

The Florida Senate
BILL ANALYSIS AND FISCAL IMPACT STATEMENT

(This document is based on the provisions contained in the legislation as of the latest date listed below.)

Prepared By: The Professional Staff of the Committee on Environment and Natural Resources

BILL: SB 298

INTRODUCER: Senator Polsky

SUBJECT: Saltwater Intrusion Vulnerability Assessments

DATE: December 5, 2023

REVISED: _____

	ANALYST	STAFF DIRECTOR	REFERENCE	ACTION
1.	Barriero	Rogers	EN	Favorable
2.			FP	

I. Summary:

SB 298 amends the Resilient Florida Grant Program to authorize the Department of Environmental Protection (DEP) to provide grants to coastal counties to conduct vulnerability assessments analyzing the effects of saltwater intrusion on their water supplies and the preparedness to respond to such a threat. Each vulnerability assessment must include an analysis of all of the following information:

- The coastal county’s primary water utilities;
- Current maps of the coastal county’s freshwater wellfields and latest saltwater intrusion impact lines;
- Projections of saltwater intrusion over the next decade, including specific wells that may be impacted during that timeframe; and
- The costs necessary to relocate freshwater wellfields that are anticipated to be impacted, including current projects that are underway to relocate the freshwater wellfields.

The bill also requires DEP to do all of the following:

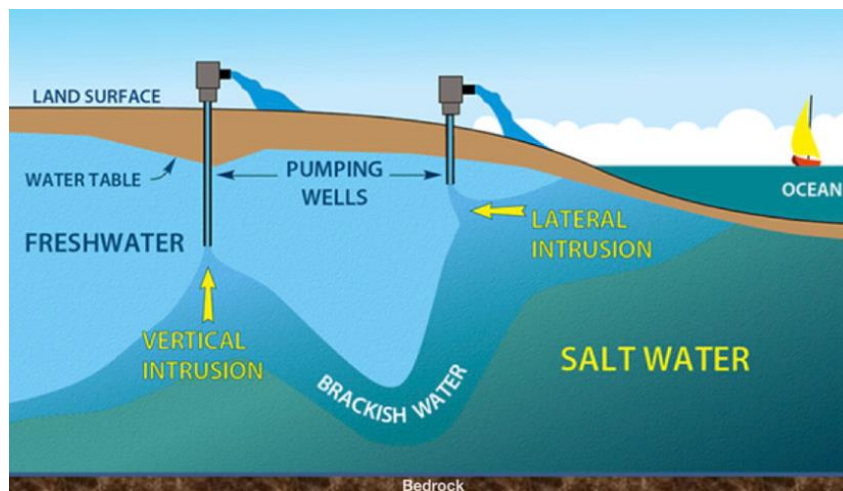
- Use the information contained in a coastal county’s saltwater intrusion vulnerability assessment to update its Comprehensive Statewide Flood Vulnerability and Sea Level Rise Data Set;
- Make publicly available on DEP’s website any appropriate information from a saltwater intrusion vulnerability assessment it receives from coastal counties; and
- Provide 50 percent cost-share funding up to \$250,000 for each grant awarded under this section of the Resilient Florida Grant Program. A coastal county with a population of 50,000 or less is not required to contribute to the cost share.

II. Present Situation:

Saltwater Intrusion

Drinking water in Florida comes primarily from water found within underground layers of water-bearing rock or sand called aquifers.¹ Aquifers are composed of different types of sediments and rocks, such as gravel, sandstone, and limestone.² Groundwater enters an aquifer as precipitation seeps through the soil and can move through the aquifer and resurface through springs and wells.³ Fresh and salt water fill the holes in the rock, with freshwater generally filling the uppermost part of aquifers and saltwater found at greater depths.⁴

Under natural conditions, the seaward movement of freshwater prevents seawater from encroaching coastal aquifers.⁵ When groundwater is pumped from a coastal aquifer, lowered water levels can cause seawater to be drawn toward the freshwater zones of the aquifer. The intruding seawater decreases the freshwater storage in the aquifers. Without treatment, this groundwater does not conform to drinking water or agricultural water quality standards.⁶



Saltwater intrusion can occur in various ways, including lateral encroachment from coastal waters and vertical movement of saltwater near discharging wells.⁷ It can be caused by digging

¹ See University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), *Central Florida's Water Resources*, <https://blogs.ifas.ufl.edu/osceolaco/2019/12/06/central-floridas-water-resources/#:~:text=Groundwater%20Over%2090,porous%20rocks%20that%20holds%20water> (last visited Nov. 16, 2023); see also St. Johns River Water Management District (SJRWMD), *Florida's Aquifers*, <https://www.sjrwmd.com/water-supply/aquifer/> (last visited Nov. 16, 2023).

