Mapping Florida's Future – Alternative Patterns of Water Use in 2070

WATER 2070

A joint project of . . .

1000 FRIENDS of FLORIDA

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FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES EST. 1868

Summary Report
November 2016

This is a joint project of the Florida Department of Agriculture and Consumer Services (DACS), University of Florida Geoplan Center and 1000 Friends of Florida with funding provided by DACS and The Curtis and Edith Munson Foundation.

For more detailed information on Water 2070, including an online presentation, state and regional maps and the technical report with methodology, please visit www.1000friendsofflorida.org/Florida2070.

Water 2070
Summary Report

One of the biggest issues facing Florida today is the availability of sufficient water to meet the needs of people, agriculture and the environment. A growing population makes the historic competition between users even more intense. In poll after poll, protection of drinking water consistently ranks as a top environmental concern for the public. Clean and abundant water also is needed to ensure that Florida's multi-billion dollar agriculture and tourism industries—the two mainstays of this state's economy—remain strong and viable over the long term.

The Florida Department of Agriculture and Consumer Services (DACS), the University of Florida's Geoplan Center and 1000 Friends of Florida partnered on Florida 2070, using geographic information systems (GIS) to show actual 2010 land use patterns and two land use scenarios for 2070, when Florida is projected to have 15 million additional residents.

Based on Florida 2070 results, DACS, Geoplan and 1000 Friends have now partnered on Water 2070 to explore the impact on water demand of projected population growth and agriculture demand encompassed in the three scenarios generated in Florida 2070. Additional demand numbers remain un-projected, including water for mining and power generation. And of particular concern, and not within the scope and budget of this project, is the annual water needed for the health and function of natural systems.

Basic assumptions:

Water 2010 Baseline is based on the actual 2010 distribution of population, agriculture and protected lands as identified in Florida 2070.

- Using data from a United States Geological Survey study, the 2010 baseline per capita gallons per day (GPD) demand for each Florida county is established and used to determine total development-related demand for each county
- Based on an Alachua County study prepared at the University of Florida, it is assumed that rural/suburban census tracts (those with less than 2000 people/square mile) use three times as much water as urban census tracts (those with > = 2000 people/square mile)
- Agriculture irrigation demand is based on data from a study prepared for the Department of Agriculture and Consumer Services which estimates water demand for crops, livestock and aquaculture

Water 2070 Trend is based on the addition of 15 million new residents, assuming 2010 development patterns continue.

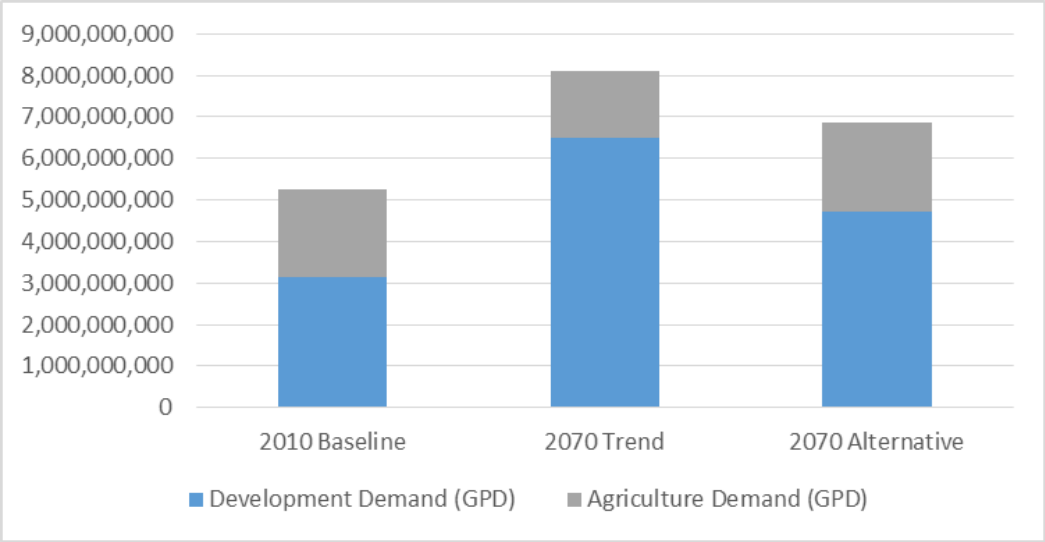
- Using the same baseline per capita gallons per day (GPD) demand for each Florida county and the assumption that suburban/rural census block groups use more water than urban census block groups, each county's water demand quantity is increased to reflect its population increase and the spatial distribution of that population
- Agricultural lands are lost to development, but the same per acre irrigation demand is assumed resulting in a decrease in agricultural demand

In **Water 2070 Alternative**, the projected 15 million new residents are accommodated with more compact development patterns and increased protected lands as shown in the Florida 2070 Alternative scenario.

