Coastal Monuments and Beach Profiles

Historical Perspective and Future Vision

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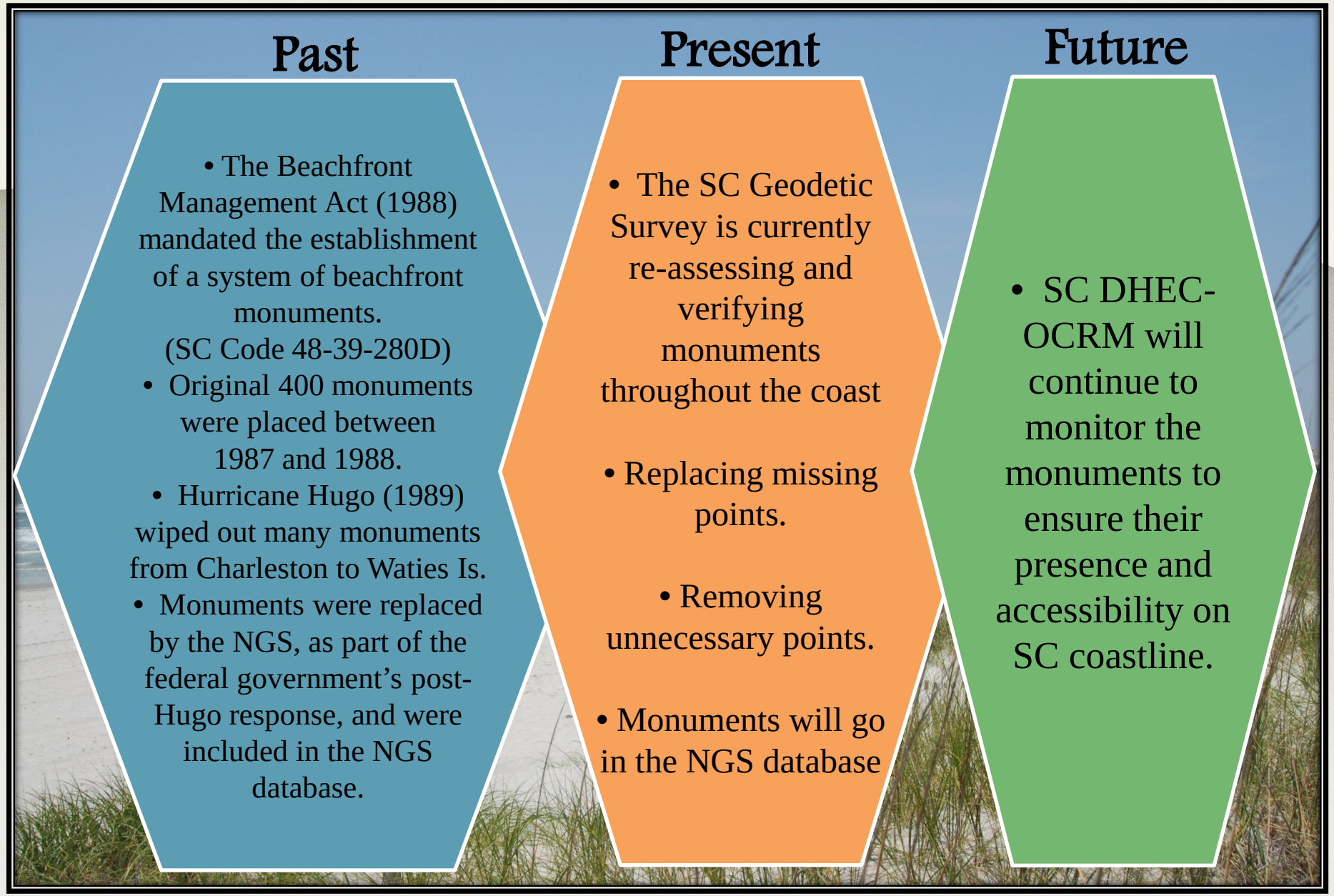
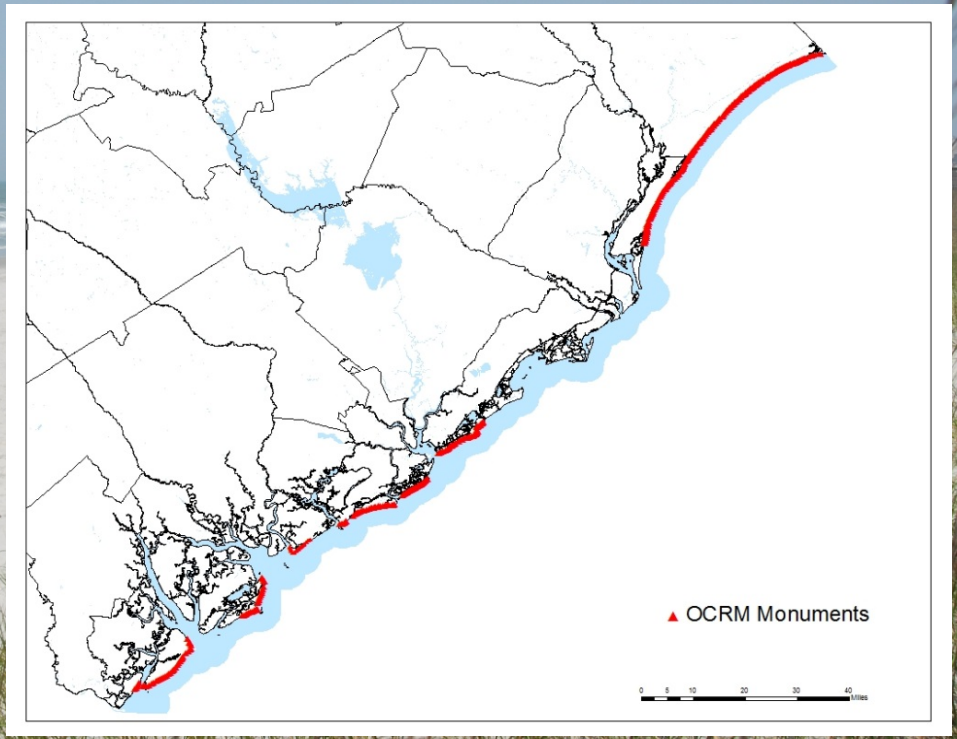
Coastal Monuments: Past, Present, and Future



Beach Profile Monumentation

•In establishing the Council's network of beach profile monitoring stations an effort was made to recover survey points where data existed from previous studies. Nearly eighty percent (80%) of South Carolina's developed shoreline had been monitored at some time in the past and much of the data has been archived as part of the program.

