



The Geology of Lake Jackson

Wakulla Springs Alliance

July 23, 2021



Guy “Harley” Means
Acting Director and State Geologist
Florida Department of Environmental Protection
Florida Geological Survey





The Florida Platform

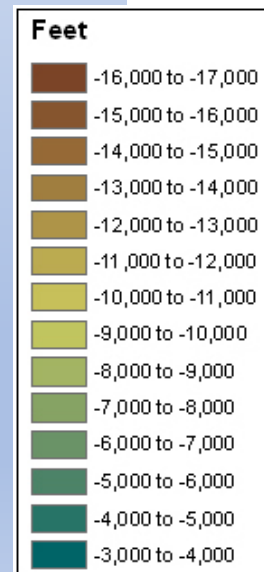




Florida's limestone foundation

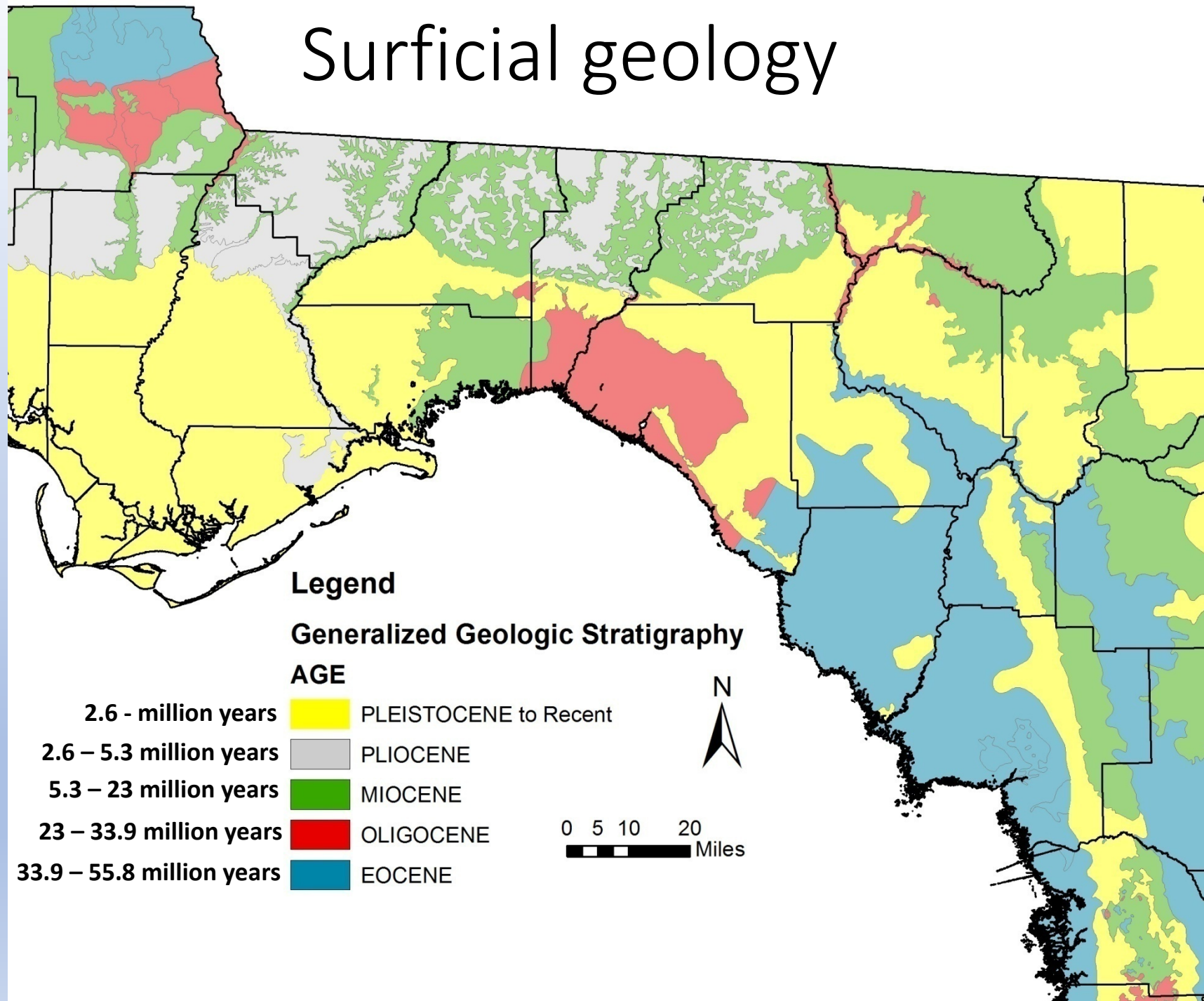
- Florida's limestone deposits accumulated over millions of years.
- Limestone thickness is variable across the state with the thickest deposits being in west and south Florida.

Depth to basement rocks





Surficial geology

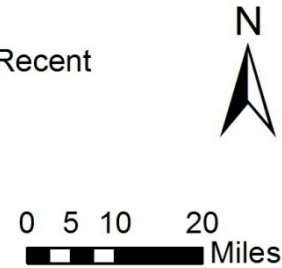


Legend

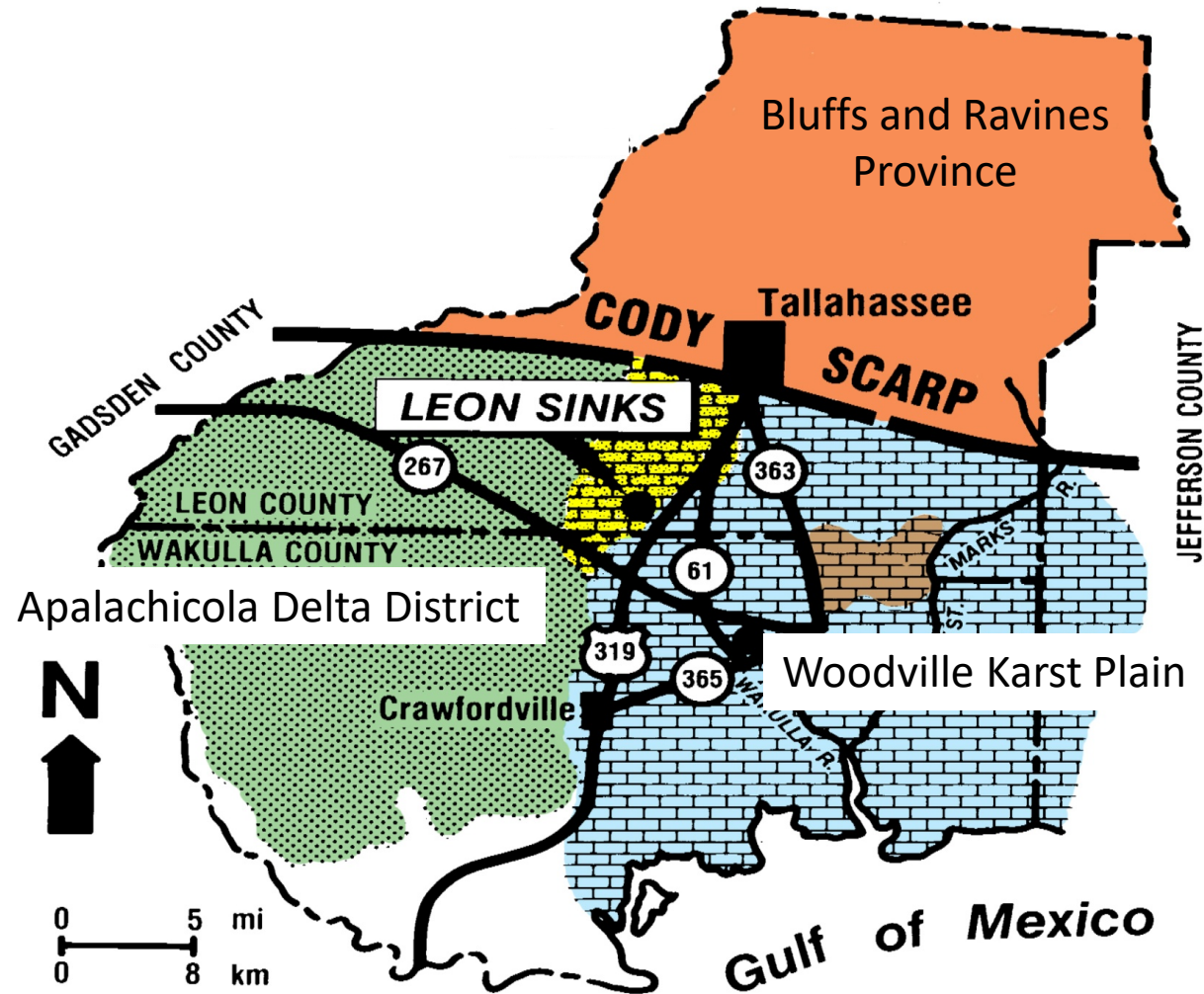
Generalized Geologic Stratigraphy

AGE

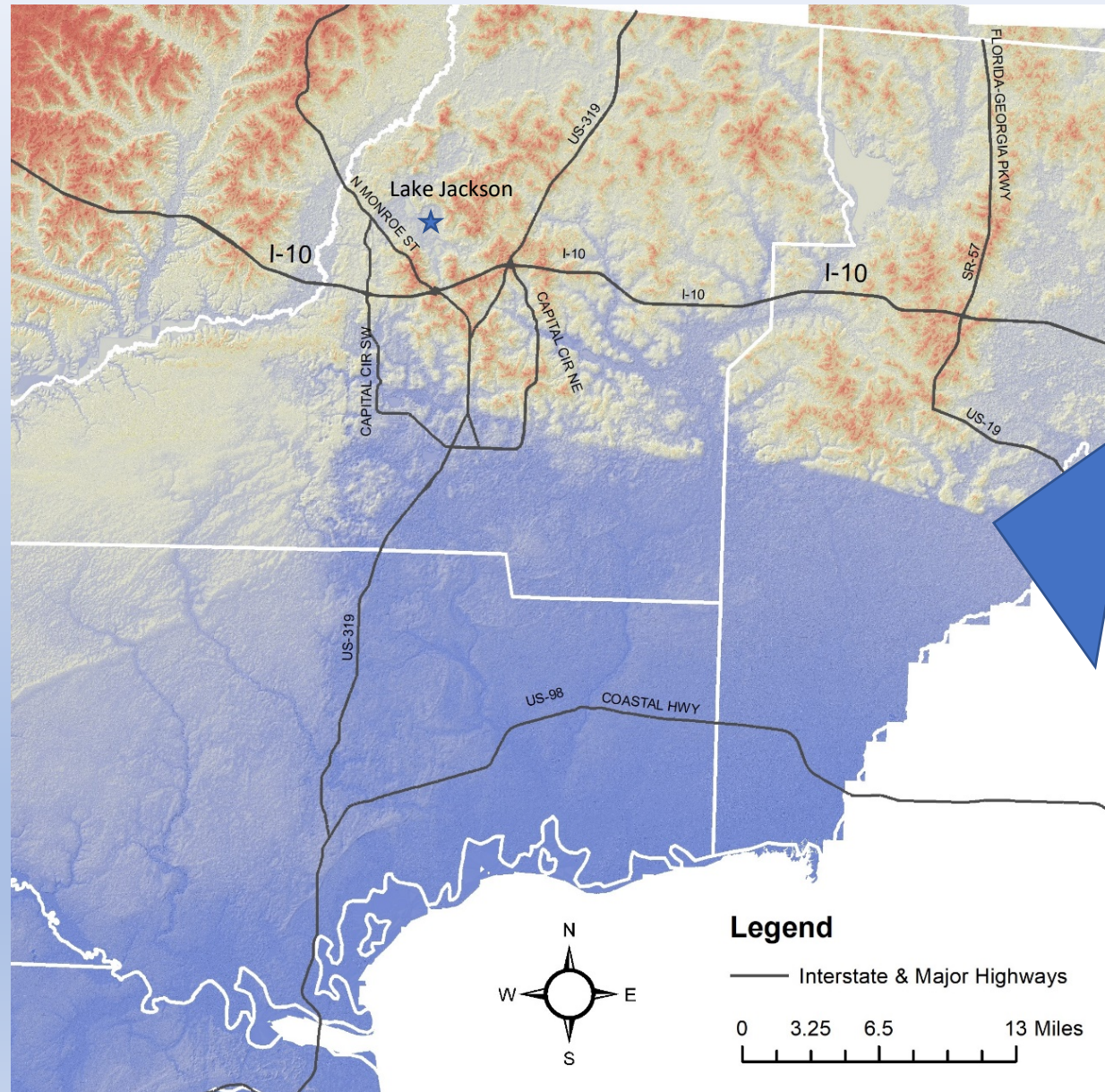
| | | |
|---------------------------|------------|-----------------------|
| 2.6 - million years | Yellow | PLEISTOCENE to Recent |
| 2.6 – 5.3 million years | Light Gray | PLIOCENE |
| 5.3 – 23 million years | Green | MIOCENE |
| 23 – 33.9 million years | Red | OLIGOCENE |
| 33.9 – 55.8 million years | Blue | EOCENE |



