

HOUSE OF REPRESENTATIVES STAFF ANALYSIS

BILL #: HB 1157 Florida Land Subsidence Research Initiative

SPONSOR(S): Ingoglia

TIED BILLS: **IDEN./SIM. BILLS:** SB 1284

| REFERENCE | ACTION | ANALYST | STAFF DIRECTOR or BUDGET/POLICY CHIEF |
|---|-----------|---------|--|
| 1) Agriculture & Natural Resources Subcommittee | 13 Y, 0 N | Melkun | Moore |
| 2) Appropriations Committee | | | |
| 3) Education Committee | | | |

SUMMARY ANALYSIS

Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to the movement of underground material. Land subsidence is most often caused by the removal of water, oil, natural gas, or mineral resources from the ground, but it can also occur as a result of natural occurrences such as earthquakes, soil compaction, erosion, and sinkhole formation. Land subsidence is a global problem and, in the United States, more than 17,000 square miles in 45 states have been directly affected by land subsidence.

The bill creates the Florida Land Subsidence Research Initiative (Initiative) as a partnership between the Department of Environmental Protection (DEP) and Florida International University (FIU). The goal of the Initiative is to collect and analyze data using geodetic techniques and to understand natural hazards and the relationship of such hazards to sea-level rise measurements. The bill requires FIU to collaborate with other state universities to implement the Initiative statewide.

The bill requires FIU, beginning July 1, 2022, to submit a biennial report to the Governor and the Legislature providing an update on the progress of the research and a summary and analysis of the data.

The bill further requires FIU, in coordination with the contributing state universities, to submit a final report to the Governor and the Legislature by July 1, 2030. The report must include the assessment methodologies for data collection used by each university; a summary of the data collected by each university; an analysis, using all relevant data, of the trends in land subsidence in the state; and an estimation of current and future sea-level risks, including land subsidence and other natural hazards such as coastal flooding and sinkholes.

The bill may have an insignificant negative fiscal impact on state government.

FULL ANALYSIS

I. SUBSTANTIVE ANALYSIS

A. EFFECT OF PROPOSED CHANGES:

Background

Sea-Level Rise and Coastal Flooding

With 1,350 miles of coastline and relatively low elevations, Florida is particularly vulnerable to coastal flooding.¹ One of the primary ways that climate change influences coastal flooding is through sea-level rise.² Sea-level rise is an observed increase in the average local sea level or global sea level trend.³

The two major causes of global sea-level rise are thermal expansion caused by the warming of the oceans and the loss of land-based ice due to melting.⁴ Since 1880, the average global sea level has risen approximately eight to nine inches, and the rate of global sea-level rise has been accelerating.⁵ The National Oceanic and Atmospheric Administration (NOAA) utilizes tide gauges to measure changes in sea level and provides data on local sea-level rise trends.⁶ Analysis of this data shows that some low-lying areas in the southeastern United States (U.S.) experience higher local rates of sea-level rise than the global average.⁷

Florida's coastal communities are experiencing high-tide flooding events with increasing frequency because sea-level rise increases the height of high tides.⁸ In the U.S., sea-level rise and flooding threaten an estimated \$1 trillion in coastal real estate value, and analysts estimate that Florida could lose more than \$300 billion in property value by 2100.⁹ Sea-level rise further affects the salinity of both surface water and groundwater through saltwater intrusion, posing a risk particularly for shallow coastal aquifers.¹⁰ Sea-level rise also pushes saltwater further upstream in tidal rivers and streams, raises coastal groundwater tables, and pushes saltwater further inland at the margins of coastal wetlands.¹¹

Storm surge intensity and the intensity and precipitation rates of hurricanes are generally projected to increase,¹² and higher sea levels will cause storm surges to travel farther inland and impact more properties than in the past.¹³ Stronger storms and sea-level rise are likely to lead to increased coastal erosion.¹⁴

¹ Florida Division of Emergency Management, *Enhanced State Hazard Mitigation Plan, State of Florida* [hereinafter "SHMP"] (2018), 107-108, 162, available at https://www.floridadisaster.org/globalassets/dem/mitigation/mitigate-fl--shmp/shmp-2018-full_final_approved.6.11.2018.pdf (last visited Jan. 13, 2020). This measurement of Florida's coastline increases to over 8,000 miles when considering the intricacies of Florida's coastline, including bays, inlets, and waterways.

