flat	423.72	0.07%
Drained Headwater Swamp	1.74	0.00%
Drained Pine Flat	11,682.20	2.04%
Drained Pocosin	3,572.77	0.62%
Drained Riverine Swamp Forest	591.96	0.10%
Freshwater Marsh	141.65	0.02%
Hardwood Flat	894.44	0.16%
Headwater Swamp	408.26	0.07%
Human Impacted	279.31	0.05%
Managed Pineland	40,475.10	7.06%
Pine Flat	8,385.99	1.46%
Pocosin	9,967.97	1.74%
Riverine Swamp Forest	20,662.86	3.60%
TOTAL	101,282.90	17.70%

*Refer to Map 12 for locations of subbasins.

NOTE: These figures include all unincorporated and incorporated areas of the County within Subbasin 03-07-57.

Source: North Carolina GIA and National Wetlands Inventory.

Subbasin 03-07-59 (Lumber River Basin)

This subbasin is entirely located in Brunswick County and is the only subbasin in the entire Lumber River basin where all waters drain to the Atlantic Ocean. Population growth in the subbasin is primarily concentrated in the coastal communities, but also around the towns of Shallotte and Calabash.

There are three (NPDES) wastewater discharge permits in this subbasin with a total permitted flow of MGD. There is also one individual NPDES stormwater permit in the subbasin. Brunswick County and South Brunswick Water and Sewer Authority are required to develop a stormwater program under Phase II.

Subbasin 03-06-17 (Cape Fear River Basin)

Table D-2.12 Subbasin 03-07-59 (Lumber River Basin)

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	1,116.46	0.20%
Cleared Bottomland Hardwood	61.12	0.01%
Cleared Depressional Swamp Forest	57.11	0.01%
Cleared Estuarine Shrub/Scrub	42.51	0.00%
Cleared Hardwood Flat	18.05	0.00%
Cleared Headwater Swamp	2.12	0.00%
Cleared Pine Flat	168.63	0.03%
Cleared Pocosin	78.22	0.01%
Cutover Bottomland Hardwood	140.65	0.03%
Cutover Depressional Swamp Forest	129.56	0.02%
Cutover Estuarine Forest	2.41	0.00%
Cutover Estuarine Scrub/Scrub	29.18	0.01%
Cutover Hardwood Flat	64.79	0.01%
Cutover Headwater Swamp	17.74	0.00%
Cutover Pine Flat	523.25	0.09%
Cutover Pocosin	283.04	0.05%
Cutover Riverine Swamp Forest	1.23	0.00%
Depressional Swamp Forest	1,834.39	0.32%
Drained Bottomland Hardwood	6.72	0.00%
Drained Depressional Swamp Forest	17.62	0.00%
Drained Hardwood Flat	44.24	0.01%
Drained Pine Flat	822.03	0.14%
Drained Pocosin	411.57	0.07%
Drained Riverine Swamp Forest	14.90	0.00%
Estuarine Forest	60.41	0.01%
Estuarine Shrub/Scrub	409.81	0.07%
Freshwater Marsh	291.57	0.05%
Hardwood Flat	529.62	0.09%
Headwater Swamp	600.65	0.11%
Human Impacted	181.68	0.03%
Managed Pineland	26,987.42	4.71%
Pine Flat	8,617.46	1.50%
Pocosin	9,997.04	1.74%
Riverine Swamp Forest	7,455.78	1.30%
Salt/Brackish Marsh	6,608.04	1.15%
TOTAL	67,627.02	11.80%

*Refer to Map 12 for locations of subbasins.

NOTE: These figures include all unincorporated and incorporated areas of the County within Subbasin 03-07-59.
Source: North Carolina GIA and National Wetlands Inventory.

Subbasin 03-06-17 is located in the outer Coastal Plain and in estuarine regions of the basin. Most tributaries in this subbasin are slow moving tannin stained streams or tidal creeks. There are 41 individual NPDES wastewater discharge permits in subbasin 03-06-17. The permitted flow is 99.9 MGD. The largest dischargers are International Paper (50 MGD), Progress Energy (3.5 MGD), New Hanover County WWTP (4MGD), Wilmington Northside WWTP (16 MGD), and Wilmington Southside WWTP (12 MGD).

