



# A Sinking Feeling: Using an Offshore Feature to Calculate Transport Rates

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# Outline

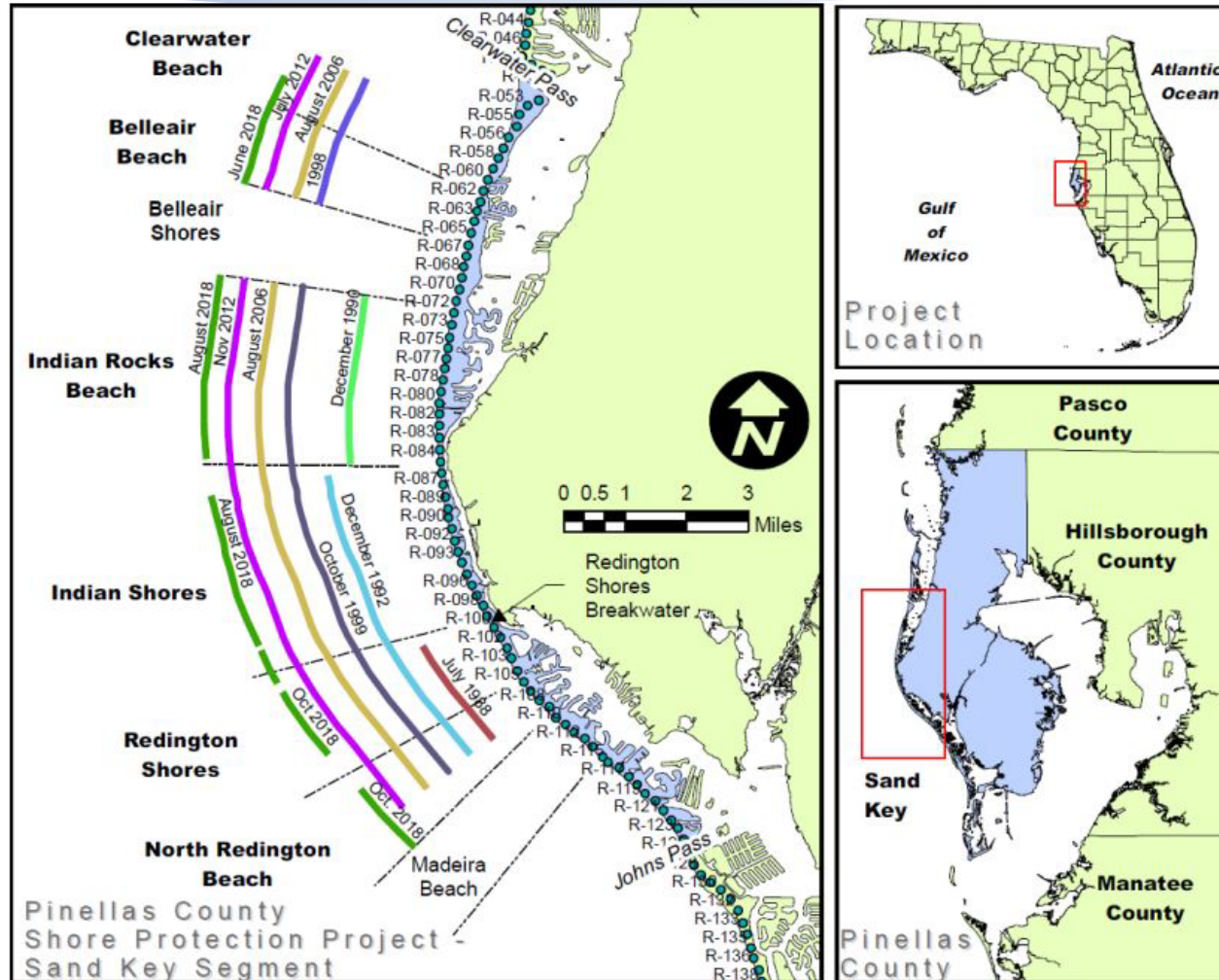
1. Brief History of the Sand Key Project
2. Discussion on Offshore Monitoring Profiles
3. Calculations of Sediment Transport Rates
4. Possible Explanation on Observed Changes
5. Conclusion



# Pinellas County Shore Protection Project



- Includes Sand Key which is an 11.3 mile project ranging from R-56 to R-66 and R-71 to R108 with roughly 9.3 MCY placed over the entirety of the Island from 1988-present.
- Borrow areas include Johns Pass, Offshore Borrow Area L, and Egmont Shoals which is the primary source for sand.

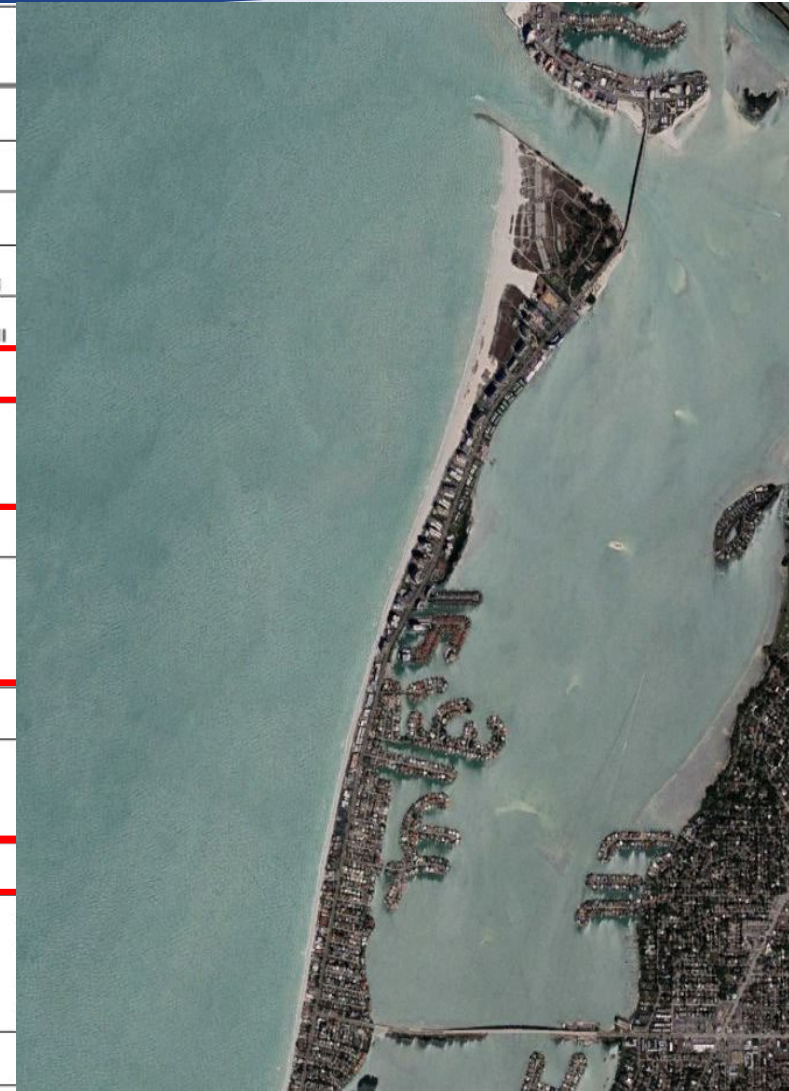


# Pinellas County Shore Protection Project



- Focus of this investigation is on the northern most segment (Clearwater Beach/Belleair Beach)
- Sand has been placed in this location from R56-R66 in 1998, 2006, 2012, and 2018
- In fact, a large percentage of sand is placed on this portion of the project
- Initial restoration of CB/BB was 1.3 MCY

Construction Completion Date	Event Type
1985	Redington Shores Breakwater
1987	North Jetty Reconstruction
Jul-88	Sand Key Restoration Phase I
Dec-90	Sand Key Restoration Phase II
Dec-92	Sand Key Restoration Phase III
1998	Restoration
Oct-99	2nd Nourishment
Aug-06	1st Nourishment
	3rd Nourishment
Nov. 2012	2nd Nourishment
	4th Nourishment
Jul-18	3rd Nourishment
Sep-18	5th Nourishment
Sep-18	
Oct-18	
Oct-18	
Oct-18	MHW Berm Restoration



