

FLORIDA'S RISING SEAS

Mapping Our Future



Florida's *Rising Seas: Mapping Our Future* is a GIS-based analysis of the intersection between population growth, development patterns and sea level rise in Florida. A joint project of the University of Florida Center for Landscape Conservation Planning and 1000 Friends of Florida, it builds on the *Florida 2070/Water 2070* reports released in 2016 but is distinguished from them by incorporating the impacts of sea level rise on lands available for development, conservation, agriculture and other purposes, and the associated need for population relocation.

Florida's Rising Seas includes an introductory report and two separate studies, *Sea Level 2040* and *Sea Level 2070*. This report focuses on *Sea Level 2040*, which reflects the impacts of sea level rise on Florida's lands and land use over the next two decades. It includes two scenarios, which cover potential futures dominated by additional sprawl or efforts to contain growth and protect important conservation lands:

Sprawl 2040 assumes 2019 densities and patterns of development will continue over the next two decades and also factors in the impacts of sea level rise on Florida's lands and the resulting need for population relocation.

Conservation 2040 accounts for the same population growth and sea level rise by 2040, but also emphasizes protection of much of the state's highest priority lands for conservation, and assumes any new development will be 30% more compact.

Potential protection of the Florida Wildlife Corridor, which has been a state legislative focus in the last few years, is included in the Conservation Scenario. The overall goal of the Conservation scenario is to provide an alternative to the Sprawl scenario by showing what Florida might look in 2040 if we adopted more dense development patterns while committing to ambitious conservation land protection efforts. It is important to note that "protection" of additional priority conservation lands included in this scenario is intended to serve a potential future that shows how growth can be accommodated while still achieving very significant land conservation goals. Future conservation lands are much more likely to be protected by easements, which means that most land will stay privately owned, will be managed by the landowner, and will stay on the tax rolls.

The Scenarios are Based on Four Assumptions:

- Florida's population will grow to 26,406,000 residents in 2040, based on 2021 Florida Bureau of Economic and Business Research (BEBR) medium projections.
- Sea Level will rise by 0.25 meters, based on the 2022 NOAA intermediate projection.
- Residents on lands to be lost to sea level rise will relocate, with half allocated within the same county, and with overflow to adjacent counties if there is insufficient capacity. The other half are assumed to move out of state. Population impacts are based on a NOAA Intermediate sea level rise scenario and a Florida State University (FSU) study on population relocation (Hauer 2016).
- Likelihood of future development of land will vary depending on its location and characteristics. For example, in this analysis proximity to cities, major roads and/or waterbodies or other features are deemed more likely to develop due to desirability, while wetlands are deemed less likely to develop due to higher development costs.

Gross Development Densities (GDD) is used to determine future densities and patterns of development. The GDD in this study was determined using the same approach as that of earlier models, dividing each county's 2019 population by its 2019 developed acres. The lower the number of people per developed acre, the more sprawling the development patterns are in the region. GDD is calculated on a county-by-county basis to project density for the Sprawl 2040 Scenario, while the GDD was increased by 30% county-by-county for the Conservation Scenario to reflect higher density future development patterns.

For this project we describe "State priority natural lands" as including lands that are either currently protected or are high priorities for protection for Florida's biodiversity, water, or other ecosystem services. Used throughout this report, this includes Florida Managed Lands (FLMA), Florida Forever conservation land protection projects, and Priorities 1, 2, and 3 in the Florida Ecological Greenways Network (FEGN), otherwise known as the Florida Wildlife Corridor.

More detailed information on the methodology is available in Appendix A on page 31.

FLORIDA'S RISING SEAS

Statewide Summary



Population Growth

- ⬆️ 4.9 million more residents, a 23% increase

Sea Level Rise

- ⬇️ 1 million acres of land lost, the majority of it protected land
- ⬇️ 205,000 residents relocated

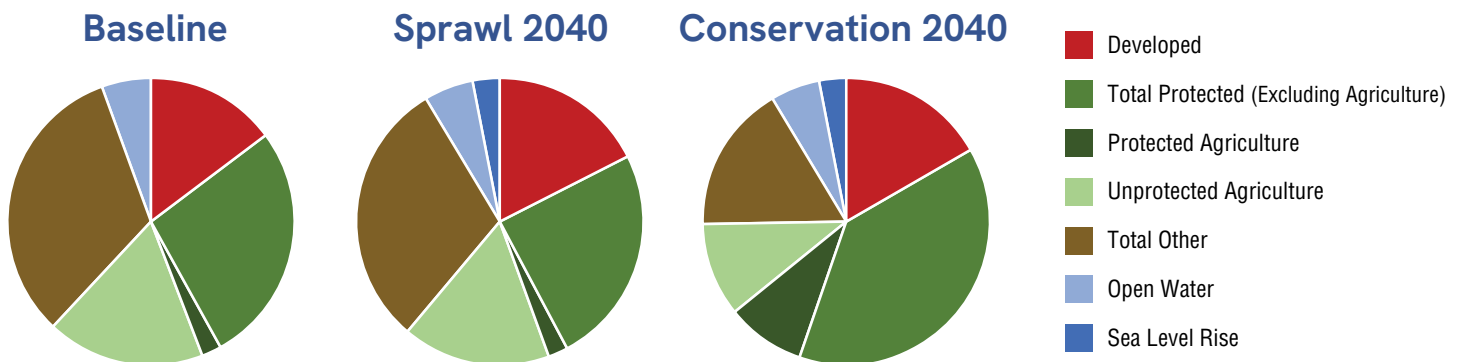
Sprawl 2040 Scenario

- ⬆️ Nearly 1 million more acres of developed land
- ⬇️ 206,000 acres in the Florida Wildlife Corridor (FWC) lost
- ⬇️ 400,000 acres of agricultural lands lost
- ⬇️ 750,000 acres of “other” lands lost (*timber, mining, etc.*)

Conservation 2040 Scenario *(compared with Sprawl Scenario):*

- ⬇️ 270,000 fewer acres of developed lands
- ⬆️ 5 million more acres of proposed protected natural lands (including the FWC)
- ⬆️ 2.4 million more acres of proposed protected agricultural lands (including the FWC)

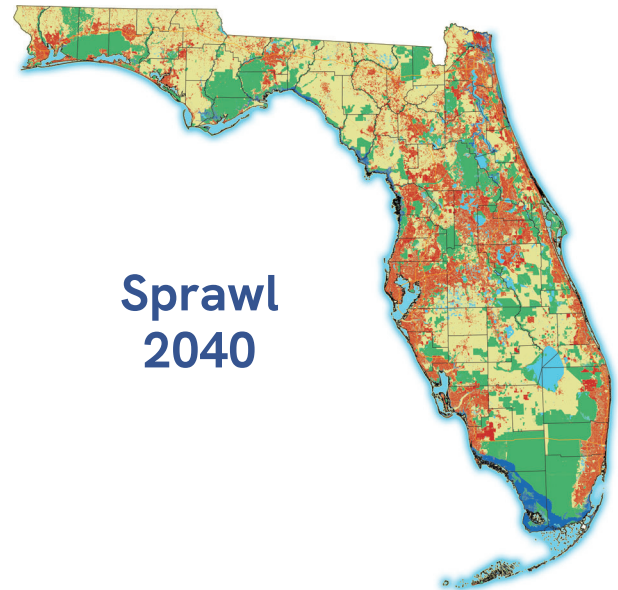
Statewide Pie Charts



Statewide Maps



Baseline



**Sprawl
2040**



**Conservation
2040**

- Developed
- Protected
- Sea Level Rise
- Other

continued

Florida 2040 Statewide Results

Population Growth and Development Patterns

Using medium BEBR projections, by 2040 Florida is expected to have a population of 26,406,000 people, an increase of 23% in about two decades. With this growth in population comes even more development to accommodate new residents and visitors. This population is allocated using each county's 2019 Gross Development Density, described earlier. The GDD remains the same as in 2019 for each county for the Sprawl Scenario and is increased by 30% for the Conservation Scenario. This is described in more detail in Appendix A.

Table 1: 2040 Statewide Population Projections

Period	2019 Census	2040 Projection	Percent Increase	Additional Population to be Allocated
2019 - 2040	21,477,737	26,406,000	23%	4,928,263

Lands Lost to Sea Level Rise

Compounding the impact of this population growth will be the loss of land and the displacement of existing residents due to sea level rise. Using the 0.25m projection, Florida stands to lose 1 million acres of land by 2040, which could result in the relocation of more than 205,000 residents. More information about how the population impacts from sea level rise were determined can be found on page 31 in Appendix A.

Certain inland counties show small numbers of population impacted by sea level rise. This is a result of increased water levels in inland water bodies that are hydrologically connected to the coast as a result of sea level rise. These effects are anticipated to increase with higher levels of sea level rise, and do not factor in other inland flooding (such as within inland floodplains) likely to occur as a result of broader climate change impacts.

As can be seen, over the next two decades Florida's protected natural lands will experience the brunt of sea level rise. Most of these lands are in South Florida, known for its low elevations and preponderance of wetlands. The projected loss of 63,000 more acres in protected natural lands under the Conservation Scenario than the Sprawl Scenario is because these lands are on the future protection lists. However, it should not be assumed that these lands should not be protected, as they could provide important buffers or storm protection for already developed areas or other natural or agricultural areas.

continued

Lands Lost to Sea Level Rise

Table 2: 2040 Statewide Lands Lost to Sea Level Rise

	Sprawl 2040 Acres Lost to SLR	% of Total Acreage	Conservation 2040 Acres Lost to SLR	% of Total Acreage
Developed Land	31,000	0.08%	31,000	0.08%
Protected Natural Lands	852,000	2.34%	915,000	2.52%
Protected Agricultural Lands	2,000	0.01%	3,000	0.01%
Unprotected Agriculture	3,000	0.01%	3,000	0.01%
All Other Land Uses	167,000	0.53%	103,000	0.35%
Total Sea Level Inundation	1,055,000	2.97%	1,055,000	2.97%

**Table 3: Statewide Acreage
Comparison of 2040 Development Scenarios**

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Developed	5,428,000	14.94%	6,374,000	17.54%	6,102,000	16.79%
Protected Natural Land	9,850,000	27.11%	8,997,000	24.76%	14,076,000	38.74%
Protected Agriculture	856,000	2.36%	854,000	2.35%	3,236,000	8.91%
Agriculture	6,418,000	17.66%	6,022,000	16.57%	3,751,000	10.32%
Other*	11,778,000	32.41%	11,028,000	30.35%	6,110,000	16.81%
2019 Open Water	2,006,000	5.52%	2,006,000	5.52%	2,006,000	5.52%
Sea Level Inundation: Protected Lands	0	0.00%	854,000	2.35%	928,000	2.55%
Sea Level Inundation: All Other Land Uses	0	0.00%	201,000	0.55%	127,000	0.35%
Total Acreage	36,337,000	100.00%	36,337,000	100.00%	36,337,000	100.00%
Total Land Acreage	34,330,000	94.48%	33,275,000	91.57%	33,275,000	91.57%
Total Sea Level Inundation	0	0.00%	1,055,000	2.90%	1,055,000	2.90%
Total Open Water including SLR	2,006,000	5.52%	3,062,000	8.43%	3,062,000	8.43%

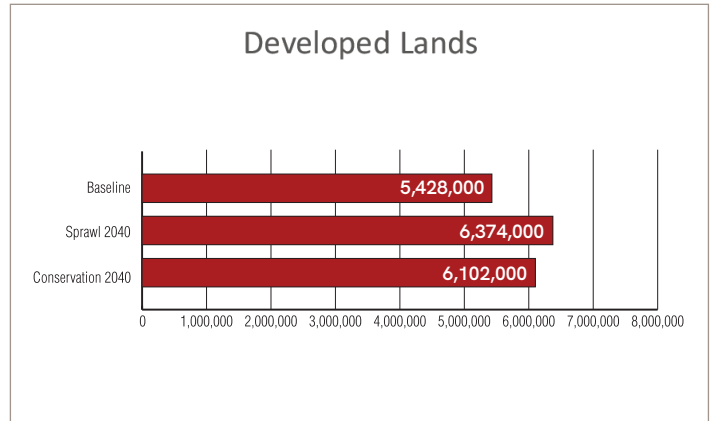
*Protected Natural Land is defined for the purposes of the report to include all protected natural communities, timberland, and other low intensity land uses not considered more intensive agriculture or developed.

