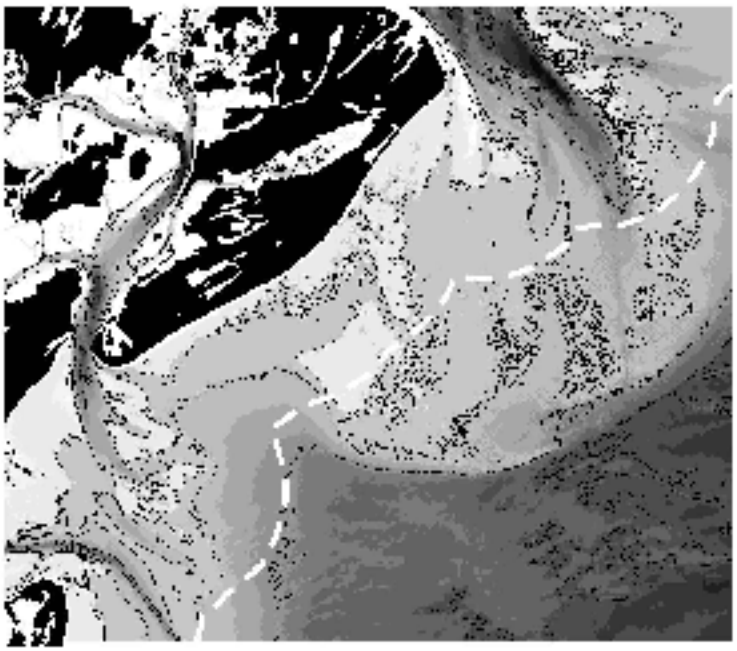
FINAL REPORT

Assessment of Beach Renourishmnet resources on the Inner Shelf of Hilton Head Island, SC



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South Carolina Task Force on Offshore Resources
a cooperative program with the
State of South Carolina
and the Minerals Management Service

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Executive Summary

This study examined the sand resources offshore of Hilton Head Island using over 270 trackline-km of high-resolution seismic data, 63 surficial sediment samples and 8 vibracore samples. The findings suggest that the previously identified landward portion of Gaskin Banks (Olsen and Associates, Inc., 1986) remains the closest and best sand resource site. The seaward portion of the site is composed of a thin (<2m) clean sand layer overlying prograding clinoforms. The sand, however, has lower Ra values. In deeper water to the south of the Banks, an area of clean sands with higher carbonate values was indicated through surficial sediment analysis. The depth of the surface layer, however, was unobtainable with the high-resolution seismic data collected. In the deeper water to the southwest of the banks, higher mud content in the surficial samples, and increasing mud content within the first meter of the cores, eliminate this area as a potential resource site.

Introduction

The South Carolina Task Force on Offshore Resources was established through funding from the Minerals Management Service INTERMAR program to compile sand, mineral, and hard bottom resource data for the inner continental shelf of South Carolina. The objective of the Task Force is to facilitate the efficient use of the state's resources while ensuring such use will incorporate environmentally-sound planning. The Task Force was designed to be a five-year program to compile and update a database relative to program goals and undertake new studies to document sand, mineral and hard-bottom resources that exist on the state's coastal ocean shelf from the shoreline to 16 kilometers (10 miles) offshore where existing data are limited.

Previous Task Force Activities

The goal of the first year of the Task Force was to assemble existing biological and geological information and identify areas where additional sand resource information was needed. That effort was presented in a combined Task Force Final Report in April of 1994 (Van Dolah et al., 1994a).

The main goal of the second and third years of the Task Force was to assemble the Year I database into a GIS system and begin a phased, field study gathering relevant information to assess beach renourishment resources off of the South Carolina coast. The sites of these surveys were established to provide such data in areas which are in need of these resources and for which existing data are limited or inadequate.

Overall accomplishments of the first three years of the program include:

1. a detailed review and synthesis of existing information on the physical and biological conditions in the coastal zone (Van Dolah et al., 1994b);
2. development of extensive computer databases on bottom habitat characteristics in both an easily accessible PC format and an ARC/INFO Geographic Information System maintained by South Carolina Marine Resources Division (SCMRD);
3. Collection and synthesis of additional data from geologic and geophysical surveys of the inner shelf off Folly Beach and Edisto Island, South Carolina (Gayes and Donovan-Ealy, 1995);
4. Development of a database on aerial imagery available for the South Carolina coastline which is maintained at the College of Charleston;
5. An evaluation of shoreline migration rates and sediment budgets for Seabrook, Kiawah and Folly Island (Katuna, et al., 1995); and
6. An evaluation of computer image processing methods to analyze shoreline change using aerial photography.