- Per capita rates of development-related water demand for each county are conservatively reduced by 20% to capture the potential impact of water conservation measures
- Agriculture irrigation demand is based on data from a study prepared for the Department of Agriculture and Consumer Services which estimates water demand for crops, livestock and aquaculture in 2035. No irrigated lands identified in this study were allowed to develop under this scenario

Statewide Results

Water 2070 results in a series of maps and associated tables and graphs which reveal significant differences among the three scenarios and among the four regions of the State. This chart summarizes statewide total gallons per day (GPD) of water use related to development and agriculture combined:



In summary:

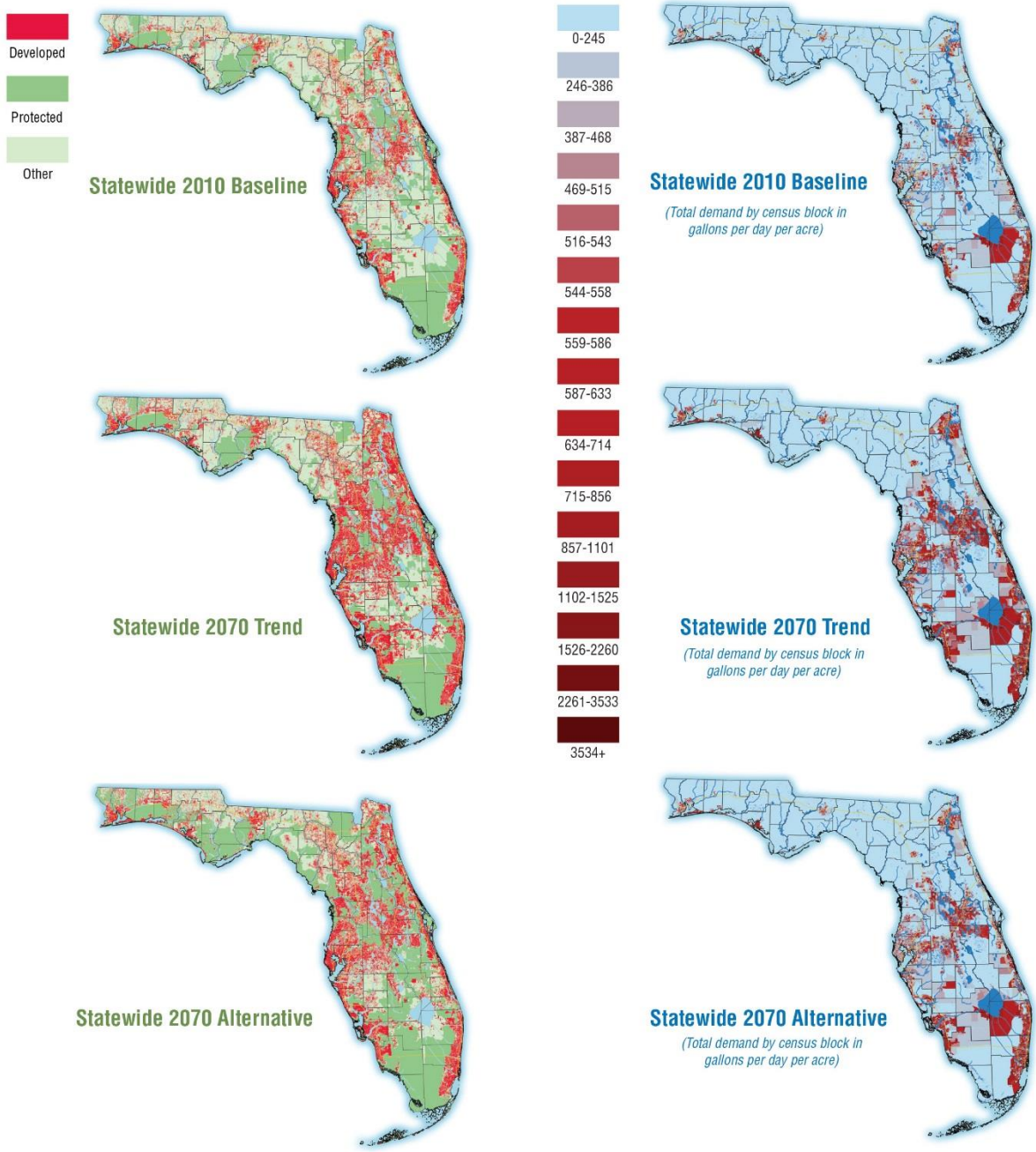
- Water 2070 Trend reveals that the combination of population growth and increased development-related irrigation (associated with new and sprawling development patterns) will increase development-related water demand by more than 100% compared to the 2010 Baseline
- With more compact development and a modest 20% increase in water conservation, Alternative 2070 would save 27% in development-related water demand when compared to the 2070 Trend
- However, Alternative 2070 development-related water demand is still 50% higher than the 2010 Baseline
- Compared to the 2010 Baseline, statewide agriculture irrigation demand in the 2070 Trend is 24% less due to the loss of agriculture lands to development
- Statewide agriculture irrigation demand is slightly greater in the 2070 Alternative than the 2010 Baseline because there are more agricultural lands projected for 2035 in the irrigation demand study prepared in 2015 by the Department of Agriculture and Consumer Services
- Given existing water shortages in some areas of the state, the 54% increase in total demand from 2010 to 2070 Trend, and even the 30% increase from 2010 to 2070 Alternative, are clearly not sustainable
- Modest water conservation of 20% and a modest increase in development density are not sufficient