**Other land includes timberlands, mining lands, and other miscellaneous land uses not classified as agriculture, developed, protected, protected agriculture, or open water based on the methods described in the technical report. *continued*

Developed Lands

In the Baseline, about 5.4 million acres – close to 15% of Florida’s lands – are developed. Under the Sprawl Scenario, almost 950,000 additional acres of lands would be developed by 2040, representing almost 18% of Florida’s lands. This is an almost 17% increase over 2019 and is further compounded by more than 1 million acres of land projected to be lost to sea level rise.

The Conservation Scenario reflects the protection of Florida’s priority natural lands, lands that have been identified as highest priorities for the long-term health of Florida’s environment. Under this scenario, developed lands would increase somewhat less than in the Sprawl Scenario, from under 18% to under 17%. But as shown in the next sections, based on our scenarios, Florida would see a significant increase in the amount of protected natural lands, from under 9 million acres to more than 14 million acres, and protected agricultural lands, from 854,000 acres to more than 3.2 million acres if the conservation land protection included in this scenario happens in the near future.



Redevelopment was not included in the Conservation 2040 Scenario. However, if the methodology from the 2070 Conservation Scenario is applied (see that report for more details) approximately 85,000 additional acres would not be developed by 2040 (assuming that redevelopment totals for each county are approximately 40% of those in 2070).

Table 4: Statewide Developed Lands

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Developed	5,428,000	14.94%	6,374,000	17.54%	6,102,000	16.79%

Conservation Lands

Currently, close to 10 million acres — or 27% — of Florida’s priority natural lands (excluding protected agricultural lands) have been protected through federal, state, local and private programs. These include conservation easement agreements with private property owners who enter legally binding commitments to limit or eliminate development on their property in return for tax benefits, payment or some other consideration.

If no new protected conservation lands are added under the Sprawl Scenario, protected state priority natural lands will decrease to less than 25% as a share of Florida’s total acreage. This is due to the loss of more than 850,000 acres of existing protected natural conservation lands to sea level rise, or almost 9% of current protected natural lands.

If additional state priority natural lands are protected, the Conservation 2040 Scenario reflects a significant 12 percentage point increase in protected natural lands when compared with the Baseline, even when considering the 850,000 acres lost to sea level rise. Under this scenario, more than 14 million natural acres would be protected, or almost 39% of Florida’s overall area.

continued

It should be noted that the additional lands protected in the Conservation scenario do not represent all important natural landscapes. However, they do represent high priority natural lands as defined by the state’s existing Florida Forever land acquisition program, and the top three priorities in the Florida Ecological Greenways Network (the Florida Wildlife Corridor), which have been recognized as a high conservation priority by the

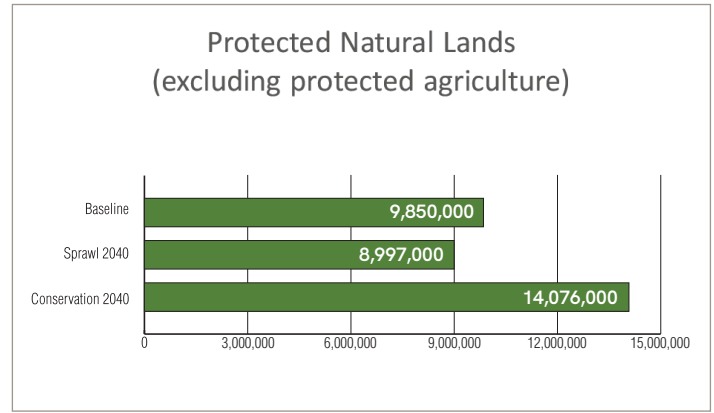


Table 5: Statewide Protected Natural Land

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Protected Natural Land	9,850,000	27.11%	8,997,000	24.76%	14,076,000	38.74%

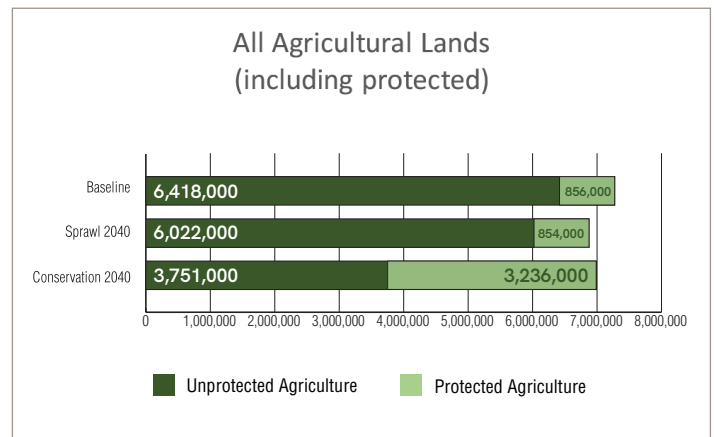
Agricultural Lands

Close to 7.3 million acres in Florida are now in croplands, livestock, aquaculture and other agricultural uses, reflecting the major role agriculture plays in the state’s economy. The Florida Department of Agriculture’s Florida Statewide Agricultural Irrigation Demand (FSAID) study is used to determine agricultural lands for this report. It does not include silviculture, which is in the “other” category, or some lands identified as agricultural in local property appraiser data.

Agriculture includes a subcategory of “protected agricultural lands” in this study. Some of these lands are protected for their natural values, such as wetlands, habitat, and the like. More detailed analysis of the impacts of development on agricultural lands in the 2040 and 2070 scenarios is forthcoming.

Under the Sprawl Scenario, Florida would lose close to 400,000 acres of agricultural lands by 2040, 5% of the state’s total. This is due primarily to new development.

The Conservation Scenario, on the other hand, shows the effect of increased protection of priority natural lands on agricultural land uses. Protected agricultural lands would increase by 278% from 856,000 acres to 3.2 million acres by 2040.



continued

Table 6: Statewide Agricultural Lands

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Protected Agricultural Lands	856,000	2.36%	854,000	2.35%	3,236,000	8.91%
Unprotected Agriculture	6,418,000	17.66%	6,022,000	16.57%	3,751,000	10.32%
Total Agriculture	7,274,000	20.02%	6,876,000	18.92%	6,987,000	19.23%

Other Lands

“Other” lands include all of the lands not included in the above categories of developed, protected natural, agriculture, or protected agriculture. “Other” lands include timberlands, mining lands, and other miscellaneous land uses.

This category is the most likely to be impacted by future development as some of the lands have fewer economic and environmental barriers to development. “Other” lands with significant resources may also become protected natural or protected agricultural lands in future scenarios.

The “other” category declines slightly, from more than 32% of Florida’s lands in the Baseline, to just over 30% in the Sprawl Scenario. The biggest change is in the Conservation Scenario when “other” drops to about 17%

of Florida’s lands. While the Sprawl Scenario basically reflects the impact of new development, the Conservation Scenario also reflects significant conversion of “other” lands to protected status.

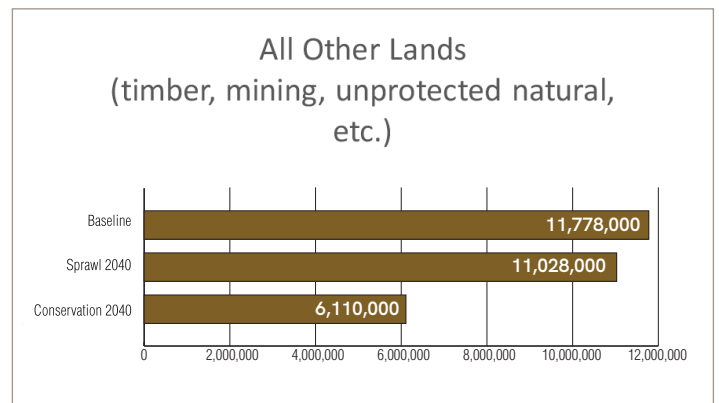


Table 7: Statewide Other Lands

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Other**	11,778,000	32.41%	11,028,000	30.35%	6,110,000	16.81%

continued

Regional Results

For more in-depth analysis, Florida has been divided into four roughly equal regions.

Panhandle Florida has by far the lowest current population. It is expected to experience a 17% increase in population by 2040. It is also projected to lose 109,000 acres of land to sea level rise, the majority protected natural land. This region has the lowest gross development density (GDD) at 1.79 people per developed acre. However, this represents a 21% increase over the GDD of 1.48 in 2010. According to FDOT, Walton and Santa Rosa counties are among the 10 counties where 60% of Florida's population growth is currently concentrated and merit particular planning attention.

Northeast Florida has a somewhat higher population than the Panhandle, but its population is expected to increase more dramatically, by 28%, over the next two decades. This population increase, combined with a low GDD of 2.1 people per developed acre, puts this region in the crosshairs of sprawl. Additionally, Northeast Florida is projected to lose 211,000 acres of land to sea level rise, including 116,000 acres of protected natural land. Much of the current development is focused on St. Johns and Nassau counties which, according to FDOT, are among the top 10 counties where 60% of Florida's population growth is concentrated.

Central Florida, with the largest amount of land and highest population of the four regions, is also expected to grow in population by 28% by 2040. But Central Florida has higher density than Northeast Florida, with a GDD of 4.14 people per developed acre. This region will lose fewer total acres of land to sea level rise than any other – 88,000 acres, including 58,000 acres of protected natural land. Central Florida is home to 5 of the 10 counties where 60% of Florida's population growth is currently concentrated, including Osceola, Orange, Sumter, Lake, and Manatee counties.

South Florida is projected to lose 647,000 acres of land to sea level rise by 2040, including almost 600,000 acres of protected natural lands. This is more than half the lands lost to sea level rise in Florida. At the same time, South Florida's population is expected to grow 16% by 2040. Unsurprisingly, this region is the most densely populated, with a GDD of 7.67 people per developed acre. Lee is one of the 10 counties where, according to FDOT, 60% of Florida's population growth is concentrated.

60% of Florida's Current Population Growth is Concentrated in **10 Counties**

- Osceola
- St. Johns
- Sumter
- Walton
- Lake
- Orange
- Santa Rosa
- Manatee
- Nassau
- Lee

This is based on an analysis by the Florida Department of Transportation using Florida Bureau of Economic and Business Research (BEBR) county data for 2020.