Beach profiling monitoring stations, marked by a geodetic control disks are located every 1000 feet along developed beaches and every 2000 feet along undeveloped beaches



BERM: Beachfront Erosion Monitoring

Past

- Monitoring of beach profiles at each of the monuments was also established with the Beachfront Management Act of 1988.
- Profiles provide an annual snapshot of beach conditions and sand volume.
- Initially, traditional survey methods were used (rod and level).
- Data was only collected to low tide mark (no bathymetric).

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BERM: Beachfront Erosion Monitoring

Past

- After the NGS re-established the monuments, GPS technology was used.
- In the early 90's, Coastal Carolina University, under contract with DHEC-OCRM, started bathymetric collection using a buggy system.
- In the late 90's, this was replaced with a boat equipped with GPS and a fathometer.

BERM: Beachfront Erosion Monitoring

Present and Future

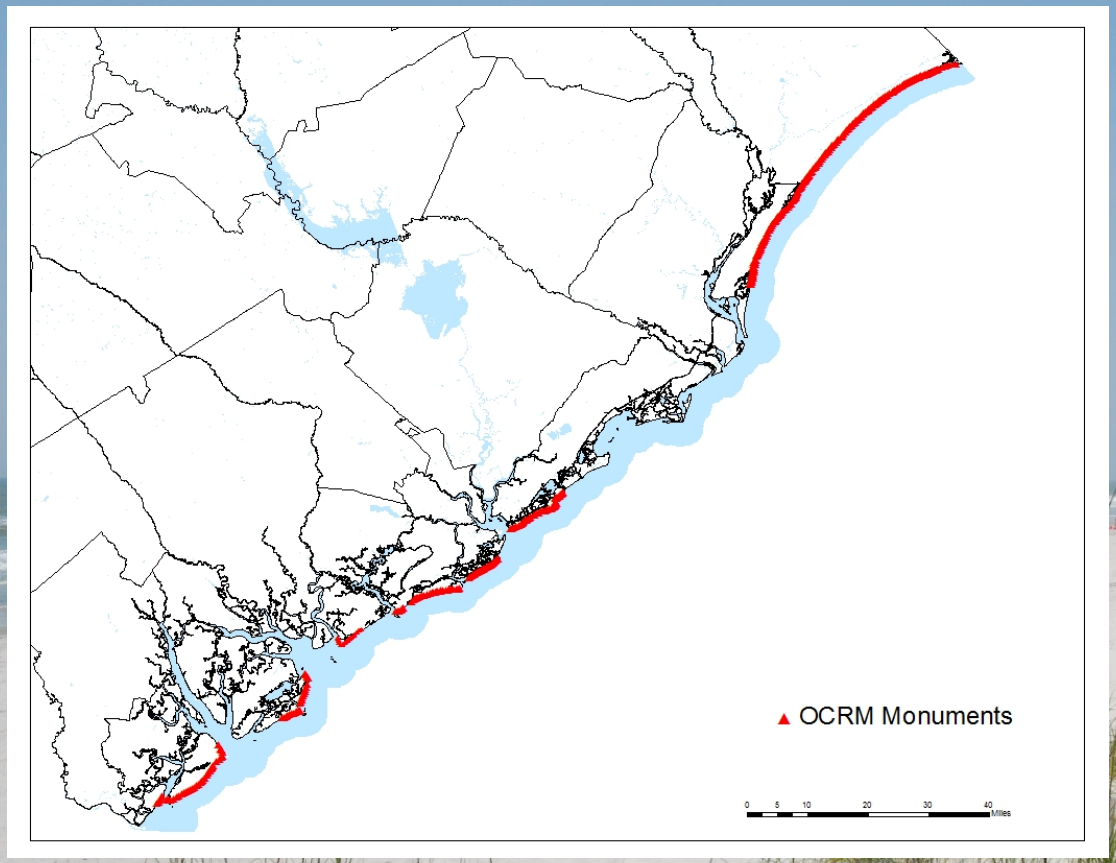
• Currently, beach profiles are collected with a survey grade GPS unit, accessing the SC VRS system, in conjunction with a GPS equipped vessel and HYPACK software.