# Sand Key Monitoring



**US Army Corps  
of Engineers** ®  
Jacksonville District



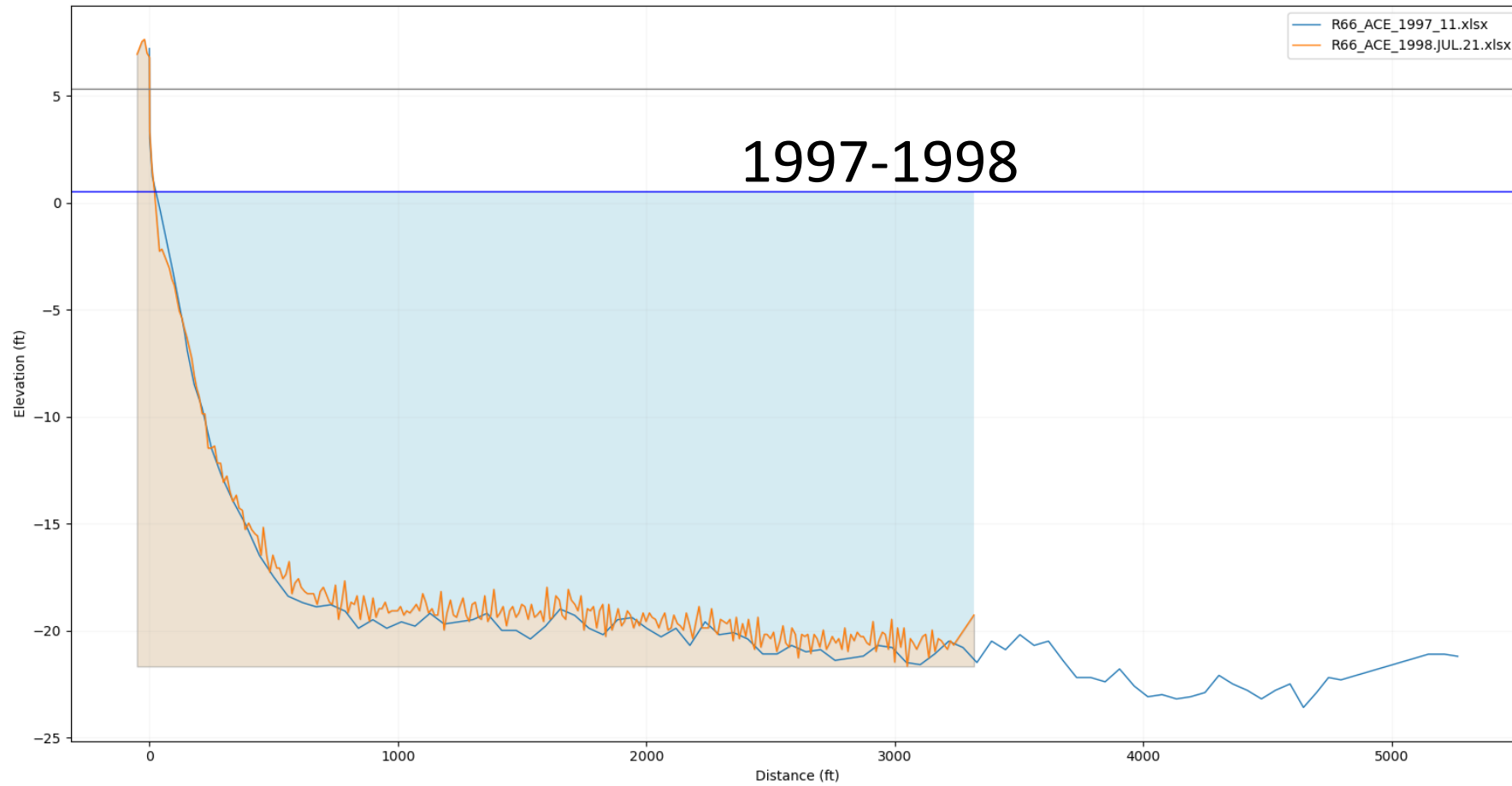
- Offshore profiles were collected from the very beginning of the project and are still collected as part of the federally authorized beach nourishment projects
- Thanks to an ongoing partnership, USACE/FDEP actively collects and shares this data with the county.
- County has over 20 years of profiles that extend up to 3000 ft or more offshore (1997-2022)

# Sand Key Monitoring

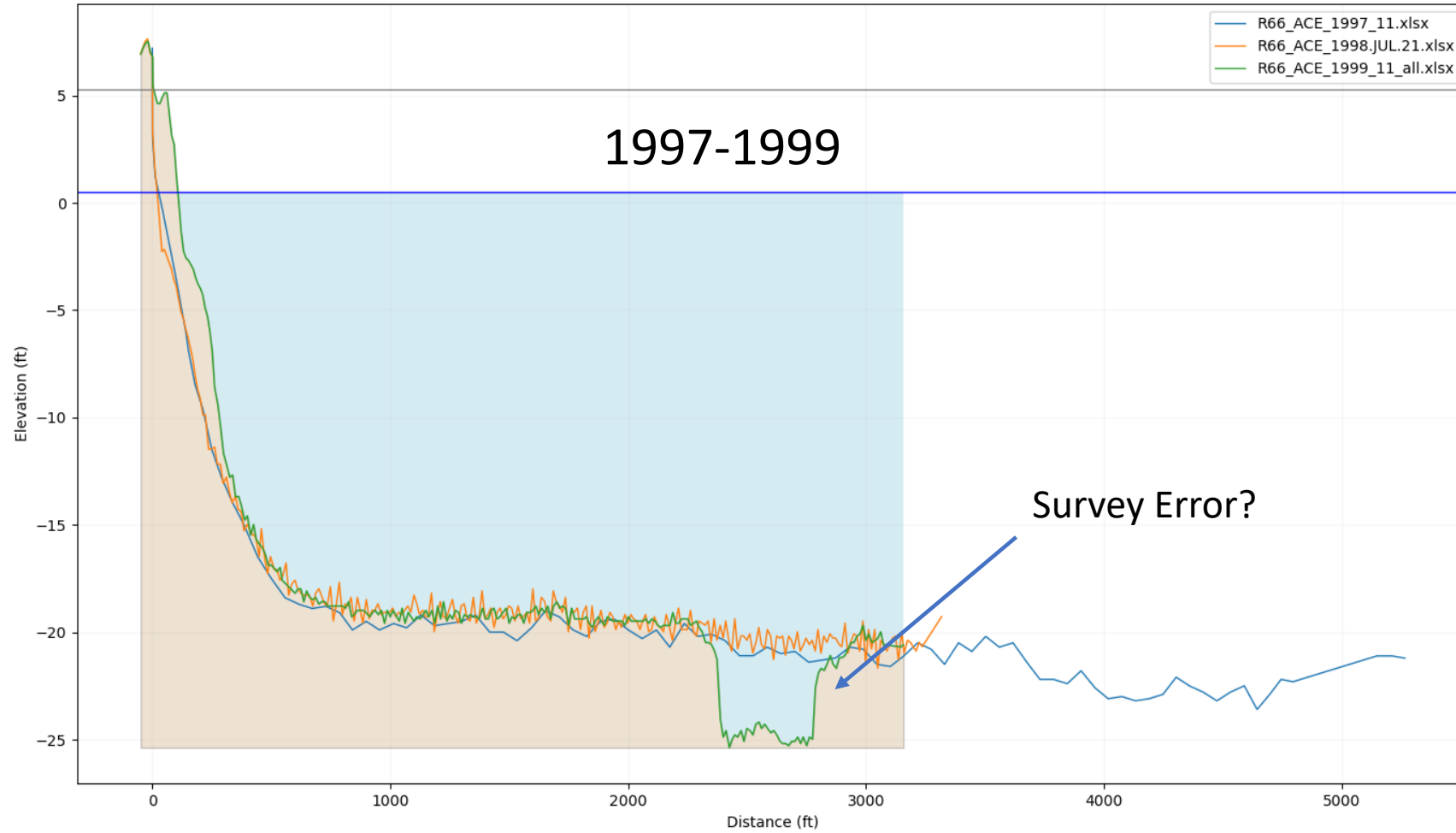
- Raw profile data was then post-processed to confirm that the origin and datum shifts were corrected
- This was done using ArcPro, Python Scripts and A LOT of Trial and Error processing thousands of profiles
- Very useful when dealing with historical sand placement issues
- This is historic data and FDEP does not preserve XY data