Copies of these reports are available through South Carolina Department of Natural Resources (SCDNR) and through the worldwide web via the Minerals Management Service INTERMAR homepage (www.mms.gov/intermar/south.htm).

The South Carolina Task Force on Offshore Resources - Year IV

The goal and specific associated tasks of the third year of the program were to:

1. Continue the phased mapping effort to delineate potential sand resources in the offshore zone near erosional beaches in the state. This phase was to focus on the inner shelf off of Hilton Head Island (Figure 1) seaward of the inshore surveys recently completed by Olsen and Associates (1994);
2. Synthesize the data obtained in Objective 1 and other recently collected data available throughout the state waters into the existing INTERMAR Databases;
3. Complete an ortho-image analysis of the Edisto Beach shoreline for inclusion into the larger ortho-image database currently being maintained by the Office of Ocean and Coastal Resource Management (OCRM)

This report documents the contributions of the Center for Marine and Wetland Studies (CMWS) at Coastal Carolina University (CCU) to the Task Force's Year IV efforts. CMWS had the responsibility of conducting a reconnaissance survey of sand resources offshore of Hilton Head Island, South Carolina.

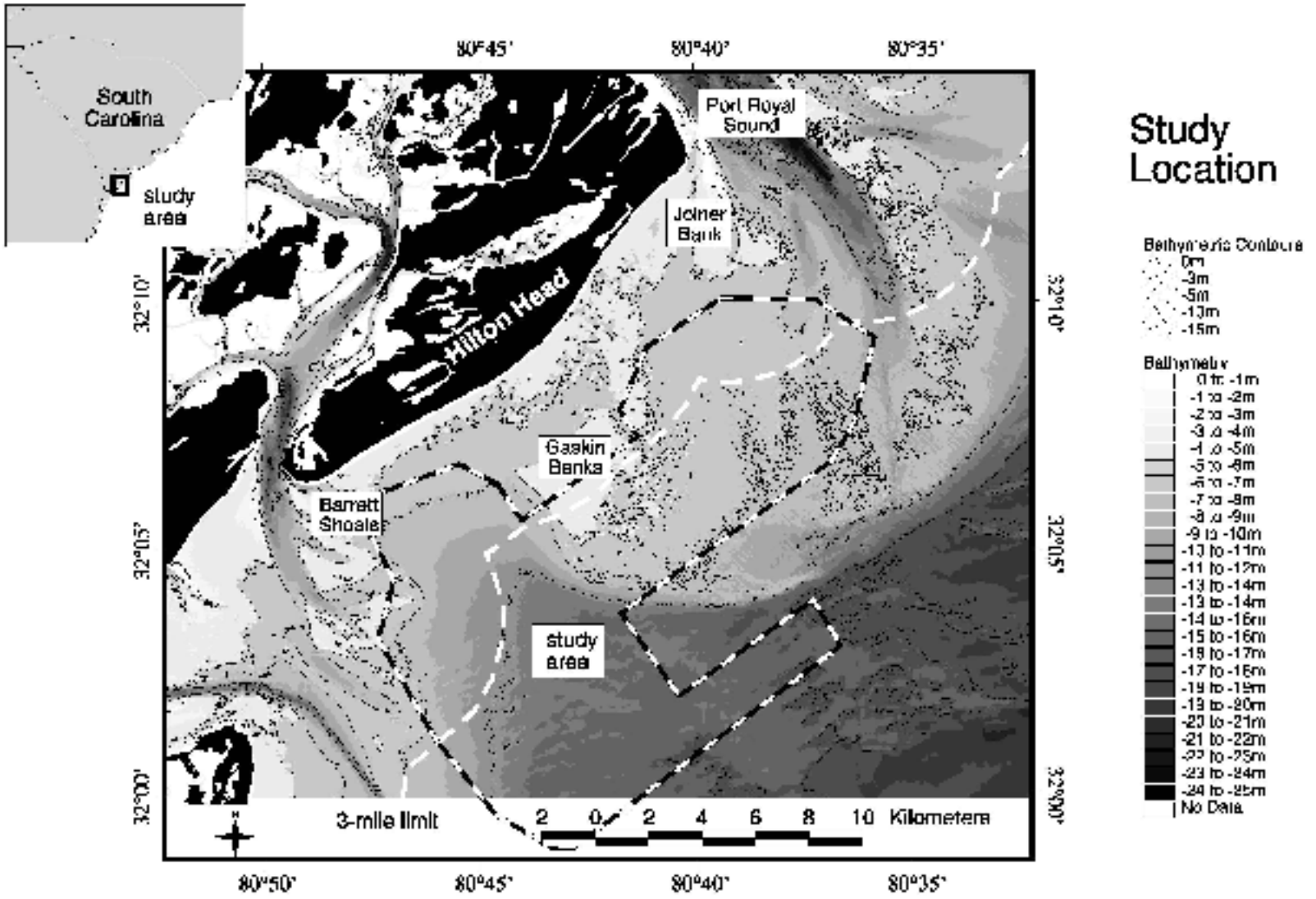


Figure 1. Study location seaward of Hilton Head Island, SC.

Previous Work

Earlier work investigating renourishment resources for Hilton Head Island studied surficial sediments of the onshore/offshore portion of the island (see summary in Sullivan, 1988). In 1986, more detailed studies of the offshore framework geology and sediment thicknesses were conducted by Olsen and Associates, Inc. (1986) using vibracore and