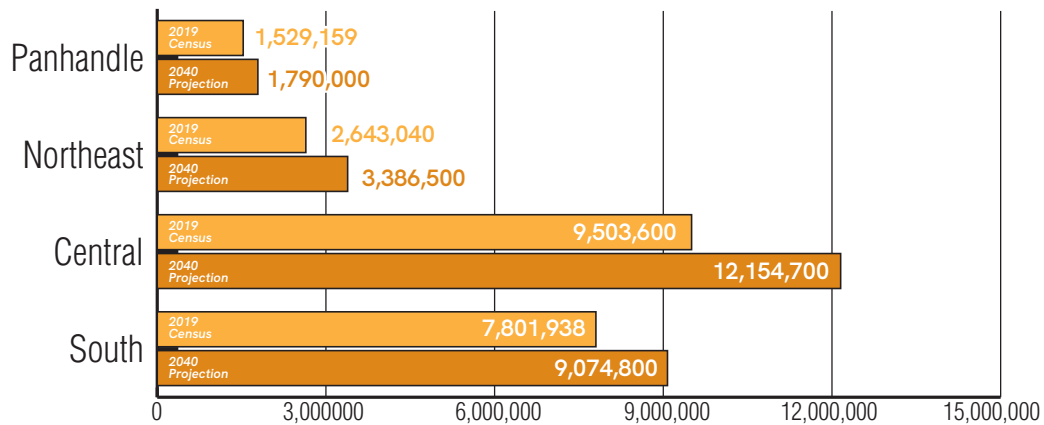
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Regional Results *continued*

Table 8: 2040 Regional Population Projections

Region	2019 Census	2040 Projection	Percent Increase	Population to be Allocated	2019 Gross Development Density (GDD)
Panhandle	1,529,159	1,790,000	17%	260,841	1.79
Northeast	2,643,040	3,386,500	28%	743,460	2.10
Central	9,503,600	12,154,700	28%	2,651,100	4.14
South	7,801,938	9,074,800	16%	1,272,862	7.67
TOTAL	21,477,737	26,406,000	23%	4,928,263	3.96

Total Population by Region



continued

FLORIDA'S RISING SEAS

Panhandle Summary



Population Growth

⬆️ 261,000 more residents, a 17% increase

Sea Level Rise

⬇️ 109,000 acres of land lost, the majority of it protected land

⬇️ 12,000 residents relocated

Sprawl 2040 Scenario

⬆️ 103,000 more acres of developed land

⬇️ 10,000 acres of agricultural lands lost

⬇️ 119,000 acres of “other” lands lost (*timber, mining, etc.*)

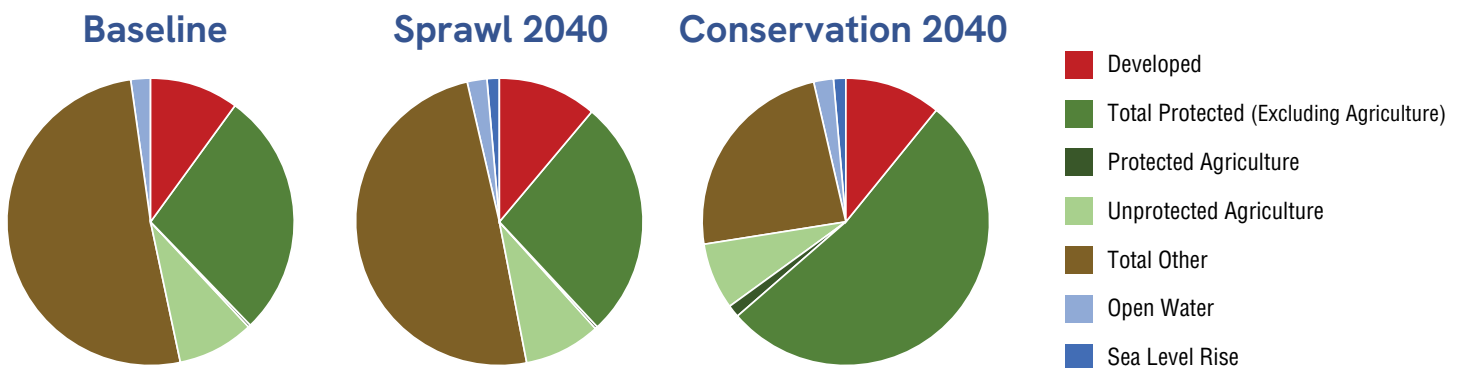
Conservation 2040 Scenario *(compared with Sprawl Scenario):*

⬇️ 25,000 fewer acres of developed lands

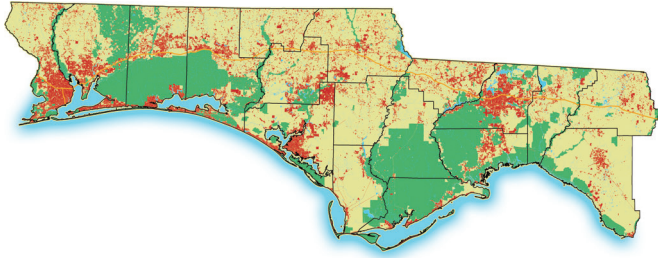
⬆️ 2.2 million more acres of protected natural lands

⬆️ 109,000 more acres of protected agricultural lands

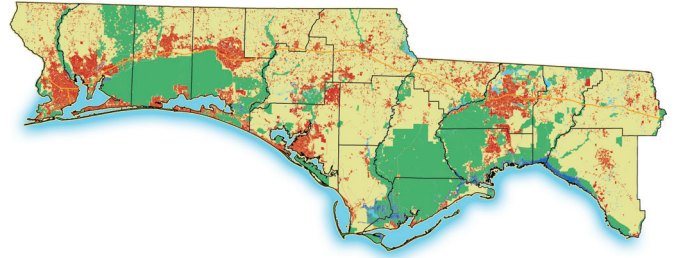
Panhandle Pie Charts



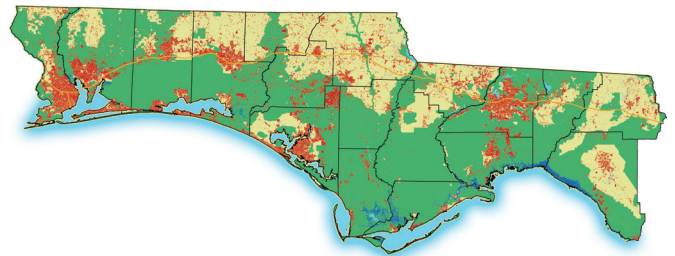
Baseline



Sprawl 2040



Conservation 2040



- Developed
- Protected
- Sea Level Rise
- Other

continued

Panhandle Florida

Encompassing 8.3 million acres of land, the Panhandle includes 18 counties – Bay, Calhoun, Escambia, Franklin, Gadsden, Gulf, Holmes, Jackson, Jefferson, Leon, Liberty, Madison, Okaloosa, Santa Rosa, Taylor, Wakulla, Walton, and Washington. As in the past, the Panhandle is projected to remain the least developed and one of the slowest growing regions in Florida, increasing from a little more than 1.5 million residents in 2019, to approximately 1.8 million in 2040, a 17% increase.

The Panhandle is projected to lose roughly 109,000 acres – about 1% of its land mass – to sea level rise by 2040. Of these lost lands, almost 83,000 acres were in conservation in the Baseline. Sea level rise will likely result in the relocation of 12,000 residents. By numbers, the most impacted counties are projected to be in Santa Rosa (2,436 residents), Bay (2,374), Escambia (1,961),

Walton (1,483), and Okaloosa (1,295). By percent, Franklin County is the most impacted, with close to 5% of its population projected to face relocation.

The Panhandle also has the lowest gross development density (GDD) (meaning most sprawling patterns) at 1.79 people per developed acre, but still a 21% increase over the 1.48 GDD in 2010. However, this regional increase needs to be looked at critically, as changes range from a 52.72% increase in GDD in Jefferson County, to a 35.96 decrease in Liberty County.

Because of the Panhandle’s rich biodiversity, land conservation initiatives have been very robust here, with large tracts of land identified as priorities for future conservation.

Table 9: 2040 Panhandle Population Projections and Gross Development Density

2019 Census	2040 Projection	2019-2040 Increase	% Change	2019 Gross Development Density
1,529,159	1,790,000	260,841	17%	1.79

Sprawl 2040

Approximately half of the lands in the Panhandle were in the “other” category, in this case primarily timber lands, in both the Baseline and Sprawl 2040 Scenario. Comparing the Sprawl and Baseline land uses, developed lands increase slightly in the next two decades – from 10% in the Baseline to slightly more than 11%. The Panhandle is projected to lose 83,000 acres of natural protected lands due to sea level rise. Agricultural lands, both protected and unprotected, show only a slight decline.

Conservation 2040

The Conservation 2040 Scenario reflects the most dramatic change, with almost 52% of Panhandle lands under protection by 2040. Most of this is attributed to timber and rural lands in the “other” category shifting to “protected” status due to the region’s high conservation value. The acreage of agricultural lands – both protected and unprotected – remains virtually unchanged between the Sprawl and Conservation scenarios; however, within those categories protected agricultural lands increase significantly, from 15,000 acres in the Baseline and Sprawl Scenario, to 124,000 in the Conservation Scenario. Developed lands increase by about 9% over the Baseline, which is only slightly less than the Sprawl 2040 Scenario.

continued

Table 10: Panhandle Acreage Comparison of 2040 Development Scenarios

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Developed	856,000	10.06%	959,000	11.26%	934,000	10.96%
Protected Natural Land	2,374,000	27.87%	2,291,000	26.90%	4,494,000	52.77%
Protected Agriculture	15,000	0.17%	15,000	0.17%	124,000	1.46%
Agriculture	747,000	8.77%	737,000	8.65%	627,000	7.37%
Other*	4,344,000	51.01%	4,225,000	49.62%	2,048,000	24.04%
2019 Open Water	180,000	2.12%	180,000	2.12%	180,000	2.12%
Sea Level Inundation: Protected Lands	0	0.00%	83,000	0.97%	101,000	1.18%
Sea Level Inundation: All Other Land Uses	0	0.00%	26,000	0.31%	8,000	0.09%
Total Acreage in Panhandle	8,516,000	100.00%	8,516,000	100.00%	8,516,000	100.00%
Total Land Acreage	8,336,000	97.88%	8,227,000	96.60%	8,227,000	96.60%
Total Sea Level Inundation	0	0.00%	109,000	1.28%	109,000	1.28%
Total Open Water including SLR	180,000	2.12%	289,000	3.40%	289,000	3.40%

*Protected Natural Land is defined for the purposes of the report to include all protected natural communities, timberland, and other low intensity land uses not considered more intensive agriculture or developed.

**Other land includes timberlands, mining lands, and other miscellaneous land uses not classified as agriculture, developed, protected, protected agriculture, or open water based on the methods described in the technical report.

Table 11: 2040 Panhandle Sea Level Rise Projected Impact by County

County	% of population impacted by SLR	Population impacted by SLR	Displaced out of state (50% of those affected by SLR)
BAY	1.17%	2,374	1,187
CALHOUN	0.00%	0	0
ESCAMBIA	0.55%	1,961	980
FRANKLIN	4.92%	708	354
GADSDEN	0.00%	0	0
GULF	1.50%	246	123
HOLMES	0.00%	0	0
JACKSON	0.00%	0	0
JEFFERSON	0.12%	19	10
LEON	0.00%	0	0
LIBERTY	0.05%	4	2
MADISON	0.00%	0	0
OKALOOSA	0.52%	1,295	648
SANTA ROSA	0.98%	2,436	1,218
TAYLOR	0.91%	195	98
WAKULLA	2.37%	999	500
WALTON	1.30%	1,483	742
WASHINGTON	0.10%	29	15
TOTAL	0.56%	11,749	5,875

continued

Panhandle Florida

NOTE: Table 11 shows small numbers of population impacted by sea level rise in certain inland counties, including Jefferson, Liberty, and Washington. This is a result of increased water levels in inland water bodies that are hydrologically connected to the coast because of sea level rise. These effects are anticipated to increase with higher levels of sea level rise, and do not factor in other inland flooding (such as within inland floodplains) likely to occur because of broader climate change impacts.