² National Geographic, *Aquifers*, <https://education.nationalgeographic.org/resource/aquifers/> (last visited Nov. 16, 2023).

³ *Id.*

⁴ SJRWMD, *Florida's Aquifers*, <https://www.sjrwmd.com/water-supply/aquifer/> (last visited Nov. 16, 2023).

⁵ U.S. Geological Survey (USGS), *Sustainable Groundwater: Seawater Intrusion*, <https://ca.water.usgs.gov/sustainable-groundwater-management/seawater-intrusion-california.html> (last visited Nov. 16, 2023).

⁶ *Id.*; see also Brett A. Buzzanga, Old Dominion University, *Precipitation and Sea Level Rise Impacts on Groundwater Levels in Virginia Beach, Virginia*, 12 (Fall 2017), available at https://www.researchgate.net/publication/328225012_Precipitation_and_Sea_Level_Rise_Impacts_on_Groundwater_Levels_in_Virginia_Beach_Virginia/download.

⁷ USGS, *Saltwater Intrusion*, <https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion> (last visited Nov. 16, 2023).

wells too deep, excessive groundwater pumping, sea level rise, severe drought,⁸ king tides, and storm surge.⁹ Sources include infiltration from tidal marshes, estuaries, and bays, encroachment from the ocean, leakage from unprotected canals, upward leakage from deeper aquifers, and movement of residual saltwater.¹⁰ Rising sea levels also push saltwater upstream in tidal rivers and streams, raise coastal ground water tables, and push saltwater further inland.¹¹

Saltwater intrusion can cause serious consequences in terms of both environmental and economic impacts. Potable water is necessary for drinking, irrigation, and most industrial uses,¹² but the intrusion of saltwater into coastal aquifers can increase groundwater salinity beyond potable levels, endangering access to freshwater for millions of people.¹³ Even small changes in salinity can render water undrinkable—chloride concentrations above 250 milligrams per liter (salinity of approximately 0.5 parts per thousand) can cause hypertension and stroke.¹⁴

Saltwater intrusion can also negatively affect local agriculture. The vast majority of commercially grown tropical fruits and vegetables and most landscape ornamental plants have little to no salinity tolerance.¹⁵ Saline soil and/or salty irrigation water can result in mild to lethal physiological effects, including reduced cell growth and plant organ (e.g., leaf and fruit) expansion, reduced water and nutrient uptake, nutrient imbalances and deficiencies, reduced plant growth and yields, and plant death.¹⁶ This results in increased production costs and decreased product sales.¹⁷

In addition, saltwater intrusion can cause a decline in forest productivity. Saltwater degrades coastal wetlands and barrier islands, which buffer inland areas from storm surge, by killing less salt-tolerant species and leaving behind “ghost forests” or wetland areas with only standing dead trees.¹⁸ Over time, saltwater intrusion, along with rising sea levels, convert these diverse wetland ecosystems into grass marshes and eventually into open water. The loss in forest and agricultural productivity due to increased soil salinity results in decreased ecosystem diversity and habitat for

⁸ USGS, *Saltwater Intrusion*, <https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion> (last visited Nov. 16, 2023); SJRWMD, *Florida’s Aquifers*, <https://www.sjrwmd.com/water-supply/aquifer/> (last visited Nov. 16, 2023).

⁹ UF/IFAS, *Saltwater intrusion and flooding: Risks to South Florida’s agriculture and potential management practices*, <https://edis.ifas.ufl.edu/publication/AE572> (last visited Nov. 16, 2023).

¹⁰ USGS, *Saltwater Intrusion in the Surficial Aquifer System of the Big Cypress Basin, Southwest Florida, and a Proposed Plan for Improved Salinity Monitoring*, 9 (2013), available at <https://pubs.usgs.gov/of/2013/1088/pdf/ofr2013-1088.pdf>.

¹¹ Dep’t of Emergency Management, *Enhanced State Hazard Mitigation Plan*, 107-108 (2018), available at https://www.floridadisaster.org/globalassets/dem/mitigation/mitigate-fl--shmp/shmp-2018-full_final_approved.6.11.2018.pdf.

¹² *Id.*

¹³ Scott Jasechko et al., *Groundwater level observations in 250,000 coastal US wells reveal scope of potential seawater intrusion*, 2 (2020), available at <https://www.nature.com/articles/s41467-020-17038-2>.

¹⁴ Kate Tully et al., *The Invisible Flood: The Chemistry, Ecology, and Social Implications of Coastal Saltwater Intrusion*, 369-70 (2019), available at <https://academic.oup.com/bioscience/article/69/5/368/5487218>.