•Profiles are surveyed following a significant storm to assess erosion and rec

Data Use: Monuments

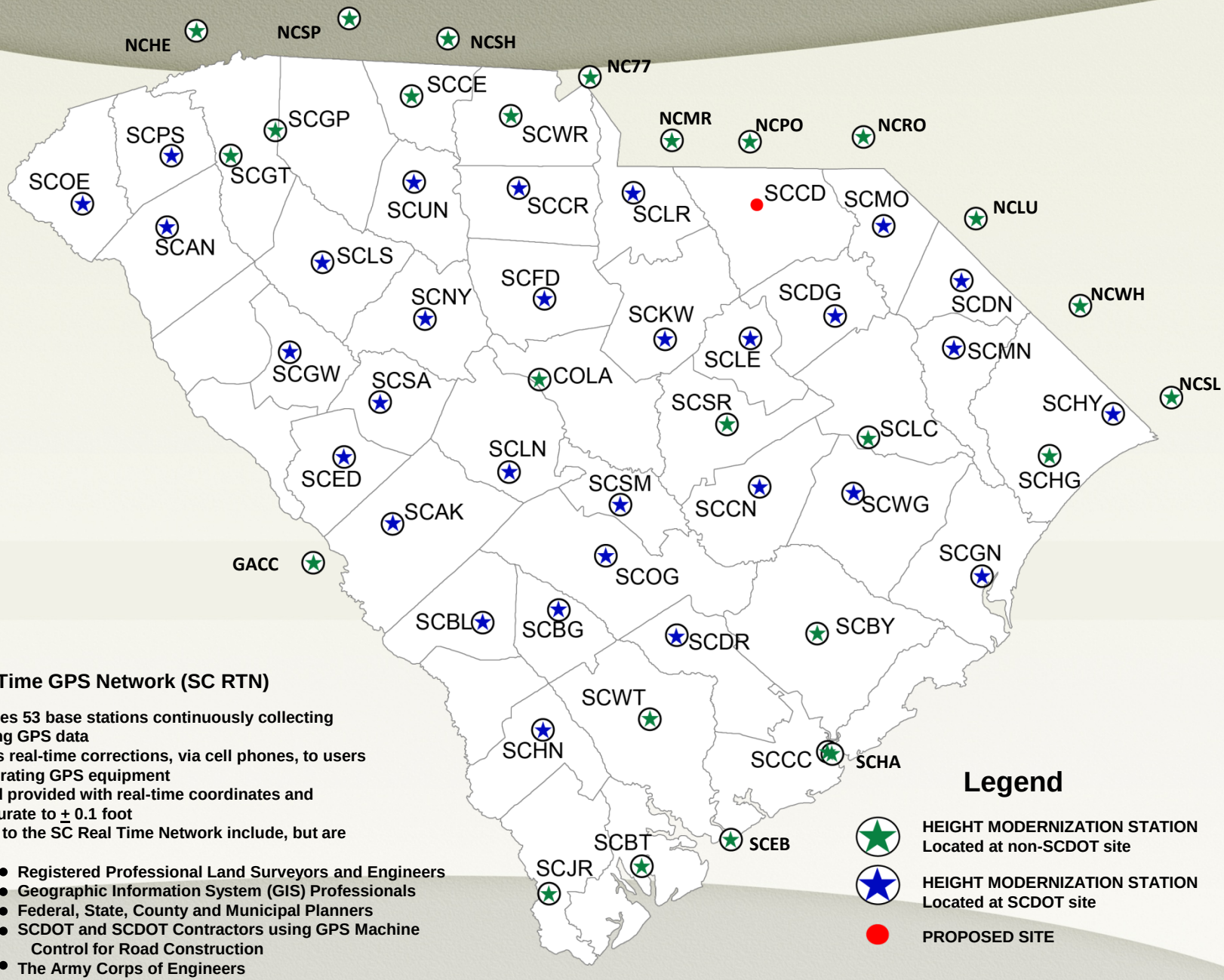
- Monuments serve as the location where transects are established to use in long term long-term erosion rate calculations.
- Monument coordinates serve a larger community of surveyors and consultants for numerous purposes.
- These coordinates are downloadable through the survey packets in SCDHEC's Beach Jurisdiction Web Application.

The Project



- 560 monuments in the project
- Recovered all of the stations using a stakeout option
- 2 ten minute observations
- Break project into 3 smaller projects

The South Carolina Real Time Network



SC Real Time GPS Network (SC RTN)

- SC RTN comprises 53 base stations continuously collecting and transmitting GPS data
- SC RTN provides real-time corrections, via cell phones, to users in the field operating GPS equipment
- Users in the field provided with real-time coordinates and elevations accurate to ± 0.1 foot
- 471 Subscribers to the SC Real Time Network include, but are not limited to:
  - Registered Professional Land Surveyors and Engineers
  - Geographic Information System (GIS) Professionals
  - Federal, State, County and Municipal Planners
  - SCDOT and SCDOT Contractors using GPS Machine Control for Road Construction
  - The Army Corps of Engineers