Table D-2.13 Subbasin 03-06-17 (Cape Fear River Basin)

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	3,041.83	0.53%
Cleared Bottomland Hardwood	32.48	0.01%
Cleared Depressional Swamp Forest	33.61	0.01%
Cleared Estuarine Shrub/Scrub	12.69	0.00%
Cleared Hardwood Flat	19.46	0.00%
Cleared Headwater Swamp	11.19	0.00%
Cleared Pine Flat	89.67	0.02%
Cleared Pocosin	20.98	0.00%
Cutover Bottomland Hardwood	178.07	0.03%
Cutover Depressional Swamp Forest	147.24	0.03%
Cutover Estuarine Scrub/Scrub	11.00	0.00%
Cutover Hardwood Flat	95.22	0.02%
Cutover Headwater Swamp	25.67	0.00%
Cutover Pine Flat	371.32	0.06%
Cutover Pocosin	150.60	0.03%
Depressional Swamp Forest	2,215.93	0.39%
Drained Bottomland Hardwood	432.08	0.08%
Drained Depressional Swamp Forest	19.87	0.00%
Drained Hardwood Flat	114.44	0.02%
Drained Headwater Swamp	0.77	0.00%
Drained Pine Flat	9,810.87	1.71%
Drained Pocosin	3,670.29	0.64%
Drained Riverine Swamp Forest	89.08	0.02%
Estuarine Forest	18.22	0.00%
Estuarine Shrub/Scrub	319.42	0.06%
Freshwater Marsh	6,039.20	1.05%
Hardwood Flat	1,065.94	0.19%
Headwater Swamp	804.98	0.14%
Human Impacted	1,153.21	0.20%
Managed Pineland	34,114.23	5.95%
Pine Flat	9,737.02	1.70%
Pocosin	13,465.97	2.35%
Riverine Swamp Forest	17,872.41	3.12%
Salt/Brackish Marsh	8,664.73	1.51%
TOTAL	113,849.70	19.87%

*Refer to Map 12 for locations of subbasins.

NOTE: These figures include all unincorporated and incorporated areas of the County within Subbasin 03-06-17.

Source: North Carolina GIA and National Wetlands Inventory.

The following recommendations were provided in the 2005 Water Quality Plan:

Bald Head Creek. Bald Head Creek from source to the Cape Fear River (79.9 acres) is impaired for shellfish harvesting because this segment is classified by DEH SS as prohibited in growing area B-2. Bald Head Creek will be added to the 303(d) list of Impaired waters.

Beaverdam Creek. Beaverdam Creek from source to Polly Gully Creek (1 mile) is Not Rated for aquatic life because benthic community ratings could not be assigned at sites BB17, BB39, and BB204 in 1999. The watershed was studied in 1999 to evaluate the effects of ditching associated with the St. James Plantation development. Large amounts of silt in the creek promoted a shift toward silt tolerant species. The Brunswick Water Treatment Plant (WTP) discharge provided permanent flow and increased the pH of the stream above what would be natural for streams in this area. A surprisingly pollution intolerant benthic community was present in some areas of the watershed. Beaverdam Creek from Polly Gully Creek to ICWW (11.3 acres) is Impaired for shellfish harvesting because this segment is classified by DEH SS as prohibited in growing area B-1. DWR will continue to monitor Beaverdam Creek. It is recommended that further development in this area avoid ditching and use BMPs to prevent further siltation of streams in this watershed. Segment 18-88-9-1-(1.5) will be added to the 303(d) list of Impaired waters.

Cape Fear River Estuary, Brunswick River, Cape Fear River. The Brunswick River from source to the Cape Fear River (743.7 acres) is Impaired for aquatic life because the dissolved oxygen standard was violated in 14.3 percent of samples at site BA707. The dissolved oxygen standard for SC classified waters is 5 mg/l. The pH standard was also below standard in 19.6 percent of samples. The low pH may be associated with swamp drainage from the Black and Northeast Cape Fear Rivers. Clairmont Shopping Center had significant violations of ammonia permit limits during the last two years of the assessment period as well. The Cape Fear River from International Paper intake to Bryant Mill Creek (3.8 miles) is Impaired on a monitored basis in the fish consumption category.

- The Cape Fear River from Bryant Mill Creek to Toomers Creek (18.5 miles) is Not Rated because dissolved oxygen was below 4 mg/l in 11 and 13.8 of samples collect at sites BA640 and BA639. This segment is classified as C Sw, which acknowledges natural characteristics of swamps such as low pH. Also, BASF had significant violations of biological oxygen demand permit limits and Leland Industrial Park WWTP had significant violations of total suspended solids permit limits during the last two years of the assessment period. BASF is under a special order of consent that expires in August 2005.
- The Cape Fear River from Toomers Creek to Snows Cut (5,616.7 acres) is Impaired for aquatic life because the dissolved oxygen standard was violated in 42.9, 37.1, 16.4, 29.5, 23.2 and 10.4 percent of samples collected at sites BA642, BA644, BA708, BA709, BA713 and BA716. The dissolved oxygen standard for SC waters is 5 mg/l. The standard was also below the standard in 38.5, 37.1, 10.4, 20.5, and 19.6 percent of samples at the same sites. The low pH may be associated with swamp drainage from the Black and Northeast Cape Fear Rivers. The segment of the Cape Fear River upstream of this area has a supplemental classification of Sw that acknowledges that swamp streams may have lower dissolved oxygen and pH.
- The Cape Fear River from Snows Cut to Federal Marsh (7,856.7 acres) is Supporting aquatic life because no criteria were exceeded at site BA722, although Kure Beach WWTP had significant violations of total suspended solids permit limits during the last two years of the assessment period.
- The Cape Fear River from Polly Gully Creek to ICWW (11.3 acres) is Impaired for shell fishharvesting because these segments are classified by DEH SS as prohibited in growing areas B-1 and B-4. Segments 18-(87.5)a is Supporting aquatic life and recreation because no criteria were exceeded at sites BA722 and S-43. Segment 18-(87.5)b is Supporting shellfish harvesting and aquatic life because this area is approved and no criteria were exceeded at site BA734.