¹⁵ UF/IFAS, *Saltwater intrusion and flooding: Risks to South Florida’s agriculture and potential management practices*, <https://edis.ifas.ufl.edu/publication/AE572> (last visited Nov. 16, 2023).

¹⁶ *Id.*; see also Ilias Siarkos et al., *A methodological framework to assess the environmental and economic effects of injection barriers against seawater intrusion*, 1 (2017), available at <https://www.sciencedirect.com/science/article/abs/pii/S030147971730169X>.

¹⁷ *Id.*

¹⁸ U.S. Dep’t of Agriculture, Climate Hubs, *Saltwater Intrusion*, <https://www.climatehubs.usda.gov/taxonomy/term/399> (last visited Nov. 16, 2023).

birds, fish, and the animals that prey on them.¹⁹ Moreover, studies show that salt buildup in the soil increases greenhouse gas emissions, contributing to climate change and global warming.²⁰

Several assessments have been prepared regarding the impact of sea level rise on water resources. For example, the South Florida Water Management District has evaluated saltwater intrusion in the surficial aquifer system of the Big Cypress Basin and southwest Florida²¹ and mapped the saltwater interface in coastal aquifers within St. Lucie, Martin, Palm Beach, Broward, Collier, and Lee counties.²² The U.S. Geological Survey conducts saltwater interface mapping for Miami-Dade and Monroe counties.²³ At least one evaluation of Florida's saltwater intrusion monitoring network has been performed.²⁴ In addition, the Northwest Florida Water Management District has commissioned a report evaluating saltwater intrusion in the Floridan Aquifer in Walton, Okaloosa, and Santa Rosa counties.²⁵

Statewide Resilience Programs

The Legislature has established several statewide resilience programs, including:

- The Resilient Florida Grant Program, which provides grants to counties or municipalities for community resilience planning, including vulnerability assessments, plan development, and projects to adapt critical assets.²⁶ In the programs first two years, 263 implementation projects have been awarded a total of nearly \$954 million.²⁷
- The Comprehensive Statewide Flood Vulnerability and Sea Level Rise Data Set and Assessment.²⁸ In May 2023, DEP published a statewide data set containing an inventory of critical and regionally significant assets (such as transportation, critical infrastructure and emergency facilities), topographical data (including digital elevation models and survey data), and flood scenario data (including data regarding precipitation, land use, and groundwater elevation).²⁹ DEP is also tasked with developing a statewide assessment providing statewide sea level rise projections and information necessary to determine the risks of flooding and sea level rise to inland and coastal communities. DEP must update the

¹⁹ *Id.*

²⁰ UF/IFAS, *Saltwater intrusion and flooding: Risks to South Florida's agriculture and potential management practices*, <https://edis.ifas.ufl.edu/publication/AE572> (last visited Nov. 16, 2023).

²¹ USGS, *Saltwater Intrusion in the Surficial Aquifer System of the Big Cypress Basin, Southwest Florida, and a Proposed Plan for Improved Salinity Monitoring: U.S. Geological Survey Open-File Report 2013-1088* (2013), available at <http://pubs.usgs.gov/of/2013/1088/>.

²² SFWMD, *Saltwater Interface Monitoring and Mapping Program, Technical Publication WS-58*, 1 (2020), available at https://www.sfwmd.gov/sites/default/files/documents/ws-58_swi_mapping_report_final.pdf.

²³ *Id.*

²⁴ Scott T. Prinos, *Saltwater Intrusion Monitoring in Florida*, 79 FLORIDA SCIENTIST 4, 269 (Fall 2016), available at <https://www.jstor.org/stable/44113190>.

²⁵ HydroGeoLogic, Inc., *Saltwater Intrusion in the Floridan Aquifer in Walton, Okaloosa and Santa Rosa Counties, Florida, Eastern Model Domain, Final Report* (Sept. 2007), available at https://nwfwater.com/content/download/19030/127812/2007_09_HGL_R2_ED_model_final.pdf.

²⁶ Section 380.093(2)(a), F.S. "Critical asset" is defined to include broad lists of assets relating to transportation, critical infrastructure, emergency facilities, natural resources, and historical and cultural resources.

²⁷ This figure includes \$270 million of state funding for the Statewide Flooding and Sea Level Resilience Plan. DEP, *Presentation to the Florida Senate Committee on Environment and Natural Resources* (Feb. 23, 2023), available at https://www.flsenate.gov/Committees/Show/SSHR/MeetingPacket/5700/10150_MeetingPacket_5700_2.23.23.pdf.