# Sand Key Monitoring

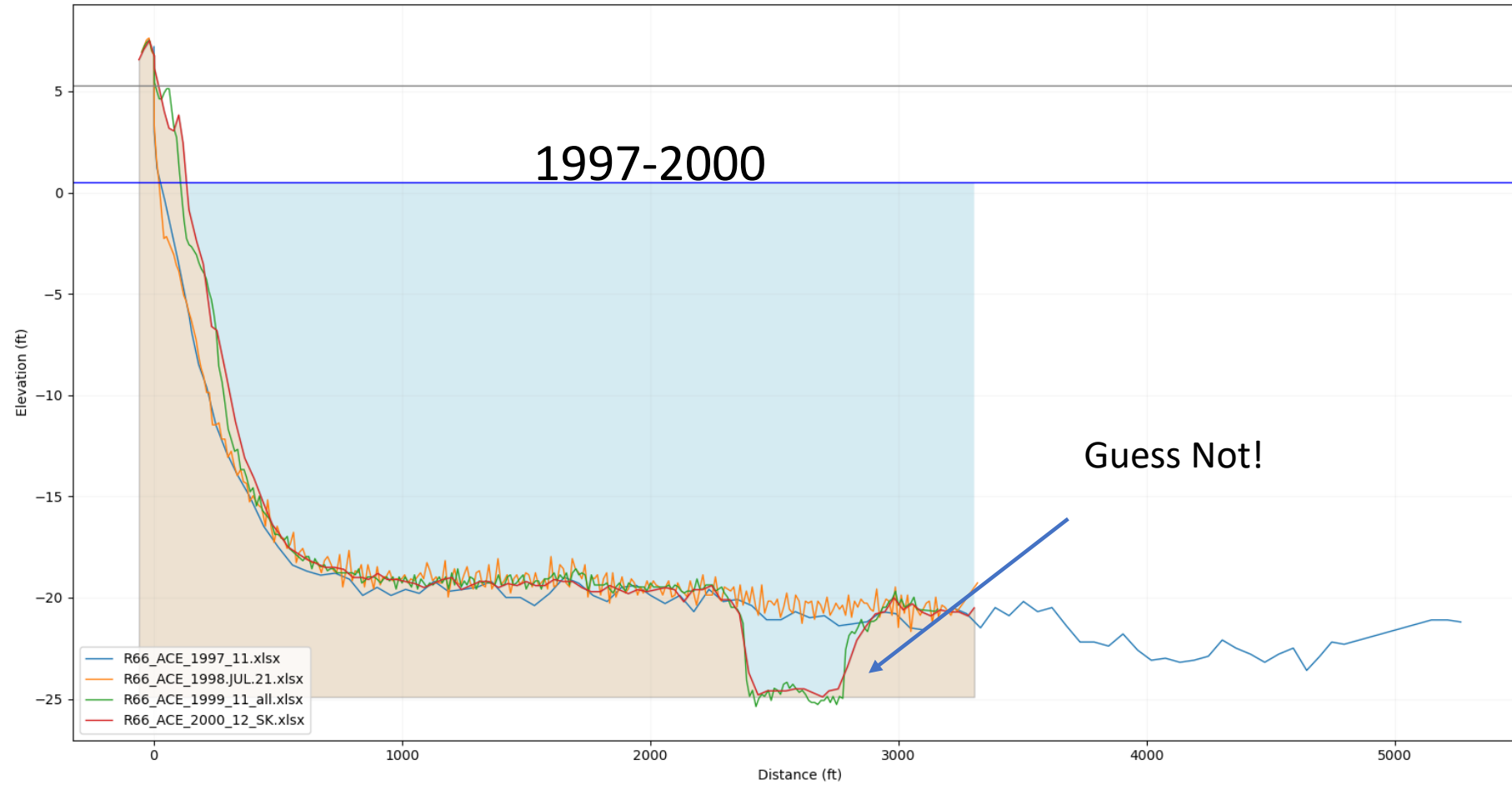


# Sand Key Monitoring

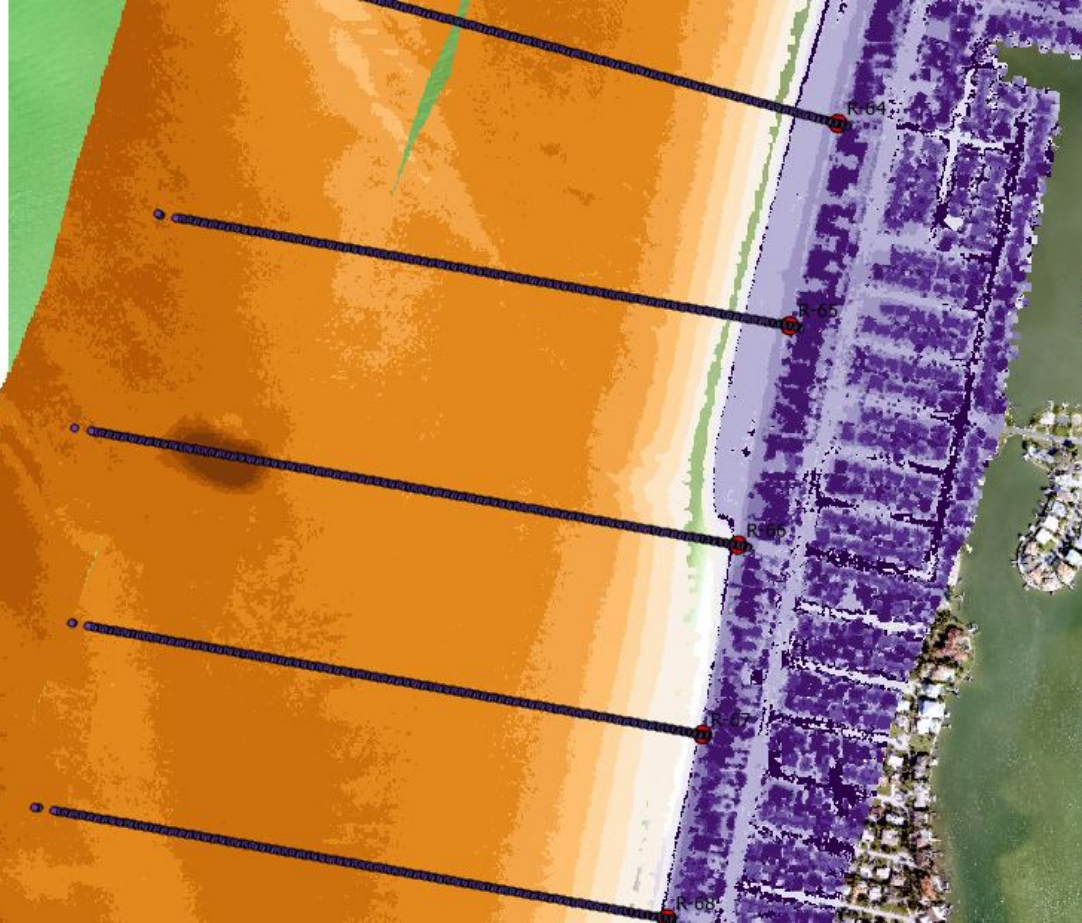




# Sand Key Monitoring



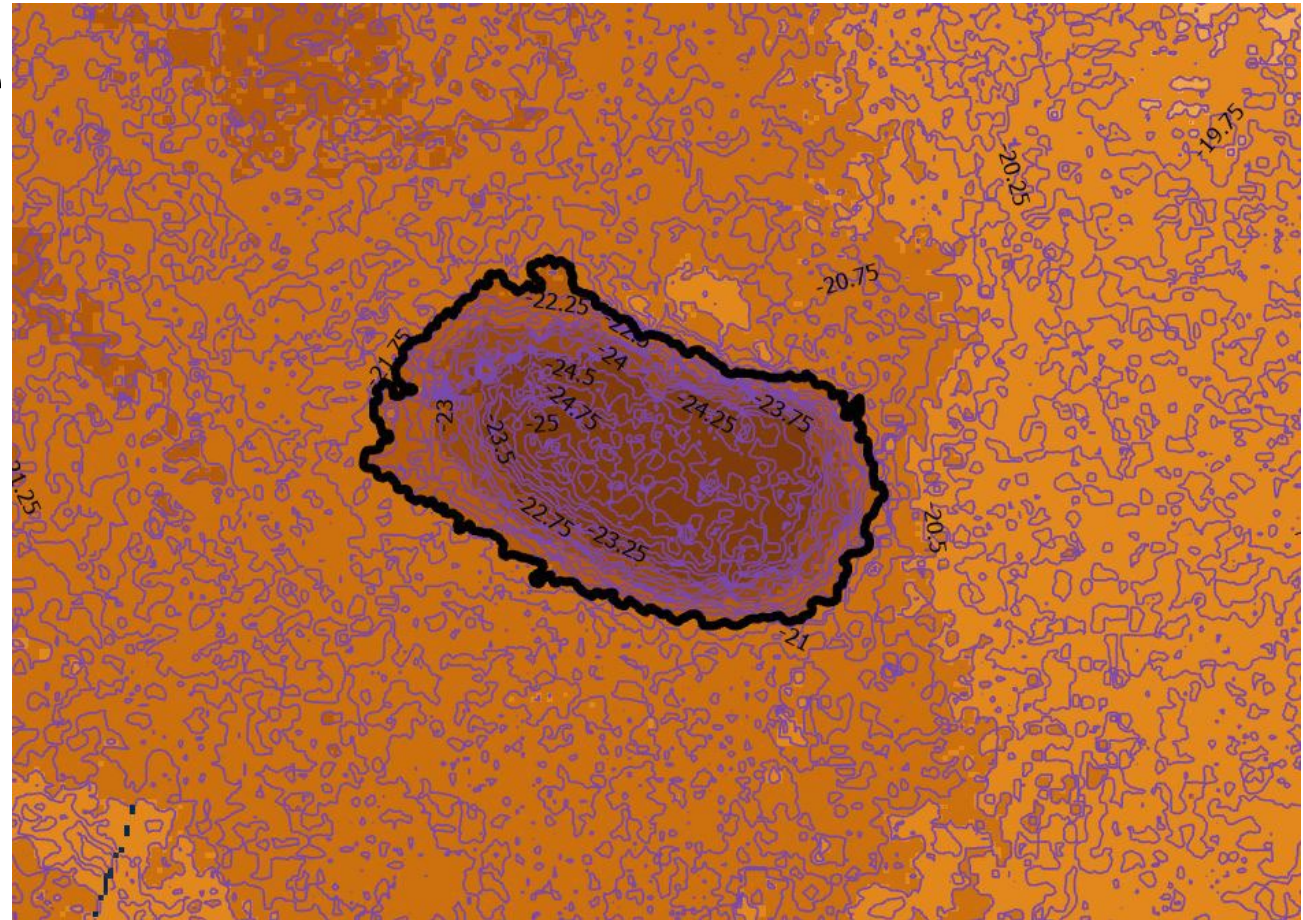
# Offshore Feature



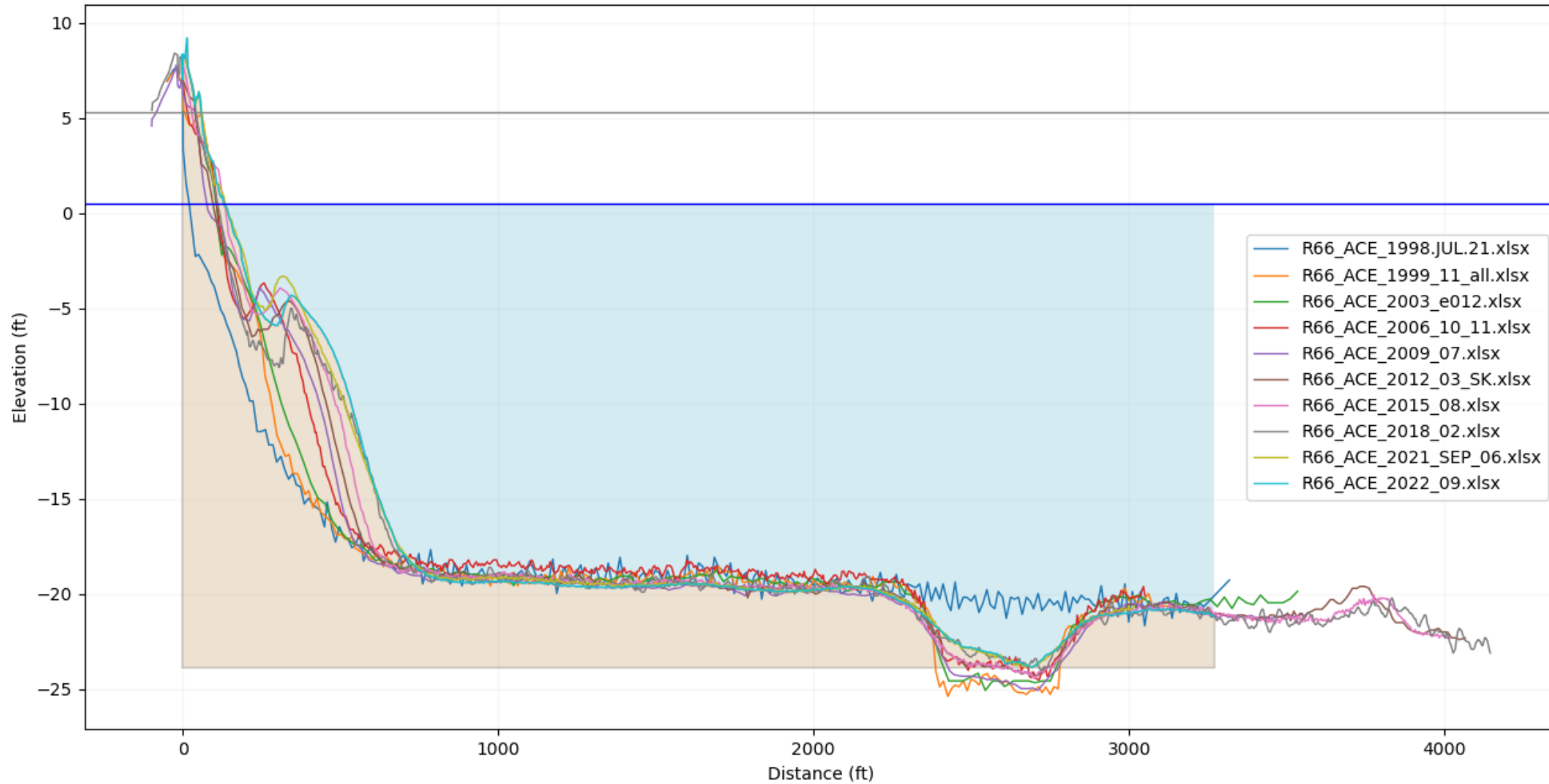
- The feature is roughly 440ft in length and 300 ft in width and -25 feet NAVD in 1999 at its deepest.
- Appears to show up between the 1998-1999 nourishments
- Lies directly on Pinellas County monument R-66 which is the last monument in the Clearwater/Belleair Segment