DWR is developing a TMDL to address the low dissolved oxygen in these segments. TMDL targets and allocations will be addressed as part of the process. Modeling efforts will include a watershed model of the Northeast Cape Fear River and hydrodynamic and water quality modeling of the estuary. The TMDL was scheduled to be submitted to EPA in late 2005. Until the TMDL is approved by EPA, new and expanding discharges will be carefully considered on a case-by-case basis. The NPDES compliance process will be used to address the significant permit violations noted above. Segment 18-(71)a and 18-77 will remain on the 303(d) list of Impaired waters replacing the Cape Fear (DEH Area) B10 listing. Segments 18-(63)a and 18-(87.5)a, c and d will be added to the list. In 2005, a NOAA grant was used to implement BMPs at the Carolina Beach State Park Marina. The BMPs included two rain gardens to treat runoff from parking lots and two inlet slip filters to filter sediment, oils, and grease from runoff.

Coward Creek. Coward Creek from source to the Cape Fear River (5.9 acres) is Impaired for shellfish harvesting because this segment is classified by DEH SS as prohibited in growing area B-1. Coward Creek will be added to the 303(d) list of Impaired waters.

Dennis Creek. Dennis Creek and Piney Point Creek south of the ICWW (45.7 acres) are Impaired for shellfish harvesting because these segments are classified by DEH SS as prohibited in growing area B-1. These creeks will be added to the 303(d) list of Impaired waters.

Dutchman Creek, Dutchman Creek Outlet Channel, and Dutchman Creek Shellfish Area. Dutchman Creek, the Outlet Channel, and Shellfish Area north of the ICWW (192 acres) are Impaired for shellfish harvesting because these segments are classified by DEH SS as prohibited in growing area B-1. These creeks will be added to the 303(d) list of Impaired waters.

Elizabeth River, Elizabeth River Shellfishing Area, and Molasses Creek Shellfish Area. Elizabeth River, Shellfish Area, and Molasses Creek south of the ICWW (290.1 acres) are Impaired for shellfish harvesting because these segments are classified by DEH SS as prohibited in growing area B-1. These creeks will be added to the 303(d) list of Impaired waters.

Fishing Creek. Fishing Creek from source to Bald Head Creek (7.9 acres) is Impaired for shellfish harvesting because this segment is classified by DEH SS as prohibited in growing area B-1. Fishing Creek will be added to the 303(d) list of Impaired waters.

Intracoastal Waterway (ICWW). The Intracoastal Waterway from channel marker F1 to Dutchmans Creek Outlet Channel (226.6 acres) is Impaired for shellfish harvesting because this segment is classified by DEH SS as prohibited in growing area B-1. This segment is Supporting recreation because no criteria were exceeded at site S-41. The Intracoastal Waterway from Dutchmans Creek Outlet Channel to Cottage Creek (96.6 acres) is Impaired for aquatic life because the dissolved oxygen standard was violated in 11 percent of samples at site BA740. The dissolved oxygen standard for SC classified waters is 5 mg/l. This segment is also Impaired for shellfish harvesting and recreation because this segment is classified by DEH SS as prohibited in growing area B-1 and because of permanent swimming advisories at site S-42. DWR and DEH will continue to monitor the ICWW and work with local governments to identify sources of bacteria and oxygen-consuming materials. This segment of the ICWW will be added to the 303(d) list of Impaired waters. TMDLs will be developed for identified stressors within 8-13 years of listing.