The clear takeaway is that development-related water demand is the major driver of increased water consumption in Florida by 2070, and that the combination of more compact development patterns and modest water conservation measures would result in a fairly significant reduction.

However, given existing water supply shortfalls in some areas of the state, going beyond Water Alternative 2070 by promoting even more compact development and increasing water conservation efforts is essential if Florida is to accommodate 15 million more residents and maintain agricultural productivity in 2070.

As shown in the Regional Results Overview section, the correlation between population growth and water demand is clearly evident when comparing the Florida 2070 maps with the Water 2070 maps which show gallons used per day **per acre** (GPD/A) for the same scenarios. Pay particular attention to Central and Northeast Florida which are most impacted by both population growth and sprawling development patterns and, as a result, development-related water demand.

Comparing Florida 2070 & Water 2070 Results



The Water 2070 map uses a mathematically-generated geometric scale to better visualize the results due to the wide range in values. Each category has roughly the same number of data entries.

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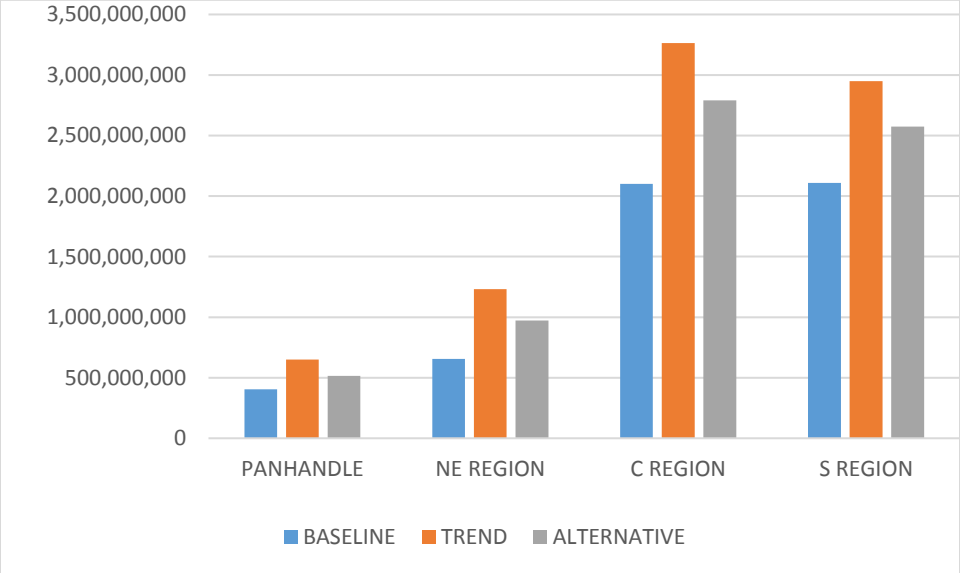
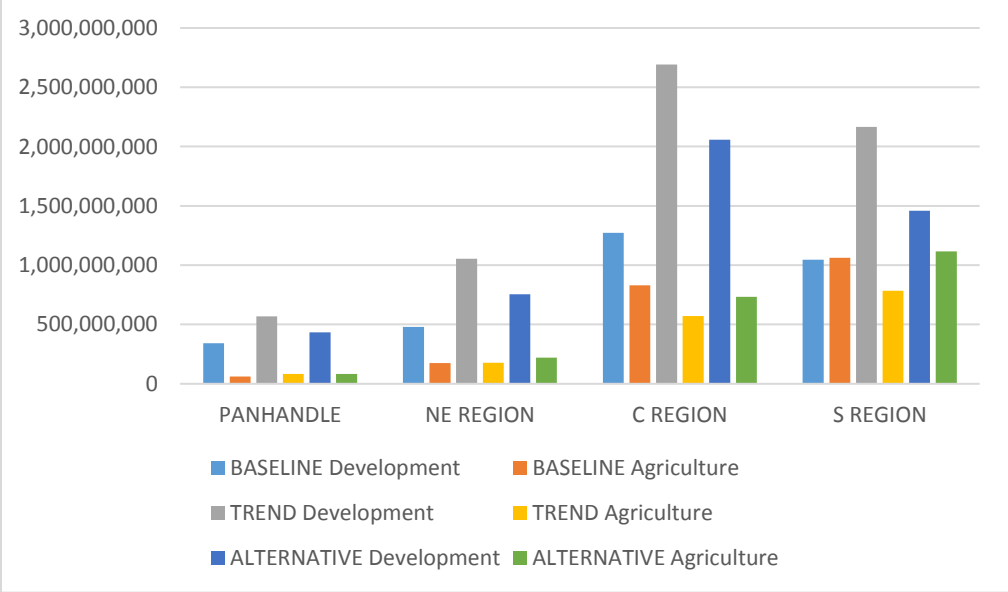
Regional Results Overview