Legend

HEIGHT MODERNIZATION STATION
Located at non-SCDOT site

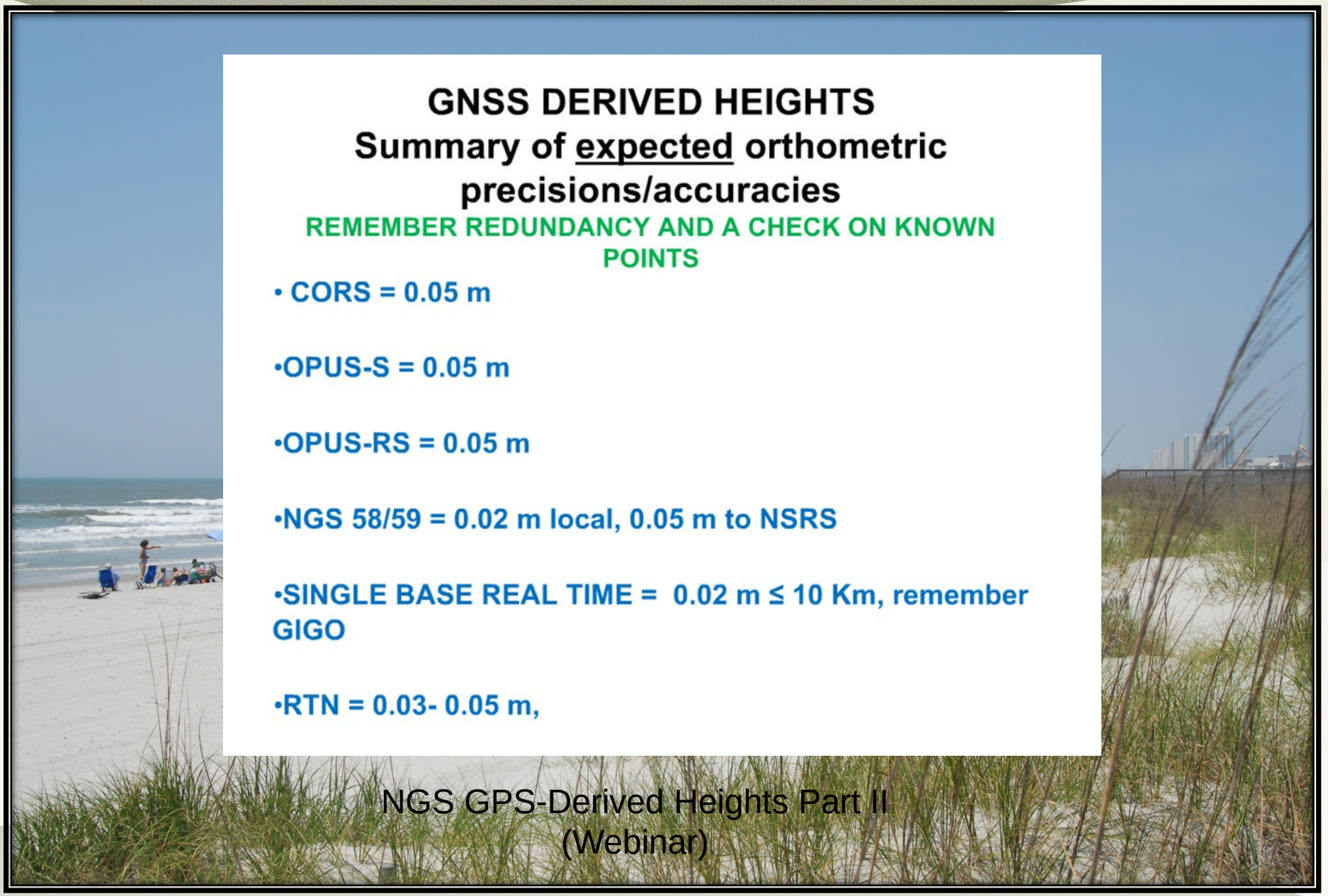
HEIGHT MODERNIZATION STATION
Located at SCDOT site

PROPOSED SITE

QUICK FIELD SUMMARY:

- Set the base at a wide open site
- Set rover elevation mask between 12° & 15°
- The more satellites the better
- The lower the PDOP the better
- The more redundancy the better
- Beware multipath
- Beware long initialization times
- Beware antenna height blunders
- Survey with “fixed” solutions only
- Always check known points before, during and after new location sessions
- Keep equipment adjusted for highest accuracy
- Communication should be continuous while locating a point
- Precision displayed in the data collector can be at the 68 percent confidence level, which is only about half the error spread to get 95 percent confidence
- Have back up batteries & cables
- RT doesn’t like tree canopy or tall buildings