Town Creek. Town Creek from source to the Cape Fear River (32.1 miles) is Supporting aquatic life because of a natural benthic community rating at site BB13. A sample in November 1999, after three hurricanes, indicated the benthic community was not severely impacted by the storms. Town Creek is Impaired on a monitored basis in the fish consumption category and will be added to the 303(d) list of Impaired waters. In 2000, the NC Coastal Land Trust received a \$305,000 Clean Water Management Trust Fund (CWMTF) grant to acquire 260 acres conservation easements along Town Creek, with an additional 320 acres of donated conservation easements included in the project. In 2001, the NC Coastal Land Trust received a \$277,000 CWMTF grant to acquire 115 acres conservation easements along Town and Russell Creeks, with an additional 135 acres of donated conservation easements included in the project. In 2002, the NC Coastal Land Trust received a \$2,095,000 CWMTF grant to acquire 638 acres along Town Creek.

Southport Restricted Area. The Southport Restricted Area, on the west bank of the Cape Fear River from Price Creek to Southport (715.3 acres), is Not Rated for aquatic life on an evaluated basis because the ADM Southport Plant had significant violations of total settleable solids permit limits during the last two years of the assessment period that could have negatively impacted aquatic life. The NPDES compliance process will be used to address the significant permit violations noted above.

Shellfishing

The following table provides updated information regarding shellfishing areas throughout Brunswick County. There are a number of waters in and adjacent to coastal Brunswick County that are closed to shellfishing. These closures are due primarily to stormwater runoff and other non-point sources of pollution, both from within Brunswick County and surrounding counties located within the watershed. Closed shellfish areas are locations where shellfish harvesting is prohibited by law due to unsafe levels of pollutants caused by conditions such as wastewater discharge and nonpoint source stormwater runoff. Conditional areas are typically open to shellfishing, but may be closed following a significant rainfall event because of the resultant runoff. NCDEQ’s Division of Marine Fisheries website provides maps depicting prohibited shellfishing locations in Brunswick County and can be accessed at: <https://deq.nc.gov/about/divisions/marine-fisheries>.

Table D-2.14 Status of Shellfishing Areas in Brunswick County

Area	Open (Acres)	Closed (Acres)
Calabash Creek	602	1,198
Shalotte River	794	556
Lockwood Folly River	718	932
Southport Area	0	1,325
Buzzard Bay	2,733	117
The Basin Area	75	0

Existing Land Use & Development

Introduction

Planning for the future of Brunswick County requires an understanding of the current development pattern and the range of land uses that occupy the developed parcels. The urbanization of the County is expected to continue, and recent development activity can provide an indication of future development potential, revealing some of the likely locations and types of uses to anticipate over the next two or three decades. The following summarizes the existing land use pattern, the types of uses that comprise development in the County, the pattern of development, and the opportunities for future development in terms of the quantity, capacity, and suitability of the land to support it.

Existing Land Use and the Development Pattern

The existing land use pattern of the Brunswick County reflects the evolution of the County, which has grown at an average annual rate of 3.4% since 1972, according to the U.S. Census. Though much of the county remains relatively rural, evidence of the agricultural activities of the past has been disappearing as farmland is converted to residential and nonresidential development. Today, the County is recognized for its attractive beaches, quaint towns, and quiet oceanfront communities. As a popular vacation destination and a desirable place to retire, the County has experienced growth in both seasonal and permanent populations, and the development that has occurred in recent years has been in response to the growing demands of new residents, second-home owners, and other investors.

Most of the county's development is concentrated on approximately 15% of the county's land area. Of that developed area, more than half is devoted to residential uses. Residential properties are providing 77% of the County's tax base. Combined, commercial and industrial lands account for roughly two percent of the total land area, but seven percent of the tax base is collected from these two land use types.

The Existing Land Use Map provided in Section 2 (Figure 2.6) and Appendix F depict a general pattern of existing land use in the county based on 2021 tax parcel data. Land use categories shown on this map include residential (three types: single-family, multifamily, and townhome), commercial, institutional, industrial, undeveloped, and protected open space. Estimates of the land area allocated to each land use category are as follows:

Table D-3.1

LAND USE CATEGORY	ACRES	PERCENTAGE OF LAND AREA
Residential (all types)	48,914	9%
Commercial	5,435	1%
Institutional	10,870	2%
Industrial	5,435	1%
Undeveloped	380,442	70%
Open Space	92,393	17%

As the map reveals, urbanization of the County has occurred primarily along the coastline in the beach communities as well as areas along US-17 and NC-211. Recently, the northern communities, particularly Leland and Belville, have experienced higher rates of growth as retirees and families seek neighborhoods conveniently located between the beaches and downtown Wilmington. New development in that part of the County includes a variety of housing types and densities as well as shopping centers with national retailers and franchise restaurants as the predominant types of tenants.

The following generally describes the characteristics of each land use category:

Residential – Built at relatively low densities, the existing residential development is comprised primarily of single-family detached homes. Many have been constructed as part of planned communities that are typically gated and offer a wide variety of recreational amenities including golf courses, walking trails, and fitness centers. Other single-family residential development includes houses in subdivisions served with public utilities and homes in more rural settings on large lots served by individual septic systems and wells. A few small pockets of multifamily and attached single-family homes (townhomes) are located within the planned communities as well as within or at the edges of the municipalities.