**Table 12: Gross Development Density (GDD)
Comparison for the Florida Panhandle**

County	2010 GDD	2019 GDD	% Change
BAY	1.65	1.92	16.07%
CALHOUN	0.95	0.96	0.56%
ESCAMBIA	2.84	3.07	8.10%
FRANKLIN	0.88	0.74	-15.74%
GADSDEN	1.07	1.01	-5.54%
GULF	0.67	0.85	26.49%
HOLMES	0.85	0.87	2.25%
JACKSON	0.74	0.75	1.37%
JEFFERSON	0.46	0.70	52.72%
LEON	2.13	2.95	38.61%
LIBERTY	1.46	0.94	-35.96%
MADISON	0.79	0.73	-7.34%
OKALOOSA	2.58	3.17	22.71%
SANTA ROSA	1.87	2.14	14.57%
TAYLOR	0.74	0.69	-6.42%
WAKULLA	0.84	1.10	30.43%
WALTON	0.71	1.04	46.05%
WASHINGTON	0.53	0.57	7.35%
REGION AVERAGE	1.48	1.79	20.95%

continued

FLORIDA'S RISING SEAS

Northeast Florida Summary



Population Growth

⬆️ 743,000 more residents, a 28% increase

Sea Level Rise

⬇️ 211,000 acres of land lost, the majority of it protected land

⬇️ 6,000 residents relocated

Sprawl 2040 Scenario

⬆️ 227,000 more acres of developed land

⬇️ 61,000 acres of agricultural lands lost

⬇️ 261,000 acres of “other” lands lost (*timber, mining, etc.*)

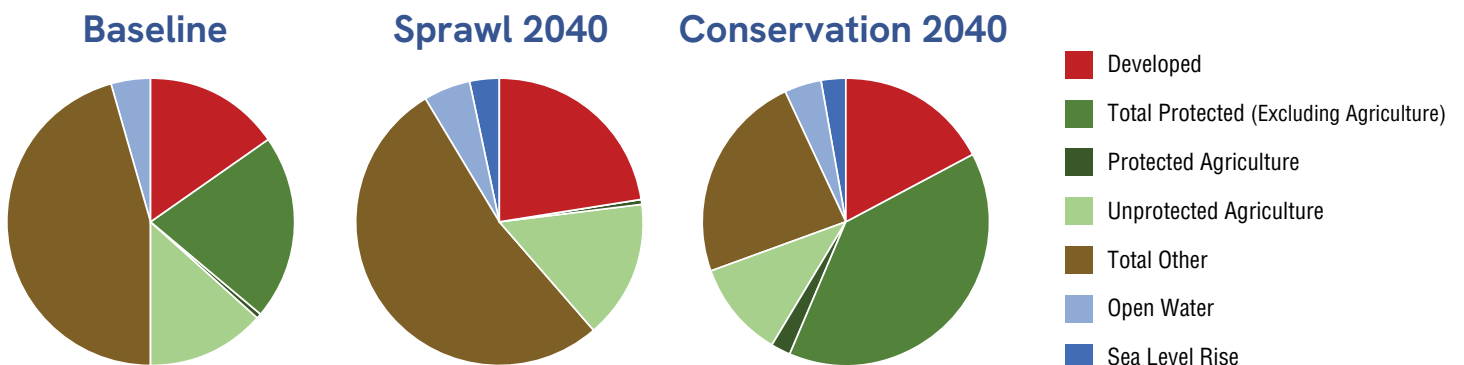
Conservation 2040 Scenario *(compared with Sprawl Scenario):*

⬇️ 68,000 fewer acres of developed lands

⬆️ 1.6 million more acres of protected natural lands

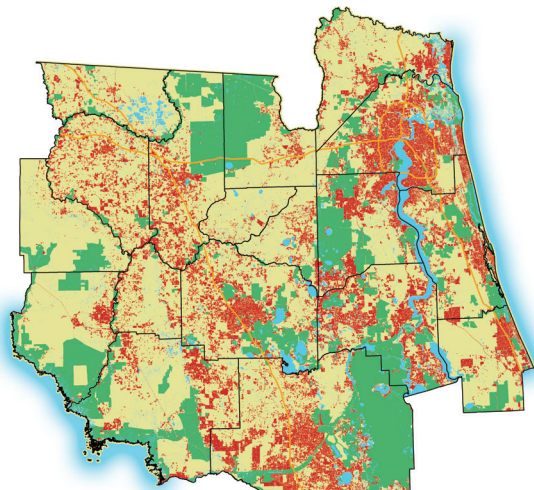
⬆️ 154,000 more acres of protected agricultural lands

Northeast Pie Charts

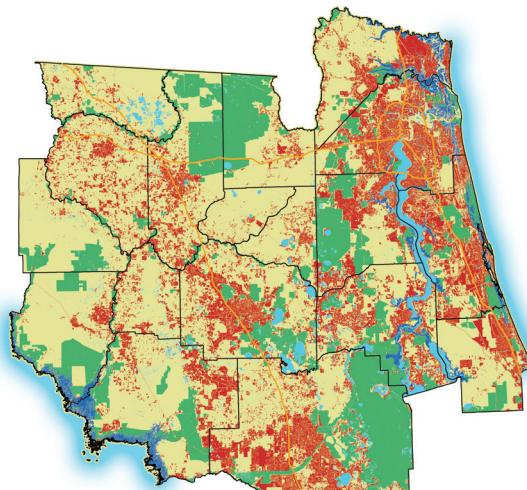


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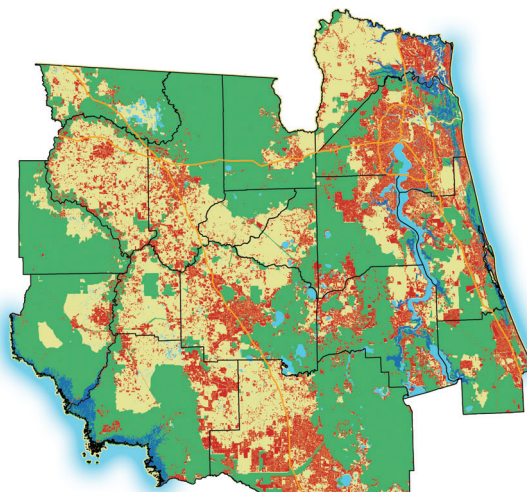
Baseline



Sprawl 2040



Conservation 2040



- Developed
- Protected
- Sea Level Rise
- Other

continued

Northeast Florida

Northeast Florida includes 18 counties – Alachua, Baker, Bradford, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Lafayette, Levy, Marion, Nassau, Putnam, St. Johns, Suwannee, and Union – which total about 7.8 million acres of land.

Northeast and Central Florida face the greatest development pressures, with the population in each projected to grow by 28%. Northeast Florida is expected to increase from 2.6 million residents in 2019 to 3.4 million in 2040.

Compounding this, Northeast Florida has more sprawling development patterns than Central Florida – with a GDD of 2.10 compared to 4.14 people per developed acre. This means that Northeast Florida will require almost twice the amount of land as Central Florida to accommodate each new resident if development continues at these very low densities. At the same time, it’s important to note that Northeast Florida’s GDD has increased by almost 23% since 2010 but, as with the Panhandle, there are dramatic differences from county to county. Hamilton County had a dramatic 180% increase, but it went from 0.26 GDD to 0.73 GDD. More urbanized St. Johns County had a 94% increase, from 1.73 to 3.35, while Nassau County experienced an 80% increase from 0.80 to 1.44. Some of the more rural counties, including Union, Bradford, and Lafayette, declined in GDD over that period.

Northeast Florida is projected to lose 211,000 acres to sea level rise by 2040, or approximately 2.6% of its land. About 26,000 residents in the Northeast would be forced to relocate due to the impacts of sea level rise, including 12,100 residents in Duval and almost 6,000 in St. Johns County. Clay (2,209 relocated) and Putnam (846 relocated) are projected to be the most impacted inland counties in Northeast Florida due to sea level rise associated with the St. Johns River.

Table 13: 2040 Northeast Florida Population Projections and Gross Development Density

2019 Census	2040 Projection	2019-2040 Increase	% Change	2019 Gross Development Density
2,643,040	3,386,500	743,460	28%	2.10

Sprawl 2040

Under the Sprawl Scenario, about 18% of lands in Northeast Florida are projected to be developed, up from about 15% in the Baseline. In addition, agricultural lands – including protected – will decrease slightly, from about 1.1 million acres in the Baseline to about 1 million acres in 2040. “Other” lands in this region, primarily timberlands, will decrease from about 46% in the Baseline to about 42% in 2040.

Conservation 2040

Even under the Conservation Scenario, about 17% of northeastern lands will be developed. But protected natural lands would close to double, increasing from about 1.6 million acres in the Sprawl Scenario to 3.1 million acres, or 39% of the region, in 2040. Many of the protected natural acres consist of lands shifted from the “other” category. “Other” includes almost 46% of the region’s lands in the Baseline but drops to about 23% under the Conservation Scenario. Compared with the Sprawl Scenario, total agricultural lands increase slightly, while protected agricultural lands increase from 35,000 to 189,000 acres.

continued

Table 14: Northeast Florida Acreage Comparison of 2040 Development Scenarios

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Developed	1,258,000	15.48%	1,485,000	18.27%	1,417,000	17.44%
Protected Natural Land	1,692,000	20.82%	1,576,000	19.39%	3,173,000	39.04%
Protected Agriculture	37,000	0.45%	35,000	0.43%	189,000	2.32%
Agriculture	1,083,000	13.32%	1,024,000	12.60%	883,000	10.86%
Other*	3,708,000	45.64%	3,447,000	42.43%	1,905,000	23.45%
2019 Open Water	349,000	4.29%	349,000	4.29%	349,000	4.29%
Sea Level Inundation: Protected Lands	0	0.00%	118,000	1.45%	154,000	1.89%
Sea Level Inundation: All Other Land Uses	0	0.00%	93,000	1.15%	57,000	0.71%
Total Acreage in Northeast	8,127,000	100.00%	8,127,000	100.00%	8,127,000	100.00%
Total Land Acreage	7,778,000	95.71%	7,567,000	93.11%	7,567,000	93.11%
Total Sea Level Inundation	0	0.00%	211,000	2.60%	211,000	2.60%
Total Open Water including SLR	349,000	4.29%	560,000	6.89%	560,000	6.89%

*Protected Natural Land is defined for the purposes of the report to include all protected natural communities, timberland, and other low intensity land uses not considered more intensive agriculture or developed.

**Other land includes timberlands, mining lands, and other miscellaneous land uses not classified as agriculture, developed, protected, protected agriculture, or open water based on the methods described in the technical report.