Geomorphology



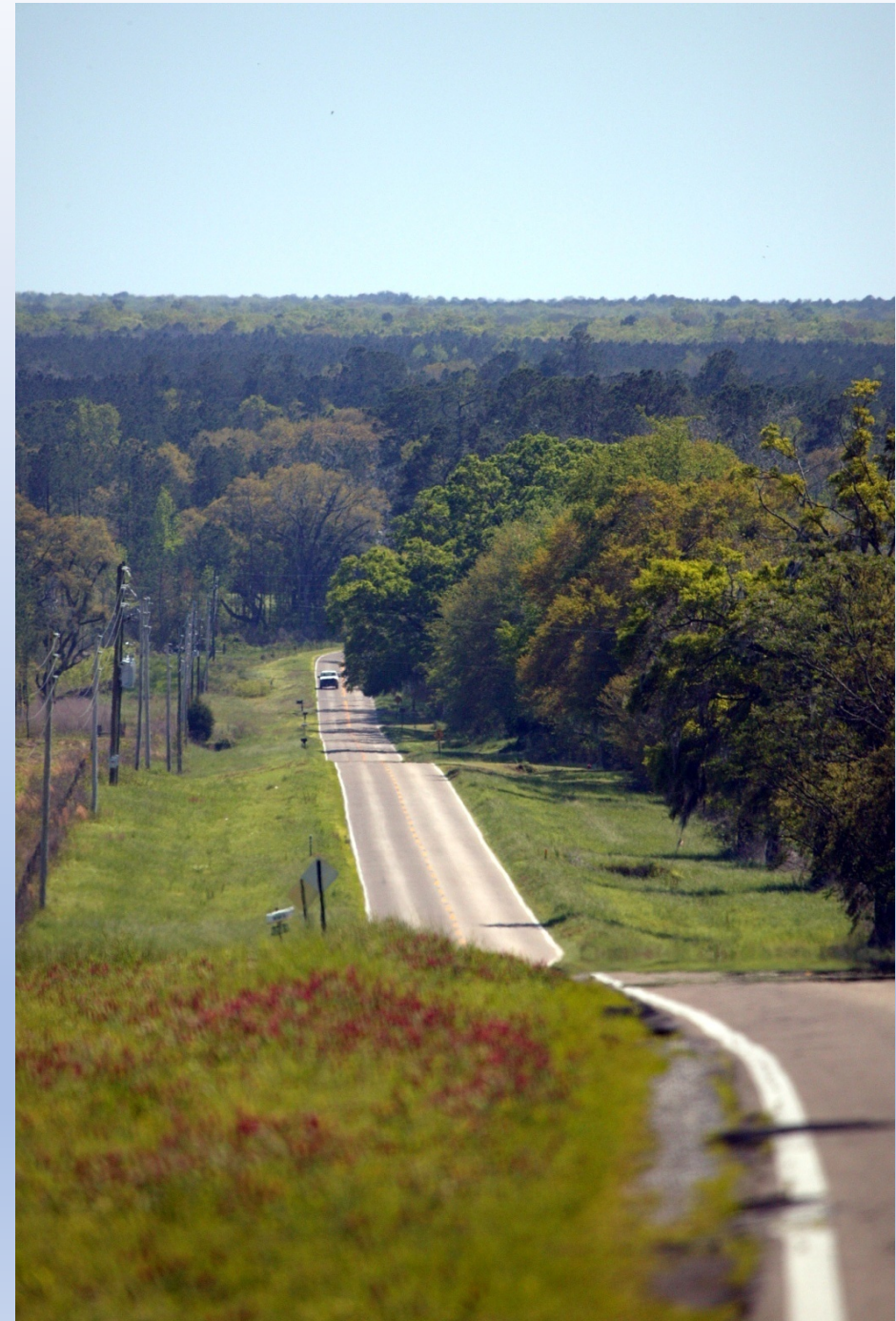
Geomorphology





Cody Scarp

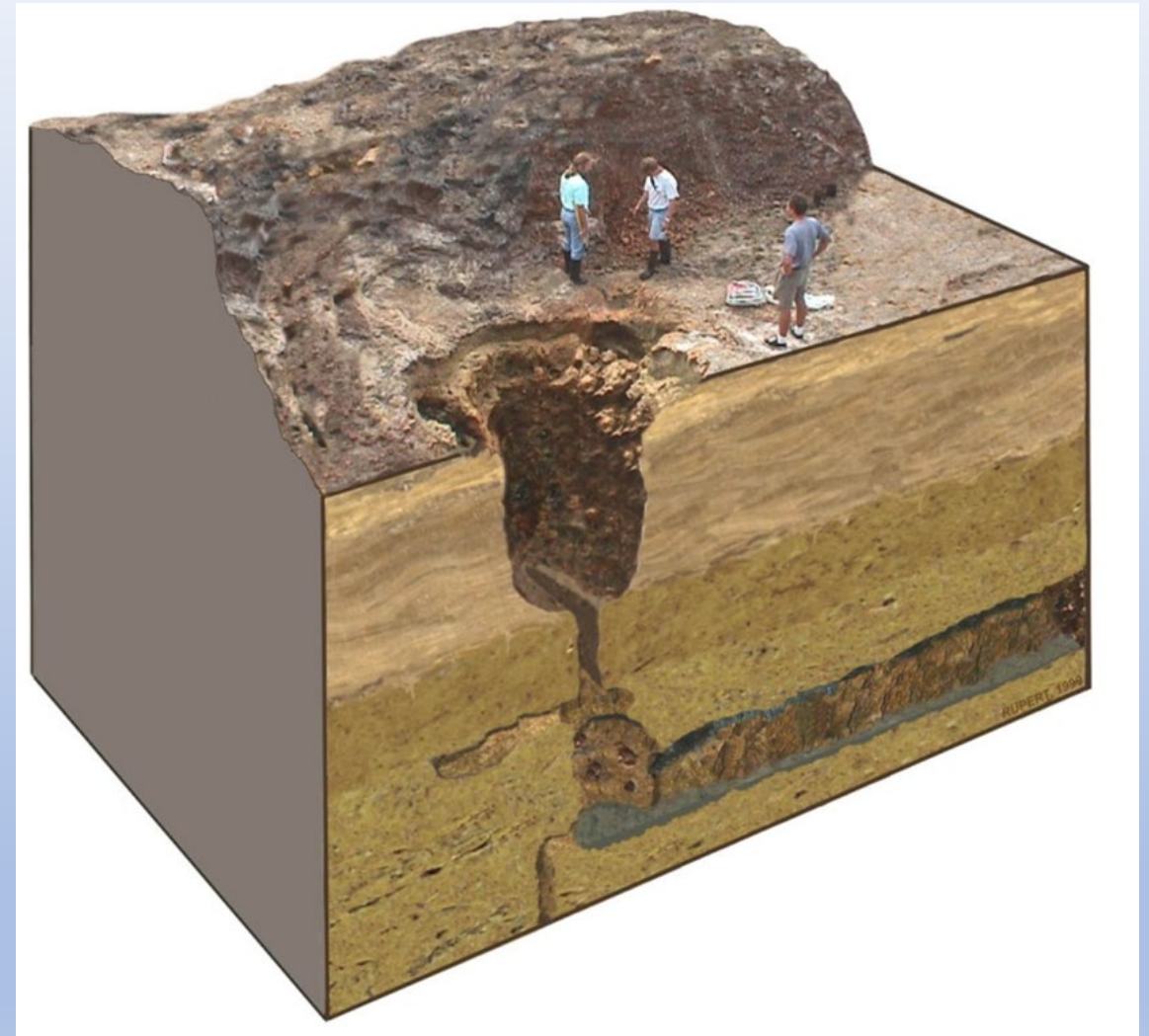
Erosional escarpment that divides the clayey sands of the Tallahassee Hills Province from the flat Woodville Karst Plain Province.





What is karst?

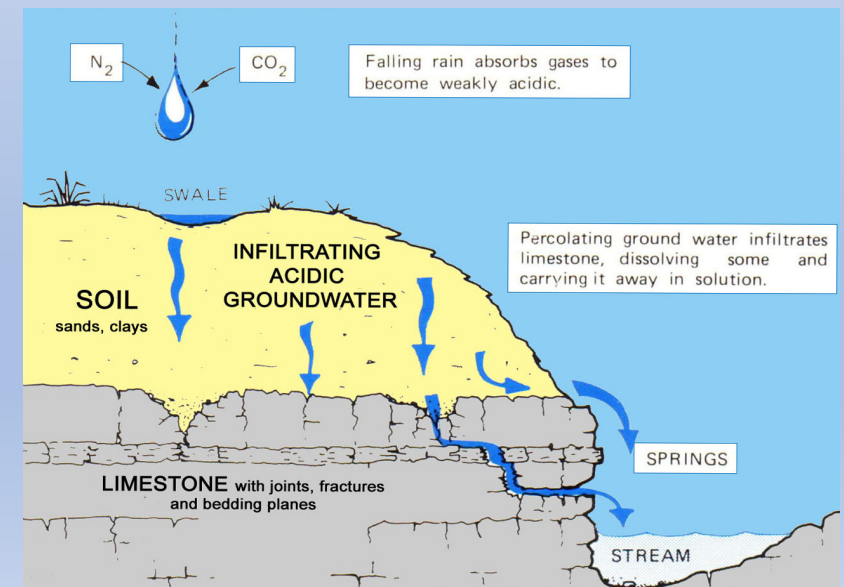
Karst – a type of topography that is formed on limestone, gypsum and other rocks by dissolution, and that is characterized by sinkholes, caves and underground drainage (Bates and Jackson, 1987).





How does karst topography form?

- As rainwater falls through the atmosphere, it picks up carbon dioxide and becomes slightly acidic.
- The slightly acidic rainwater becomes more acidic as it moves through soil.
- Limestone, which underlies all of Florida, is dissolved by the acidic water. This creates pore space which includes cavities, caves and conduits.
- The overlying sediment can collapse into the limestone voids creating sinkholes and karst topography.





How does the acidic water get into the underlying carbonate rocks?