Commercial – Commercial development is located throughout the County, but the most common locations are the centers of the municipalities and sites at or near the intersections of major highways. Most of the commercial development in unincorporated areas of the County consists of local-serving businesses (retail, restaurant, office, and service uses), which are typically occupants of multi-tenant buildings in grocery-anchored shopping centers that vary in size based on location. Positioned to take advantage of the visual and physical access from adjacent highways, these centers capture the attention of passing traffic, and they are set back from the road by generously sized fields of surface parking. Many single-tenant buildings that house retail, restaurant, office, or service uses are situated amongst the centers, but with separate access and parking, they are typically not connected to adjacent development.

Institutional – In the existing land use classifications, institutional uses include local government complexes, education campuses, healthcare facilities, and sites associated with Military Ocean Terminal Sunny Point (MOTSU). These uses are located on sites designed to accommodate the specific functions associated with each.

Industrial – Industrial development in the County ranges from the very large site where the Brunswick Nuclear Plant is situated to small parcels, particularly in municipalities, with individual buildings that house small-scale manufacturing operations or outdoor storage of materials. Historically, rail and water access dictated the locations of many of the industrial sites. More recently, highway access has been a factor in the siting of industrial facilities.

Undeveloped – This category includes vacant parcels (lots without structures), but a high percentage of this land is considered a “working landscape” as it also encompasses the agricultural uses in the County. Such lands, which are mostly managed for timber, cultivated fields, and pastureland as well as other uses associated with farming activities, can also be found in these areas.

Open Space – This category identifies the locations of parcels that have been permanently protected for conservation and/or recreational uses. Several such parcels throughout the county are owned and maintained by Federal, State, and local governments and other public entities. Many are shown on the Protected Areas Map in Section 2 (Figure 2.4) and Appendix F, which also displays lands that are privately held and protected through conservation easements and other mechanisms. Among them are several large parcels that, in addition to protecting plant species and wildlife habitats, are used for special purposes. The NC Wildlife Resource Commission (NCWRC), for example, manages game lands in the county, including more than 18,000 acres in the Juniper Game Creek Game Land and 2,048 in the Green Swamp Game Land.

Land Supply and Suitability

Future development can be accommodated in areas of undeveloped land as well as land that is underutilized and therefore ripe for redevelopment. Therefore, to better understand development potential within the current development pattern, an assessment of the land supply (quantity of developable acres) and the capacity of the land to support future development (qualities of developable parcels) is required. This assessment involves an examination of the development status of all parcels in the County. Parcels are described as follows:

Developed – The level of investment is high and such parcels are not likely to redevelop over the next 20 years.

Open Space – Parcels of land are protected as public parks, state-maintained game lands, military installations, or privately-owned conservation easements.

Underdeveloped – The level of investment is low relative to the parcel value and the property is therefore ripe for redevelopment.

Undeveloped – With few or no structures, parcels of land remain vacant or relatively undeveloped. (Note: These parcels include agricultural lands that are managed for timber, cultivated fields, and pastureland.)

A Development Status Map provided in Section 2 (Figure 2.7) and Appendix F indicates the status of each parcel. Combined, some of the “undeveloped” and “underdeveloped” parcels in the county’s jurisdiction constitute the “Land Supply,” which is approximately 45,000 acres of land that may be available for future development. If land currently in use for agriculture is included, that number could be as high as 140,000.

Some of the land that comprises the land supply is not highly suited for future development. A suitability analysis was conducted to delineated areas to which future growth will be drawn. The suitability of land refers to the capacity of land to support a type of land use. This is based on various attributes, such as availability of infrastructure, access, parcel size, topography, environmental conditions, and proximity to other uses. Regulatory constraints can also have an impact on suitability. All such factors make a parcel more or less attractive for future growth. Investors seeking sites for residential development, for example, often pursue parcels that are in close proximity to schools, have—or will have—public utilities (water and sewer services), have access to major roads, are not limited by environmental constraints, and are generally distanced from historic and culturally important places or high-impact development. Some suitability factors, such as availability of infrastructure, apply to commercial and industrial development, too, but a minimum parcel size and a minimum distance from schools and existing neighborhoods can narrow the options for future industrial development sites.

Historic, Cultural, and Scenic Areas

Historic, cultural, and scenic areas are important elements of Brunswick County's development pattern. An inventory of the sites and structures are documented in the *Comprehensive Historical/Architectural Site Survey of Brunswick County, North Carolina*. This study, completed in 2010, examined a total of 506 buildings and other historic resources located in the County to identify Study List candidates. As noted in the 2010 study, the Study List signals that a property is likely to be eligible for the National Register of Historic Places but does not guarantee a listing in the register.