- Located ~2360 ft offshore from R-66

# Offshore Feature

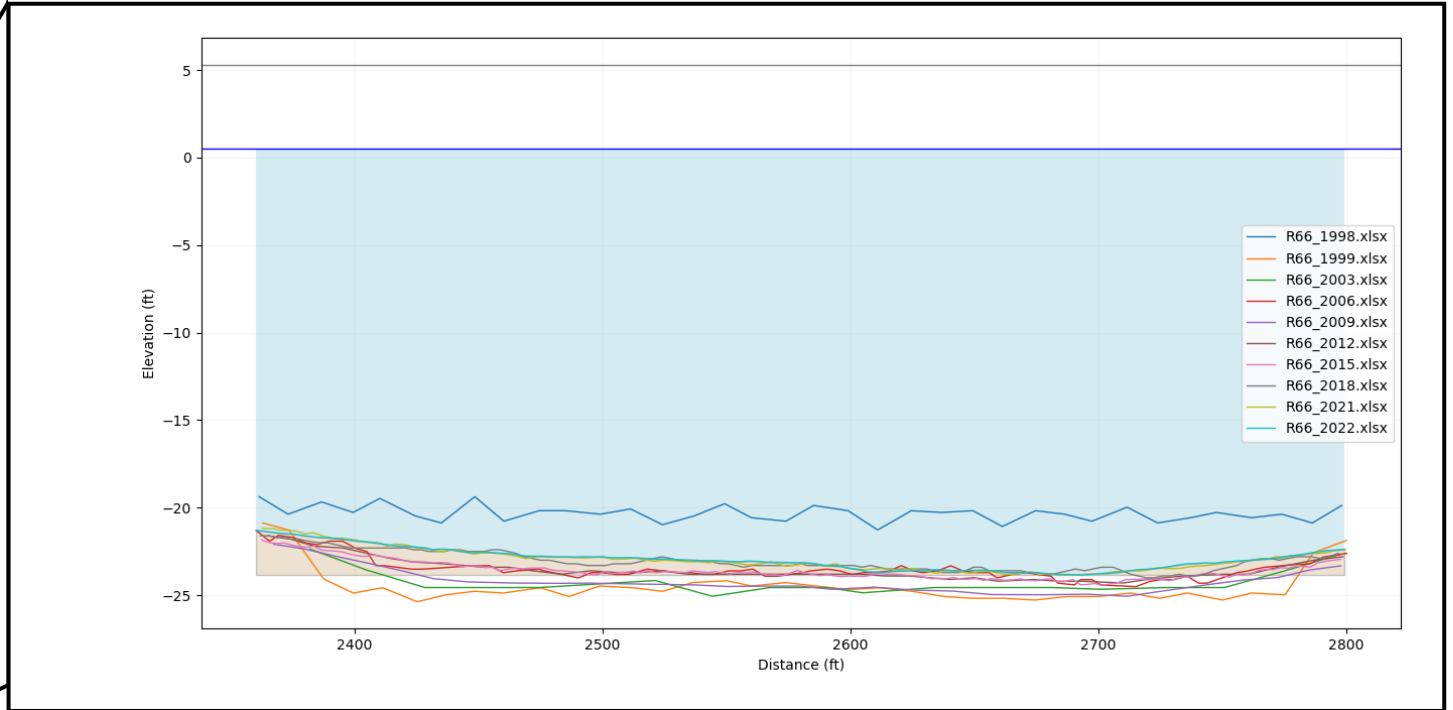
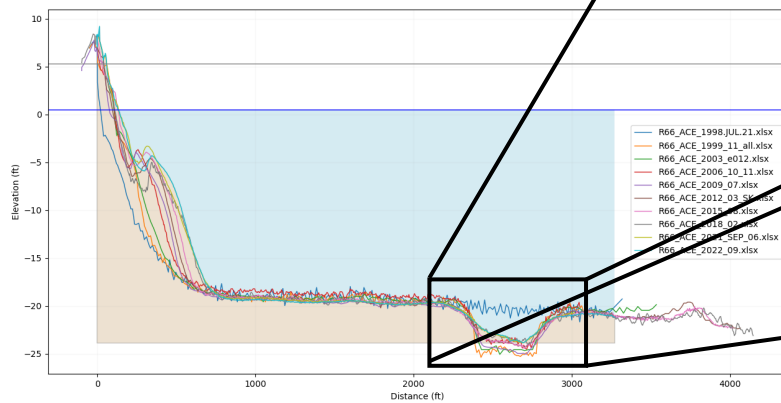
- Surrounding bathymetry around the feature appeared to be at about -20ft NAVD
- Used the -21.5ft contour to outline
- Offshore LiDAR was available but could not capture the depths well.
- Only the 2006 Survey was able to adequately capture so the profiles were used to calculate infilling rates