high-resolution seismic data (Figure 2). Vibracores from this study also were used to examine island evolution (Sullivan, 1988). Based on these earlier studies, Olsen and Associates, Inc. (1994) conducted a survey using CHIRP sonar and vibracores of the seaward banks and shoals as a potential renourishment source. Potential borrow sites were identified on Gaskin and Joiner Banks. In 1997, these two borrow sites were dredged as a renourishment source.

Methods

Seismic reflection profiles, surficial sediment samples and vibracores were collected seaward of the area surveyed by Olsen and Associates (1994) to help assess potential sand resources for future nourishment projects (Figure 3). This was primarily a reconnaissance geophysical study to be augmented by a limited, vibracoring effort.

Along much of the South Carolina coast, the Quaternary sections are relatively thin to absent, except within individual incised paleochannels or large ebb tidal delta complexes. In this section of the coast, a priority was initially placed on defining sand resources:

1. within the Gaskin Banks complex seaward of the existing renourishment site; and
2. to explore paleochannel systems or other high resource potential depositional settings that may exist south of the bank.

Sediment thickness within Gaskin Banks were interpreted from high-resolution seismic data and an isopach map of Quaternary(?) sediment thickness was constructed from the seismic transects collected south of Gaskin Banks. The sediment thickness maps were augmented by vibracore and surficial sediment data. These maps provided a quantitative assessment of sand quality, and were useful in identifying potential borrow sites and estimating the sand resource potential of the inner shelf off of Hilton Head Island.