The fifth edition of the *North Carolina Byways*, produced by the North Carolina Department of Transportation (NCDOT) in 2021, explains the purpose of the 62 designated byways, noting that each provides residents and visitors "a chance to experience North Carolina's history, geography, and culture, while also raising awareness of for the protection and preservation of these treasures." Each corridor is selected for its diverse natural features and the cultural aspects they feature. The publication identifies two scenic byways within Brunswick County: the Green Swamp Byway (NC-211 from a point just north of its intersection with US-17 to the County's northern boundary) and Brunswick Town Road (comprised of segments of NC-133, SR-1530, SR-1529, and SR-1533).

Brunswick County boasts 15 buildings on the National Register of Historic Places, and over 40 state-recognized Historic Preservation Sites (see map below for their locations). The locations of these places are depicted on the Cultural Resources Map in Section 2 (Figure 2.2) and in Appendix F. As the map shows, these resources are spread across the county, with concentrations in historic town centers including Southport, Shallotte, and Leland. In addition to individual sites and structures, the county also has several recognized historic districts and portions of four of them, including one in Southport, are on the National Register of Historic Places. Among the resources are the following buildings and sites. Descriptions of the many places shown on the map are provided in the *Comprehensive Historical/Architectural Site Survey of Brunswick County, North Carolina*.

Fort Anderson – Located at the site of Brunswick Town in 1861, this Confederate fortification is largely intact. Except the barracks chimneys, which were built on bases of brick and ballast stone collected from abandoned buildings in the adjacent town, the fort is constructed of sand.

St. Philip's Church – Part of the Charles Town settlement (1725), the ruins are all that remain of this elegant brick church, which today is one of the County's most important standing structures.

Orton Plantation – [Excerpt from the 2010 study] *The County's best preserved antebellum plantation is Orton Plantation on the Cape Fear. The site was first settled by Roger Moore of the powerful South Carolina Moore family. There is a tradition that Moore's first residence at Orton, thought to have been built as early as ca. 1725, was burned by Indians. Moore rebuilt in brick, as a 1734 description of his "exceedingly pleasantly situated" residence indicates, and this story-and-a-half house is believed to form the core of the present Greek Revival-style mansion. An 1824 sale advertisement described the plantation soon after the death of its recent owner Governor Benjamin Smith. The plantation contained "4,975 acres, more or less. Of this track [sic] between 400 and 500 acres is swamp land of a strong and fertile soil, which, it is believed will produce at least 1,000 lbs. of cotton or four times of rice to the acre . . . Included in the premises is a very superior and never failing mill stream with an excellent dam, wanting only flood gates. The rice machine mill and gin having been recently destroyed by fire." The mill pond served double duty as a reservoir that could be used to flood the rice fields when needed. Roger Moore's 1730s house was apparently raised to two stories in height before a major renovation was completed in the 1840s by then owner Frederick James Hill. The renovation added a monumental Doric portico with an elliptical fanlight in the tympanum. The antebellum design was made more imposing in 1910 by the addition of symmetrical side wings and other classical embellishments designed by New York architect Kenneth M. Murchison, Jr. Ornamental gardens dating to the same period were enlarged in the 1930s according to specifications by Massachusetts landscape architect Robert Swann Sturtevant.*

Community Facilities

Water & Wastewater Utilities

Water System Overview

Brunswick County owns and operates a public water supply system that provides direct water service to over 48,000 residential, commercial, and industrial customers. The Public Utilities Department also supplies drinking water to nine (9) wholesale customers through long-term purchase agreements. These customers include Village of Bald Head Island, Brunswick Regional Water & Sewer (H2GO), Town of Holden Beach, Little River Water & Sewerage Company, Town of Navassa, Town of Oak Island, Town of Ocean Isle Beach, Town of Shallotte, and City of Southport. Collectively, this represents service to a year-round population of more than 105,000, and a seasonal population (May through September) of over 260,000.

The water system is comprised of the following components:

Sources of Supply

- Cape Fear River

- Groundwater Wells, NC Hwy 211 near US 17

Water Treatment

- Northwest Water Treatment Plant: 24.0 MGD capacity

- Hwy 211 Water Treatment Plant: 6.0 MGD capacity

Pumping

- 12 pump stations: Various locations and capacities

Storage

- Elevated Storage Tanks: 5.85 million gallons

- Ground Storage Tanks: 15.75 million gallons

Distribution Mains

- 1,100 miles

Historical Use Pattern

2015 Average Day Demand: 10.08 MGD

2021 Average Day Demand: 17.46 MGD

Annual Growth Rate: 4.7%

Available Capacity

41.8% of System Capacity

A summary of the Comprehensive Water Treatment & Distribution System Master Plan is provided in Appendix B. The full plan can be found on the County's website (www.brunswickcountync.gov). Updates to this plan are currently underway, with expected completion in Spring 2023.