Carbonate rocks (like limestone) are porous and permeable





Void spaces in limestone are interconnected



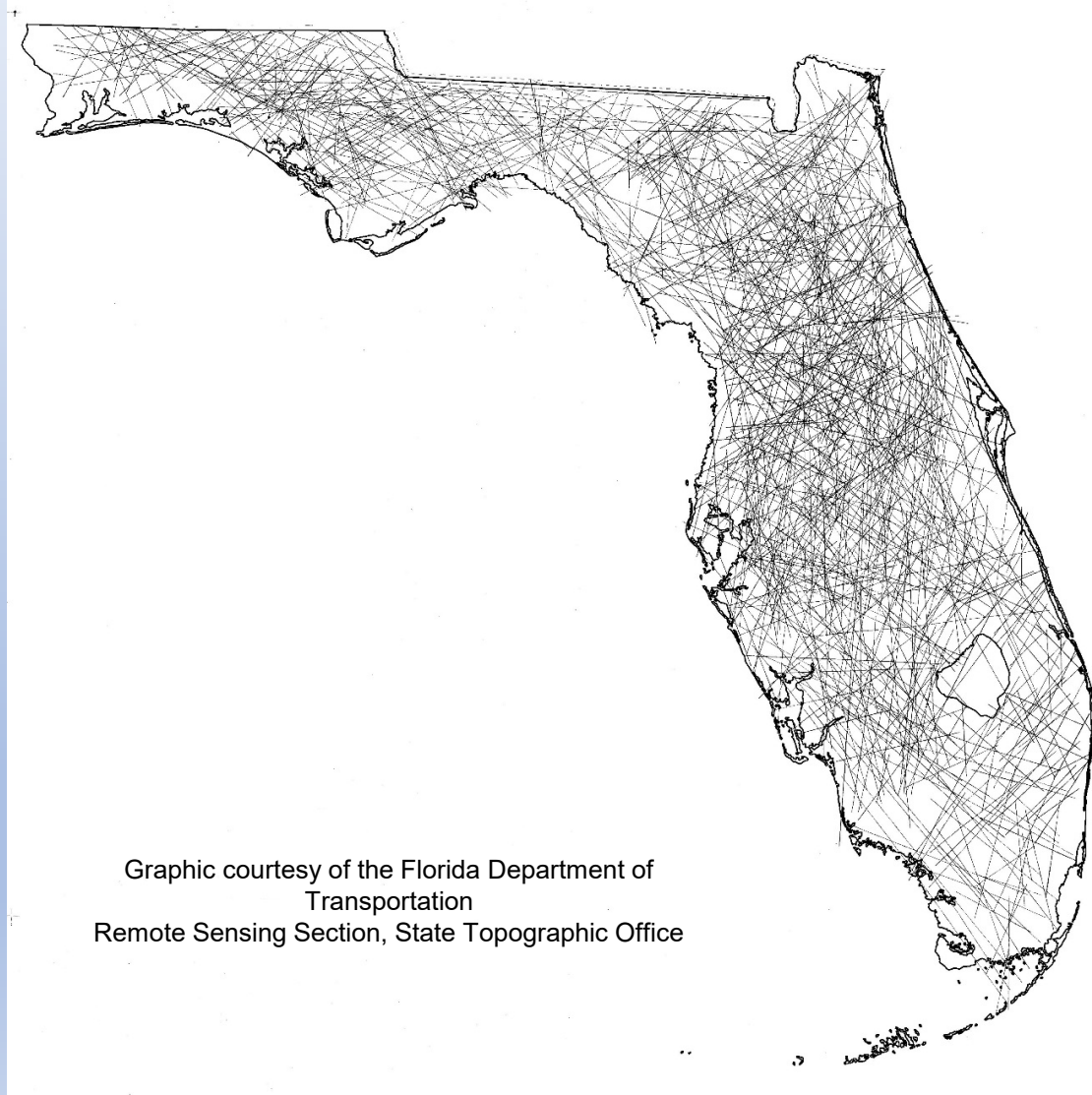


Limestone is brittle and can fracture





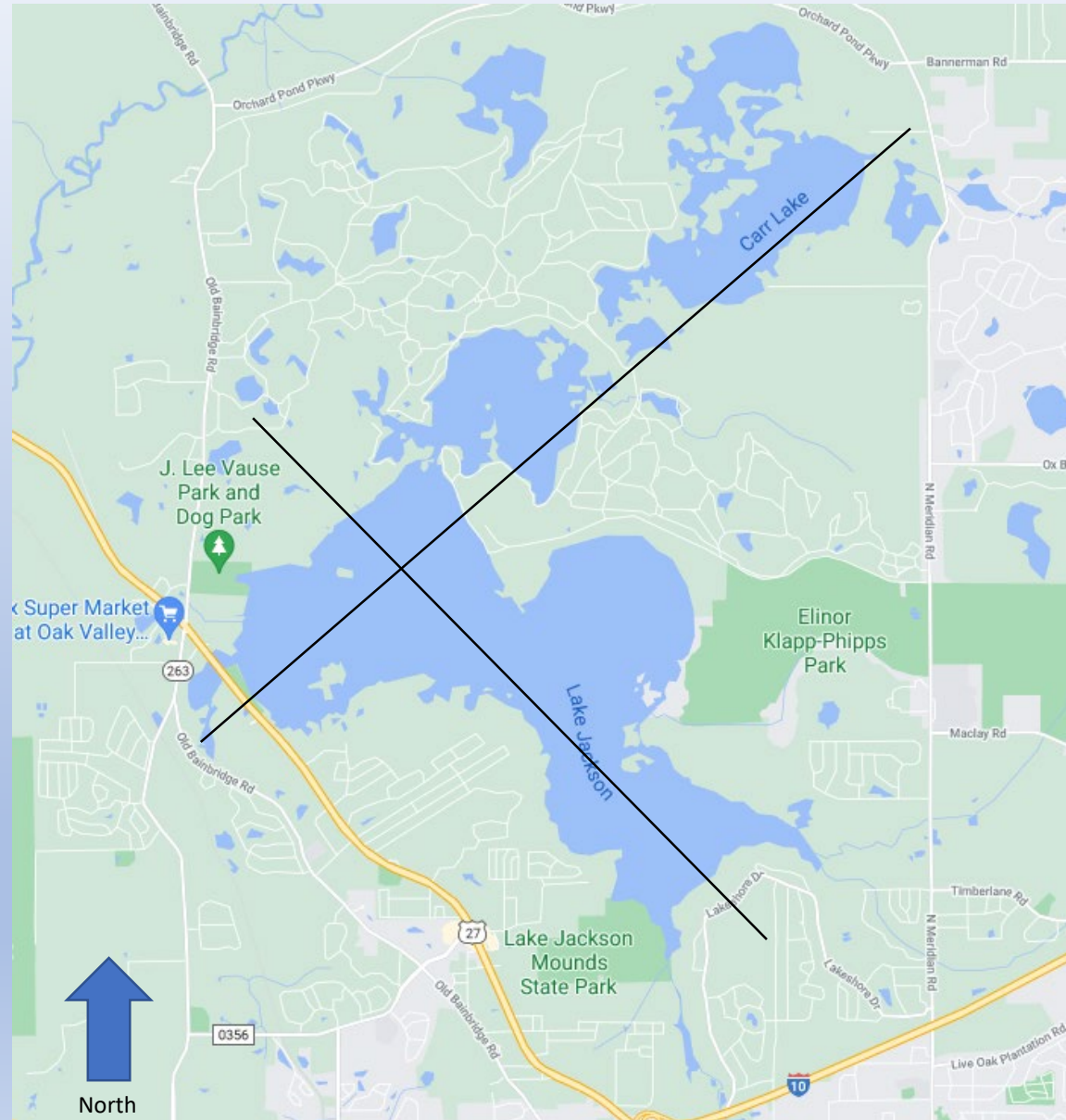
Fracture pattern in Florida based on lineament analysis



Graphic courtesy of the Florida Department of
Transportation
Remote Sensing Section, State Topographic Office



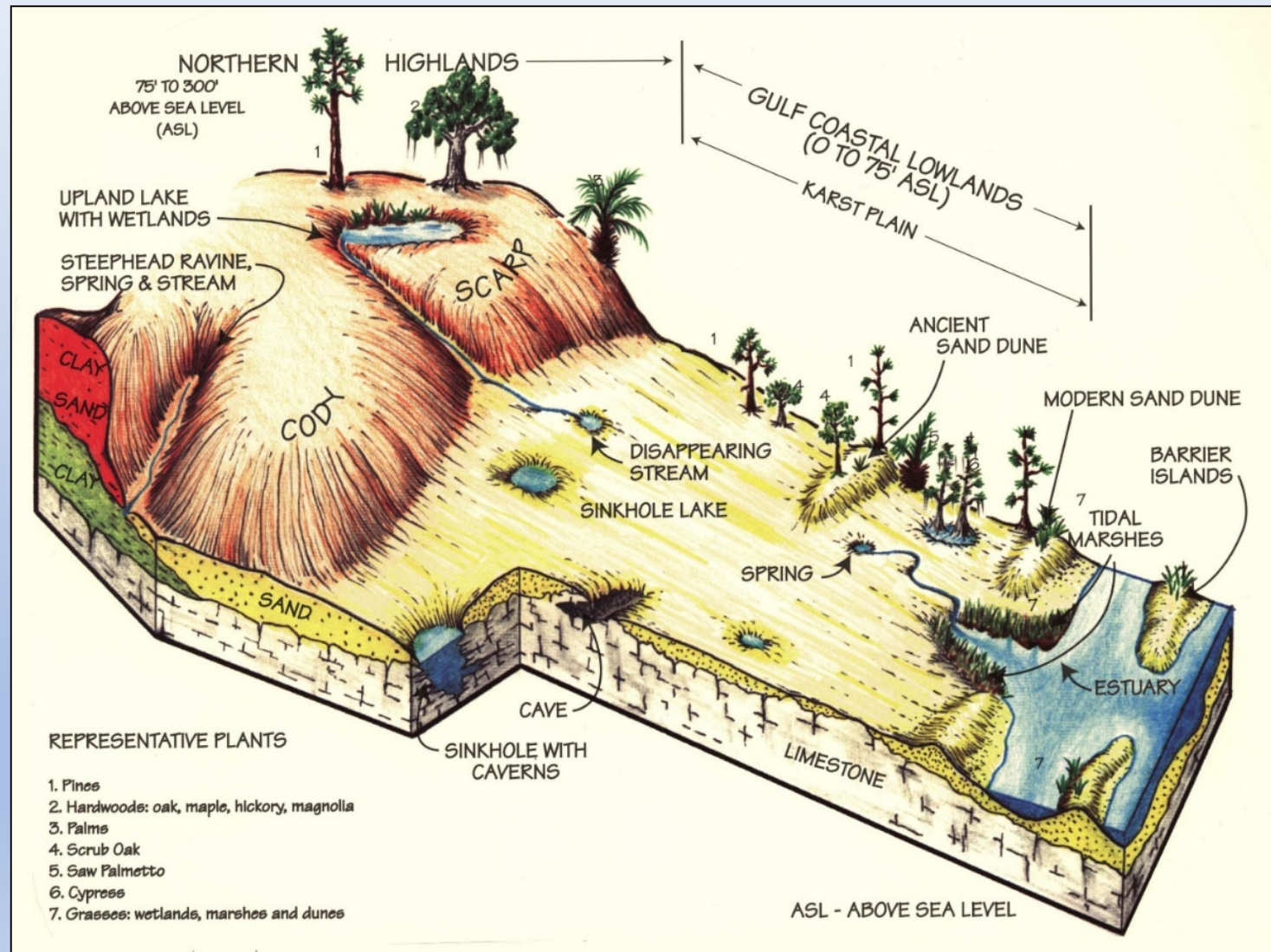
Lake Jackson linear patterns





Karst features in our area

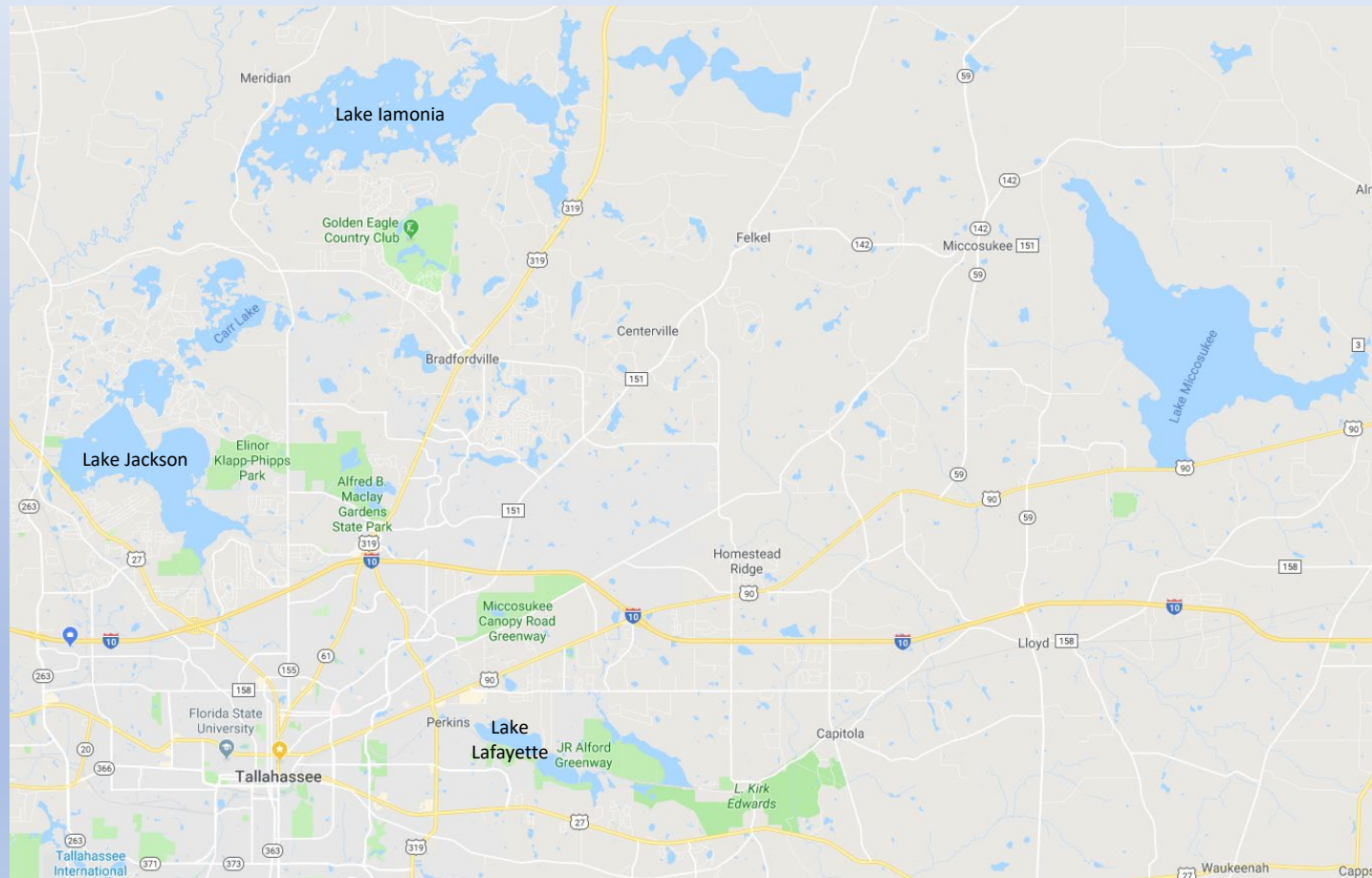
- Sinkholes
- Swallets
- Uvalas
- Springs
- Caves (both air and water filled)
- Karst lakes (Lake Jackson)





