

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 734

INTRODUCER: Senator Polsky

SUBJECT: Saltwater Intrusion Vulnerability Assessments

DATE: March 13, 2023

REVISED: _____

	ANALYST	STAFF DIRECTOR	REFERENCE	ACTION
1.	Barriero	Rogers	EN	Pre-meeting
2.			AEG	
3.			AP	

I. Summary:

SB 734 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 counties' preparedness to respond to such threats, including water utility infrastructure, wellfield protection, and freshwater supply management. Each vulnerability assessment must include:

- The county's primary water utilities;
- Maps of the county's freshwater wellfields and latest saltwater intrusion impact lines;
- Projections of saltwater intrusion over the next decade; and
- An analysis of the costs necessary to relocate freshwater wellfields anticipated to be impacted.

The bill requires DEP to use the information from counties' saltwater intrusion vulnerability assessments to update the Comprehensive Statewide Flood Vulnerability and Sea Level Rise Data Set. DEP must also make any appropriate information from the vulnerability assessments available to the public on its website.

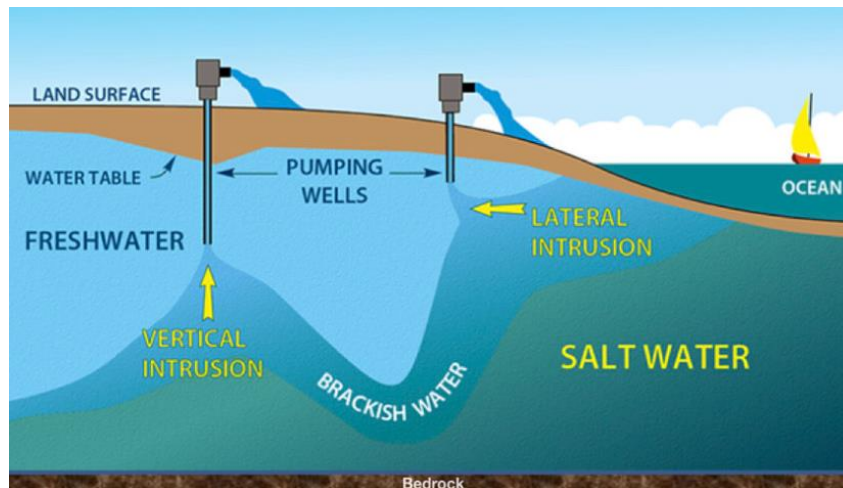
The bill requires DEP to provide 50 percent cost-share funding, up to \$250,000, for each grant awarded. A county with a population of 50,000 or less is not required to contribute to the cost share.

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 Where aquifer layers meet the ocean (referred to as the freshwater/saltwater interface),⁵ there is the risk of saltwater moving inland and polluting the freshwater aquifers.⁶

Under natural conditions, the seaward movement of freshwater prevents seawater from encroaching coastal aquifers.⁷ An interface between freshwater and seawater is maintained with denser seawater underlying freshwater. 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.⁸



¹ See South Florida Water Management District (SFWMD), *Saltwater Intrusion in Coastal Aquifers*, <https://storymaps.arcgis.com/stories/3731671833e34567b783e9b881a8b36e> (last visited Mar. 6, 2023); see also St. Johns River Water Management District (SJRWMD), *Florida's Aquifers*, <https://www.sjrwmd.com/water-supply/aquifer/> (last visited Mar. 6, 2023).

² National Geographic, *Aquifers*, <https://education.nationalgeographic.org/resource/aquifers/> (last visited Mar. 6, 2023).

³ *Id.*

⁴ SJRWMD, *Florida's Aquifers*, <https://www.sjrwmd.com/water-supply/aquifer/> (last visited Mar. 6, 2023).

⁵ *Id.*

⁶ SFWMD, *Saltwater Intrusion in Coastal Aquifers*, <https://storymaps.arcgis.com/stories/3731671833e34567b783e9b881a8b36e> (last visited Mar. 6, 2023).

⁷ U.S. Geological Survey (USGS), *Sustainable Groundwater: Seawater Intrusion*, <https://ca.water.usgs.gov/sustainable-groundwater-management/seawater-intrusion-california.html> (last visited Mar. 6, 2023).

⁸ USGS, *Sustainable Groundwater: Seawater Intrusion*, <https://ca.water.usgs.gov/sustainable-groundwater-management/seawater-intrusion-california.html> (last visited Mar. 6, 2023). 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.