Wastewater System Overview

Brunswick County owns and operates public wastewater collection and treatment systems that provides direct sewer service to over 21,000 residential, commercial, and industrial customers. The Public Utilities Department provides retail sewer service within the municipalities of City of Boiling Spring Lakes, Town of Bolivia, Town of Calabash, Town of Carolina Shores, Town of Caswell Beach, Town of Sandy Creek, Town of St. James, Town of Navassa, City of Northwest, Town of Sunset Beach, and other unincorporated areas of Brunswick County. Wholesale sewer treatment is provided to Holden Beach, Oak Island, Ocean Isle Beach, Shallotte, Southport, and H2GO.

The wastewater systems are comprised of the following components:

Wastewater Treatment

West Brunswick Water Reclamation Facility:

6.0 MGD Capacity

4.2 Daily Average Flow FY21

30% Available Capacity

Northeast Brunswick Water Reclamation Facility:

2.475 MGD Capacity

2.35 Daily Average Flow FY21

Ocean Isle Beach Water Reclamation Facility:

1.05 MGD Capacity

0.347 Daily Average Flow FY21

Carolina Shores WWTP:

0.53 MGD Capacity

0.39 Daily Average Flow FY21

Shallotte WWTP:

0.5 MGD Capacity

0.2 Daily Average Flow FY21

Sea Trail WWTP:

0.3 MGD Capacity

0.19 Daily Average Flow FY21

Total Capacity Across All Systems: 10.855 MGD

Pump Stations

159 major pump stations: Various locations and capacities

9,100 individual grinder pump stations

Collection System Mains

645 miles of gravity, force main, low pressure, and vacuum sewer lines

Historical Flow Pattern – Across All Systems

2015 Average Day Demand: 5.98 MGD

2021 Average Day Demand: 7.67 MGD

Annual Growth Rate: 4.7%

Available Capacity – Cumulative Across All Systems

29.3% of System Capacity

A summary of the Comprehensive Wastewater Master Plan is provided in Appendix B. The full plan, along with the latest Brunswick County Wastewater Collection and Treatment System Annual Report, can be found on the County's website (www.brunswickcountync.gov). Updates to the plan are currently underway, with expected completion in Spring 2023.

System Expansion & Capital Improvements

Brunswick County Public Utilities governs construction, access, connections, line extensions, infill development, and related standards and specifications, etc., under its Utility Policy. The County's intent is "to provide potable water and environmentally sound sewer treatment to all those citizens of the County where it is deemed economically feasible and structurally practical."

System expansions and upgrades related to new development require developer contributions of infrastructure and/or payment of system development fees. These fees generally offset the incremental cost of capital assets that provide capacity that continue to meet the demands placed on the system by each new customer or development.

Capital improvements planning related to system expansion, rehabilitation and upgrades are developed and managed through the Brunswick County Public Utilities Department. Water and sewer master planning documents are created to help provide guidance. Accurate master planning is critical to ensuring capacity comfortably keeps pace with future demand. Historical water demand and sewer flows are studied and used to estimate future demands. Capital projects are developed to meet system demand forecasts, with details provided in terms of project scope, cost, and recommended scheduling over a 20-year planning period. Capital costs and scheduling are also critical components of utility rate studies, which are performed by the County on a regular basis.

A summary of the Brunswick County Public Utilities Department Utility Policy is included in Appendix B. The policy document as well as the County's Approved Budget document, which identifies current capital improvement plans, can be viewed on the County's website (www.brunswickcountync.gov).

Transportation

As Brunswick County continues its current pattern of growth, transportation matters will certainly be a focal point for local and state officials. Through a network of roadways, some rail service, bike/pedestrian routes, ferry systems, and airports, people and products are transported into, within, and out of the county.

Roads

A few areas with roadway transportation challenges include the southern portion of US-17 corridor within potential areas of the Carolina Bays Parkway Extension, NC-211 from its intersection with US-17 to Southport, and those related to growth and movement in the northern end of the County in and around US-17 and NC-133.

Though Brunswick County does not own, build, or maintain roads, per North Carolina state statutes, state contributions help fund the NC Department of Transportation (NCDOT) initiatives within the County, as well as Powell Bill initiatives to help with improvements for some municipal assets.