The top chart reveals that all four regions demonstrate a similar pattern for total demand (development plus agriculture in GPD), with the 2010 Baseline having the lowest total water demand, and the Alternative scenario having lower demand than the Trend scenarios. It is also clear that the counties grouped in the Panhandle have the lowest total demand, followed by the Northeast Region. The Central Region has the greatest total demand in all scenarios. This is correlated with the population and agriculture found in each region.

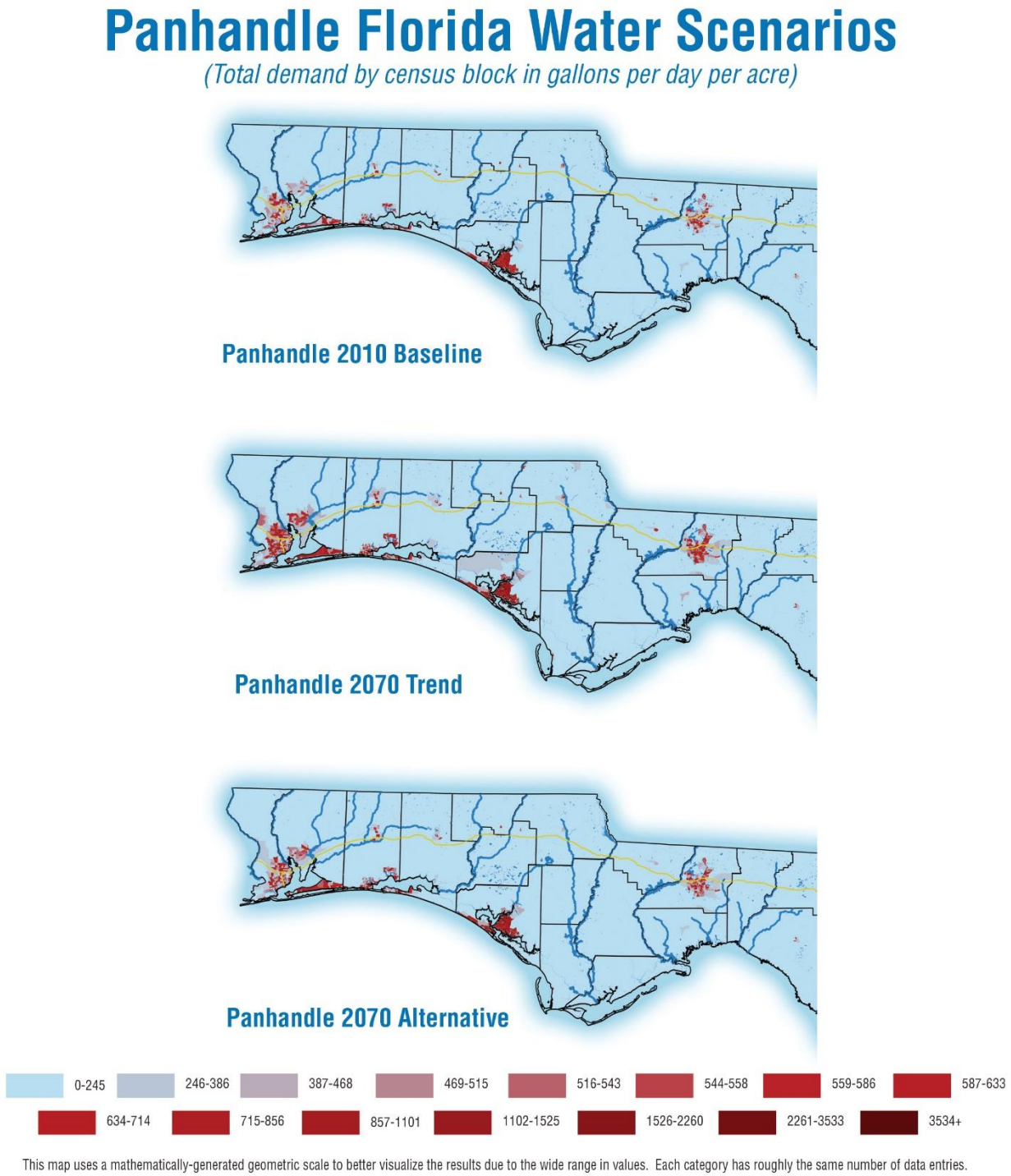


While the top chart shows agriculture and development-related water use combined, the bottom chart splits out total gallons per day associated with development and agriculture for each of the three scenarios, revealing more complex patterns.



Panhandle Florida Results