²⁸ Section 380.093(4), F.S.

²⁹ DEP, *Resilient Florida Program – Statewide Assessment*, <https://floridadep.gov/rcp/resilient-florida-program/content/resilient-florida-program-statewide-assessment> (last visited Nov. 16, 2023).

data set and assessment every five years.³⁰ The statewide assessment and data set must be updated every five years.³¹

- The Statewide Flooding and Sea Level Rise Resilience Plan, which consists of ranked projects that address risks of flooding and sea level rise to coastal and inland communities.³² Examples of projects include construction of living shorelines, seawalls, and pump stations, elevation projects, and infrastructure hardening.³³ Counties, municipalities, water management districts, regional water supply authorities, and other entities may submit to DEP an annual list of proposed projects. In December 2022, DEP submitted the FY 23-24 Statewide Flooding and Sea Level Rise Resilience Plan totaling nearly \$408 million over the next three years.³⁴
- The Florida Flood Hub for Applied Research and Innovation,³⁵ which was established within the University of South Florida College of Marine Science to coordinate efforts between the academic and research institutions of the state.³⁶ The Florida Flood Hub is tasked with, among other things, organizing existing data needs for comprehensive statewide flood vulnerability and sea level rise analyses and performing gap analyses to determine data needs; developing statewide open source hydrologic models for physically based flood frequency estimation and real-time forecasting of flood; establishing community-based programs to improve flood monitoring and prediction along major waterways; and providing tidal and storm surge flooding data to counties and municipalities for vulnerability assessments.³⁷

DEP may also provide funding for regional resilience entities to assist local governments with planning for the resilience needs of communities and coordinating intergovernmental solutions to mitigate adverse impacts of flooding and sea level rise.³⁸ As of February 2023, \$4 million had been appropriated to regional resilience entities to date.³⁹

³⁰ Section 380.093(4), F.S. See also DEP, *Resilient Florida Program – Statewide Assessment*, <https://floridadep.gov/rcp/resilient-florida-program/content/resilient-florida-program-statewide-assessment> (last visited Nov. 16 2023).

³¹ Section 380.093(4)(c), F.S.

³² Section 380.093(5), F.S.

³³ DEP, *2022-2023 Statewide Flooding and Sea Level Rise Resilience Plan*, available at https://floridadep.gov/sites/default/files/FY22.23%20Statewide%20Flooding%20and%20Sea%20Level%20Rise%20Resilience%20Plan_0.pdf; DEP, *2023-2024 Statewide Flooding and Sea Level Rise Resilience Plan*, available at https://www.flgov.com/wp-content/uploads/2023/07/Statewide-Flooding-and-Sea-Level-Rise-Resilience-Plan_Grant-List_07122023.pdf.

³⁴ DEP and Florida Statewide Office of Resilience, *2022 Flood Resilience and Mitigation Efforts Across Florida*, 9, available at https://floridadep.gov/sites/default/files/2022%20Flood%20Resilience%20and%20Mitigation%20Efforts%20Report%20Only_0.pdf; see also DEP, *2023-2024 Statewide Flooding and Sea Level Rise Resilience Plan*, available at https://www.flgov.com/wp-content/uploads/2023/07/Statewide-Flooding-and-Sea-Level-Rise-Resilience-Plan_Grant-List_07122023.pdf.

³⁵ See University of South Florida College of Marine Science, *Florida Flood Hub for Applied Research and Innovation: Overview*, <https://www.usf.edu/marine-science/research/florida-flood-hub-for-applied-research-and-innovation/> (last visited Nov. 16, 2023).

³⁶ Section 380.0933(1), F.S.

³⁷ Section 380.0933(2) and (3), F.S.

³⁸ Section 380.093(6), F.S.

³⁹ DEP, *Presentation to the Florida Senate Committee on Environment and Natural Resources*, 18 (Feb. 23, 2023), available at https://www.flsenate.gov/Committees/Show/SSHR/MeetingPacket/5700/10150_MeetingPacket_5700_2.23.23.pdf.