Large karst lakes in the area

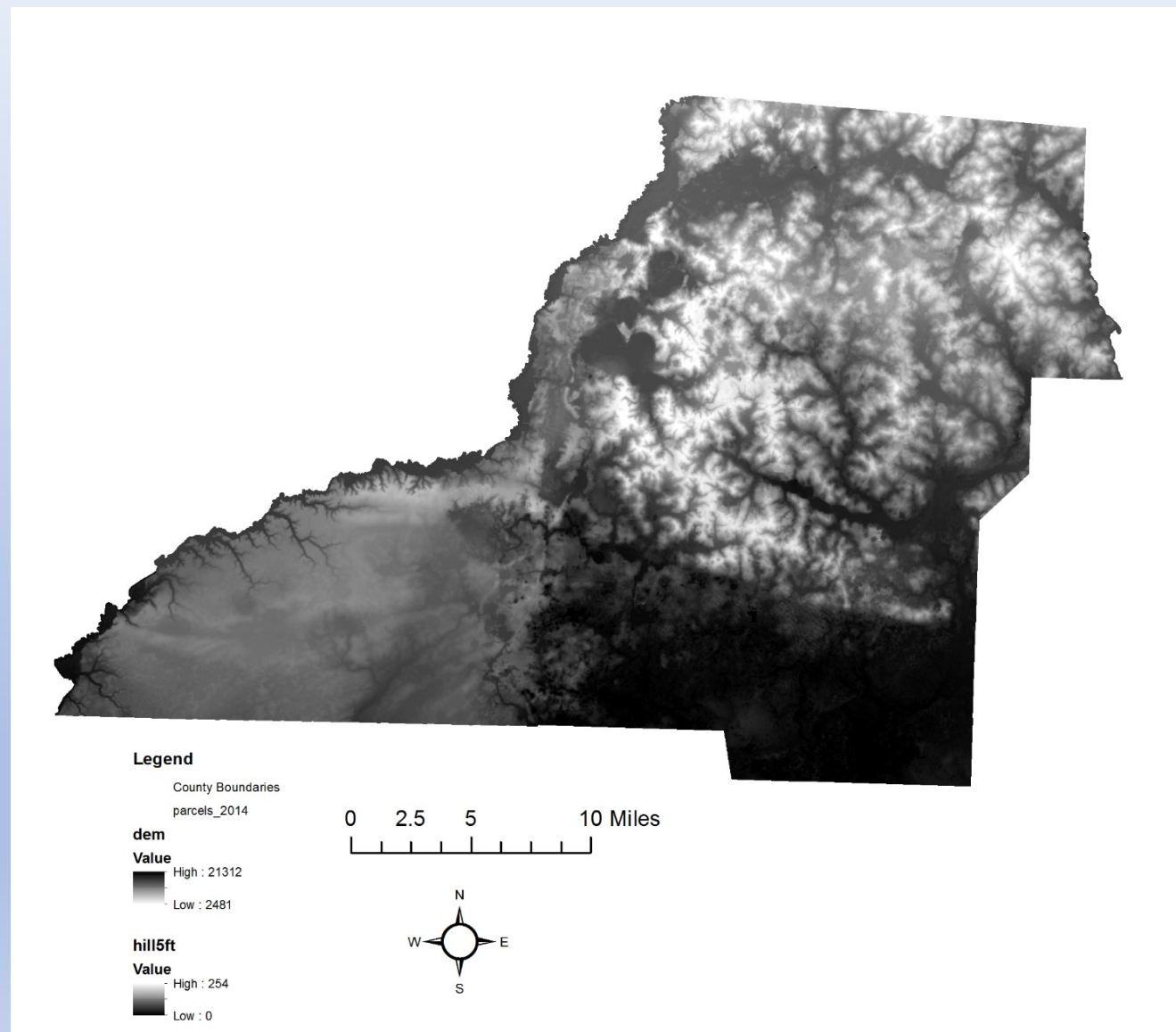
- Lake Jackson is approximately 4,000 acres in size and is one of several large sinkhole lakes located in this area.
- Lakes Iamonia, Miccosukee, and Lafayette are other examples.





LiDAR showing erosion patterns

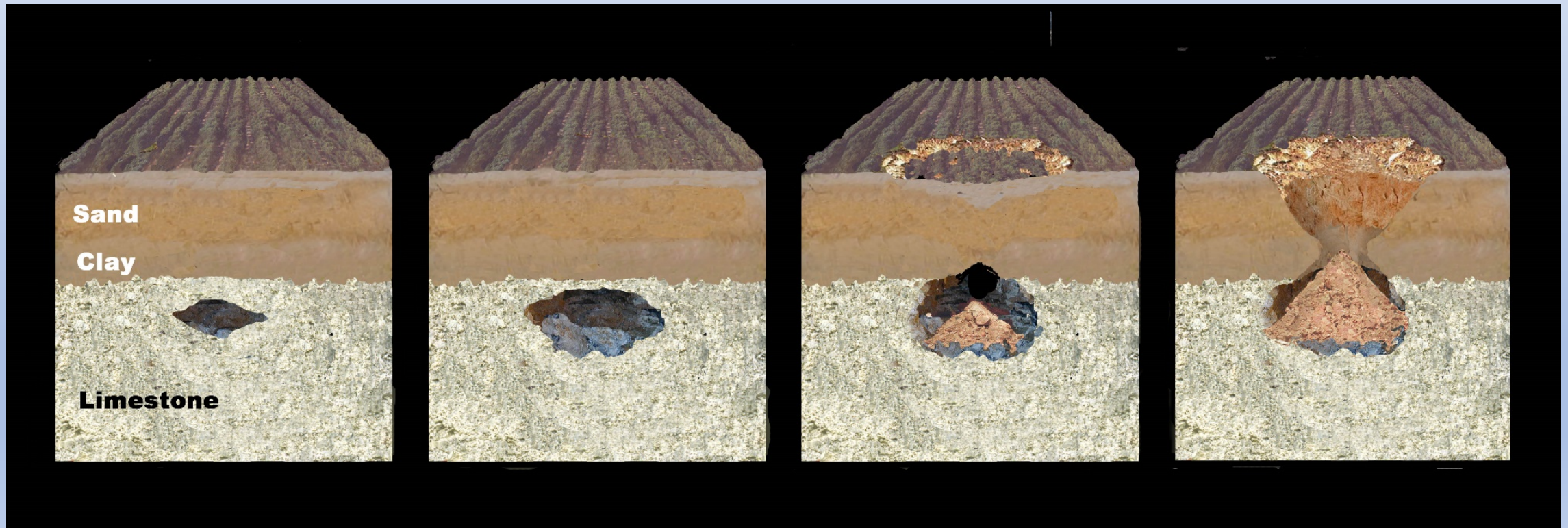
Lake basins in northern Leon County are karst lakes formed either by sinkhole activity in creek beds or by planar dissolution of underlying limestone which lowers land surface creating the basin.





Formation of Lake Jackson

Cover subsidence and cover collapse sinkholes coalesce over geologic time creating closed lake basins.





Formation of Lake Jackson



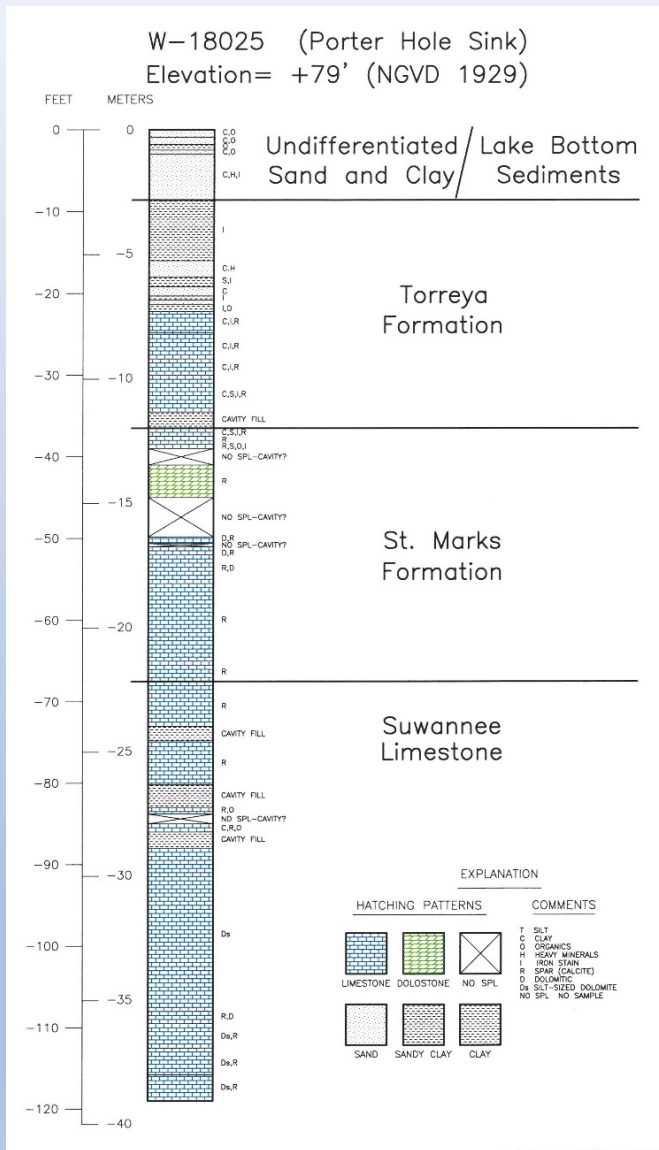
Near Lime Sink, 2004



What geologic units underlie Lake Jackson?

During the 1999 draining of Lake Jackson, the FGS drilled several cores in the dry lakebed.