In the Panhandle, development-related demand is significantly greater than the agriculture demand, and agriculture demand is relatively flat for all three scenarios. This suggests that the irrigated agriculture lands in this region are not likely to be significantly impacted by projected development.

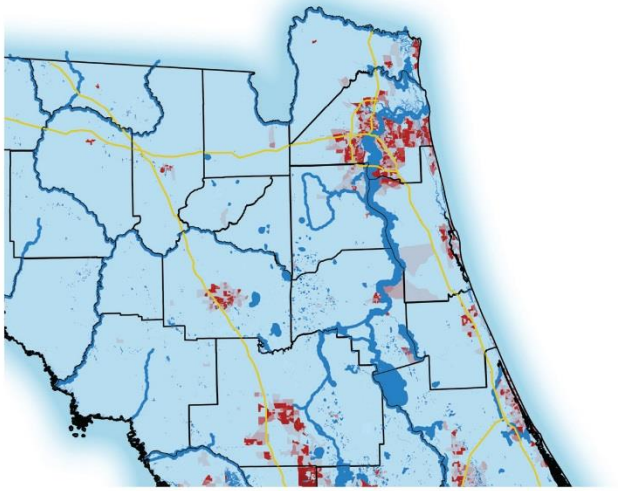


Northeast Florida Results

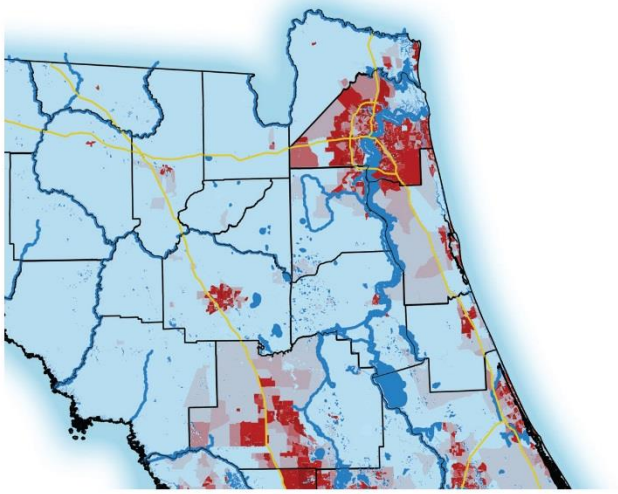
Agriculture demand remains relatively flat in all three scenarios. Development-related demand more than doubles from the Baseline to the Trend and decreases 23% from the Trend to the Alternative. The graphs suggest that the projected development in this region does not significantly impact irrigated agriculture lands.

Northeast Florida Development Scenarios

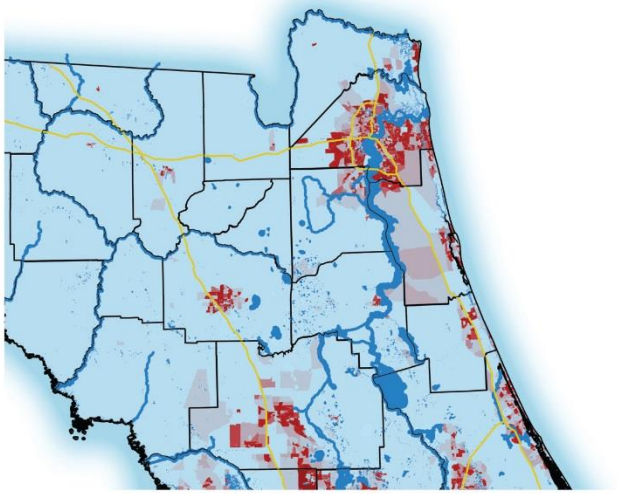
(Total demand by census block in gallons per day per acre)