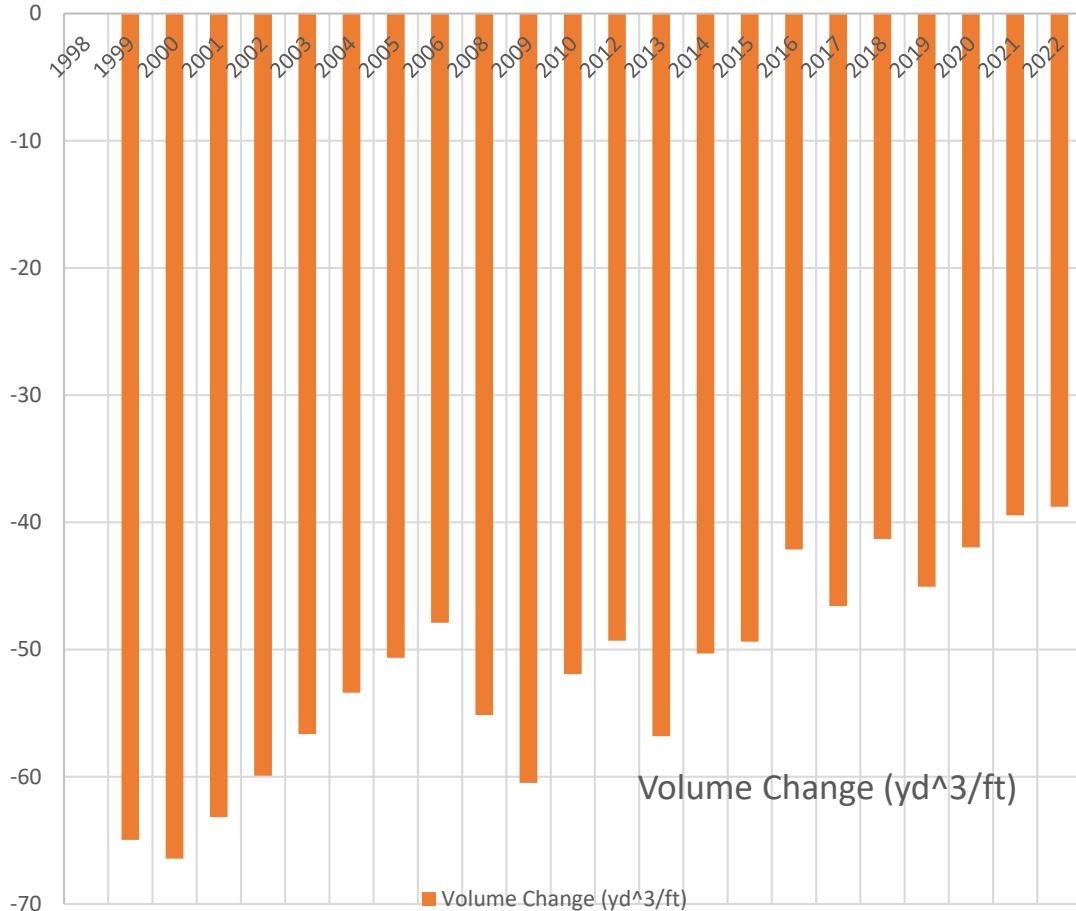
# Offshore Feature



# Offshore Feature

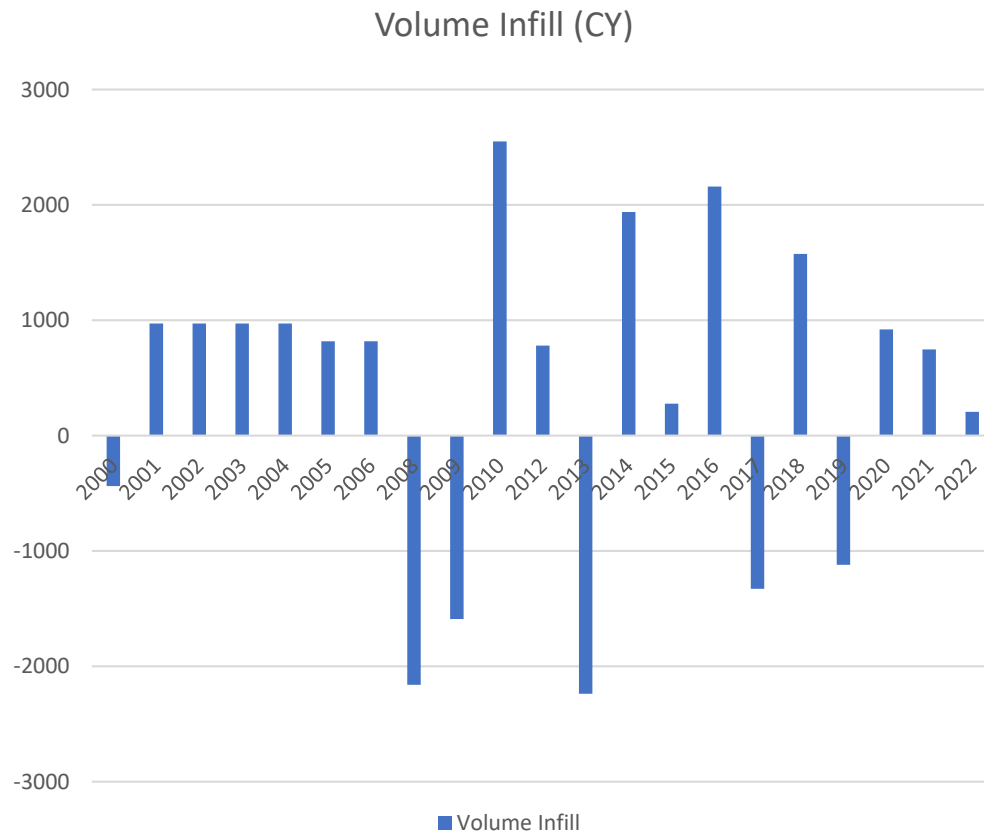


# Sediment Transport



Year	length	Volume Change (yd <sup>3</sup> /ft)	Cell Volume Lost
1998	297.91	0	0
1999	297.91	-64.97	-19355.2127
2000	297.91	-66.44	-19793.1404
2001	297.91	-63.1775	-18821.20903
2002	297.91	-59.915	-17849.27765
2003	297.91	-56.6525	-16877.34628
2004	297.91	-53.39	-15905.4149
2005	297.91	-50.645	-15087.65195
2006	297.91	-47.9	-14269.889
2008	297.91	-55.15	-16429.7365
2009	297.91	-60.49	-18020.5759
2010	297.91	-51.93	-15470.4663
2012	297.91	-49.31	-14689.9421
2013	297.91	-56.82	-16927.2462
2014	297.91	-50.31	-14987.8521
2015	297.91	-49.38	-14710.7958
2016	297.91	-42.13	-12550.9483
2017	297.91	-46.59	-13879.6269
2018	297.91	-41.3	-12303.683
2019	297.91	-45.06	-13423.8246
2020	297.91	-41.97	-12503.2827
2021	297.91	-39.46	-11755.5286
2022	297.91	-38.77	-11549.9707