Table 15: 2040 Northeast Florida Sea Level Rise Projected Impact by County

County	% of population impacted by SLR	Population impacted by SLR	Displaced out of state (50% of those affected by SLR)
ALACHUA	0.00%	0	0
BAKER	0.00%	0	0
BRADFORD	0.00%	0	0
CLAY	0.82%	2,209	1,105
COLUMBIA	0.00%	0	0
DIXIE	0.69%	123	62
DUVAL	1.00%	12,148	6,074
FLAGLER	1.10%	1,818	909
GILCHRIST	0.10%	20	10
HAMILTON	0.00%	0	0
LAFAYETTE	0.00%	0	0
LEVY	0.64%	315	158
MARION	0.00%	2	1
NASSAU	1.90%	2,381	1,191
PUTNAM	1.13%	846	423
ST JOHNS	1.37%	5,905	2,953
SUWANNEE	0.00%	0	0
UNION	0.00%	0	0
TOTAL	0.59%	25,767	12,884

continued

Northeast Florida

NOTE: Table 15 shows some residents impacted by sea level rise in certain inland counties, including Clay and Putnam, which experience considerable impact due to potential sea level rise along the lower St. Johns River. This is a result of increased water levels in inland water bodies that are hydrologically connected to the coast because of sea level rise. These effects are anticipated to increase with higher levels of sea level rise, and do not factor in other inland flooding (such as within inland floodplains) likely to occur because of broader climate change impacts.

**Table 16: Gross Development Density (GDD)
Comparison for Northeast Florida**

County	2010 GDD	2019 GDD	% Change
ALACHUA	1.91	2.23	16.85%
BAKER	1.62	1.68	3.83%
BRADFORD	1.26	1.18	-6.24%
CLAY	2.19	2.70	23.19%
COLUMBIA	0.89	0.94	6.05%
DIXIE	0.60	0.67	10.96%
DUVAL	4.84	5.80	19.89%
FLAGLER	1.89	2.38	25.97%
GILCHRIST	0.53	0.57	7.95%
HAMILTON	0.26	0.73	179.79%
LAFAYETTE	1.04	1.00	-4.12%
LEVY	0.43	0.48	10.87%
MARION	1.68	1.87	11.22%
NASSAU	0.80	1.44	79.64%
PUTNAM	0.58	0.60	3.86%
ST JOHNS	1.73	3.35	93.86%
SUWANNEE	0.48	0.52	8.47%
UNION	2.75	2.18	-20.90%
REGION AVERAGE	1.71	2.10	22.81%

continued

FLORIDA'S RISING SEAS

Central Florida Summary



Population Growth

- ⬆️ 2.7 million more residents, a 23% increase

Sea Level Rise

- ⬇️ 88,000 acres of land lost, the majority of it protected land
- ⬇️ 65,000 residents relocated

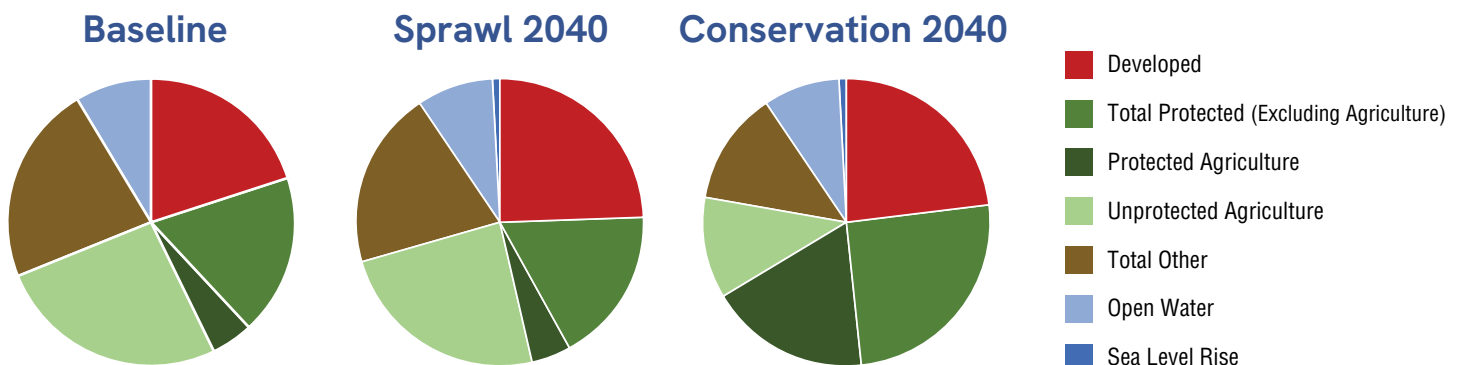
Sprawl 2040 Scenario

- ⬆️ 500,000 more acres of developed land
- ⬇️ 260,000 acres of agricultural lands lost
- ⬇️ 266,000 acres of “other” lands lost (*timber, mining, etc.*)

Conservation 2040 Scenario *(compared with Sprawl Scenario):*

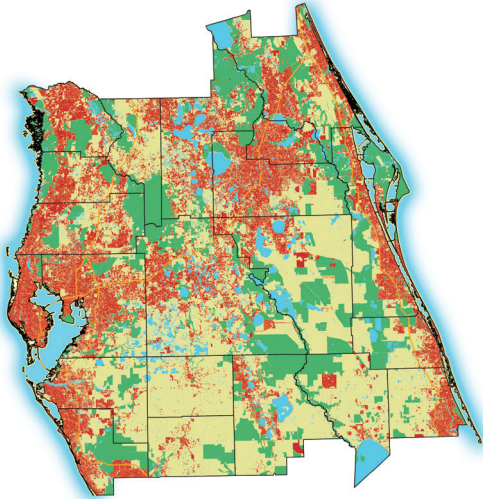
- ⬇️ 135,000 fewer acres of developed lands
- ⬆️ 886,000 more acres of protected natural lands
- ⬆️ 1.5 million more acres of protected agricultural lands

Central Pie Charts

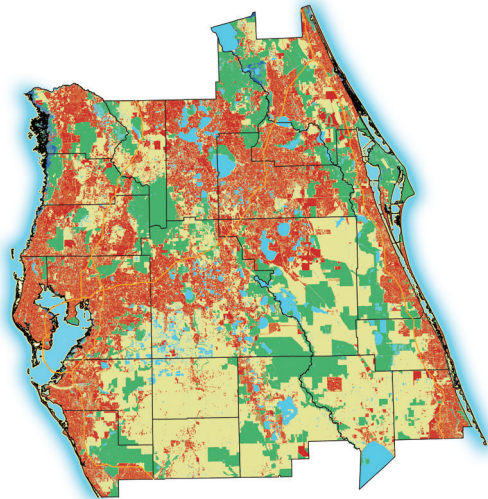


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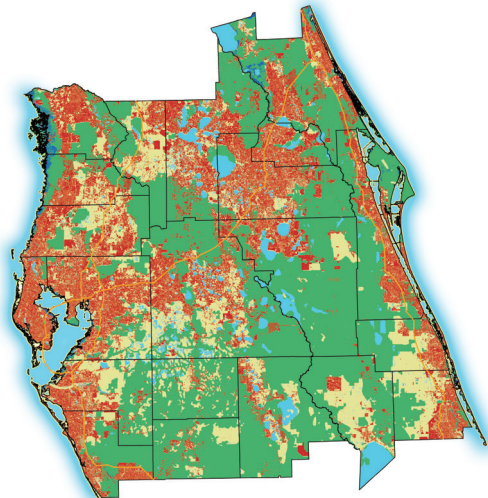
Baseline



Sprawl 2040



Conservation 2040



- Developed
- Protected
- Sea Level Rise
- Other

continued

Central Florida

Brevard, Citrus, Desoto, Hardee, Hernando, Highlands, Hillsborough, Indian River, Lake, Manatee, Okeechobee, Orange, Osceola, Pasco, Pinellas, Polk, Sarasota, Seminole, St Lucie, Sumter, and Volusia are the 21 counties that make up Central Florida. This is the largest of the four regions, both in terms of land acreage – 10.4 million acres – and population – 9.5 million residents.

Central Florida is projected to lose about 88,000 acres – or about 1% — of its lands to sea level rise by 2040, which is projected to cause the relocation of 65,000 residents. The Gulf Coast will be hardest hit, with Pinellas (13,578 residents), Manatee (9,474), Hillsborough (6,650), Sarasota (6,193), and Pasco (5,973) counties having the highest relocations. On the East Coast, Volusia (8,325) and Brevard (7,085) counties will see the greatest impacts.

Central Florida’s population – significantly larger than any other region – is projected to increase by 28%, to 12,154,700 by 2040. Its gross development density of 4.14 persons per developed acre is higher than those of the Panhandle and Northeast Florida, but lower than South Florida. Central Florida’s GDD is 32% higher than in 2010, when it was 3.14. Individual counties seeing the greatest increase in GDD include St. Lucie (66.16%), Osceola (60.05%), and Orange (56.49%). The three counties experiencing declines in GDD include Seminole (-20.39%), Sarasota (-17.51%), and Hardee (-6.34%).

Table 17: 2040 Central Florida Population Projections and Gross Development Density

2019 Census	2040 Projection	2019-2040 Increase	% Change	2019 Gross Development Density
9,503,600	12,154,700	2,651,100	28%	4.14

Sprawl 2040

Central Florida’s developed lands will increase fairly significantly – from 2.3 million acres (or 20%) in the Baseline to 2.8 million acres (or more than 24%) in 2040. Central Florida has by far the most agricultural lands of the four regions, with approximately 3.5 million acres – or about a third of its area – in the Baseline. Under the Sprawl Scenario, the region stands to lose 260,000 acres of these lands by 2040. About 22% of the region’s lands were in the “other” category, including timber in the Baseline. Other lands are projected to decrease to about 20% under the Sprawl Scenario in 2040.

Conservation 2040

The Conservation Scenario results in approximately 23% of the region’s lands being developed, not significantly less than the 24% projected under the Sprawl Scenario. Protected natural lands are projected to increase from about 18% in the Baseline to 25% in 2040. Total agricultural lands (both protected and not) would increase slightly comparing the Sprawl and Conservation 2040 Scenarios, but protected agricultural lands would undergo a significant increase, from 528,000 acres in the Baseline to just over 2 million acres in 2040. “Other” lands decline from almost 2.6 million acres in the Baseline to 1.5 million by 2040.

continued

Table 18: Central Florida Acreage Comparison of 2040 Development Scenarios

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Developed	2,297,000	20.12%	2,793,000	24.47%	2,658,000	23.29%
Protected Natural Land	2,058,000	18.03%	2,000,000	17.53%	2,886,000	25.28%
Protected Agriculture	528,000	4.63%	528,000	4.62%	2,056,000	18.01%
Agriculture	3,004,000	26.32%	2,744,000	24.04%	1,286,000	11.27%
Other*	2,556,000	22.40%	2,290,000	20.06%	1,469,000	12.87%
2019 Open Water	971,000	8.51%	971,000	8.51%	971,000	8.51%
Sea Level Inundation: Protected Lands	0	0.00%	58,000	0.51%	70,000	0.61%
Sea Level Inundation: All Other Land Uses	0	0.00%	30,000	0.27%	18,000	0.16%
Total Acreage in Central	11,414,000	100.00%	11,414,000	100.00%	11,414,000	100.00%
Total Land Acreage	10,443,000	91.49%	10,355,000	90.72%	10,355,000	90.72%
Total Sea Level Inundation	0	0.00%	88,000	0.77%	88,000	0.77%
Total Open Water including SLR	971,000	8.51%	1,059,000	9.28%	1,059,000	9.28%

*Protected Natural Land is defined for the purposes of the report to include all protected natural communities, timberland, and other low intensity land uses not considered more intensive agriculture or developed.

**Other land includes timberlands, mining lands, and other miscellaneous land uses not classified as agriculture, developed, protected, protected agriculture, or open water based on the methods described in the technical report.