Saltwater intrusion can occur in various ways, including lateral encroachment from coastal waters and vertical movement of saltwater near discharging wells.⁹ It can be caused by drilling wells too deep, excessive groundwater pumping, sea level rise, severe drought, and other factors.¹⁰ 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.¹¹ Rising sea levels also push saltwater upstream in tidal rivers and streams, raise coastal ground water tables, and push saltwater further inland.¹²

Saltwater intrusion is problematic for several reasons. For example, potable water is necessary for drinking, irrigation, and most industrial uses.¹³ When an aquifer is contaminated by saltwater, it must either be treated to remove the salt—a costly process—or another source of freshwater must be found.¹⁴ Public water supply utilities may shut down a well if it becomes too salty.¹⁵ Utilities with wellfields near the freshwater/saltwater interface that do not have an inland wellfield, have not developed alternative water supply sources, and have limited ability during a drought to meet user needs through interconnects with other utilities are considered more vulnerable.¹⁶

Saltwater intrusion can also cause flooding.¹⁷ Because saltwater is denser than freshwater, an aquifer can become stratified with a layer of freshwater on top of a layer of denser saltwater below. When sea level rise acts upon an aquifer like this, it can cause the freshwater layer to rise in response. This can cause flooding as the top of the water, called the water table, gets closer to ground surface.¹⁸

In addition, saltwater intrusion can cause a decline in forest and agricultural 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

⁹ USGS, *Saltwater Intrusion*, <https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion> (last visited Mar. 6, 2023).

¹⁰ University of Pennsylvania, The Water Center, *Salt Intrusion: A Threat to Source Water Quality*, <https://watercenter.sas.upenn.edu/salt-intrusion-a-threat-to-source-water-quality/> (last visited Mar. 6, 2023); USGS, *Saltwater Intrusion*, <https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion> (last visited Mar. 6, 2023); SJRWMD, *Florida’s Aquifers*, <https://www.sjrwmd.com/water-supply/aquifer/> (last visited Mar. 6, 2023).

¹¹ SFWMD, *Saltwater Intrusion in Coastal Aquifers*, <https://storymaps.arcgis.com/stories/3731671833e34567b783e9b881a8b36e> (last visited Mar. 6, 2023).

¹² 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.

¹³ *Id.*; see also Scott Jasechko et al., *Groundwater Level Observations in 250,000 Coastal US Wells Reveal Scope of Potential Seawater Intrusion*, 11 NATURE COMMUNICATIONS 3229 (2020), available at <https://www.nature.com/articles/s41467-020-17038-2>.

¹⁴ SFWMD, *Saltwater Intrusion in Coastal Aquifers*, <https://storymaps.arcgis.com/stories/3731671833e34567b783e9b881a8b36e> (last visited Mar. 6, 2023).

¹⁵ *Id.*; USGS, *Saltwater Intrusion*, <https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion> (last visited Mar. 6, 2023).

¹⁶ SFWMD, *Saltwater Intrusion in Coastal Aquifers*, <https://storymaps.arcgis.com/stories/3731671833e34567b783e9b881a8b36e> (last visited Mar. 6, 2023).

¹⁷ *Id.*

¹⁸ *Id.*

with only standing dead trees.¹⁹ 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 birds, fish, and the animals that prey on them.²⁰

Coastal counties with the following characteristics are particularly susceptible to lateral saltwater intrusion:²¹

- Proximity to the ocean, inlets, and lagoons;
- A large number of coastal wellfields;
- Low land surface elevations (less than 10 feet above mean sea level);
- Drainage canals that lower the water table, reducing the water pressure exerted against the saltwater interface;
- Canals without coastal water control structures to inhibit inland movement of seawater;
- Rising sea levels.²²

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 Florida²³ and mapped the saltwater interface in coastal aquifers within St. Lucie, Martin, Palm Beach, Broward, Collier, and Lee counties.²⁴ The U.S. Geological Survey conducts saltwater interface mapping for Miami-Dade and Monroe counties.²⁵ At least one evaluation of Florida's saltwater intrusion monitoring network has been performed.²⁶ The Northwest Florida Water Management District has commissioned a report evaluating saltwater intrusion in the Floridan Aquifer in Walton, Okaloosa, and Santa Rosa counties.²⁷

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

¹⁹ U.S. Dep't of Agriculture, Climate Hubs, *Saltwater Intrusion*, <https://www.climatehubs.usda.gov/taxonomy/term/399> (last visited Mar. 6, 2023).