Guidelines from NGS

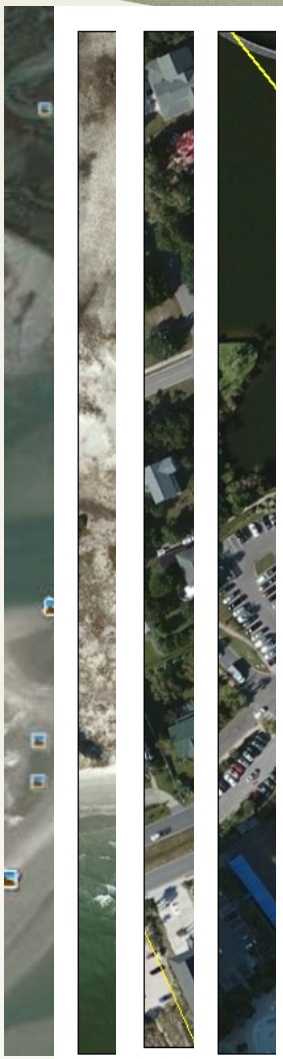


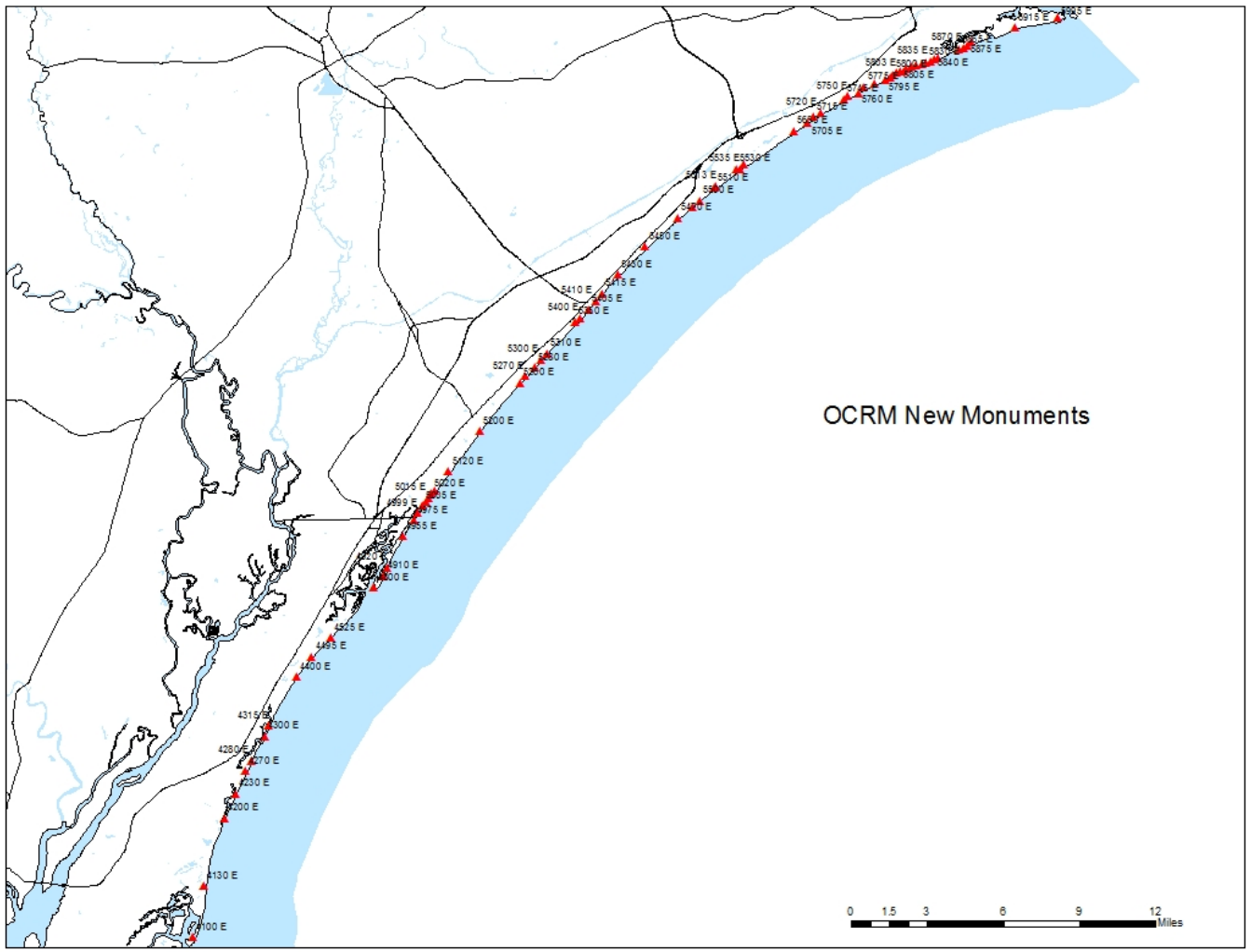
GNSS DERIVED HEIGHTS
Summary of expected orthometric precisions/accuracies

REMEMBER REDUNDANCY AND A CHECK ON KNOWN POINTS

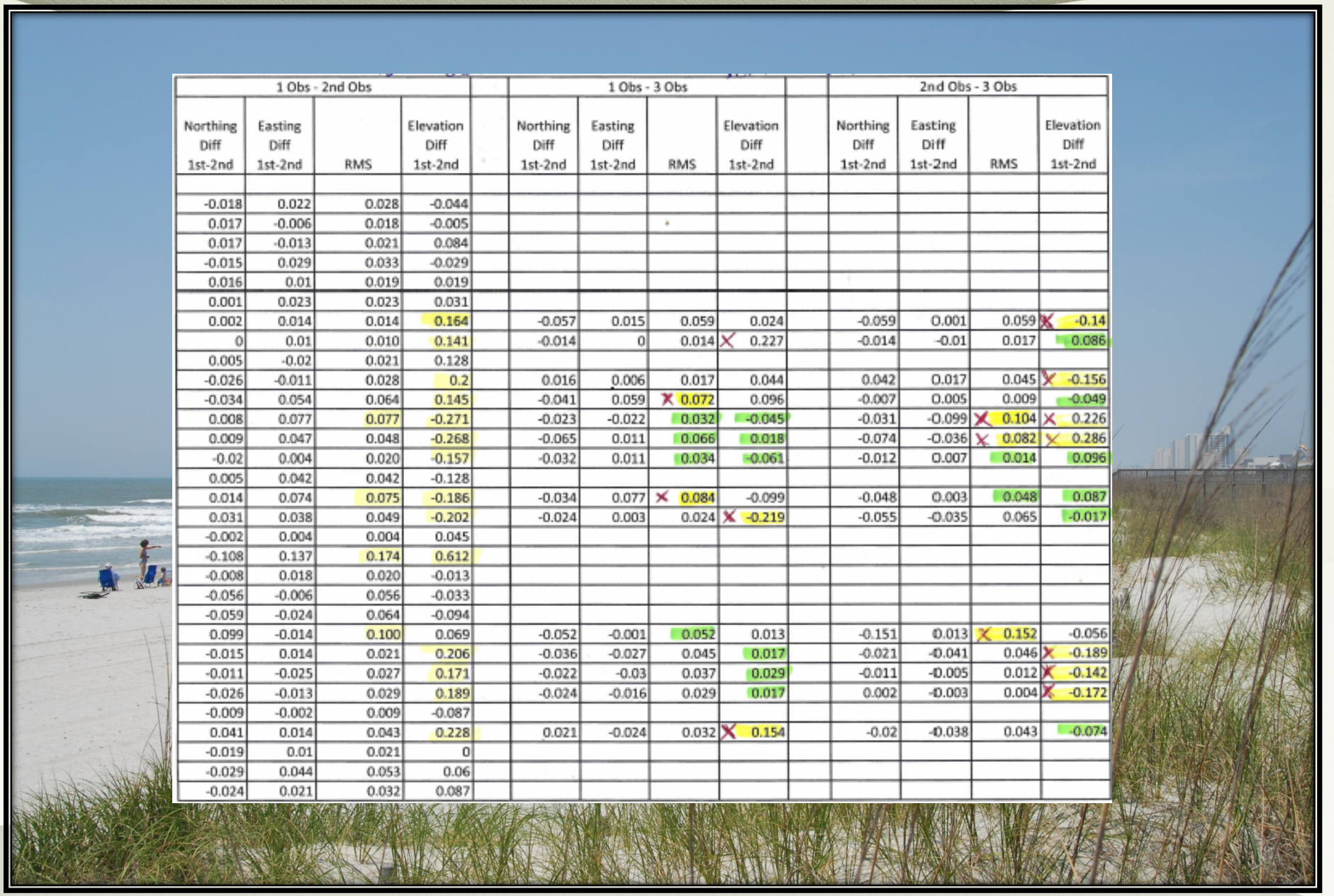
- CORS = 0.05 m
- OPUS-S = 0.05 m
- OPUS-RS = 0.05 m
- NGS 58/59 = 0.02 m local, 0.05 m to NSRS
- SINGLE BASE REAL TIME = 0.02 m ≤ 10 Km, remember GIGO
- RTN = 0.03- 0.05 m,