Table 19: 2040 Central Florida Sea Level Rise Projected Impact by County

County	% of population impacted by SLR	Population impacted by SLR	Displaced out of state (50% of those affected by SLR)
BREVARD	0.98%	7,085	3,543
CITRUS	0.88%	1,573	787
DESOTO	0.01%	3	2
HARDEE	0.00%	0	0
HERNANDO	0.55%	1,297	649
HIGHLANDS	0.00%	0	0
HILLSBOROUGH	0.36%	6,650	3,325
INDIAN RIVER	1.33%	2,614	1,307
LAKE	0.00%	8	4
MANATEE	1.77%	9,474	4,737
OKEECHOBEE	0.00%	0	0
ORANGE	0.00%	0	0
OSCEOLA	0.00%	0	0
PASCO	0.80%	5,973	2,987
PINELLAS	1.34%	13,578	6,789
POLK	0.00%	0	0
ST LUCIE	1.16%	2,161	1,081
SARASOTA	0.02%	6,193	3,097
SEMINOLE	0.48%	106	53
SUMTER	0.00%	0	0
VOLUSIA	1.26%	8,325	4,163
TOTAL	0.42%	65,040	32,520

continued

Central Florida

NOTE: Table 19 shows small numbers of population impacted by sea level rise in certain inland counties, including DeSoto. This is a result of increased water levels in inland water bodies that are hydrologically connected to the coast as a result of sea level rise. These effects are anticipated to increase with higher levels of sea level rise, and do not factor in other inland flooding (such as within inland floodplains) likely to occur as a result of broader climate change impacts.

Table 20: Gross Development Density (GDD) Comparison for Central Florida

County	2010 GDD	2019 GDD	% Change
BREVARD	3.15	3.90	23.91%
CITRUS	1.04	1.19	14.44%
DESOTO	1.48	1.81	22.07%
HARDEE	1.79	1.68	-6.34%
HERNANDO	1.87	2.17	15.82%
HIGHLANDS	1.35	1.76	30.34%
HILLSBOROUGH	4.73	6.24	31.96%
INDIAN RIVER	2.49	3.41	37.09%
LAKE	1.57	2.24	42.76%
MANATEE	3.09	4.38	41.67%
OKEECHOBEE	1.10	1.16	5.39%
ORANGE	4.59	7.18	56.49%
OSCEOLA	2.61	4.18	60.05%
PASCO	3.18	3.95	24.30%
PINELLAS	7.21	9.12	26.47%
POLK	2.45	3.36	37.07%
SARASOTA	4.75	3.92	-17.51%
SEMINOLE	6.47	5.15	-20.39%
ST LUCIE	2.82	4.69	66.16%
SUMTER	2.32	2.77	19.45%
VOLUSIA	2.16	2.95	36.51%
REGION AVERAGE	3.14	4.14	31.85%

continued

FLORIDA'S RISING SEAS

South Florida Summary



Population Growth

- ⬆️ 1.3 million more residents, a 16% increase

Sea Level Rise

- ⬇️ 647,000 acres of land lost, the majority of it protected lands; more than half of the lands lost to sea level rise in Florida
- ⬇️ 103,000 residents relocated

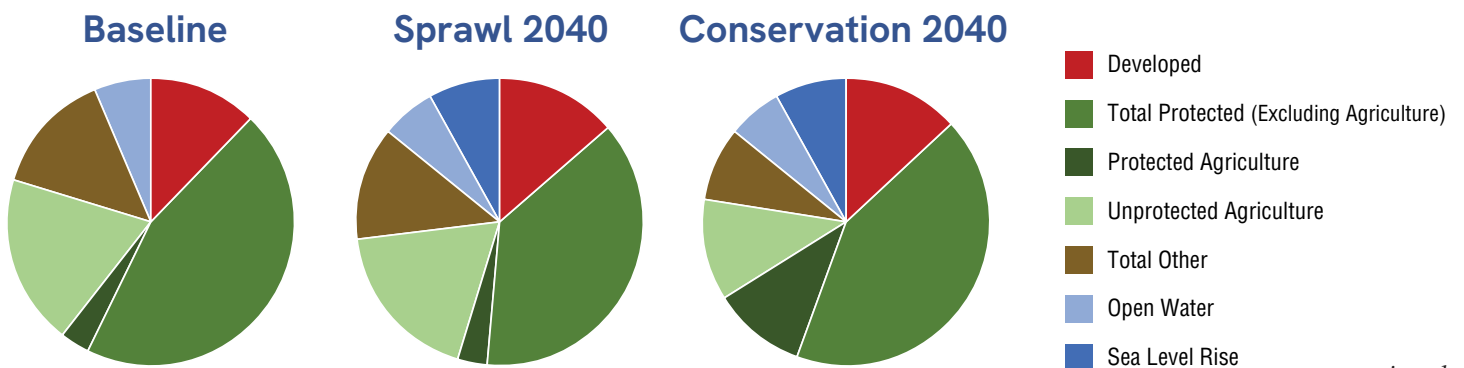
Sprawl 2040 Scenario

- ⬆️ 120,000 more acres of developed land
- ⬇️ 67,000 acres of agricultural lands lost
- ⬇️ 104,000 acres of “other” lands lost (*timber, mining, etc.*)

Conservation 2040 Scenario *(compared with Sprawl Scenario):*

- ⬇️ 44,000 fewer acres of developed lands
- ⬆️ 393,000 more acres of protected natural lands
- ⬆️ 591,000 more acres of protected agricultural lands

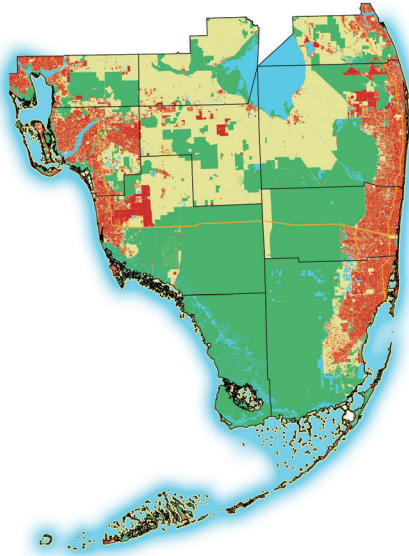
South Pie Charts



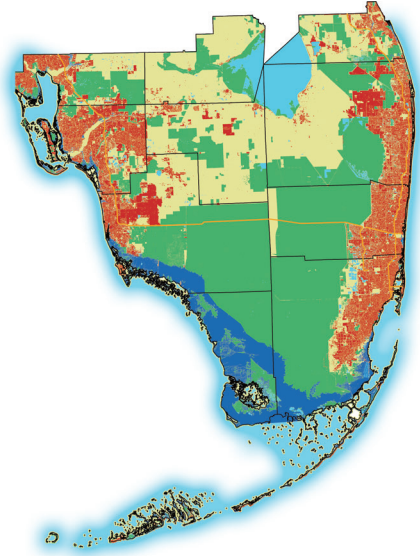
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South Maps

Baseline

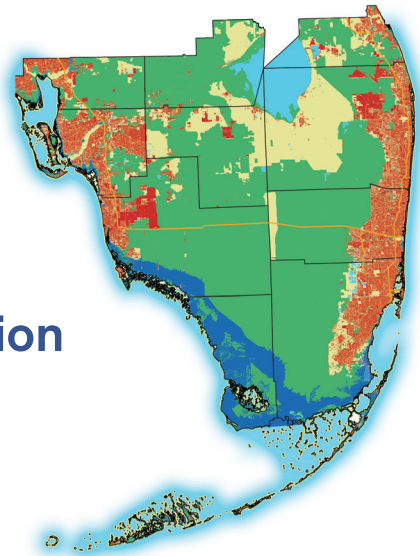


**Sprawl
2040**



-  Developed
-  Protected
-  Sea Level Rise
-  Other

**Conservation
2040**



continued

South Florida

South Florida encompasses 7.8 million acres of land and 10 counties including Broward, Charlotte, Collier, Glades, Hendry, Lee, Martin, Miami-Dade, Monroe, and Palm Beach. Almost half of the lands in South Florida are already under protection, mostly for their natural value. This is due in large part to federal and state conservation lands protecting the Everglades and other large swaths of unique environmental resources in the region.

South Florida is expected to experience a 16% increase in population (actually the lowest percentage increase of the four regions), from 7.8 million residents in the Baseline to 9 million residents by 2040. With its major metropolitan areas, South Florida understandably has the highest gross development density of the four regions, with 7.67 people per developed acre. The region's average GDD has increased by almost 27% since 2010 when it was 6.06. Lee County's GDD has increased by 52%, Charlotte County by 37% and Monroe by 36%. There are no decreases in GDD in this region and all but one county, Hendry at 3%, show double-digit increases.

Because of its low elevation and vast expanses of wetlands, South Florida is expected to experience the greatest loss of land due to sea level rise, losing almost 650,000 acres, including 600,000 acres of currently protected land. This is projected to cause the potential relocation of 103,000 residents in the region, including 36,000 in Miami-Dade and 15,000 in Broward County on the east coast. On the west coast, 18,000 residents in Lee and 7,400 residents in Collier will likely need to relocate. Of course, Monroe County, which includes the island chain of the Florida Keys, will be the most impacted in terms of percent of residents, with more than 15% of its population potentially needing to move.

Table 21: 2040 South Florida Population Projections and Gross Development Density

2019 Census	2040 Projection	2019-2040 Increase	% Change	2019 Gross Development Density
7,801,938	9,074,800	1,272,862	16%	7.67

Sprawl 2040

Even though South Florida is the most significantly impacted by sea level rise, the vast majority of those acres are protected – and thus undeveloped – reducing the number of residents and related infrastructure impacted by complete inundation. Also, to the region's benefit is its GDD, by far the highest in Florida. Even with a 1.3 million increase in population, the Sprawl Scenario shows a relatively modest 120,000-acre increase in developed lands. The region also experiences relatively modest losses in agricultural and other lands.

Conservation 2040

Under this scenario, 44,000 fewer acres are developed than under the Sprawl Scenario, reflecting the impact of the 30% increase in GDD. Protected natural lands in this region will increase by close to 400,000 acres – to a total of 3.5 million acres – when compared with the Sprawl Scenario. In addition, almost another 600,000 agricultural acres will be protected, resulting in a modest increase in all agricultural lands when compared with the Sprawl Scenario. The lands most impacted are projected to be in the “other” category, which will decline from 1 million to less than 700,000 acres.

continued

Table 22: South Florida Acreage Comparison of 2040 Development Scenarios

	Baseline	% of Total Acreage	Sprawl 2040	% of Total Acreage	Conservation 2040	% of Total Acreage
Developed	1,017,000	12.28%	1,137,000	13.73%	1,093,000	13.20%
Protected Natural Land	3,726,000	45.00%	3,130,000	37.81%	3,523,000	42.55%
Protected Agriculture	276,000	3.33%	276,000	3.33%	867,000	10.47%
Agriculture	1,584,000	19.13%	1,517,000	18.32%	955,000	11.54%
Other*	1,170,000	14.15%	1,066,000	12.88%	688,000	8.31%
2019 Open Water	506,000	6.12%	506,000	6.12%	506,000	6.12%
Sea Level Inundation: Protected Lands	0	0.00%	595,000	7.19%	603,000	7.29%
Sea Level Inundation: All Other Land Uses	0	0.00%	52,000	0.63%	44,000	0.53%
Total Acreage in South	8,280,000	100.00%	8,280,000	100.00%	8,280,000	100.00%
Total Land Acreage	7,773,000	93.88%	7,126,000	86.07%	7,126,000	86.07%
Total Sea Level Inundation	0	0.00%	647,000	7.82%	647,000	7.82%
Total Open Water including SLR	506,000	6.12%	1,154,000	13.93%	1,154,000	13.93%

*Protected Natural Land is defined for the purposes of the report to include all protected natural communities, timberland, and other low intensity land uses not considered more intensive agriculture or developed.