Air

Brunswick County's airports (Cape Fear Regional Jetport and Odell Williamson Municipal Airport) continue to be valuable assets for the community. They provide the public with opportunity for recreational flights, lessons, and skydiving, while also serving as key transport for private charters, personal transport and business uses. Air transport also plays an important role in disaster assessment and recovery for the County of Brunswick, which has allocated more than \$1 million per year in its Capital Improvement Plan budget for airport expansion projects from FY2021-2025.

Rail

The CSX "Queen City Express" rail from Wilmington to Charlotte serves the Mid-Atlantic Industrial Rail Park, adjacent to US HWY 74/76 in Leland/Northwest.

The Military Ocean Terminal at Sunny Point (MOTSU) is the largest ammunition port in the nation and the Army's primary east coast deep-water port. MOTSU has a railroad to Leland, where cargo is dropped off at an interchange yard owned by the Army. Commercial railroad entities drop off cargo at the interchange, where MOTSU's own locomotives pick it up. The Army has agreements with two other local rail users, Duke Energy and Archer Daniels Midland, to transport some of their cargo via railroad.

Ferries

Southport / Fort Fisher Ferry: The Southport-Fort Fisher Ferry offers an alternative way to get back and forth from Southport to historic Fort Fisher, the North Carolina Aquarium at Fort Fisher, and Kure and Carolina Beaches. The cost is \$7 for a typical vehicle. Any size car, RV or trailer licensed for highway use can be accommodated for a variable fee.

Bald Head Island Ferry: The Bald Head Island Ferry allows transport to and from the unique island of Bald Head with a 20-minute passenger ferry ride. The mainland embarkation point is Deep Point Marina, in Southport. Round trip tickets are \$23 for adults and \$12 for children.

Public Transportation

Brunswick Transit System, Inc. (BTS) is a non-profit community transportation system that coordinates public and human services transportation for the residents of Brunswick County. BTS operates a fleet of 17 vehicles, including ADA equipped vehicles to assist persons with special needs.

Bike and Pedestrian Facilities

The County has worked in partnership with numerous municipalities, the Cape Fear MPO, and other partners on the existing More Than A Trail plan. This recently developed plan inventories existing bike and pedestrian facilities as well as looks to the future with proposed routes. Continued study and updating of this planning effort should occur with all partners and appropriate stakeholders as projects are implemented and completed. Connectivity to area destinations such as schools, parks, healthcare facilities, and popular gathering places should continue to be prioritized. Gaps in the bike/pedestrian network should be identified and considered important projects to prioritize.

Other

Various private taxi providers and bus charters serve Brunswick County.

Transportation Planning

Brunswick County is supported by the Grand Strand Area Transportation Study (GSATS), which serves as the designated Metropolitan Planning Organization (MPO). As the MPO, GSATS provides the forum for cooperative decision making in developing regional transportation plans and programs to meet changing needs. It is composed of elected and appointed officials representing local, state, and federal governments or agencies having interest or responsibility in comprehensive transportation planning. GSATS serves as the formal agency that plans and programs transportation improvements in the GSATS area, which are then implemented by local and state jurisdictions.

Brunswick County is also served by the Cape Fear Area Rural Transportation Planning Organization (CFRPO), which is one of twenty multi-county rural transportation planning organizations chartered by the North Carolina Department of Transportation (NCDOT). The RPO was established in 2001 through a memorandum of understanding between NCDOT, Brunswick, Columbus, and Pender counties, and the Cape Fear Council of Governments. According to the NCDOT, the State of North Carolina recognized the need for more coordinated transportation planning in rural North Carolina areas not within a designated MPO by enacting legislation in 2000 that provides for the development of Rural Transportation Planning Organizations (RPOs). Although like MPOs, RPOs are grounded in state law rather than federal, and are intended to assist NCDOT in facilitating rural area transportation planning processes.

In December 2020, Brunswick County began work to update its Comprehensive Transportation Plan (CTP), which is a long-range plan that identifies major transportation improvement needs and develops long-term solutions to be implemented over the 25 to 30 years that follow. The previous CTP was mutually adopted by the NCDOT on March 4, 2010. The current study is a joint effort with County municipalities, NCDOT, GSATS, and CFRPO. The CTP study involves both government officials and the public to determine the area's future transportation needs based on the best information available including, but not limited to, population, economic conditions, traffic trends and patterns of land development in the county. The study will also include multimodal forms of transportation (bicycle, pedestrian, and public transportation). The preliminary planning documents can be found on the County's website (www.brunswickcountync.gov).

2040 MTP Plan Focus Areas

- **Roadways Improvements** - including widening, aesthetic improvements, and safer intersections
- **Biking and Walking** - including changes that make safer and better places, where visitors and residents want to live, work, walk, and ride
- **Public Transportation** - reaching places for people with and without easy access to cars
- **Regional Mobility** - prioritizing regional needs across all modes of transportation

Source: GSATS-2040-MTP-Plan-Update