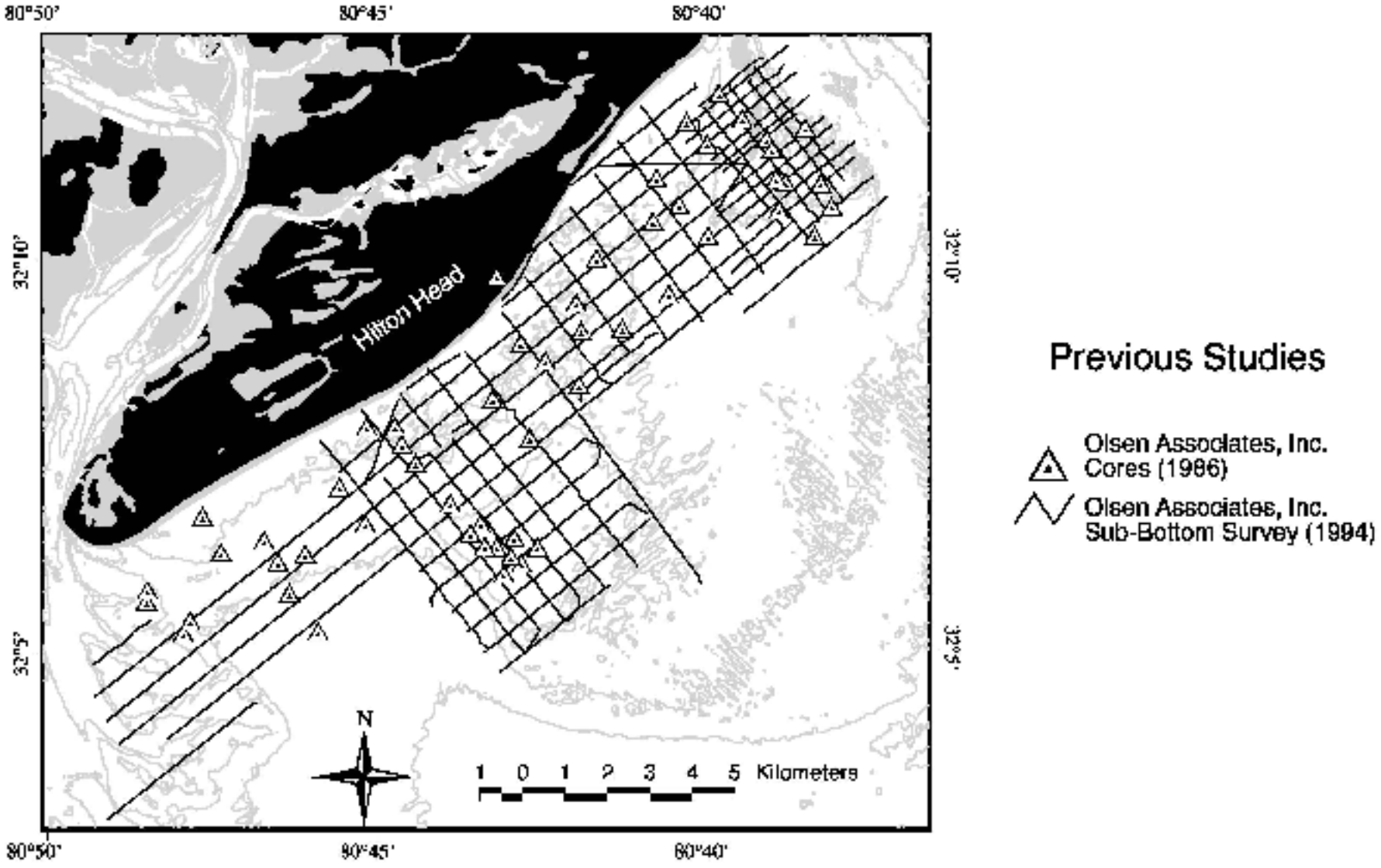


Figure 2: Location of previous data collected seaward of Hilton Head Island, SC by Olsen Associates, Inc. (1986, 1994).