**Other land includes timberlands, mining lands, and other miscellaneous land uses not classified as agriculture, developed, protected, protected agriculture, or open water based on the methods described in the technical report.

Table 23: 2040 South Florida Sea Level Rise Projected Impact by County

County	% of population impacted by SLR	Population impacted by SLR	Displaced out of state (50% of those affected by SLR)
BROWARD	0.69%	15,063	7,532
CHARLOTTE	2.49%	5,839	2,920
COLLIER	1.56%	7,352	3,676
GLADES	0.00%	0	0
HENDRY	0.00%	0	0
LEE	1.77%	18,295	9,148
MARTIN	1.29%	2,298	1,149
MIAMI-DADE	1.18%	36,230	18,115
MONROE	15.39%	13,263	6,632
PALM BEACH	0.24%	4,236	2,118
TOTAL	0.88%	102,576	51,288

continued

Table 24: Gross Development Density (GDD) Comparison for South Florida

County	2016 Report GDD	2019 GDD	% Change
BROWARD	10.85	13.44	23.86%
CHARLOTTE	1.64	2.25	37.18%
COLLIER	2.44	3.06	25.33%
GLADES	1.31	1.61	23.21%
HENDRY	1.17	1.21	3.10%
LEE	2.66	4.04	51.88%
MARTIN	2.79	3.40	21.84%
MIAMI-DADE	13.58	16.49	21.45%
MONROE	3.81	5.18	35.98%
PALM BEACH	6.23	7.45	19.55%
REGION AVERAGE	6.06	7.67	26.57%

continued

Appendix A

Sea Level 2040 Methodology

Sea Level 2040 includes a Baseline and two future scenarios, each reflecting the impacts of population growth and sea level inundation in Florida by the year 2040. The two future scenarios assume that by 2040, 50% of the population displaced by sea level rise in each county will relocate in the county or nearby counties, and 50% is projected to leave the state.

Sprawl 2040 reflects each county continuing similar patterns of development as in 2019 amid sea level rise and population growth, with development allowed to occur on state priority natural lands. Conservation 2040 accommodates the same population growth and sea level rise, does not allow development to occur on identified state priority natural lands, and reflects a 30% increase in gross development density in each county. Table 25 outlines major differences between the two future scenarios.

Table 25: Comparison of Modeling Assumptions

	Sprawl 2040	Conservation 2040
Development Densities	New population to be accommodated is allocated at each county's 2019 gross density	New population is allocated at a development density 30% greater than that used for Sprawl 2040.
Protected lands	2021 Florida Managed Areas are included as protected	In addition to 2021 Florida Managed Areas, 2021 Florida Forever project lands, and the highest three priorities within the Florida Ecological Greenways are protected (the Florida Wildlife Corridor).
Agricultural lands	No agricultural lands are excluded from population allocation	All irrigated agricultural lands (2045) on good soils (USDA/NRCS Capability Rating Excellent – Marginal) from FSAID, 2020 are excluded from population allocation
Sea Level Rise	50% of population impacted by sea level rise is reallocated within or near to the county affected. The other 50% are assumed to move out of the state.	50% of population impacted by sea level rise is reallocated within or near to the county affected. The other 50% are assumed to move out of the state.

continued

Methodology:

The University of Florida Center for Landscape Conservation Planning undertook these steps to develop the baseline and two future scenarios:

Steps:

1. Calculate the projected new population county by county — The Florida Bureau of Economic and Business Research (BEBR) medium projections for 2040 were used, based on 2020 U.S. census data. Regional projections are shown in Table 26.

Table 26: Population Projected Change by Region and State

	2019 Census	2040 Projection	2019-2040 Difference	% Change
Panhandle	1,529,159	1,790,000	260,841	17%
Northeast	2,643,040	3,386,500	743,460	28%
Central	9,503,600	12,154,700	2,651,100	28%
South	7,801,938	9,074,800	1,272,862	16%
Statewide	21,477,737	26,406,000	4,928,263	23%

2. Map existing developed lands — County property appraiser data for the land use categories identified in Table 27 were used to identify developed lands for the Baseline. These were also shown as developed for both the Sprawl and Conservation 2040 Scenarios.

TABLE 27: Developed Categories

SINGLE FAMILY	BOWLING ALLEYS, SKATING RINGS, ENCLOSED ARENAS
MOBILE HOMES	TOURIST ATTRACTIONS
MULTI-FAMILY	RACE HORSE, AUTO, AND DOG TRACKS
CONDOMINIA	GOLF COURSES
COOPERATIVES	HOTELS, MOTELS
RETIREMENT HOMES	LIGHT MANUFACTURING
BOARDING HOMES (INSTITUTIONAL)	HEAVY MANUFACTURING
MULTI-FAMILY LESS THAN 10 UNITS	LUMBER YARDS, SAWMILLS, PLANNING MILLS
STORES ONE-STORY	FRUIT, VEGETABLES, AND MEAT PACKING
MIXED USE, I.E., STORE AND OFFICE	CANNERIES, DISTILLERIES, AND WINERIES
DEPARTMENT STORES	OTHER FOOD PROCESSING
SUPERMARKET	WAREHOUSES, AND DISTRIBUTION CENTERS
REGIONAL SHOPPING MALLS	INDUSTRIAL STORAGE (FUEL, EQUIP, AND MATERIAL)
COMMUNITY SHOPPING CENTERS	CHURCHES
ONE-STORY NON-PROFESSIONAL OFFICES	PRIVATE SCHOOLS
MULTI-STORY NON-PROFESSIONAL OFFICES	PRIVATE HOSPITALS
PROFESSIONAL SERVICE BUILDINGS	HOMES FOR AGED
AIRPORTS, MARINAS, BUS TERMINALS, AND PIERS	MORTUARIES, CEMETERIES
RESTAURANTS, CAFETERIAS	CLUBS, LODGES, AND UNION HALLS
DRIVE-IN RESTAURANTS	SANITARIUMS, CONVALESCENT, AND BEST HOMES
FINANCIAL INSTITUTIONS	CULTURAL ORGANIZATIONS
INSURANCE COMPANY OFFICES	PUBLIC SCHOOLS
REPAIR SERVICE SHOPS	COLLEGES
SERVICE STATIONS	PUBLIC HOSPITALS
AUTOMOTIVE REPAIR, SERVICE, AND SALES	OTHER MUNICIPAL
PARKING LOTS, MOBILE HOME SALES	UTILITIES
WHOLESALE, MANUFACTURING, AND PRODUCE OUTLETS	VACANT RESIDENTIAL
FLORIST, GREENHOUSES	VACANT COMMERCIAL
DRIVE-IN THEATERS, OPEN STADIUMS	VACANT INDUSTRIAL
ENCLOSED THEATERS, AUDITORIUMS	VACANT INSTITUTIONAL
NIGHT CLUBS, BARS, AND COCKTAIL LOUNGES	

continued

3. Map existing protected lands and state priority natural lands — The Baseline included lands already protected in Florida based on May 21, 2021, Florida Managed Areas (FLMA) data from Florida Natural Areas Inventory. Additional state priority natural lands included projects identified as priorities in the Florida Forever land acquisition program and Florida Ecological Greenways Network (FEGN) highest priorities 1-3 (also known as the Florida Wildlife Corridor). The 2040 Sprawl Scenario assumed that priority natural lands could be developed over the coming decades, while the Conservation Scenario assumed they were not developed. Tables 28 and 29 include additional information on protected natural and protected agriculture lands in the Baseline and future scenarios.

TABLE 28: Protected Natural Lands

	Baseline	Sprawl 2040	Conservation 2040
Protected Natural Lands	2021 Florida Managed Areas are included as protected	Lands in the 2021 Florida Managed Lands data layer (from Florida Natural Areas Inventory via FNAI)	Lands in the 2021 Florida Managed Lands data layer (from Florida Natural Areas Inventory via FNAI), or Florida Forever 2021 project lands, or Florida Ecological Greenways Network priorities 1, 2, and 3

TABLE 29: Protected Agriculture

	Baseline	Sprawl 2040	Conservation 2040
Protected Agriculture	Lands in the 2021 Florida Managed Lands data layer (from Florida Natural Areas Inventory via FGDL) and in the Crop, Livestock and Aquaculture Lands of 2018 (FSAID).	Lands in the 2021 Florida Managed Lands data layer (from Florida Natural Areas Inventory via FGDL) and in the Crop, Livestock and Aquaculture Lands of 2045 (FSAID).	Lands in the 2021 Florida Managed Lands data layer (from Florida Natural Areas Inventory via FGDL), and Florida Forever 2021 project lands, and Florida Ecological Greenways Network priorities 1,2, and 3 and in the Crop, Livestock and Aquaculture Lands of 2045 (FSAID)
Agriculture (crop, livestock, and aquaculture)	2018 lands so identified through FSAID not in the Florida Managed Lands data layer.	2045 lands so identified through FSAID not in the Florida Managed Lands data layer.	2045 lands so identified through FSAID not overtaken by development and not included in the protected category defined above.

4. Identify lands and population projected to be impacted by sea level rise — The sea level rise scenario for Sea Level 2040 was based on the 2022 NOAA Intermediate sea level rise projection (0.25 meters). The number of people impacted in 2040 by a 0.25m sea level rise was identified using the ratio of a 0.9m sea level rise (the projection used for the Sea Level 2070 model) and a 0.25m sea level rise (the projection for 2040) to identify the percentage of population impacted in each county.

For this analysis, 50% of the population on inundated lands was assumed to relocate out of state as shown in Table 30, with the remaining 50% relocating within or near their existing county of residence, based on the premise that existing residents would want to move to locations close to their existing employment, social networks, and home. Counties with sufficient capacity accommodated the full 50% of the relocated population, but in counties with insufficient capacity, “overflow” population was assigned to an adjacent county or counties.