# Sediment Transport

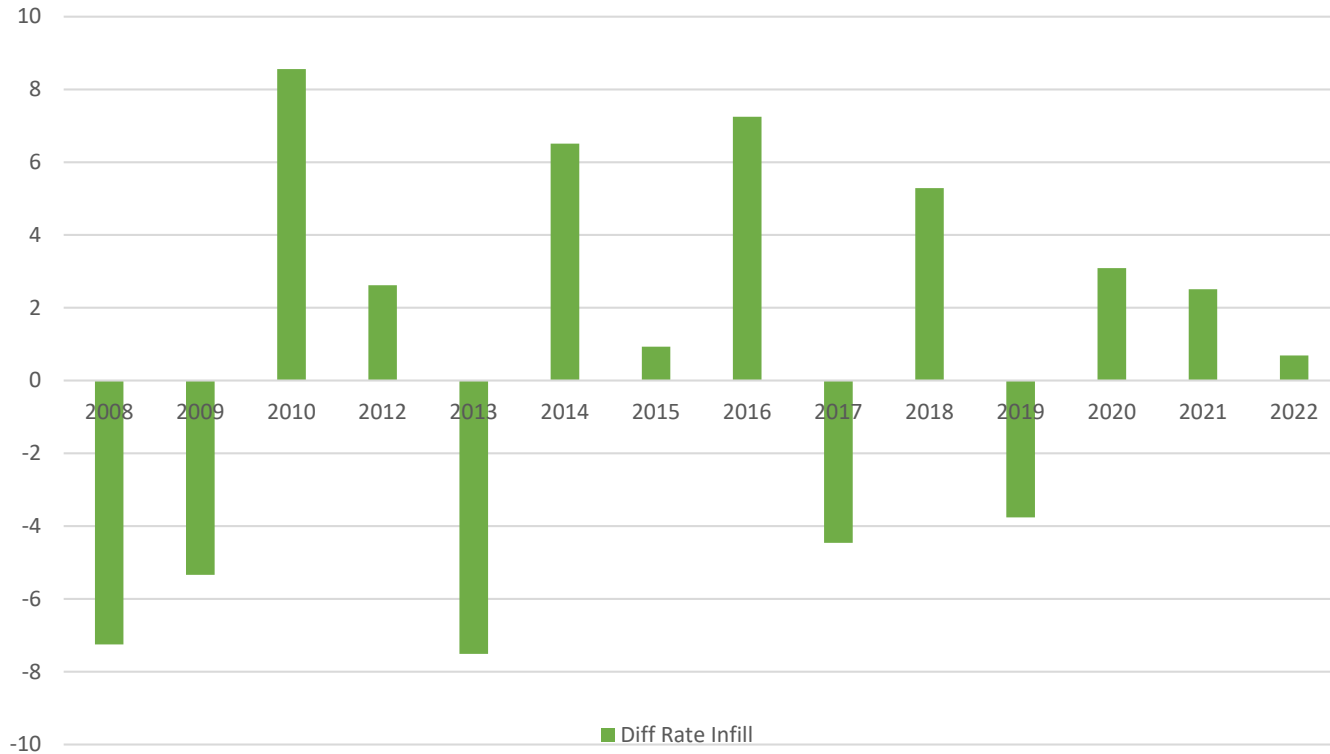


- 2000-2006 positive infill likely due to side sloughing
- Roughly 4 years after re-nourishment projects, the largest infilling rates occurred (2006, 2012)

# Sediment Transport



Diff Rate Infill



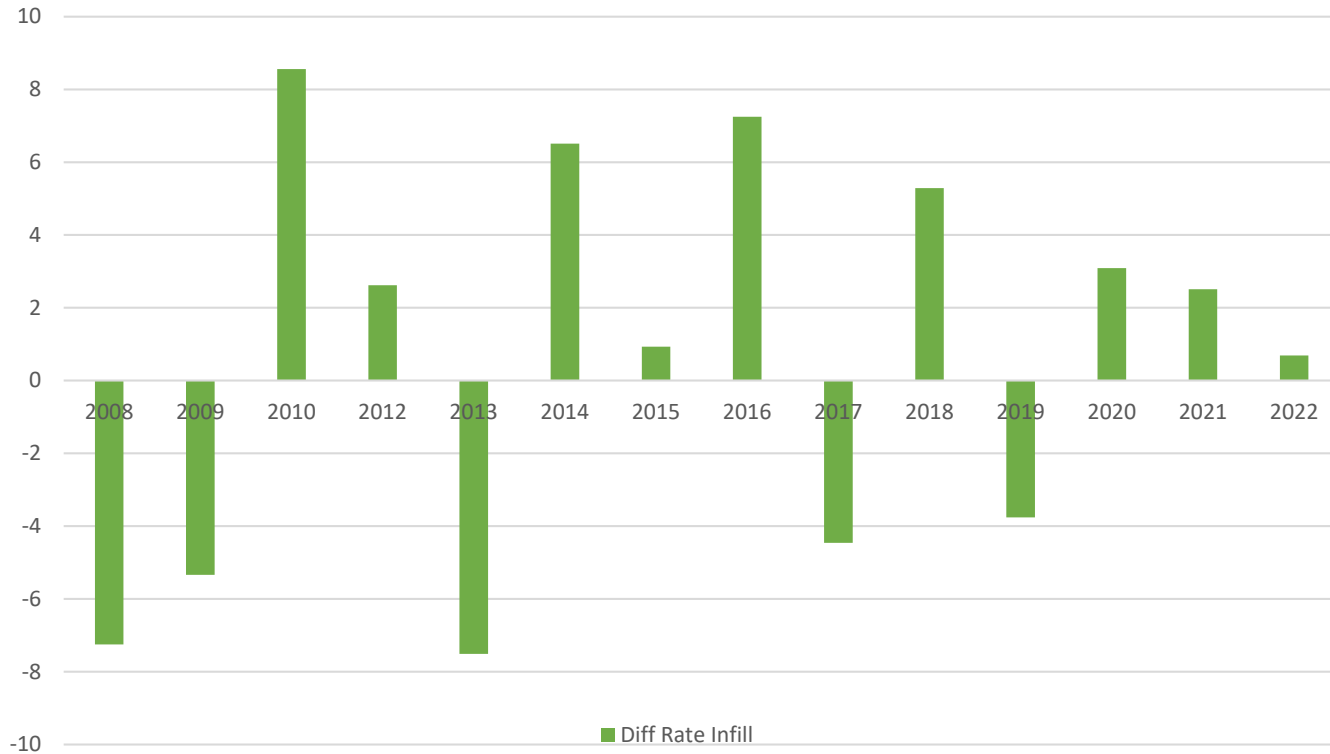
Year	Rate CY/ft)
<b>2008</b>	<b>-7.25</b>
<b>2009</b>	<b>-5.34</b>
<b>2010</b>	<b>8.56</b>
<b>2012</b>	<b>2.62</b>
<b>2013</b>	<b>-7.51</b>
<b>2014</b>	<b>6.51</b>
<b>2015</b>	<b>0.93</b>
<b>2016</b>	<b>7.25</b>
<b>2017</b>	<b>-4.46</b>
<b>2018</b>	<b>5.29</b>
<b>2019</b>	<b>-3.76</b>
<b>2020</b>	<b>3.09</b>
<b>2021</b>	<b>2.51</b>
<b>2022</b>	<b>0.69</b>