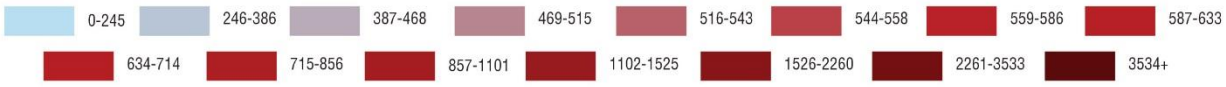
Northeast 2010 Baseline



Northeast 2070 Trend



Northeast 2070 Alternative



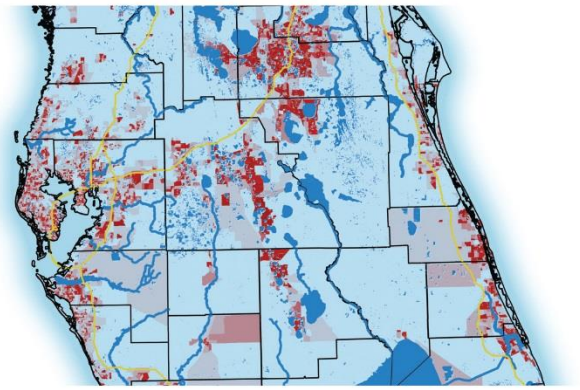
This map uses a mathematically-generated geometric scale to better visualize the results due to the wide range in values. Each category has roughly the same number of data entries.

Central Florida Results

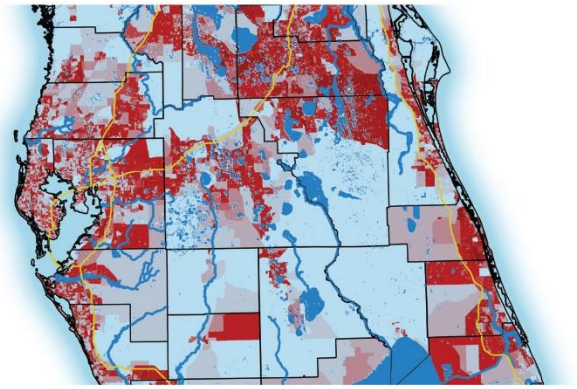
In the Central Region, the Trend development-related demand is roughly double the Baseline development demand and even the Alternative development demand is projected to exceed 2 billion gallons per day. These high development demand projections correlate to the fact that the Central Region has the highest projected population increase of all the regions. It also shows that even with the water conservation assumptions employed in the Alternative scenario, only modest water demand savings will be realized because the development patterns are likely to remain sprawling and the projected population increase is substantial. This shows the need for even more compact growth and greater water conservation to achieve significant water demand reductions in this region.

Central Florida Development Scenarios

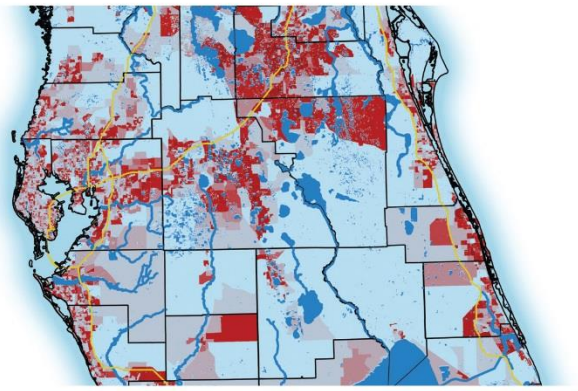
(Total demand by census block in gallons per day per acre)



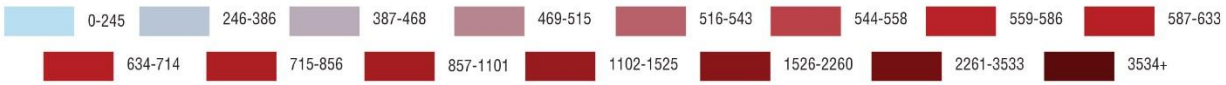
Central 2010 Baseline



Central 2070 Trend



Central 2070 Alternative



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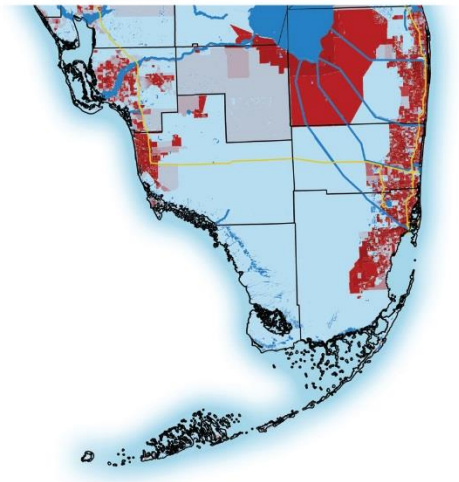
South Florida Results