New “E” Monuments



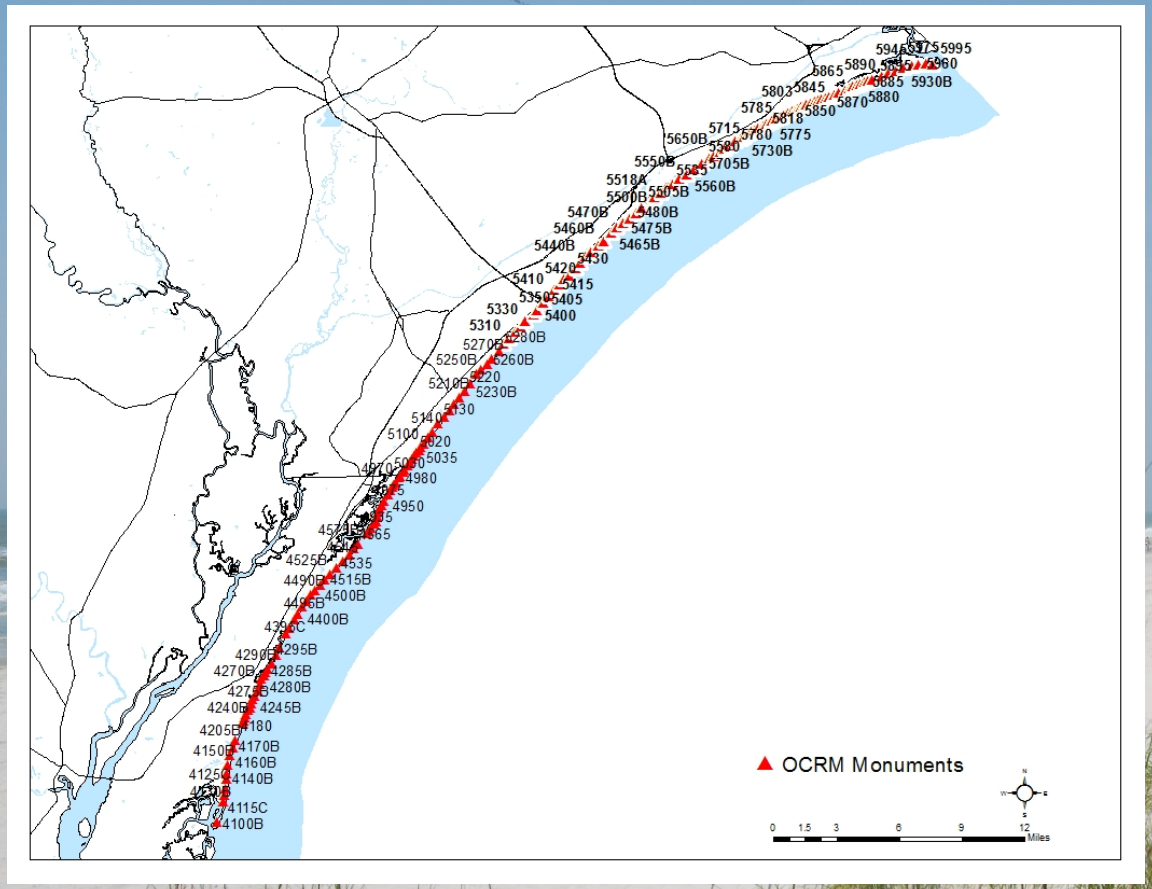


Calculations from Project



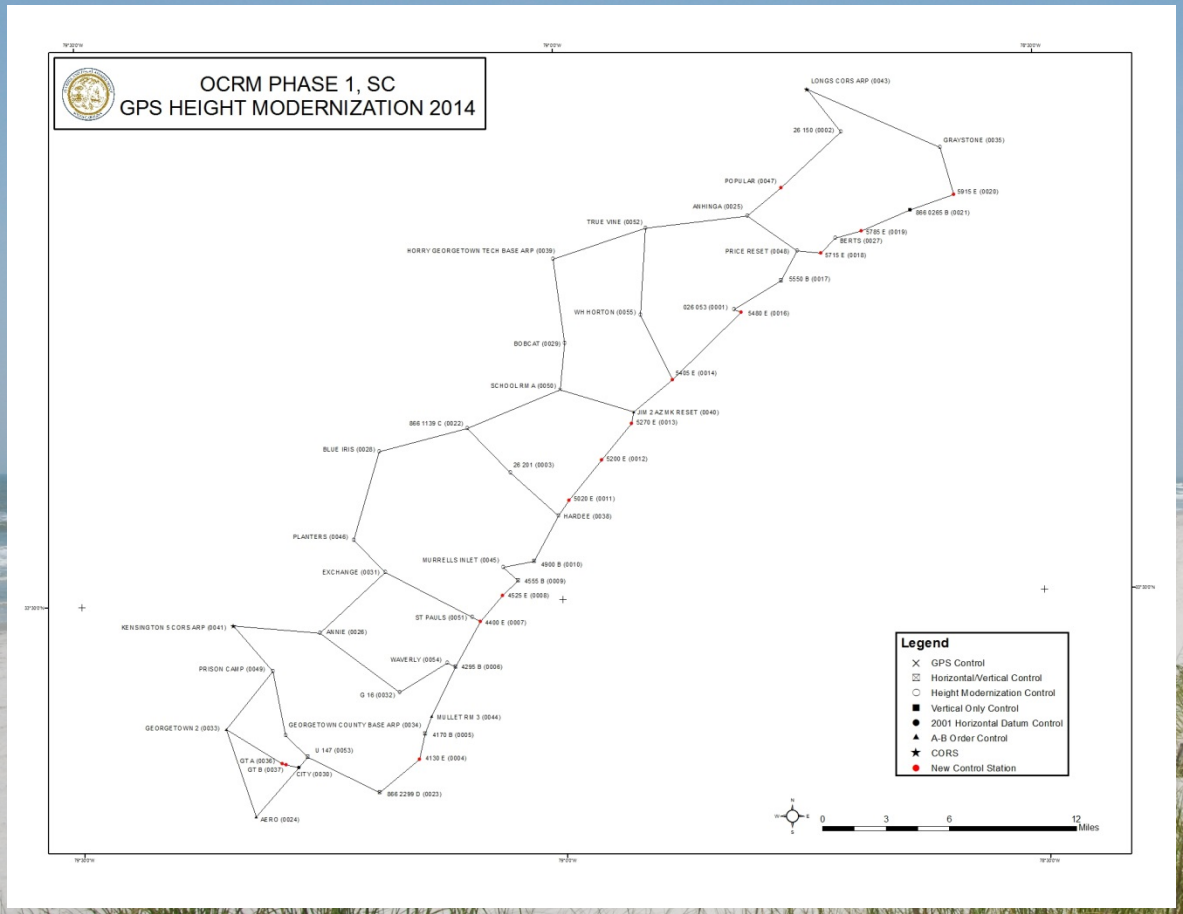
1 Obs - 2nd Obs				1 Obs - 3 Obs				2nd Obs - 3 Obs			
Northing Diff 1st-2nd	Easting Diff 1st-2nd	RMS	Elevation Diff 1st-2nd	Northing Diff 1st-2nd	Easting Diff 1st-2nd	RMS	Elevation Diff 1st-2nd	Northing Diff 1st-2nd	Easting Diff 1st-2nd	RMS	Elevation Diff 1st-2nd
-0.018	0.022	0.028	-0.044								
0.017	-0.006	0.018	-0.005								
0.017	-0.013	0.021	0.084								
-0.015	0.029	0.033	-0.029								
0.016	0.01	0.019	0.019								
0.001	0.023	0.023	0.031								
0.002	0.014	0.014	0.164	-0.057	0.015	0.059	0.024	-0.059	0.001	0.059	-0.14
0	0.01	0.010	0.141	-0.014	0	0.014	0.227	-0.014	-0.01	0.017	0.086
0.005	-0.02	0.021	0.128								
-0.026	-0.011	0.028	0.2	0.016	0.006	0.017	0.044	0.042	0.017	0.045	-0.156
-0.034	0.054	0.064	0.145	-0.041	0.059	0.072	0.096	-0.007	0.005	0.009	-0.049
0.008	0.077	0.077	-0.271	-0.023	-0.022	0.032	-0.045	-0.031	-0.099	0.104	0.226
0.009	0.047	0.048	-0.268	-0.065	0.011	0.066	0.018	-0.074	-0.036	0.082	0.286
-0.02	0.004	0.020	-0.157	-0.032	0.011	0.034	-0.061	-0.012	0.007	0.014	0.096