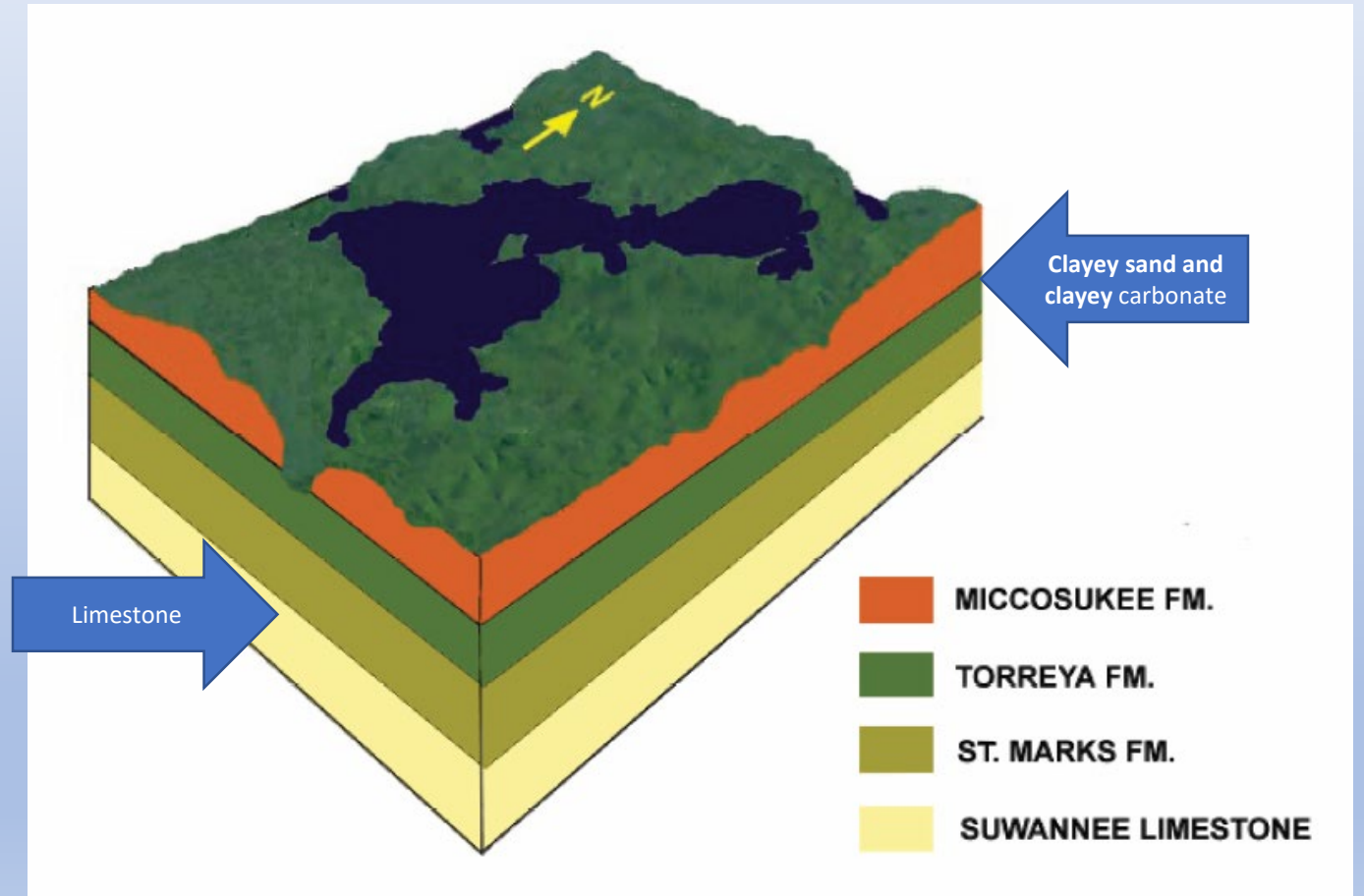
Torrey/St. Marks
contact





Strata underlying Lake Jackson

- Limestone containing void spaces can be seen at several places in the bed of the lake when it is low.
- Sinkhole activity and dissolution of underlying limestone is going on today and will continue.
- Coalescing sinkholes are responsible for creating the Lake Jackson Basin.





September 1999 draining event

Lake Jackson water levels
Began to decline in March of
1998 (lake level at ~86 feet).



On September 16, 1999, one
of the large lake pools connected
to Porter Sink drained exposing
the lake bottom.



September 1999 draining event





What do geologists do when the lake goes dry?





FGS took advantage of the opportunity!

Sampled lake sediment

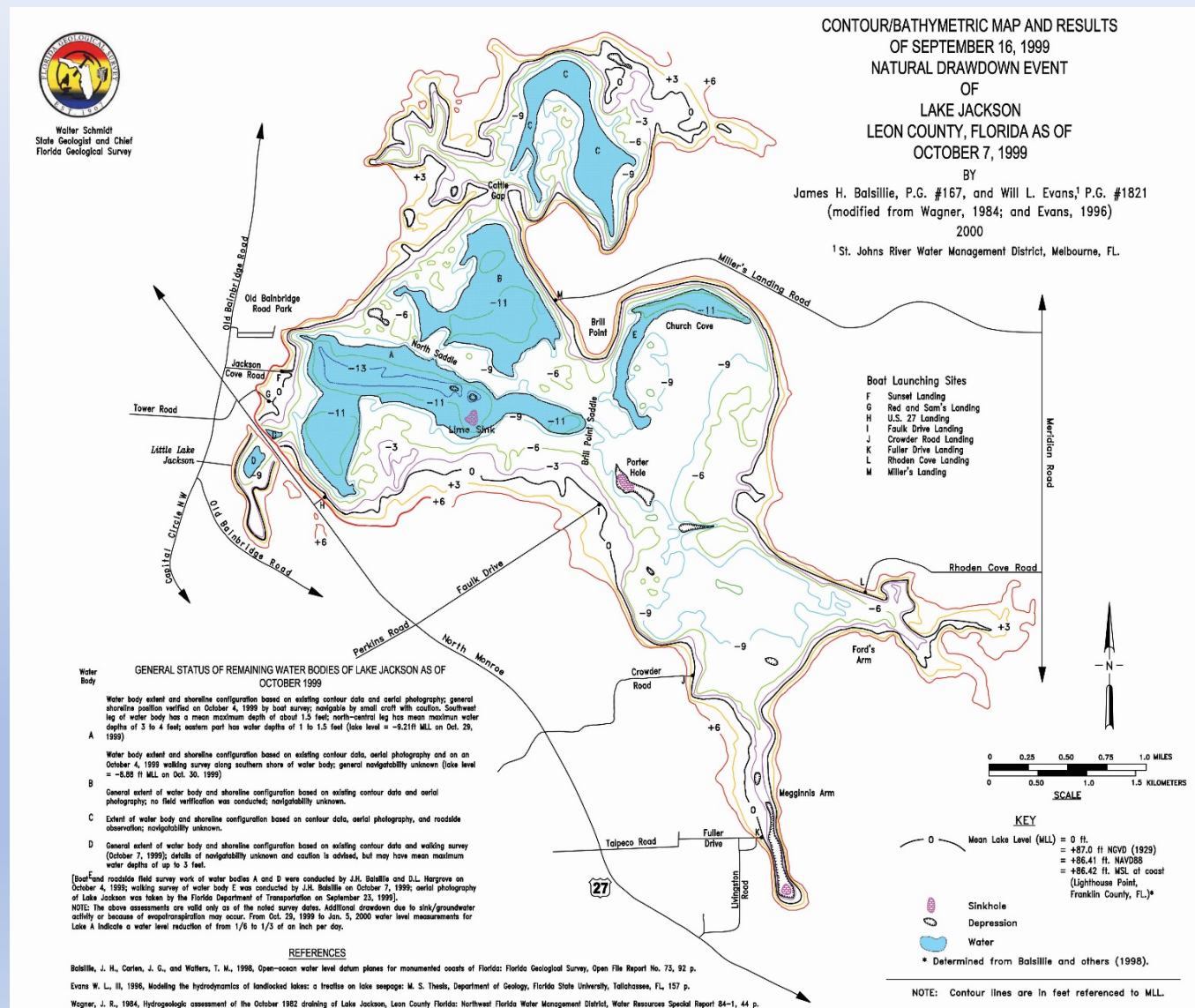


Conducted a bathymetric survey of the lakebed





Lake Jackson bathymetric map



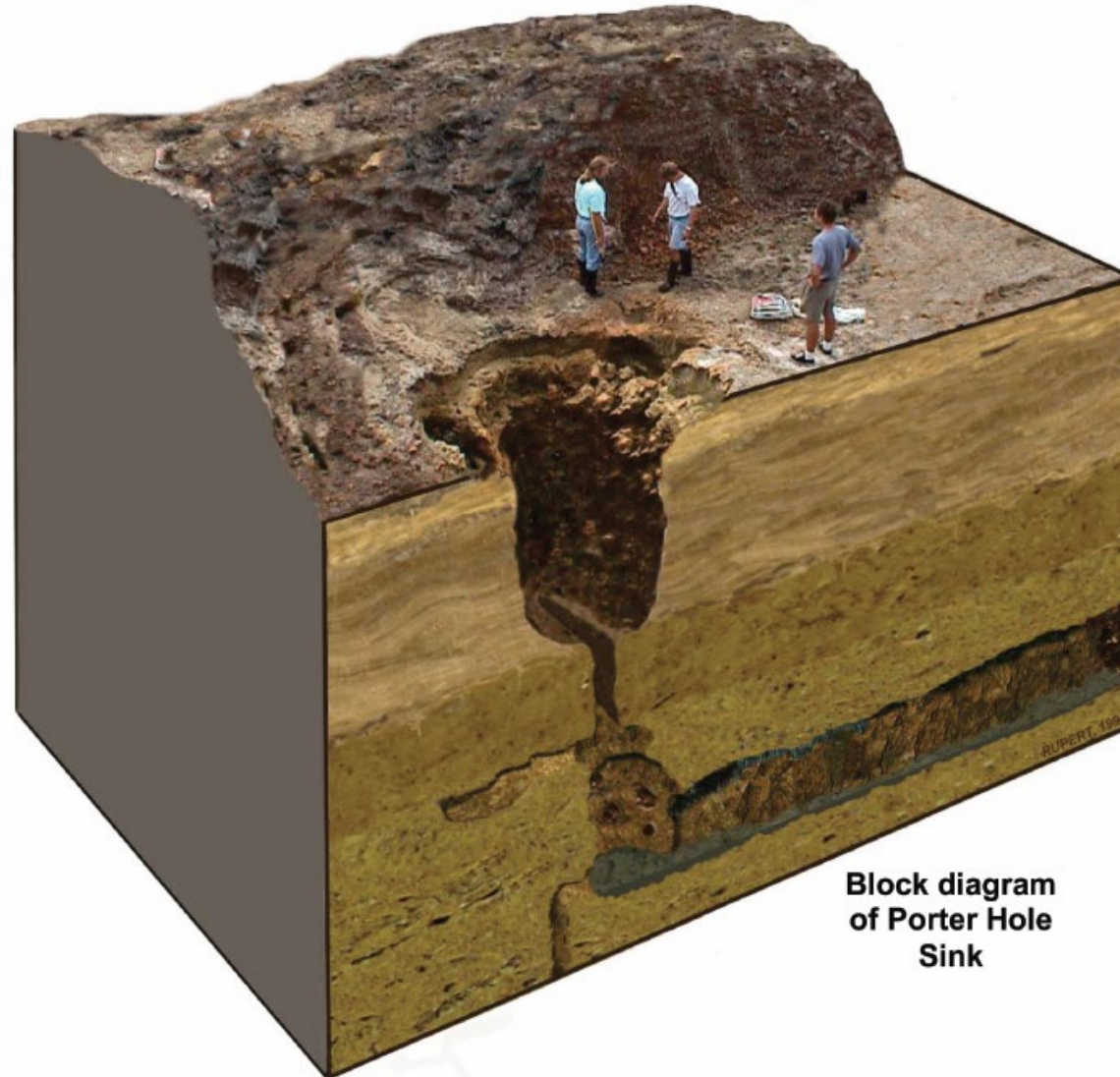


We also climbed around
under the lake!