An additional 0.5m buffer (corresponding with a .75m sea level rise) was included where new population was allowed but given a low likelihood in the Sprawl Scenario and not allowed in the Conservation Scenario.

continued

TABLE 30: County Population Impacted by SLR

County	% of population impacted by SLR	Population impacted by SLR	Displaced out of state (50% of those affected by SLR)
ALACHUA	0.00%	0	0
BAKER	0.00%	0	0
BAY	4.17%	2,374	1,187
BRADFORD	0.00%	0	0
BREVARD	3.50%	7,085	3,543
BROWARD	2.45%	15,063	7,531
CALHOUN	0.00%	0	0
CHARLOTTE	8.90%	5,839	2,920
CITRUS	3.13%	1,573	787
CLAY	2.92%	2,209	1,104
COLLIER	5.56%	7,352	3,676
COLUMBIA	0.00%	0	0
DESOTO	0.03%	3	1
DIXIE	2.48%	123	61
DUVAL	3.56%	12,148	6,074
ESCAMBIA	1.97%	1,961	980
FLAGLER	3.93%	1,818	909
FRANKLIN	17.57%	708	354
GADSDEN	0.00%	0	0
GILCHRIST	0.34%	20	10
GLADES	0.00%	0	0
GULF	5.37%	246	123
HAMILTON	0.00%	0	0
HARDEE	0.00%	0	0
HENDRY	0.00%	0	0
HERNANDO	1.96%	1,297	648
HIGHLANDS	0.00%	0	0
HILLSBOROUGH	1.28%	6,650	3,325
HOLMES	0.00%	0	0
INDIAN RIVER	4.76%	2,614	1,307
JACKSON	0.00%	0	0
JEFFERSON	0.44%	19	10
LAFAYETTE	0.00%	0	0
LAKE	0.01%	8	4
LEE	6.32%	18,295	9,147
LEON	0.00%	0	0
LEVY	2.28%	315	158

continued

TABLE 30: County Population Impacted by SLR (Continued)

County	% of population impacted by SLR	Population impacted by SLR	Displaced out of state (50% of those affected by SLR)
LIBERTY	0.16%	4	2
MADISON	0.00%	0	0
MANATEE	6.31%	9,474	4,737
MARION	0.00%	2	1
MARTIN	4.61%	2,298	1,149
MIAMI-DADE	4.22%	36,230	18,115
MONROE	54.95%	13,263	6,632
NASSAU	6.79%	2,381	1,190
OKALOOSA	1.86%	1,295	648
OKEECHOBEE	0.00%	0	0
ORANGE	0.00%	0	0
OSCEOLA	0.00%	0	0
PALM BEACH	0.86%	4,236	2,118
PASCO	2.86%	5,973	2,987
PINELLAS	4.77%	13,578	6,789
POLK	0.00%	0	0
PUTNAM	4.03%	846	423
ST JOHNS	4.91%	5,905	2,953
ST LUCIE	1.71%	2,161	1,080
SANTA ROSA	3.49%	2,436	1,218
SARASOTA	4.16%	6,193	3,096
SEMINOLE	0.07%	106	53
SUMTER	0.00%	0	0
SUWANNEE	0.00%	0	0
TAYLOR	3.24%	195	98
UNION	0.00%	0	0
VOLUSIA	4.51%	8,325	4,162
WAKULLA	8.45%	999	499
WALTON	4.64%	1,483	742
WASHINGTON	0.37%	29	14
TOTAL		205,131	102,566

5. Determine the potential location of future development — Shown in Table 31, the likelihood of development criteria are used to determine where projected new development is to be allocated. These assume that available lands closer to cities, close to major roads, and in proximity to waterbodies would be more likely to develop. Due to higher development costs, wetlands were deemed less likely to develop. Likewise, lands with prime agricultural soils in the Florida Statewide Agricultural Irrigation Demand (FSAID) study for 2045 were determined less likely to develop in the Sprawl 2040 scenario because of the considerable investment in irrigation to make these lands more productive. These lands were excluded from development in the Conservation 2040 Scenario.

continued

TABLE 31: Likelihood of Development (Development Suitability) Criteria

Development Suitability Criterion	Rational for Use	Weight
Proximity to Large Urban Areas (over 50,000 people)	Major urban areas tend to accommodate more additional population than smaller urban areas.	5%
Proximity to All Urban Areas (over 2,500 people)	New urban development tends to occur in close proximity to existing urban development.	27%
Proximity to coastline	The coast has historically been an attractor for urban development. However future sea level rise is expected to make these areas less attractive in 2040.	9%
Preliminary Development Approvals	Areas within approved DRIs and DSAPs are highly likely to develop. The only DSAP that was used, however, was West Bay in Bay County, because the other existing DSAPs fell in the path and pattern of new urban development and their boundaries did not affect the pattern or timing of new urban development.	8%
Road density	New urban development tends to occur in areas of relatively higher road density.	12%
Presence/absence of wetlands	Urban development on lands without wetlands is often less costly than on lands with wetlands.	16%
Proximity to open water	Physical or visual access to water has historically been an attractor for development.	2%
Proximity to major roads	Roads facilitate new urban development.	5%
Absence of USDA/NRCS Soils within FSAID 2045 Projected Irrigated Agricultural Lands	There is an economic incentive to convert poorer agricultural soils to urban development before good agricultural soils.	16%

6. Determine the density of existing and future development — Gross Development Density (GDD) was used to determine the density of existing and projected development. GDD reflects the average number of people per every developed acre and is calculated on a county-by-county basis. For the future scenarios, the GDD was used to determine the acreage required to accommodate new development in each county.

For the Sprawl 2040 Scenario, the 2040 population projection for each county was divided by the 2019 GDD for that county to determine the amount of land needed to accommodate potential future development. This means that current patterns of development are presumed to persist. In order to show an alternative future scenario with less sprawling development patterns, for the Conservation 2040 Scenario the GDD was increased by 30%.

continued

TABLE 32: Gross Development Density (GDD) by Urban and Rural County

County	2010 GDD	2019 GDD	% Change
Urban Counties			
ALACHUA	1.91	2.23	16.85%
BAY	1.65	1.92	16.07%
BREVARD	3.15	3.90	23.91%
BROWARD	10.85	13.44	23.86%
CHARLOTTE	1.64	2.25	37.18%
CITRUS	1.04	1.19	14.44%
CLAY	2.19	2.70	23.19%
COLLIER	2.44	3.06	25.33%
COLUMBIA	0.89	0.94	6.05%
DUVAL	4.84	5.80	19.89%
ESCAMBIA	2.84	3.07	8.10%
FLAGLER	1.89	2.38	25.97%
HERNANDO	1.87	2.17	15.82%
HIGHLANDS	1.35	1.76	30.34%
HILLSBOROUGH	4.73	6.24	31.96%
INDIAN RIVER	2.49	3.41	37.09%
LAKE	1.57	2.24	42.76%
LEE	2.66	4.04	51.88%
LEON	2.13	2.95	38.61%
MANATEE	3.09	4.38	41.67%
MARION	1.68	1.87	11.22%
MARTIN	2.79	3.40	21.84%
MIAMI-DADE	13.58	16.49	21.45%
MONROE	3.81	5.18	35.98%

County	2010 GDD	2019 GDD	% Change
Urban Counties			
NASSAU	0.80	1.44	79.64%
OKALOOSA	2.58	3.17	22.71%
ORANGE	4.59	7.18	56.49%
OSCEOLA	2.61	4.18	60.05%
PALM BEACH	6.23	7.45	19.55%
PASCO	3.18	3.95	24.30%
PINELLAS	7.21	9.12	26.47%
POLK	2.45	3.36	37.07%
PUTNAM	0.58	0.60	3.86%
ST JOHNS	1.73	3.35	93.86%
ST LUCIE	2.82	4.69	66.16%
SANTA ROSA	1.87	2.14	14.57%
SARASOTA	4.75	3.92	-17.51%
SEMINOLE	6.47	5.15	-20.39%
SUMTER	2.32	2.77	19.45%
VOLUSIA	2.16	2.95	36.51%
WALTON	0.71	1.04	46.05%
AVERAGE	3.48	4.46	28.16%

County	2010 GDD	2019 GDD	% Change
Rural Counties			
BAKER	1.62	1.68	3.83%
BRADFORD	1.26	1.18	-6.24%
CALHOUN	0.95	0.96	0.56%
DESOTO	1.48	1.81	22.07%
DIXIE	0.60	0.67	10.96%
FRANKLIN	0.88	0.74	-15.74%
GADSDEN	1.07	1.01	-5.54%
GILCHRIST	0.53	0.57	7.95%
GLADES	1.31	1.61	23.21%
GULF	0.67	0.85	26.49%
HAMILTON	0.26	0.73	179.79%
HARDEE	1.79	1.68	-6.34%
HENDRY	1.17	1.21	3.10%
HOLMES	0.85	0.87	2.25%
JACKSON	0.74	0.75	1.37%
JEFFERSON	0.46	0.70	52.72%
LAFAYETTE	1.04	1.00	-4.12%
LEVY	0.43	0.48	10.87%
LIBERTY	1.46	0.94	-35.96%
MADISON	0.79	0.73	-7.34%
OKEECHOBEE	1.10	1.16	5.39%
SUWANNEE	0.48	0.52	8.47%
TAYLOR	0.74	0.69	-6.42%
UNION	2.75	2.18	-20.90%
WAKULLA	0.84	1.10	30.43%
WASHINGTON	0.53	0.57	7.35%
AVERAGE	0.77	0.86	11.43%

NOTE: Urban counties are those with a population of 50,000 or greater in the 2019 census, while rural counties have populations less than 50,000.

7. Identify lands within special planning areas that were available for new development — We assumed that certain lands that had already been approved for development were more likely to develop first. To address these lands, a special planning area mask was created for lands designated as Developments of Regional Impact (DRIs) and Detailed Specific Area Plans (DSAPs). Lands within those planning areas that could not be developed were excluded, including open water, major road rights of way, existing protected lands, mitigation banks, and Miccosukee Indian Reservation lands in western Broward County.

The lands with the highest Likelihood of Development scores derived from Table 31 were the first to have population allocated to them, using the 2019 GDD from the appropriate county, as shown in Table 32. This allocation process was repeated until all DRI/DSAP lands in each county were used or all new population accommodated. The population allocated to DRI/DSAP lands was then subtracted from remaining new population data to determine infill/greenfield population.

8. Identify lands outside of special planning areas that were available for new development — This involved creating an infill/greenfield mask for land use categories identified in the county property appraiser data from Table 33, and then excluding lands that could not be developed for other reasons (open water, major road rights of way, existing protected lands), mitigation banks, and Miccosukee Indian Reservation lands in western Broward County. Population was allocated first to the areas identified as having the highest likelihood of development following the methodology in Table 31 and using the appropriate county GDD from Table 32. This allocation process was repeated until all the population was accommodated or all infill/greenfield lands in each county were used.

continued

TABLE 33: Infill-Greenfield Categories

CAMPS	GRAZING LAND SOIL CLASS 4
IMPROVED AGRICULTURE	GRAZING LAND SOIL CLASS 5
CROPLAND SOIL CLASS 1	GRAZING LAND SOIL CLASS 6
CROPLAND SOIL CLASS 2	ORCHARD, GROVES, CITRUS
CROPLAND SOIL CLASS 3	POULTRY, BEES, TROPICAL FISH, RABBITS, ETC
TIMBERLAND	DAIRIES, FEED LOTS
TIMBERLAND	ORNAMENTALS, MISC. AGRICULTURE
TIMBERLAND	MINING, PETROLEUM, AND GAS LANDS
TIMBERLAND	ACREAGE NOT ZONED AGRICULTURE
TIMBERLAND	VACANT RESIDENTIAL
TIMBERLAND	VACANT COMMERCIAL
GRAZING LAND SOIL CLASS 1	VACANT INDUSTRIAL
GRAZING LAND SOIL CLASS 2	VACANT INSTITUTIONAL
GRAZING LAND SOIL CLASS 3	

9. Allocate spillover population — If there was insufficient land available to accommodate the projected population increase for a particular county, spillover population was allocated to adjacent counties. This was based upon the percentage of the sum of the total 2019 population of the adjacent counties, following the Likelihood of Development criteria in Table 31 and the GDD in Table 32 for the county accommodating the spillover. For example, if there was spillover population from Orange County, then Lake, Seminole, Brevard, Osceola and Polk counties received their proportionate share of the spillover. Population to be accommodated through redevelopment was calculated using the ratio of 2019 developed lands to available lands for development. Counties with less land available for future development were assumed to have higher levels of redevelopment than counties with abundant available land.

continued