# Sediment Transport



Diff Rate Infill



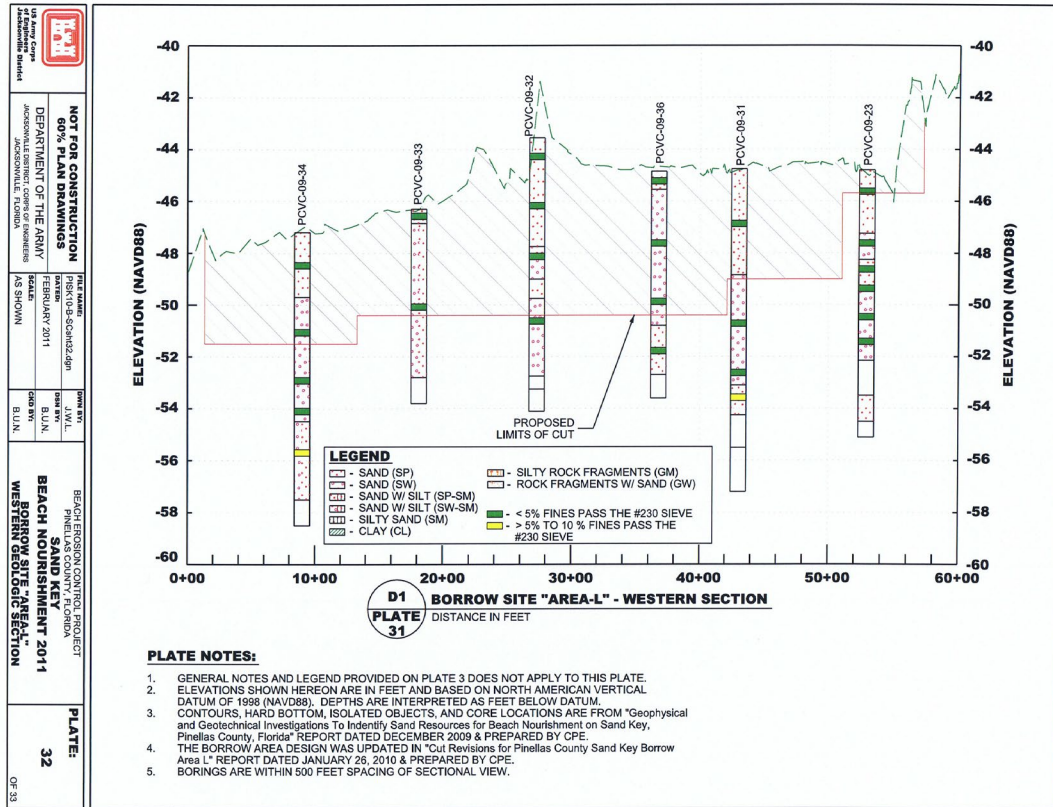
	Volume Infilling (CY)	Years	Volume/Year Per Cell	Volume/per foot/Year
2008-2022	4879.7658	14	348.5547	1.17
2015-2022	3160.8251	7	451.5464429	1.515714286
2019-2022	1873.8539	3	624.6179667	2.096666667

A large yellow circle is positioned on the left side of the slide, partially cut off by the edge.

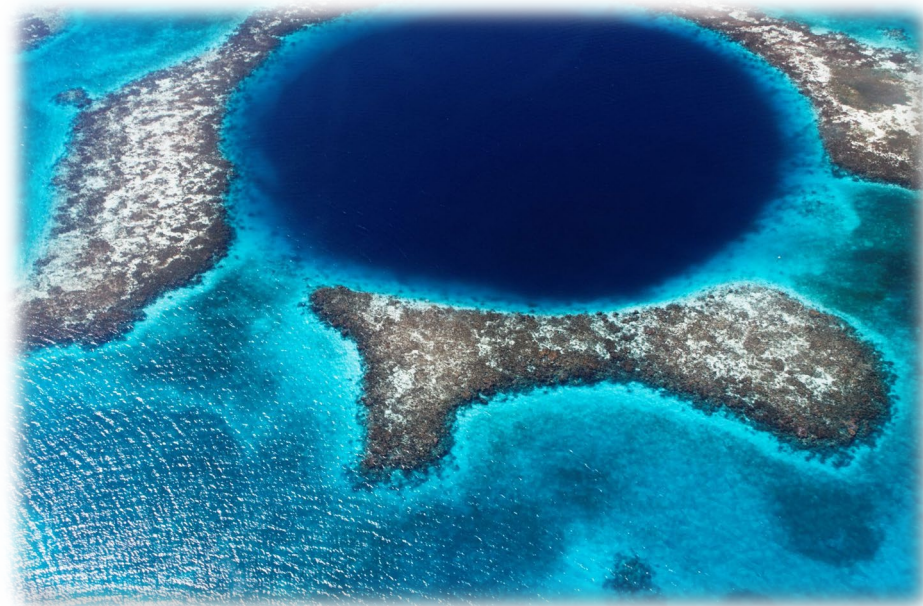
## So What Is It?

- Here's the facts:
  - Occurred between 1998-1999 as shown in profiles
  - About 20K CY of material is missing
  - Happened at the same time as the 1998/1999 Nourishment Project
  - Borrow area for the Sand Key Project was Egmont Shoals

# Possibilities



- Possible Dredge Pit?
- Sinkhole?



PERMIT # 238664001

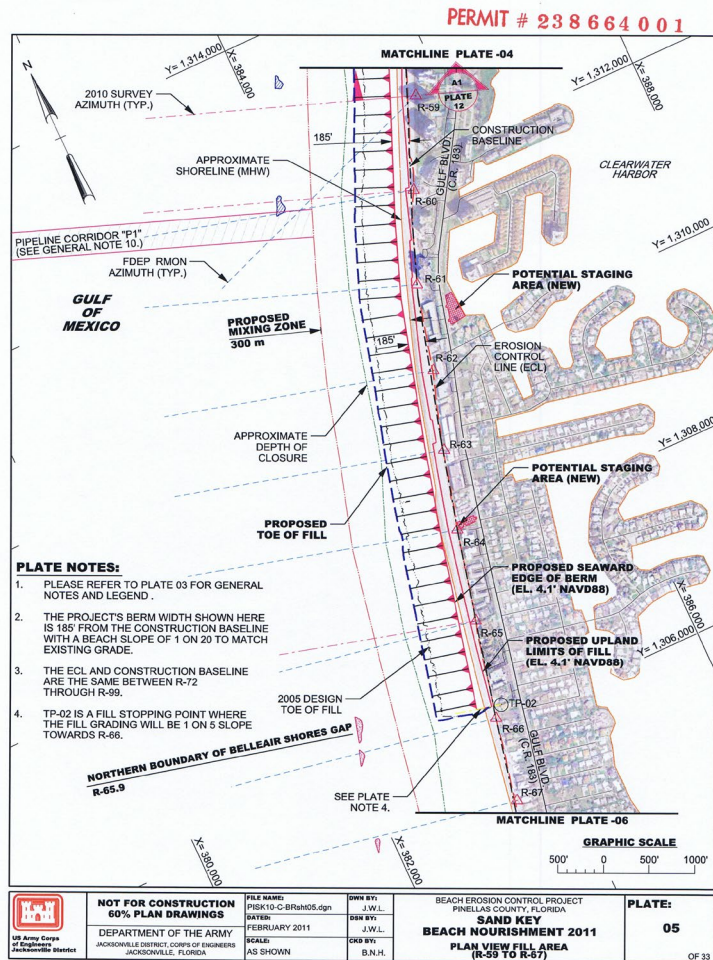
# Possibilities



- The 1998-1999 Sand Key Project took sand from Egmont Shoals
- Used Spider Barge Technique
- Unlikely dredge would come up to the project area since sand is being barged from Egmont Key BA