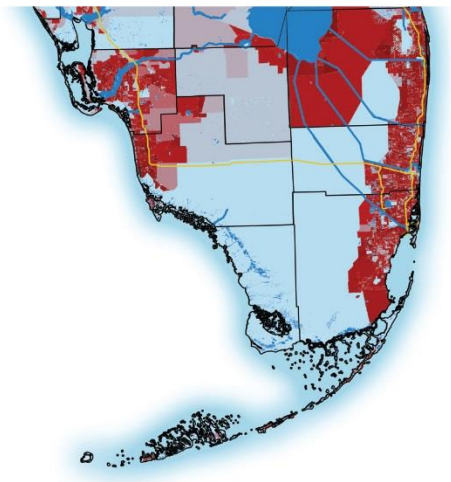
South Florida is the only region in which the Baseline scenario has a higher agriculture demand than development demand. This is attributable to the large acreage in the region currently under irrigation, including portions of the Everglades Agricultural Area and the nurseries in south Miami-Dade County. In the 2070 scenarios, the development demand outstrips the agriculture demand, but agriculture demand in the Alternative scenario is projected to be greater than for the 2010 Baseline. This is because additional irrigated agricultural lands are projected to be added in the South Region.

South Florida Development Scenarios

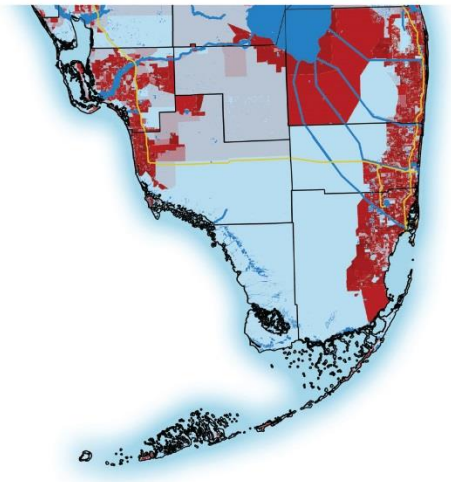
(Total demand by census block in gallons per day per acre)



South 2010 Baseline



South 2070 Trend



South 2070 Alternative

This map uses a mathematically-generated geometric scale to better visualize the results due to the wide range in values. Each category has roughly the same number of data entries.

Recommendations:

The two basic options to address future water demand is to increase supply (through alternative water supply such as reclaiming water and desalinization plants) or reduce demand (through water conservation and increased efficiency). While desalinization is a multi-billion dollar proposition that raises serious environmental concerns, the other options – water conservation, increased efficiency, and reclaiming water – all provide significant and cost-effective results.

According to Florida-Friendly Landscaping™, at least 50% of water used by households is used outdoors for landscape irrigation. Numerous studies and programs outlined in the accompanying *Water 2070 Technical Report* (available at www.1000friendsofflorida.org/water2070) show that significant reductions could be accomplished by reducing the use of irrigation and increasing the efficiency of irrigation systems. That has led to the conclusion that:

The single most effective strategy to reduce water demand in Florida is to significantly reduce the amount of water used for landscape irrigation.

Not only does this conserve water, but it also can result in savings to individual homeowners through reduced water bills. Additionally, if enough people conserve water, community costs associated with supplying water and addressing sewage and stormwater can be significantly reduced, resulting in tax savings.

Two statewide initiatives already exist to promote significantly reductions in water demand in Florida. **Florida Water Star** (www.floridawaterstar.com) is this state's water conservation certification program for new and existing homes and commercial developments and addresses both outdoor and indoor water conservation. F**lorida-Friendly Landscaping**™ (www.ffl.ifas.ufl.edu), a joint program of the University of Florida's IFAS Extension and the Florida Department of Environmental Protection, provides residents, developers and landscaping professionals with water conservation and other strategies to better protect this state's environment.