² *Id.* at 107.

³ DEP, *Florida Adaptation Planning Guidebook: Glossary* [hereinafter "DEP Guidebook"] (2018), available at <https://floridadep.gov/sites/default/files/AdaptationPlanningGuidebook.pdf> (last visited Jan. 13, 2020).

⁴ National Aeronautics and Space Administration (NASA), *Facts: Sea Level*, available at <https://climate.nasa.gov/vital-signs/sea-level/> (last visited Jan. 13, 2020).

⁵ U.S. Global Change Research Program, *Fourth National Climate Assessment* [hereinafter "NCA4"] (2018), 757, available at https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf (last visited Jan. 13, 2020).

⁶ NOAA, *What is a Tide Gauge?*, available at <https://oceanservice.noaa.gov/facts/tide-gauge.html> (last visited Jan. 13, 2020); NOAA, Tides and Currents, *Sea Level Trends*, available at <https://tidesandcurrents.noaa.gov/sltrends/> (last visited Jan. 13, 2020).

⁷ NCA4 at 757.

⁸ SHMP at 108, 101; NOAA, *High-Tide Flooding*, available at <https://toolkit.climate.gov/topics/coastal-flood-risk/shallow-coastal-flooding-nuisance-flooding> (last visited Jan. 13, 2020).

⁹ NCA4 at 324, 758.

¹⁰ SHMP at 106.

¹¹ *Id.* at 108.

¹² SHMP at 106, 141; NCA4 at 95, 97, 116-117, 1482.

¹³ NCA4 at 758; SHMP at 107.

¹⁴ NCA4 at 331, 340-341, 833, 1054, 1495; SHMP at 108, 221.

Land Subsidence

Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to the movement of underground material.¹⁵ Land subsidence is most often caused by the removal of water, oil, natural gas, or mineral resources from the ground, but it can also occur as a result of natural occurrences such as earthquakes, soil compaction, erosion, and sinkhole formation.¹⁶ Land subsidence is a global problem and, in the U.S., more than 17,000 square miles in 45 states have been directly affected by land subsidence.¹⁷

The occurrence of land subsidence is typically gradual and widespread and, as a result, difficult to measure. The detection of regional-scale subsidence has historically occurred with the identified movement of key benchmarks over long periods of time; however, with the advancement of global positioning system (GPS) technologies, the U.S. Geological Survey (USGS) has relied on Interferometric Synthetic Aperture Radar (InSAR) to detect smaller and more subtle changes in the Earth's surface.¹⁸ InSAR is a geodetic¹⁹ technique for mapping ground deformation using radar images of the Earth's surface that are collected from orbiting satellites. InSAR greatly extends the ability of scientists to monitor land movement because, unlike other techniques that rely on measurements at a few points, InSAR produces a map of ground deformation that covers a very large spatial area with centimeter-scale accuracy. Once land subsidence is identified and mapped, assessments of the InSAR data can be done to aid in the determination of the cause and how it may be mitigated.

Land Subsidence Incident Reporting

The Florida Geological Survey (FGS) within the Department of Environmental Protection (DEP) maintains a database of voluntarily reported land subsidence incidents statewide.²⁰ Currently, a majority of the records come from the State Watch Office,²¹ which is the clearinghouse for emergency response calls involving man-made and natural disasters. Data is also received from citizens who report subsidence incidents to FGS by phone or using FGS's Subsidence Incident Report Form.²² According to DEP's website, the majority of the incidents have not been field-checked and the cause of subsidence is not verified.²³

Effect of the Bill

The bill creates the Florida Land Subsidence Research Initiative (Initiative) as a partnership between DEP and Florida International University (FIU). The goal of the Initiative is to collect and analyze data using geodetic techniques, including, but not limited to, GPS and other satellite approaches, to understand natural hazards and the relationship of such hazards to sea-level rise measurements.