0.005	0.042	0.042	-0.128								
0.014	0.074	0.075	-0.186	-0.034	0.077	0.084	-0.099	-0.048	0.003	0.048	0.087
0.031	0.038	0.049	-0.202	-0.024	0.003	0.024	-0.219	-0.055	-0.035	0.065	-0.017
-0.002	0.004	0.004	0.045								
-0.108	0.137	0.174	0.612								
-0.008	0.018	0.020	-0.013								
-0.056	-0.006	0.056	-0.033								
-0.059	-0.024	0.064	-0.094								
0.099	-0.014	0.100	0.069	-0.052	-0.001	0.052	0.013	-0.151	0.013	0.152	-0.056
-0.015	0.014	0.021	0.206	-0.036	-0.027	0.045	0.017	-0.021	-0.041	0.046	-0.189
-0.011	-0.025	0.027	0.171	-0.022	-0.03	0.037	0.029	-0.011	-0.005	0.012	-0.142
-0.026	-0.013	0.029	0.189	-0.024	-0.016	0.029	0.017	0.002	-0.003	0.004	-0.172
-0.009	-0.002	0.009	-0.087								
0.041	0.014	0.043	0.228	0.021	-0.024	0.032	0.154	-0.02	-0.038	0.043	-0.074
-0.019	0.01	0.021	0								
-0.029	0.044	0.053	0.06								
-0.024	0.021	0.032	0.087								

Project 1 ~ The Grand Strand



- 172 monuments in this project
- 73 new monuments designated by number and letter E
- 2 ten minute observations

Project 1 – Height Modernization



- 22 OCRM monuments in this part of the project
- Two to three mile spacing between monuments
- 2 60 minute observations