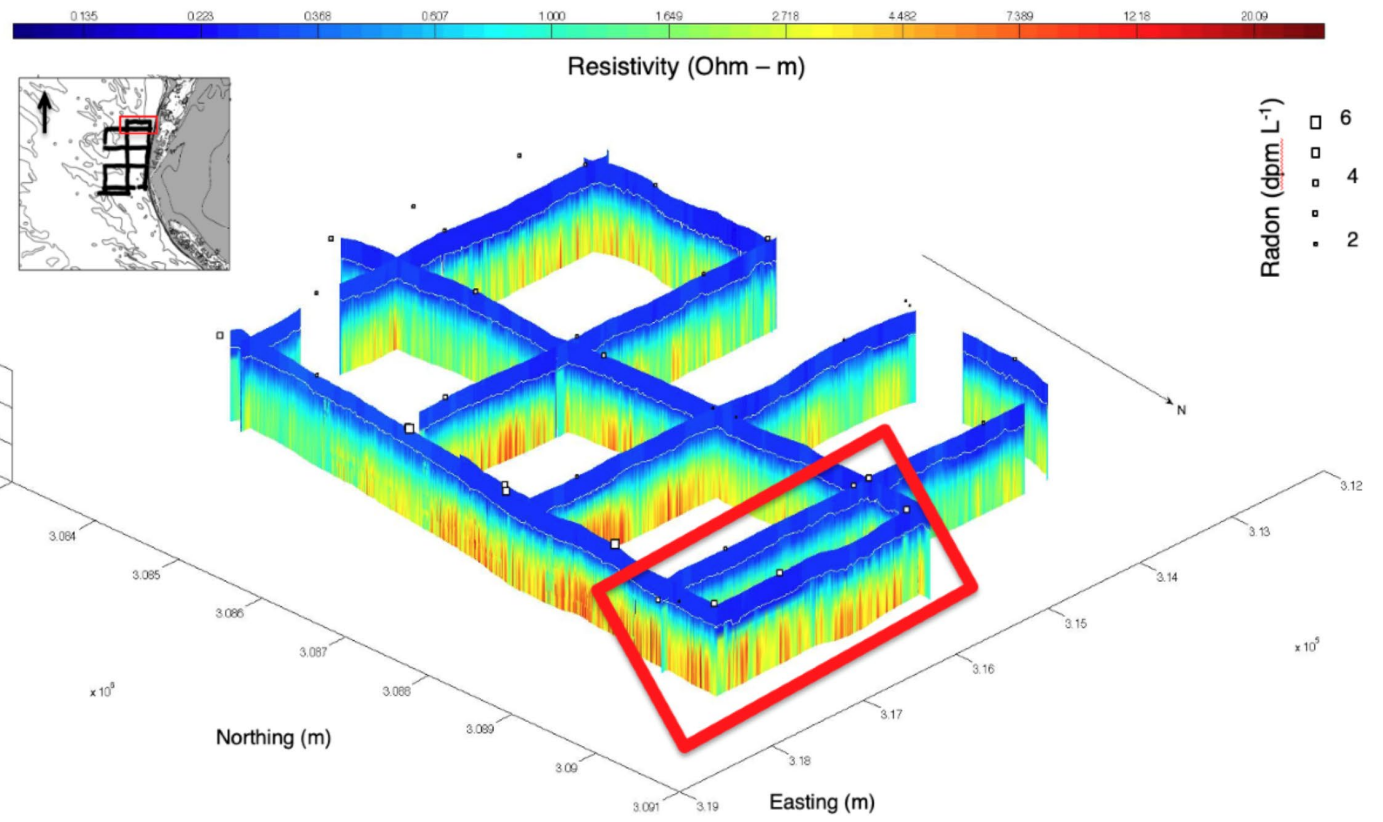
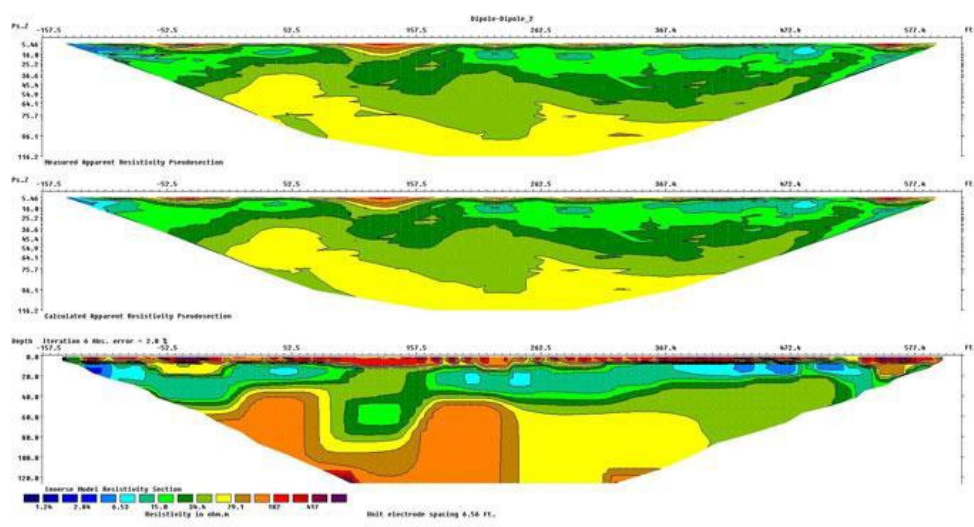
# Possibilities



Pipeline burial and retrieval could be a possibility but pipeline corridor is to the north.

Same Pipeline corridors have been used since the initial 1998-1999 restoration project

## Offshore Geophysical & Geochemical Surveys

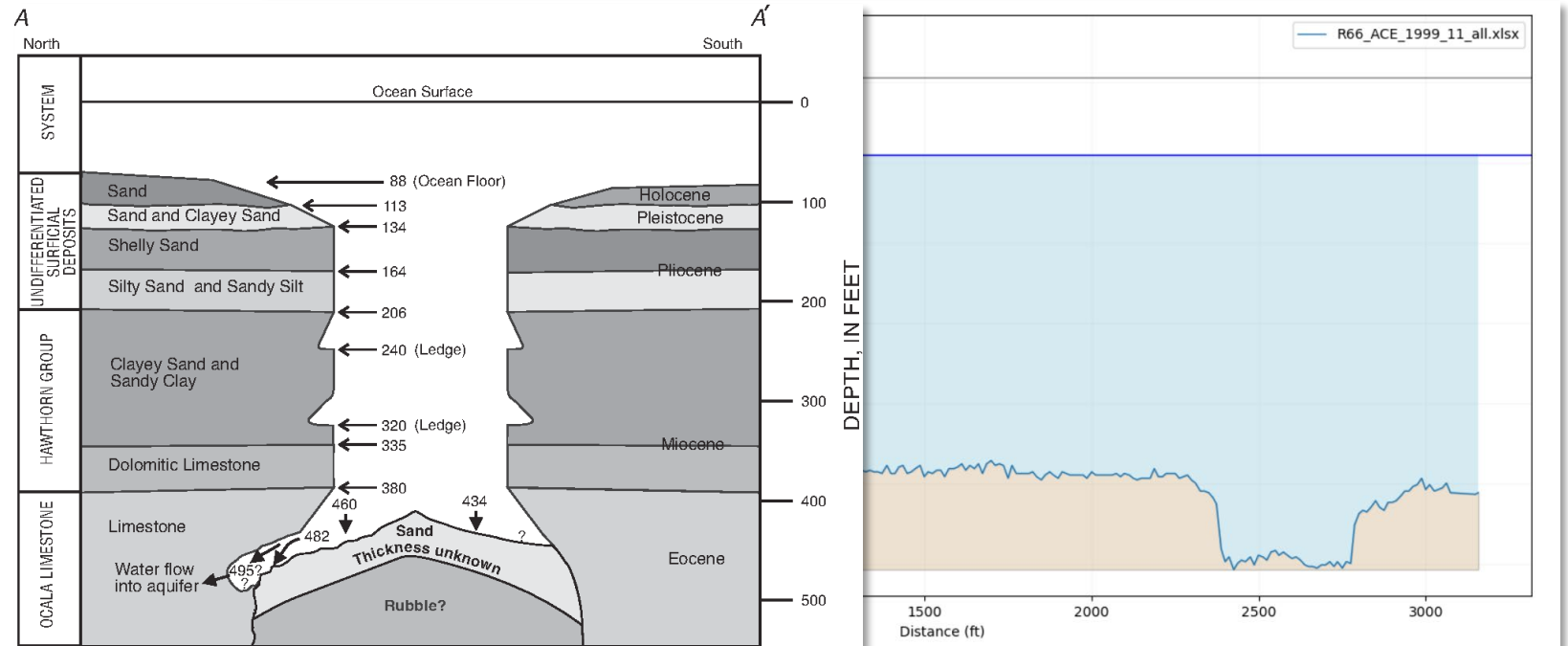


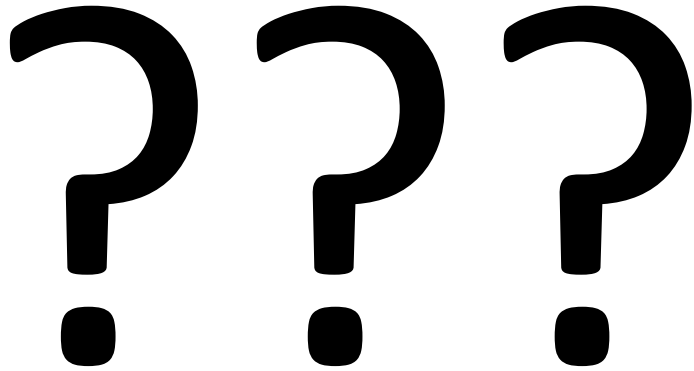
# Possibilities

## Subsidence Reports-FGS



Upland Pinellas Considered Area III where cover collapse sinkholes are dominate and can vary in size





- Take a Salinity meter to see if there is any change in salinity (i.e. freshwater interchange)
- Fine resolution water temp data to again see if there is any submarine groundwater discharge occurring
- Other ideas?
- Someone here already knows what it is?



QUESTIONS???

Thank You!!!