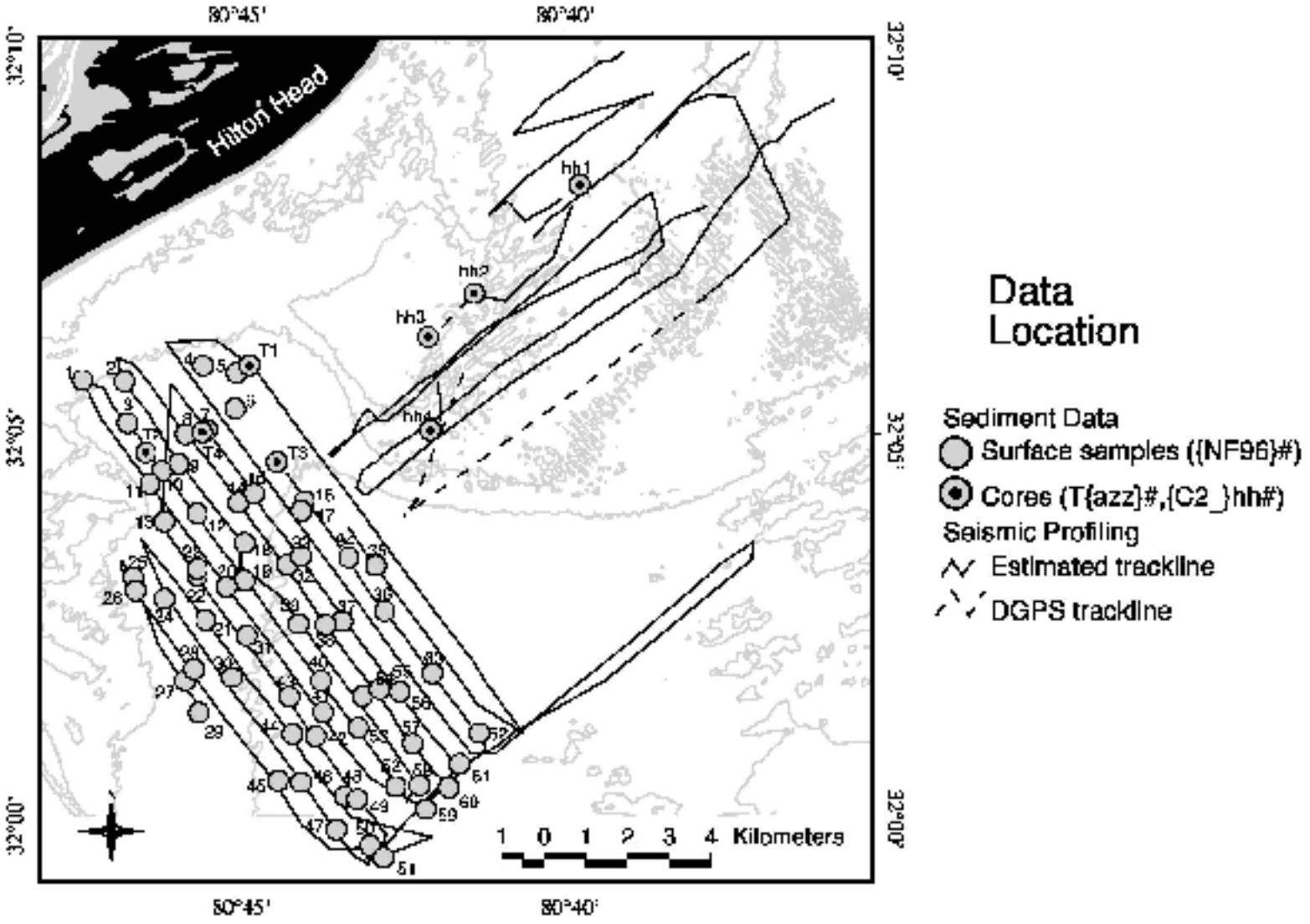


Figure 3: Location of data collected by this study seaward of Hilton Head Island, SC.

Seismic Reflection Profiling

Over 270 trackline kilometers of high resolution seismic reflection profiles were collected for sand resource assessment of the inner shelf off Hilton Head Island (Figure 3). Seismic data were collected on board the National Ocean and Atmospheric Administration (NOAA) Ship FERREL and the Coastal Carolina University vessel R/V COASTAL II. Both ships used differential global positioning systems (DGPS) for navigation. When DGPS was unobtainable on the COASTAL II, the cruise track was estimated using the speed and direction prior to and after the interruption of DGPS.

The CMWS Geopulse high-resolution seismic reflection profiling system was used for the collection of the seismic data. The system was triggered every 0.65 seconds at 100 Joules. The return signal was filtered through a Krone Hite Hi-Pass/Lo-Pass filter and the maximum frequency range sampled was 300-10,000 Hz under optimum sea state but more typically was 400-8,000 Hz. The data was collected as an analog record on an EPC 1650s recorder. Minimum resolution of this system is 0.5 meters.

Surficial Sediment Sampling:

Sixty-three surficial sediment samples were gathered using a modified Young grab sampler from Coastal Carolina's R/V Coastal II, the NOAA Ship FERREL and the FERREL's launch (figure 3). Sample sites were chosen to broadly characterize regional surficial sediment textural trends, to extrapolate inshore trends defined by Olsen and Associates, Inc. (1994) and to quantify surficial sediment characteristics in key sites based on seismic and bathymetric data. DGPS was used for navigation to the sites. All samples were bagged and shipped to CCU for sediment analysis.

Vibracores

Eight vibracores were collected in the study area for this project (Figure 3). Four cores were collected using the CMWS electric vibracore rig deployed from the NOAA Ship FERREL and four additional vibracores were collected using a standard marsh vibracore system deployed from the CCU R/V COASTAL II. Core locations were selected from preliminary analysis of seismic data to sample major regional seismic reflectors and sand deposits. DGPS was used to locate these sites.

Both coring rigs use 3-inch diameter aluminum pipe, which is vibrated into the sediment. Cores were then recovered, labeled, capped and sealed for transit on the ship. All of the cores were shipped to CCU where they were split, photographed, visually described and sampled for sediment analyses.