Porter Hole Sink



**Block diagram
of Porter Hole
Sink**



Porter Hole Sink cave system

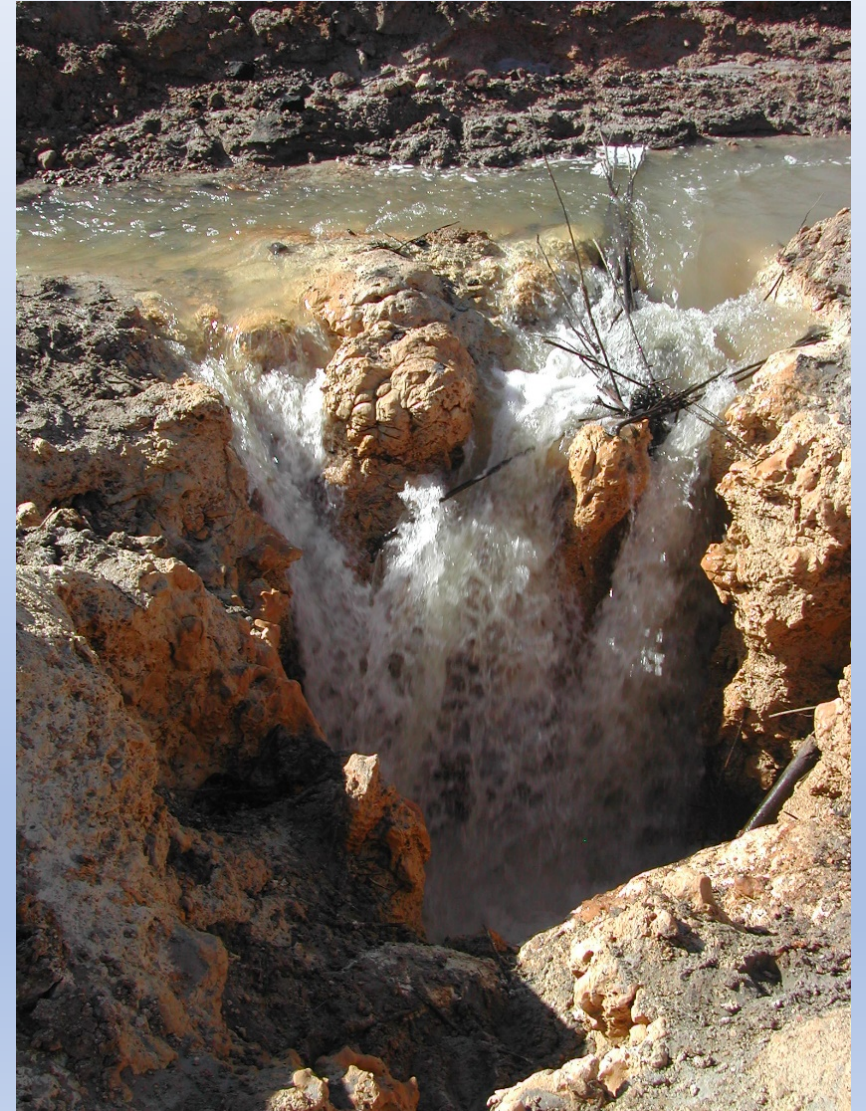
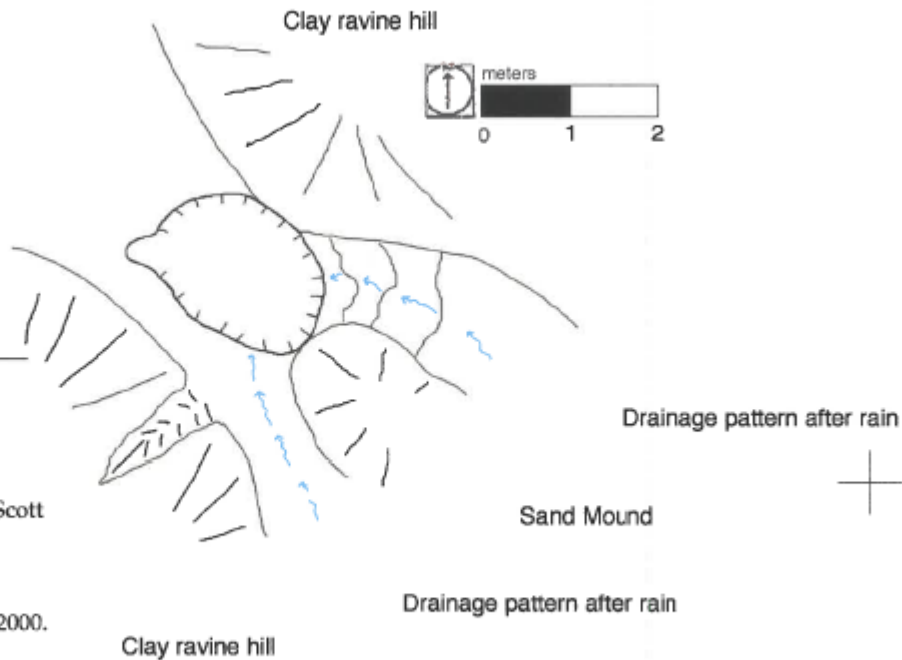
Porter Hole Sink Entrance Level

Lake Jackson Basin
Tallahassee, Florida.

Survey by Tom Stodd, Bruce Brewer, Scott
Worrell and Kris Esterson.
Sketch/Draft by Bruce Brewer.

Survey data from March 21 / April 10 2000.

Plan view map prepared July 11, 2000





Porter Hole Sink

Porter Hole Sink Fissure Entrance Level

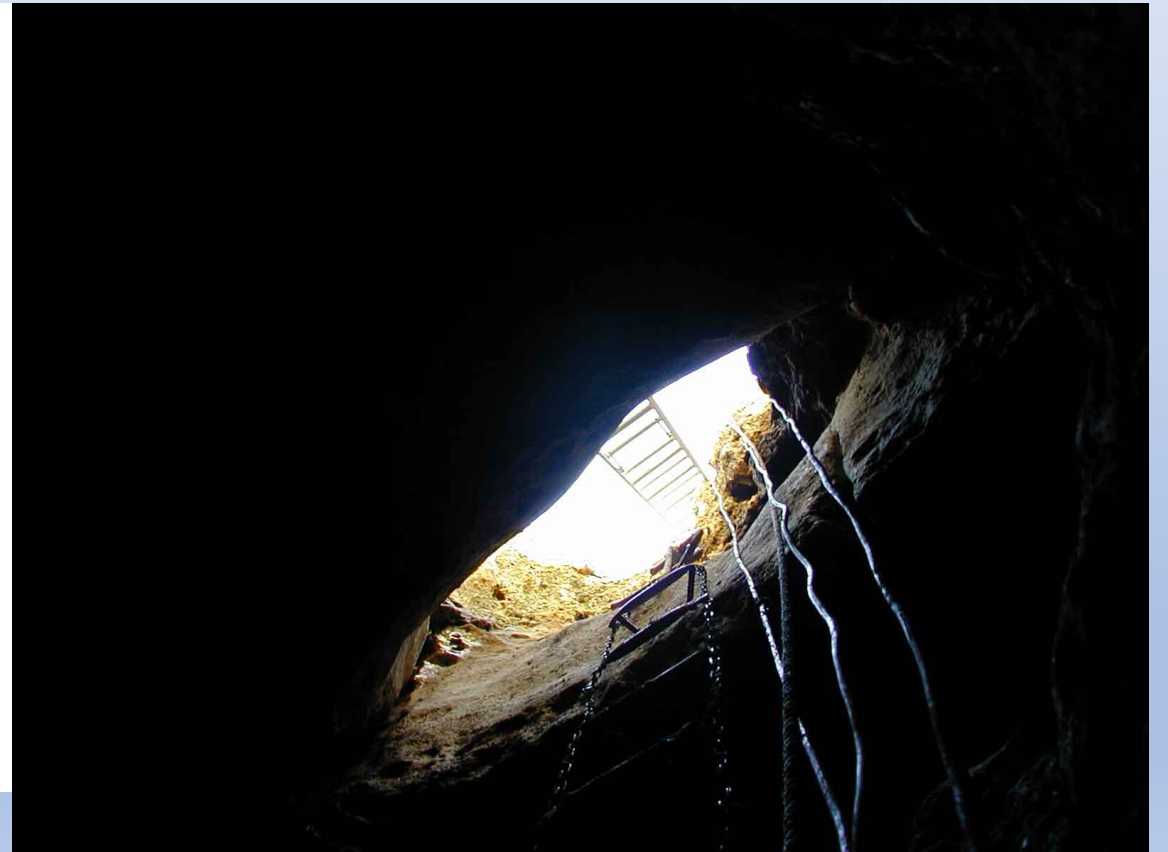
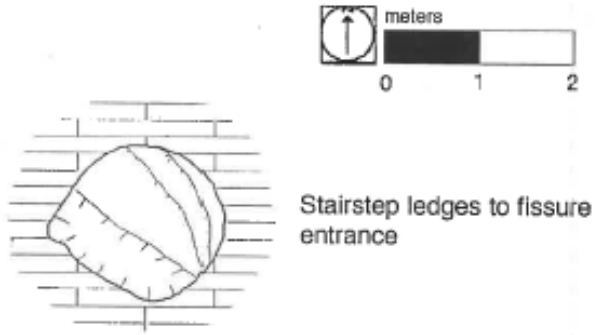
Apx. depth: 3 meters

Lake Jackson Basin
Tallahassee, Florida.

Survey by Tom Stodd, Bruce Brewer, Scott
Worrell and Kris Esterson.
Sketch/Draft by Bruce Brewer.

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Porter Hole Sink

Porter Hole Sink Middle Level

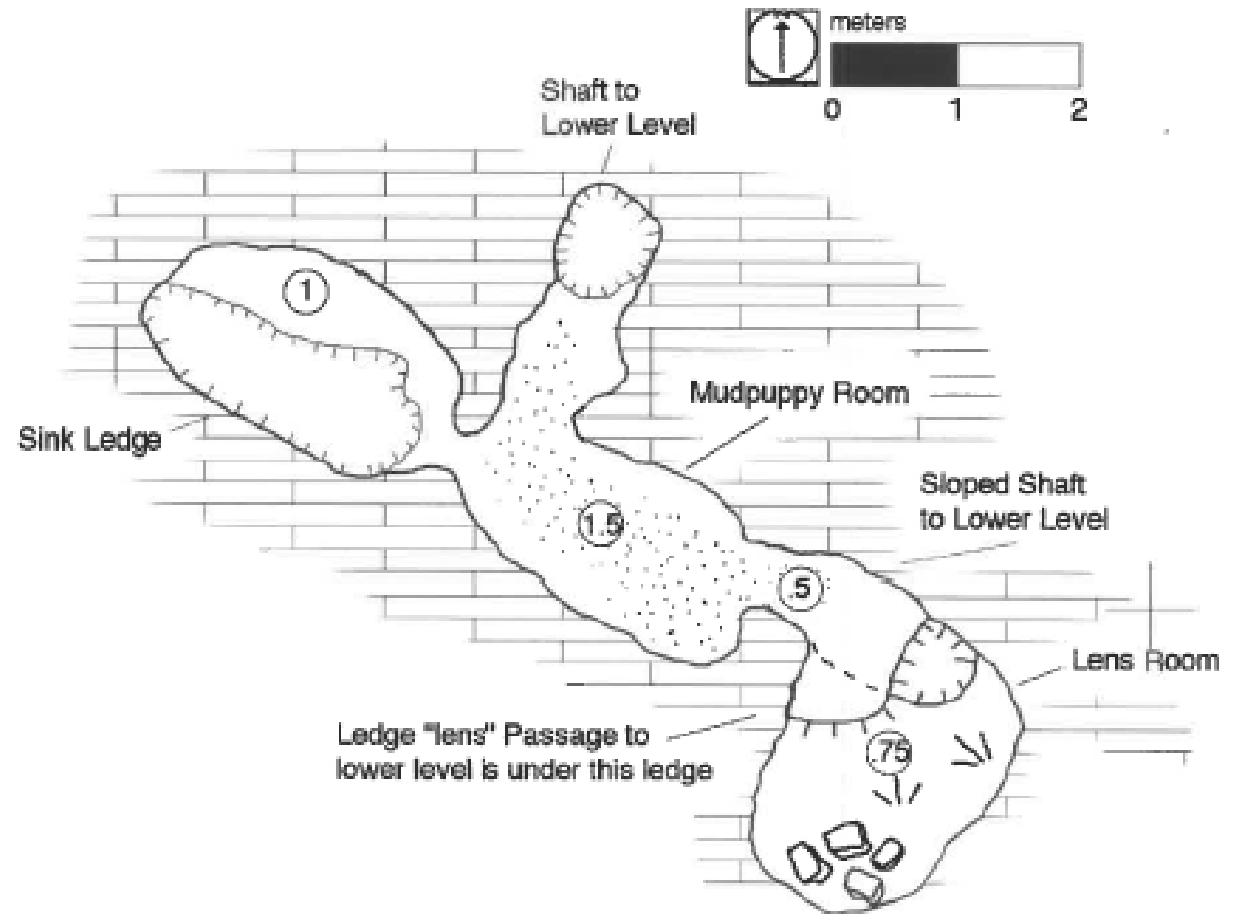
Apx. depth: 5 meters

Lake Jackson Basin
Tallahassee, Florida.