The bill requires DEP to contract with FIU, which must collaborate with Florida State University, the University of Florida, the University of North Florida, and the University of South Florida, to implement the Initiative. FIU must develop specifications for the collection and reporting of data by the other

¹⁵ USGS, *Land Subsidence*, available at https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects (last visited Jan. 15, 2020).

¹⁶ National Ocean Service, *What is subsidence?*, available at <https://oceanservice.noaa.gov/facts/subsidence.html> (last visited Jan. 14, 2020).

¹⁷ U.S. Geological Survey (USGS), *USGS Groundwater Information: Land Subsidence*, available at <https://water.usgs.gov/ogw/subsidence.html> (last visited Jan. 13, 2020).

¹⁸ USGS, *Land Subsidence*, available at https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects (last visited Jan. 15, 2020).

¹⁹ "Geodesy" means the science of accurately measuring and understanding the Earth's geometric shape, orientation in space, and gravitational field as well as the changes of these properties with time. National Ocean Service, *What is Geodesy?*, available at <https://oceanservice.noaa.gov/facts/geodesy.html> (last visited Jan. 15, 2020).

²⁰ DEP, *MapDirect: Subsidence Incident Reports Map*, available at <https://ca.dep.state.fl.us/mapdirect/?focus=fgssinkholes> (last visited Jan. 15, 2020).

²¹ The State Watch Office is a part of the Division of Emergency Management and monitors all hazards that impact or have the potential to impact the residents of Florida. Division of Emergency Management, *Operations: State Watch Office*, available at <https://floridadisaster.org/dem/response/operations/> (last visited Jan. 15, 2020).

²² DEP, *Subsidence Incident Reports*, available at <https://floridadep.gov/fgs/sinkholes/content/subsidence-incident-reports> (last visited Jan. 15, 2020).

²³ *Id.*

participating universities, and FIU must allocate a portion of the funds for the Initiative to facilitate participation with the other state universities to assist in implementing the Initiative statewide.

The bill requires FIU, beginning July 1, 2022, to submit a biennial report to the Governor and the Legislature providing an update on the progress of the research and a summary and analysis of the data collected by each state university.

The bill requires FIU, in coordination with the contributing state universities, to submit a final report to the Governor and the Legislature by July 1, 2030. The bill requires the report to include the assessment methodologies for data collection used by each university; a summary of the data collected by each university; an analysis, using all relevant data, of the trends in land subsidence in the state; and an estimation of current and future sea-level risks, including land subsidence and other natural hazards such as coastal flooding and sinkholes.

B. SECTION DIRECTORY:

Section 1. Creates s. 380.29, F.S., to establish the Florida Land Subsidence Research Initiative.

Section 2. Provides an effective date of July 1, 2020.

II. FISCAL ANALYSIS & ECONOMIC IMPACT STATEMENT

A. FISCAL IMPACT ON STATE GOVERNMENT:

1. Revenues:

None.

2. Expenditures:

The bill may have an insignificant negative fiscal impact on DEP because the bill requires DEP to contract with and allocate appropriated funds to FIU. The bill requires FIU to develop the Initiative and provide funding to other state universities; however, such requirements appear to be subject to appropriation.

B. FISCAL IMPACT ON LOCAL GOVERNMENTS:

1. Revenues:

None.

2. Expenditures:

None.

C. DIRECT ECONOMIC IMPACT ON PRIVATE SECTOR:

None.

D. FISCAL COMMENTS:

None.

III. COMMENTS

A. CONSTITUTIONAL ISSUES:

1. Applicability of Municipality/County Mandates Provision:

Not applicable. This bill does not appear to affect county or municipal governments.

2. Other:

None.

B. RULE-MAKING AUTHORITY:

None.

C. DRAFTING ISSUES OR OTHER COMMENTS:

None.

IV. AMENDMENTS/ COMMITTEE SUBSTITUTE CHANGES

None.