Sediment Analysis

Standard sieve analysis (Folk, 1981) was conducted on surficial sediment samples and subsamples from the vibracores. The following textural parameters were determined: mean grain size (mm), % gravel-sand-mud, sorting, skewness and kurtosis. Carbonate fractions were removed by dilute acid to determine percent carbonate and the grain size moments were determined for the non-carbonate fractions.

RESULTS

Seismic Reflection Data:

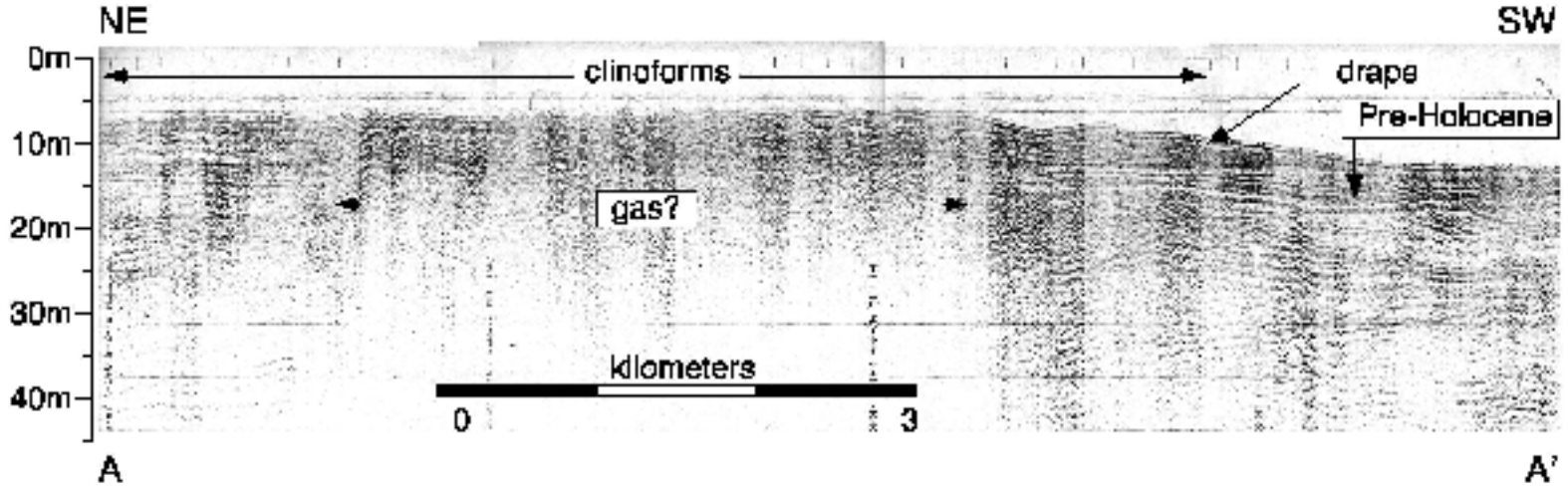
High-resolution seismic reflection profiles collected over the seaward portion of Gaskin Banks indicate a thin unit (<2m) overlying prograding clinoforms (Figure 4). This shallow unit forms a lensoid shape at the distal end of the clinoforms, thinning basinward. To the north of the Banks, the base of this upper unit is a flat-lying reflector. Below this unit, numerous cut and fill structures occur (Figure 5).

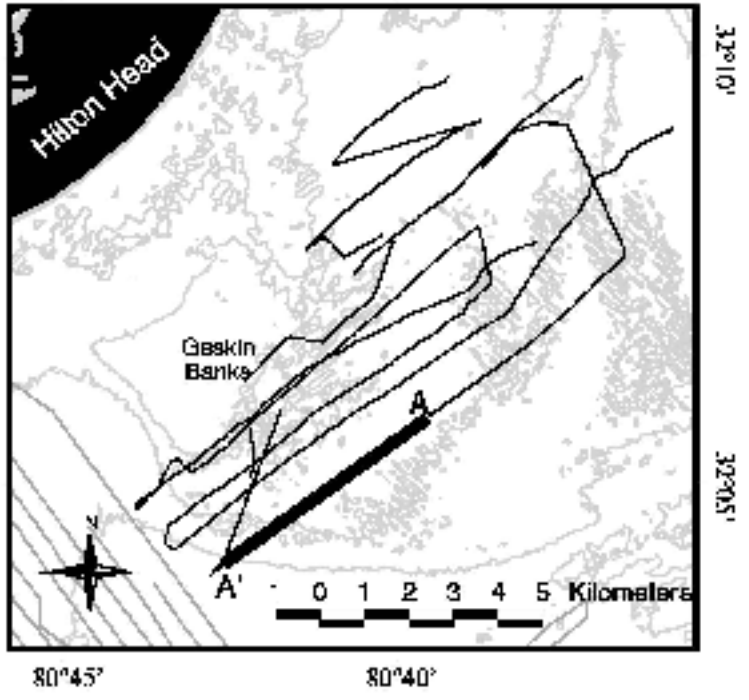
Data collected basinward or to the south of Gaskin Banks was of only fair quality (Figure 6). The first strong, continuous reflector was mapped, with jump correlations between the closely-spaced transects. This reflector (which may represent the Quaternary surface) deepens to the south with overlying sediments thickening toward the south-southwest. (Figure 7). A few, large cut-and-fill structures were identified but these features where isolated with no mappable riverine channels occurring within this data set.