Survey by Tom Stodd, Bruce Brewer, Scott
Worrell and Kris Esterson.
Sketch/Draft by Bruce Brewer.

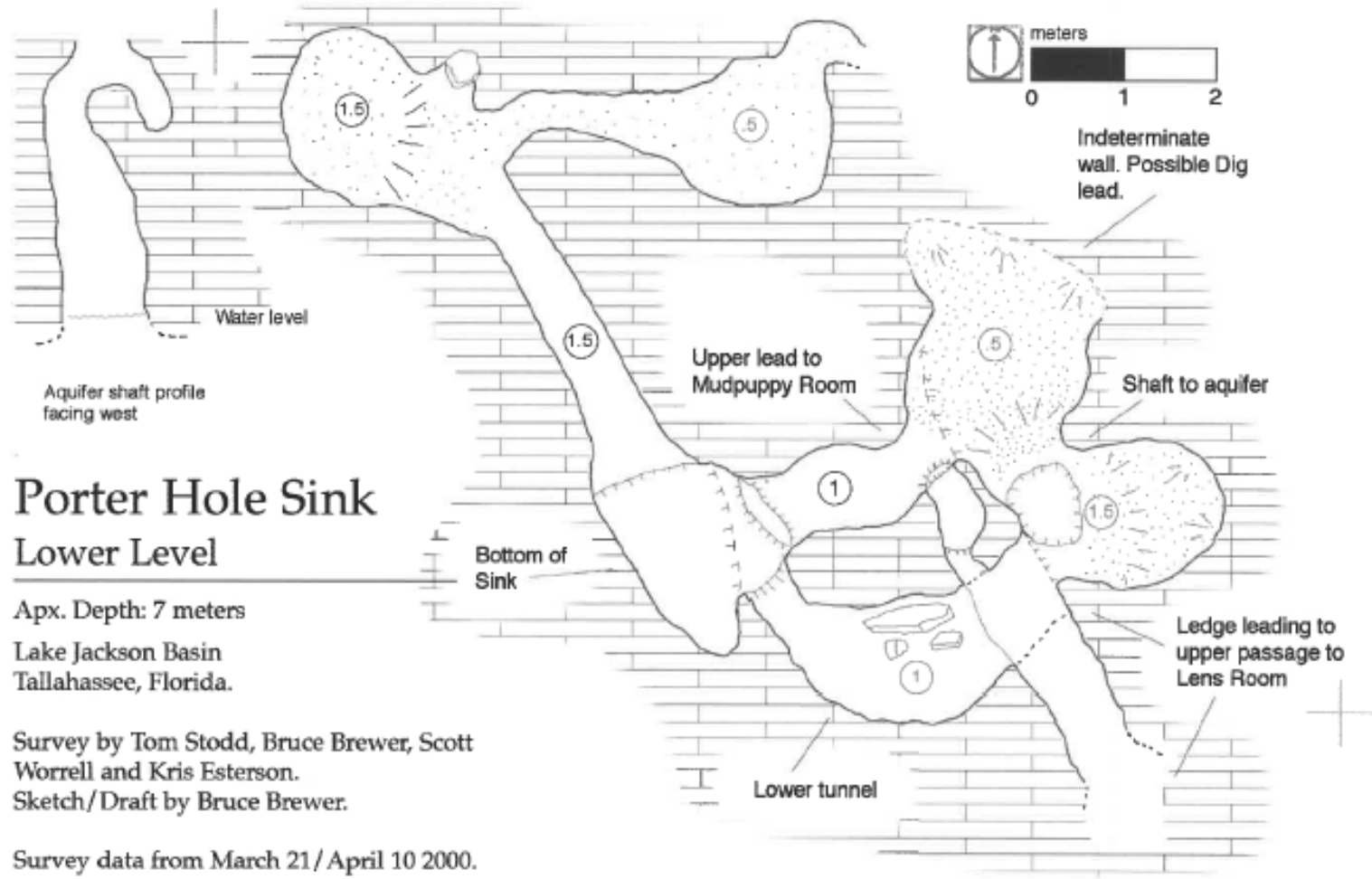
Survey data from March 21 / April 10 2000.

Plan view map prepared July 11, 2000





Porter Hole Sink



Porter Hole Sink Lower Level

Apx. Depth: 7 meters

Lake Jackson Basin
Tallahassee, Florida.

Survey by Tom Stodd, Bruce Brewer, Scott
Worrell and Kris Esterson.
Sketch/Draft by Bruce Brewer.

Survey data from March 21 / April 10 2000.

Plan view map prepared July 11, 2000



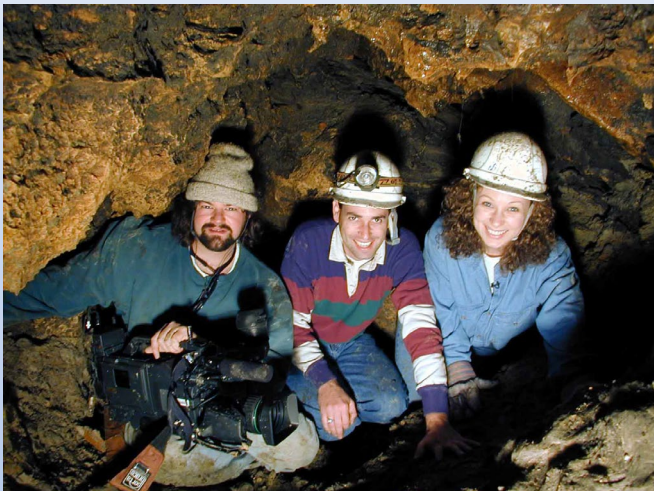
Porter Hole Sink cave – snot-tites!





People in Porter Hole Sink

WFSU TV Crew



Sean McGlynn



**County
Commissioner**



Means brothers

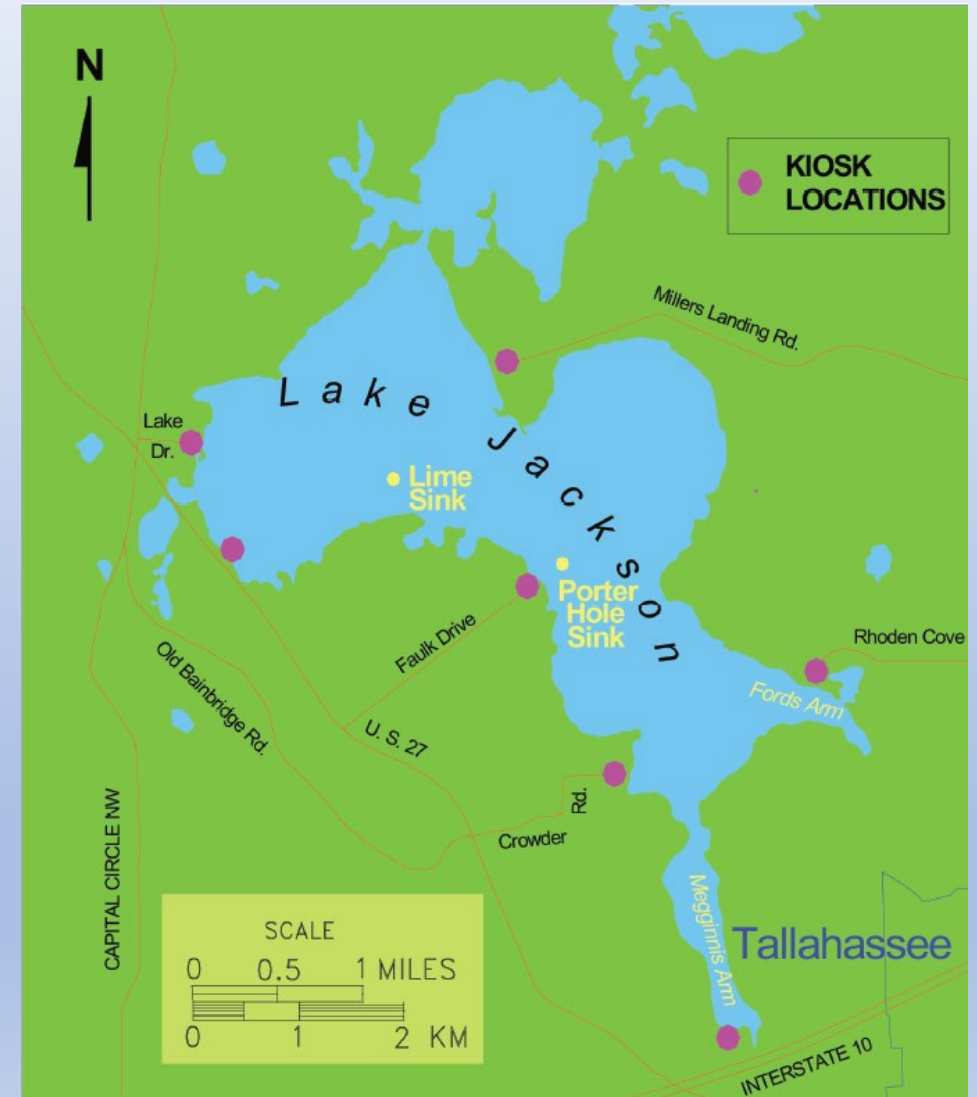




Lime Sink and Megginnis Arm

Lime Sink was reportedly filled with concrete and debris in 1959 to try to prevent the lake from draining.

A sink in Megginnis Arm was filled by the County in 1954 (Tallahassee Democrat, August 17, 1954)





Lime Sink – May 2000





Historic draining of the lake

Documented draining of the lake occurred:

- 1907
- 1909
- 1932
- 1935/36
- 1957
- 1982
- 1999/2000
- 2002
- 2007
- 2012
- 2021

Historic photos



1909



1932



1932



1982





June 2021 dry down



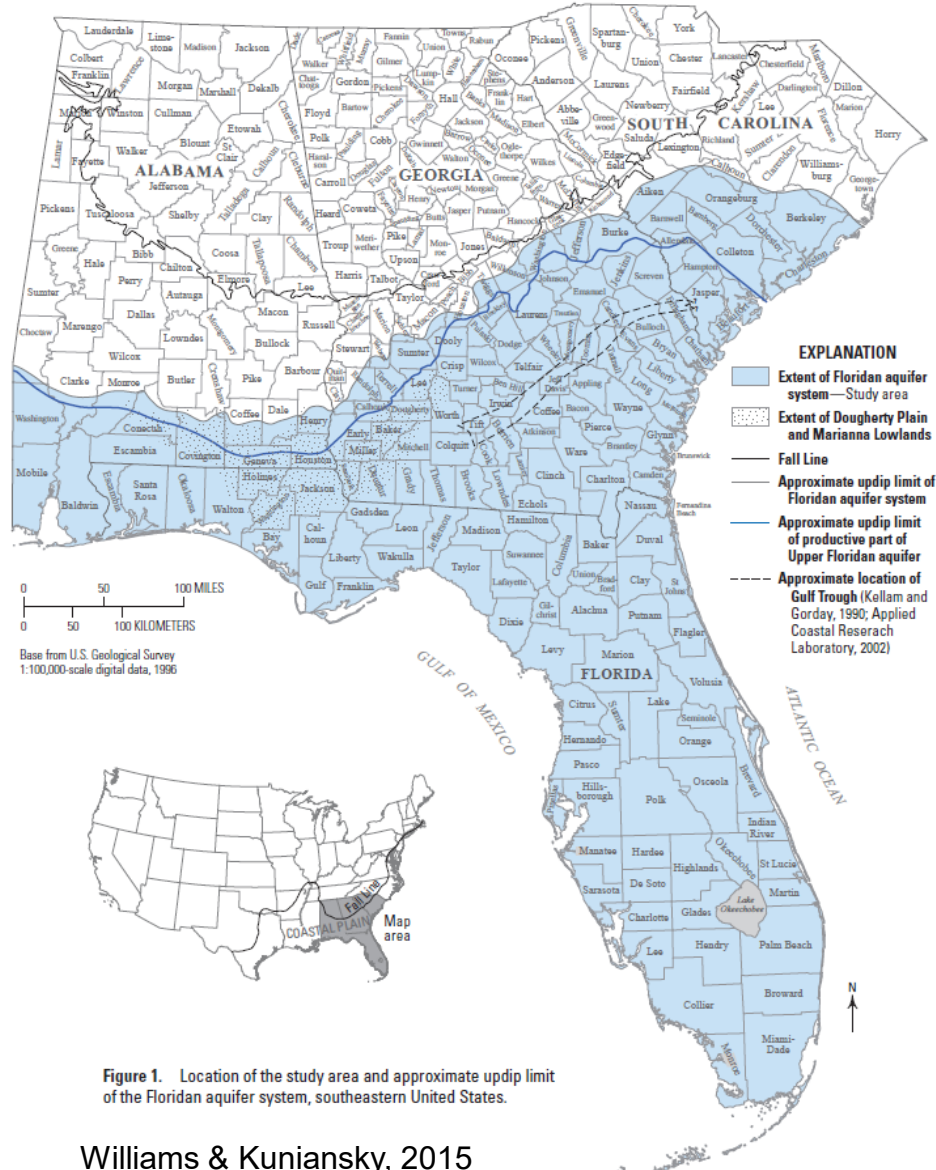


When the lake drains, where does the water go?