Expand Public Water Conservation Efforts

- Increase funding and outreach for the Florida Water Star and Florida-Friendly Landscaping™ programs to promote greater water conservation in new and existing development
- Require Florida Friendly Landscaping™, manual irrigation, soil moisture sensors, or comparable water conservation technology for all new development
- Require permitted water users to monitor the amount of groundwater used
- Partner with developers and local governments to establish conservation goals, water budgets and water use monitoring strategies prior to the approval of new development
- Update the Florida Building Code to require indoor and outdoor water efficiency standards for new construction and major remodeling
- Adopt registration and training standards for irrigation professionals
- Establish conservation rate structures that incentivize lower levels of water consumption
- Construct and incentivize the use of reclaimed water facilities

Reduce Personal Water Use

- Use Florida-Friendly Landscaping™ and other measures to reduce or eliminate landscaping water use, and seek formal Florida-Friendly Landscaping™ recognition
- Lessen the need for irrigation by using the right plants in the right locations, grouping them according to water needs, and using rain barrels or cisterns to capture rainwater for irrigation
- Reduce stormwater runoff through mulching plant beds, using porous surfaces for patios, walkways and driveways, and creating swales or low areas to hold and filter water on your property

- If an automated irrigation system is used, ensure that it is designed and operated to meet strict water conservation criteria including drip systems, soil moisture sensors, automatic rain shutoff sensors and/or other technology to significantly reduce water use
- Make sure the irrigation system is calibrated correctly and check it regularly for breaks and head alignment
- Do not water if it has rained in the last 24 hours or if rain is forecast in the next 24 hours
- Select Florida Water Star certified properties when purchasing a new home, and follow Water Star guidelines when remodeling an existing home
- Use Water-Sense labeled high-efficiency appliances to significantly reduce indoor water consumption

As Florida's population continues to grow, less water will be available for per capita human use. Now is the time to move forward on serious water conservation efforts before it is too costly, or too late. Not only is water conservation the smart thing to do, but it can result in significant savings on Floridians' water bills and taxes. Water conservation helps to protect Florida's rivers, lakes and aquifer – and the people, wildlife and farms that depend on them now and in the future.

For more detailed information on Water 2070, including an online presentation, state and regional maps and the technical report with methodology, please visit www.1000friendsofflorida.org/Florida2070.

About the project partners:

Established in 1984, **Geoplan** is a multidisciplinary GIS laboratory located in the University of Florida's School of Landscape Architecture and Planning, College of Design, Construction and Planning. It was developed in response to the need for a teaching and research environment for Geographic Information Systems, or GIS. Under its auspices spatial analysis is conducted in support of a broad range of academic disciplines. Additional information is available at www.geoplan.ufl.edu.

The **Florida Department of Agriculture and Consumer Services** supports and promotes Florida agriculture, protects the environment, safeguards consumers, and ensures the safety and wholesomeness of food. Our programs and activities are so varied and extensive, they touch the life of just about every Floridian. For more information please visit www.freshfromflorida.com.

Founded in 1986, **1000 Friends of Florida** is a 501(c)(3) not-for-profit organization that focuses on saving special places and building better communities in one of the fastest growing states in the nation. Visit www.1000friendsofflorida.org for more information on 1000 Friends.

Acknowledgements:

The working team for this project was comprised of representatives of 1000 Friends of Florida, The Department of Agriculture and Consumer Services (DACS), and the University of Florida's GeoPlan Center. 1000 Friends representatives include Ryan Smart, President, Vivian Young, AICP, Communications Director and Charles Pattison, FAICP, former Policy Director. The Florida Department of Agriculture and Consumer Services (DACS) was represented by Corinne Hermle. GeoPlan was represented by Dr. Paul Zwick, and Peggy Carr, Professors in the School of Landscape Architecture and Planning.

Generous and critical support was provided for the water demand modeling by University of Florida and USGS colleagues. We particularly acknowledge the careful review of our methodology by Jennison Kipp Searcy, Lynn M. Jarrett, and Pierce Jones, all part of the University of Florida's Program for Resource Efficient Communities. Their study *Envision Alachua: Resource Efficiency, Establishing Water Consumption Baselines for Alachua County*, 2014 provided important demand data for Alachua County. Carol Lippincott and Wendy Graham of UF's Water Institute provided project-shaping suggestions and helped greatly with tracking down water demand data. Richard Marella of the U. S. Geological Survey also provided critical input and review. His report *Florida Water Demand 2010* served as the foundation for our water demand modeling. Thanks also to Scott King, President, Florida Irrigation Society, who reviewed and provided input on irrigation demand reduction strategies.

At the time of this study DACS was under the leadership of Commissioner Adam Putnam.

Members of 1000 Friends of Florida Board of Directors in place at the time of this study were:

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