²⁰ *Id.*

²¹ See SFWMD, *Saltwater Intrusion in Coastal Aquifers*, <https://storymaps.arcgis.com/stories/3731671833e34567b783e9b881a8b36e> (last visited Mar. 6, 2023).

²² *Id.*

²³ 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/> (last visited Mar. 6, 2023).

²⁴ 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 (last visited Mar. 6, 2023).

²⁵ *Id.*

²⁶ Scott T. Prinos, *Saltwater Intrusion Monitoring in Florida*, 79 FLORIDA SCIENTIST 4, 269 (Fall 2016), available at <https://www.jstor.org/stable/44113190>.

²⁷ 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 (Mar. 6, 2023).

projects to adapt critical assets.²⁸ In the programs first two years, 263 implementation projects have been awarded a total of nearly \$954 million.²⁹

- The Comprehensive Statewide Flood Vulnerability and Sea Level Rise Data Set and Assessment.³⁰ By July 1, 2023, DEP must develop a data set providing statewide sea level rise projections and information necessary to determine the risks of flooding and sea level rise to inland and coastal communities. By July 1, 2024, DEP must develop a statewide assessment (using the statewide data set) identifying vulnerable infrastructure, geographic areas, and communities. The statewide assessment must include an inventory of critical assets and 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. Each project must have a minimum 50 percent cost share, unless the project assists or is within a financially disadvantaged community.³⁴ DEP ranks the projects using a four-tier scoring system.³⁵ DEP has adopted rules to implement s. 380.093, F.S., relating to the Statewide Flooding and Sea Level Rise Resilience Plan and project submittal requirements. These rules can be found in chapter 62S-8 of the Florida Administrative Code.³⁶ 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.³⁷
- The Florida Flood Hub for Applied Research and Innovation,³⁸ 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.³⁹ The Florida Flood Hub is tasked with, among other things, organizing existing data needs for comprehensive statewide flood

²⁸ 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.

²⁹ 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.

³⁰ Section 380.093(4), F.S.

³¹ *Id.* See also DEP, *Resilient Florida Program – Statewide Assessment*, <https://floridadep.gov/rcp/resilient-florida-program/content/resilient-florida-program-statewide-assessment> (last visited Mar. 7, 2023).

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.

³⁴ Section 380.093(5)(e), F.S. A financially disadvantaged small community is a municipality with a population of 10,000 or fewer, or a county with a population of 50,000 or fewer, where the per capita annual income is less than the state’s per capita annual income. *Id.*

³⁵ Section 380.093(5)(h), F.S.

³⁶ Fla. Admin. Code Chapter 62S-8, available at https://floridadep.gov/sites/default/files/Final%20Rule%20Language_0.pdf.

³⁷ 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

³⁸ 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 Mar. 7, 2023).

³⁹ Section 380.0933(1), F.S.

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.⁴⁰

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.⁴¹ To date, \$4 million has been appropriated to regional resilience entities.⁴²

In 2022, the Statewide Office of Resilience was created within the Executive Office of the Governor for the purpose of reviewing all 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.,⁴³ 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.;⁴⁴
- An overview of the geographic distribution of entities with funded projects in the Statewide Flooding and Sea Level Rise Resilience Plan;⁴⁵ 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.⁴⁶

⁴⁰ Section 380.0933(2) and (3), F.S.

⁴¹ Section 380.093(6), F.S.

⁴² 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.

⁴³ 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.

⁴⁴ 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

⁴⁵ *Id.* at 7-9.

⁴⁶ *Id.* at 10-12.

Coastal Counties

Florida has 35 coastal counties.⁴⁷



The following seven coastal counties have populations less than 50,000 as of April 2022:⁴⁸

- 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, 2024, to provide grants to coastal counties to conduct vulnerability assessments analyzing the effects of saltwater intrusion on their water supplies and preparedness to respond to such threats, including water utility infrastructure, wellfield protection, and freshwater supply management.

⁴⁷ 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 Mar. 6, 2023).

⁴⁸ 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 Mar. 6, 2023).

Each vulnerability assessment must include all of the following information:

- The county's primary water utilities;
- Current maps of the 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
- An analysis of 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 use the information from the vulnerability assessments to update its Comprehensive Statewide Flood Vulnerability and Sea Level Rise Data Set. DEP must also make any appropriate information from the assessment available to the public on its website.

The bill also requires DEP to provide 50 percent cost-share funding, up to \$250,000, for each grant awarded under this section of the Resilient Florida Grant Program. A 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.