The Statewide Office of Resilience reviews flood resilience and mitigation activities in the state and coordinating flood resilience and mitigation efforts with federal, state, and local governmental entities and other stakeholders. The office's Chief Resilience Officer and DEP worked together to provide the Governor and Legislature with a report on flood resilience and mitigation efforts across Florida. The report includes:

- A list of local governments that are required to comply with the requirements of s. 163.3178(2)(f), F.S.,⁴⁰ but are not in compliance, as reported by the Department of Economic Opportunity;
- A list of local governments that have completed vulnerability assessments in compliance with the requirements of the Resilient Florida grant program in s. 380.093(3), F.S.;⁴¹
- An overview of the geographic distribution of entities with funded projects in the Statewide Flooding and Sea Level Rise Resilience Plan;⁴² and
- A statewide inventory of basin-level flooding assessments and other related basin-level planning efforts self-reported by water management districts or special districts authorized to submit projects pursuant to s. 380.093(5), F.S.⁴³

⁴⁰ Section 163.3178(2)(f), F.S., requires local coastal governments to include a redevelopment component within their comprehensive plans' coastal management element, which outlines the principles that must be used to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise. *See* DEP and Florida Statewide Office of Resilience, *2022 Flood Resilience and Mitigation Efforts Across Florida*, 2, available at https://floridadep.gov/sites/default/files/2022%20Flood%20Resilience%20and%20Mitigation%20Efforts%20Report%20Only_0.pdf; Letter from Department of Economic Opportunity to DEP, 1-2 (Nov. 9, 2022), available at https://floridadep.gov/DEO_PoF_Letter2022.

⁴¹ DEP and Florida Statewide Office of Resilience, *2022 Flood Resilience and Mitigation Efforts Across Florida*, 3, available at https://floridadep.gov/sites/default/files/2022%20Flood%20Resilience%20and%20Mitigation%20Efforts%20Report%20Only_0.pdf

⁴² *Id.* at 7-9.

⁴³ *Id.* at 10-12.

Coastal Counties

Florida has 35 coastal counties.⁴⁴



The following seven coastal counties have populations less than 50,000 as of April 2022:⁴⁵

- Gulf 15,938
- Franklin 12,729
- Wakulla 35,169
- Jefferson 14,923
- Taylor 21,375
- Dixie 16,988
- Levy 44,288

III. Effect of Proposed Changes:

Section 1 amends the Resilient Florida Grant Program, s. 380.093, F.S., to authorize the Department of Environmental Protection (DEP), beginning July 1, 2025, to provide grants to coastal counties to conduct vulnerability assessments analyzing the effects of saltwater intrusion on their water supplies and the preparedness to respond to such a threat.

⁴⁴ DEP, *Map of Florida’s Coastal Counties*, <https://floridadep.gov/rcp/fcmp/documents/map-floridas-coastal-counties> and <https://floridadep.gov/sites/default/files/CPI-coastal-Florida-map.pdf> (last visited Nov. 16, 2023).

⁴⁵ Office of Economic and Demographic Research, *Florida Population Estimates by County and Municipality as of April 1, 2022*, available at http://edr.state.fl.us/Content/population-demographics/data/2022_Pop_Estimates.pdf (last visited Nov. 16, 2023).

Each vulnerability assessment must include an analysis of all of the following information:

- The coastal county's primary water utilities;
- Current maps of the coastal county's freshwater wellfields and latest saltwater intrusion impact lines;
- Projections of saltwater intrusion over the next decade, including specific wells that may be impacted during that timeframe; and
- The costs necessary to relocate freshwater wellfields that are anticipated to be impacted, including current projects that are underway to relocate the freshwater wellfields.

The bill requires DEP to do all of the following:

- Use the information contained in a coastal county's saltwater intrusion vulnerability assessment to update its Comprehensive Statewide Flood Vulnerability and Sea Level Rise Data Set;
- Make publicly available on DEP's website any appropriate information from a saltwater intrusion vulnerability assessment it receives from coastal counties; and
- Provide 50 percent cost-share funding up to \$250,000 for each grant awarded under this section of the Resilient Florida Grant Program. A coastal county with a population of 50,000 or less is not required to contribute to the cost share.

Section 2 provides that the act will take effect upon becoming a law.

IV. Constitutional Issues:

A. Municipality/County Mandates Restrictions:

None.

B. Public Records/Open Meetings Issues:

None.

C. Trust Funds Restrictions:

None.

D. State Tax or Fee Increases:

None.

V. Fiscal Impact Statement:

A. Tax/Fee Issues:

None.

B. Private Sector Impact:

None.

C. Government Sector Impact:

The Department of Environmental Protection (DEP) may incur costs related to updating its comprehensive statewide flood vulnerability and sea level rise data set with the information provided by counties in their saltwater intrusion vulnerability assessments. DEP may also incur costs related to making such information available to the public on its website.

VI. Technical Deficiencies:

None.

VII. Related Issues:

None.

VIII. Statutes Affected:

This bill substantially amends s. 380.093 of the Florida Statutes.

IX. Additional Information:**A. Committee Substitute – Statement of Changes:**

(Summarizing differences between the Committee Substitute and the prior version of the bill.)

None.

B. Amendments:

None.