Data Use: Monuments

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- Monument coordinates serve a larger community of surveyors and consultants for numerous purposes.
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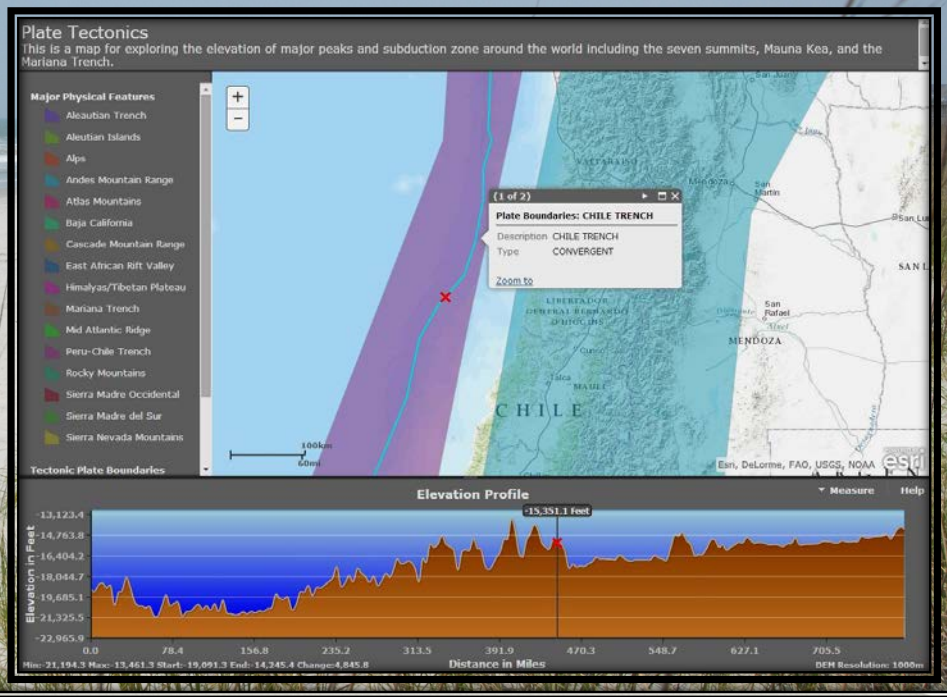
Data Use: BERM – Beach Profile Monitoring

Past and Present

- Beach profile data feeds into the annual **State of the Beaches Report**.
- Profiles help identify most dynamic and at-risk areas.
- Beach profiles allow a look at the effects of near shore alterations, including groins, erosion control devices and beach renourishment

Future

- **Enhanced State of Beaches Report** will be released in 2015 with state-ranking of beaches for renourishment
- Beach Profile data accessed through a web application



Acknowledgements and Contacts

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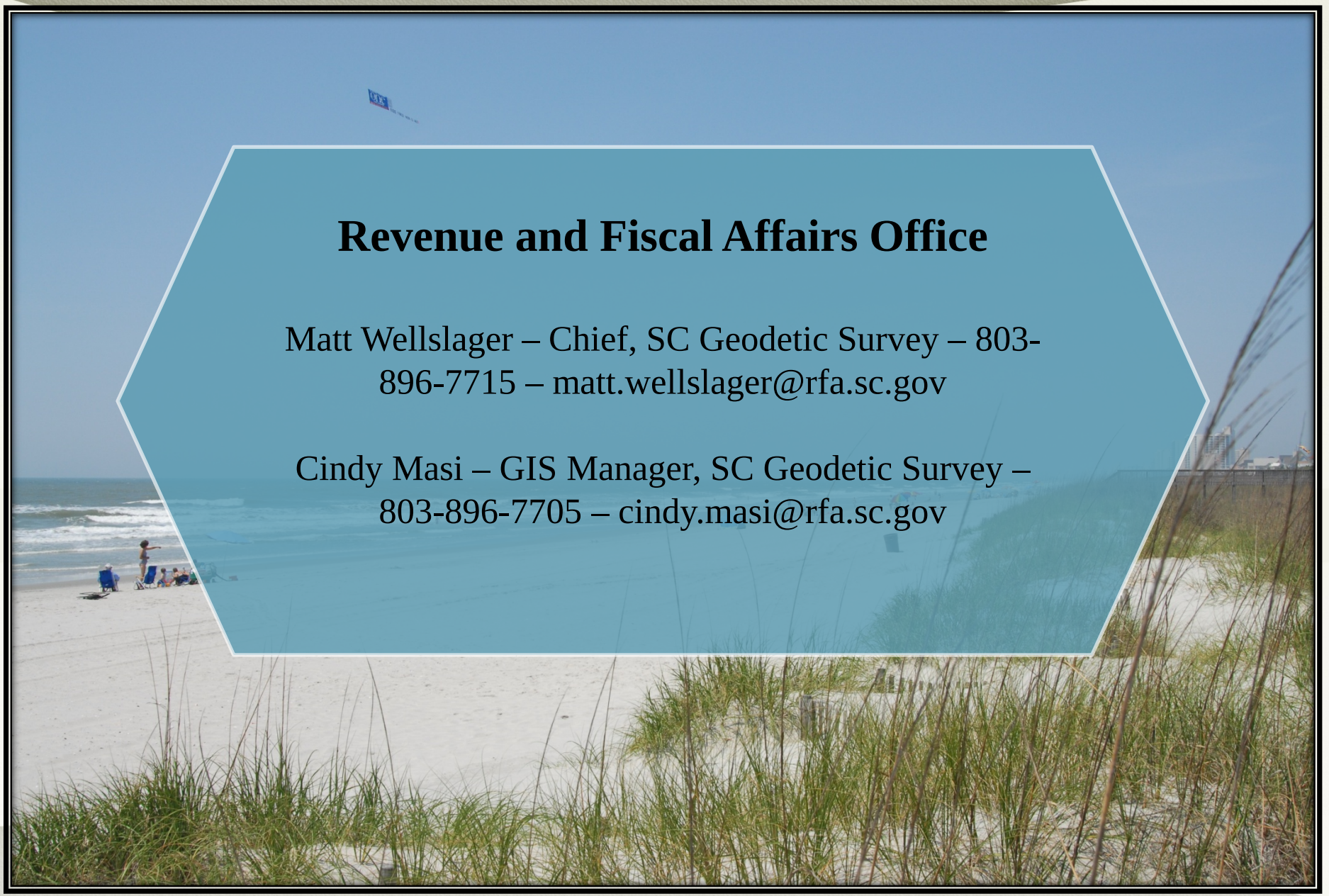
Contacts



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Thank-you