Into the underlying Floridan aquifer system





The map displays the Lake Jackson area in Florida, characterized by a topographic background with purple and green hues. A prominent blue arrow points to Lake Jackson, which is situated in the upper central part of the map. The map shows a network of roads, including major highways like SR-61, SR-375, SR-30, SR-98, SR-261, SR-263, SR-10, SR-8, SR-22, SR-24, SR-25, SR-26, SR-27, SR-28, SR-29, SR-30, SR-31, SR-32, SR-33, SR-34, SR-35, SR-36, SR-37, SR-38, SR-39, SR-40, SR-41, SR-42, SR-43, SR-44, SR-45, SR-46, SR-47, SR-48, SR-49, SR-50, SR-51, SR-52, SR-53, SR-54, SR-55, SR-56, SR-57, SR-58, SR-59, SR-60, SR-61, SR-62, SR-63, SR-64, SR-65, SR-66, SR-67, SR-68, SR-69, SR-70, SR-71, SR-72, SR-73, SR-74, SR-75, SR-76, SR-77, SR-78, SR-79, SR-80, SR-81, SR-82, SR-83, SR-84, SR-85, SR-86, SR-87, SR-88, SR-89, SR-90, SR-91, SR-92, SR-93, SR-94, SR-95, SR-96, SR-97, SR-98, SR-99, SR-100, SR-101, SR-102, SR-103, SR-104, SR-105, SR-106, SR-107, SR-108, SR-109, SR-110, SR-111, SR-112, SR-113, SR-114, SR-115, SR-116, SR-117, SR-118, SR-119, SR-120, SR-121, SR-122, SR-123, SR-124, SR-125, SR-126, SR-127, SR-128, SR-129, SR-130, SR-131, SR-132, SR-133, SR-134, SR-135, SR-136, SR-137, SR-138, SR-139, SR-140, SR-141, 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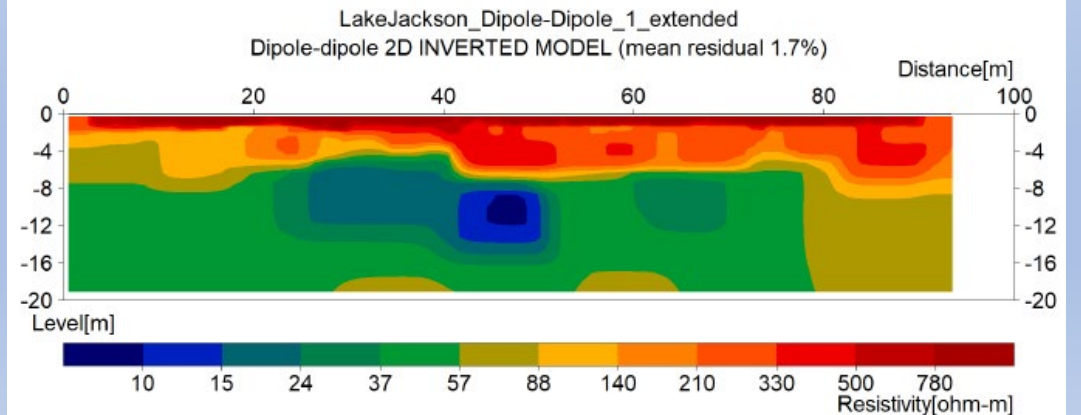




FGS research at Lake Jackson (resistivity)

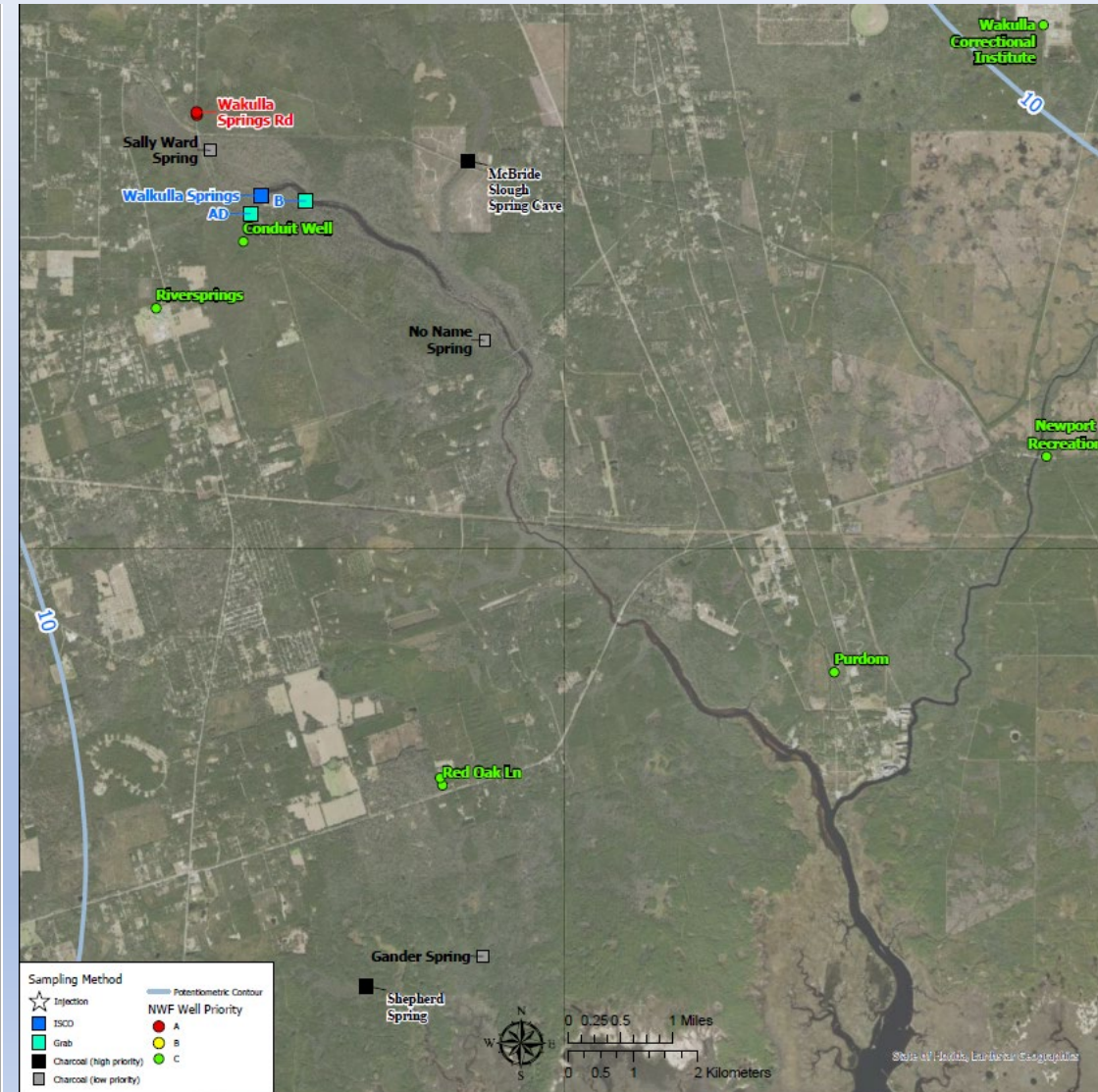
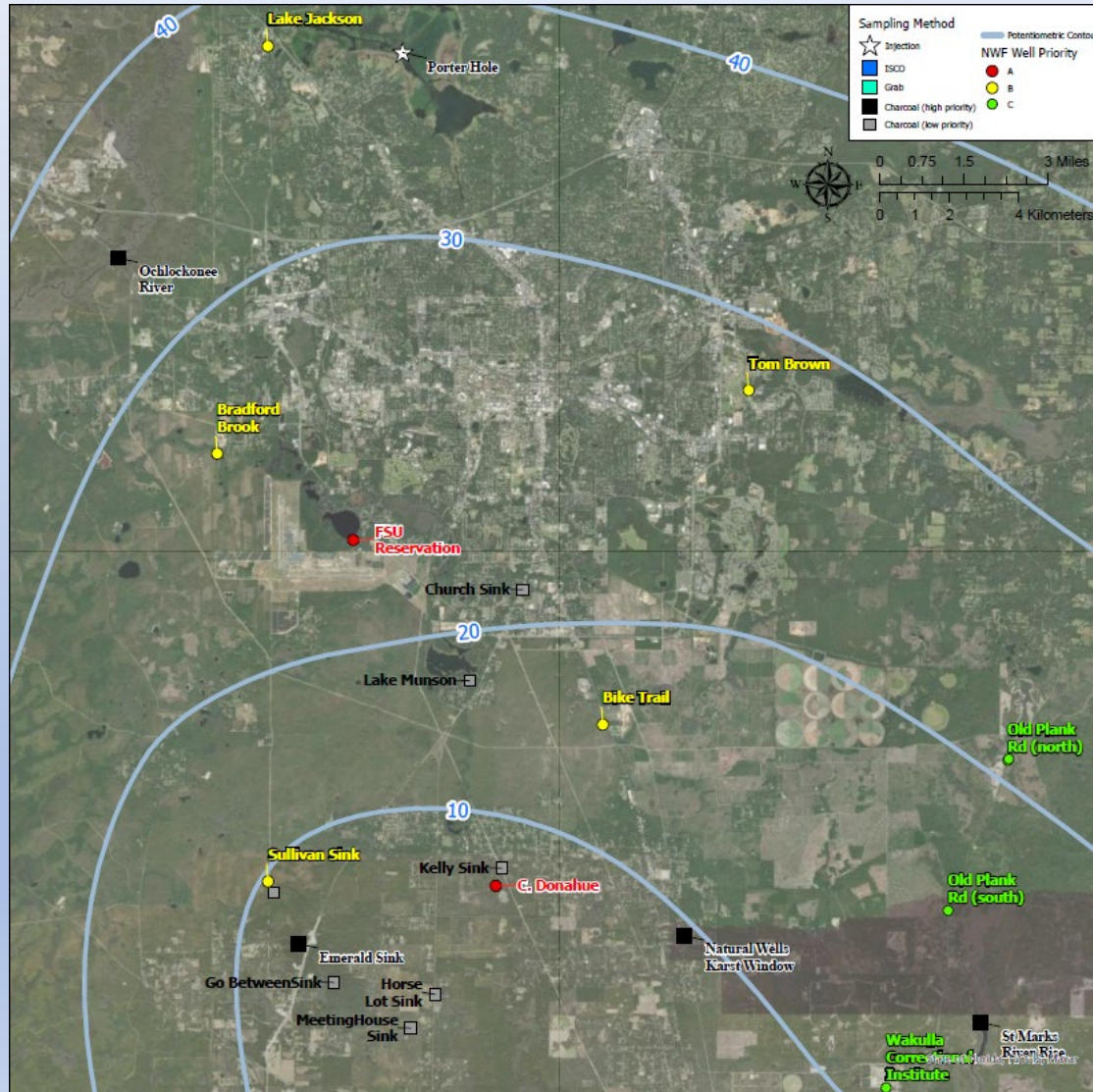


Resistivity Transect Location: Lake Jackson near Porter Sink





Possible dye trace from Porter Hole Sink





Questions?

Harley Means, P.G.
Acting State Geologist and Director of the
Florida Geological Survey
3000 Commonwealth Boulevard
Tallahassee, FL 32303-3157
850-617-0300

www.floridadep.gov/fgs
Guy.means@FloridaDEP.gov