Surficial Sediment Samples:

Values of grain size, carbonate content, and calculated sedimentary moments and Ra values are shown in APPENDIX I. An Ra value represents the equivalent volume of material needed to replace a volume of present beach material. Higher Ra values (> 1) represent finer borrow material than the natural beach material. Therefore, to maintain the beach with the finer borrow material, additional borrow material will be required. Ra values of greater than 1.25 are considered unstable. Ra values were calculated using a method similar to James (1975, Figure 8) and mean grain size of the beach from a study by Olsen and Associates, Inc. (1986).

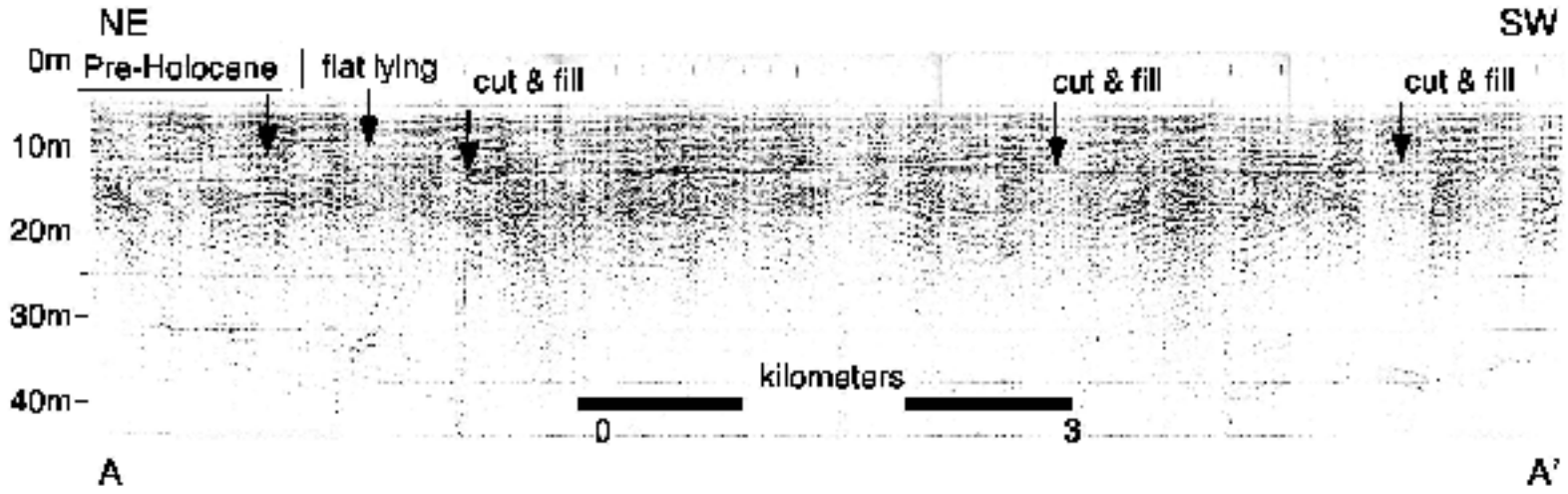
Surface sediment grain-size analysis indicates higher percent sand values (>95%) on Gaskin Banks and seaward of the Banks in deeper water to the south (Figure 9). Lower values are located in deeper water to the southwest of the Banks and the farthest seaward samples to the southeast. The decrease in the values to the farthest southwest corresponds to increased percent mud values (Figure 10). The decrease in values to the

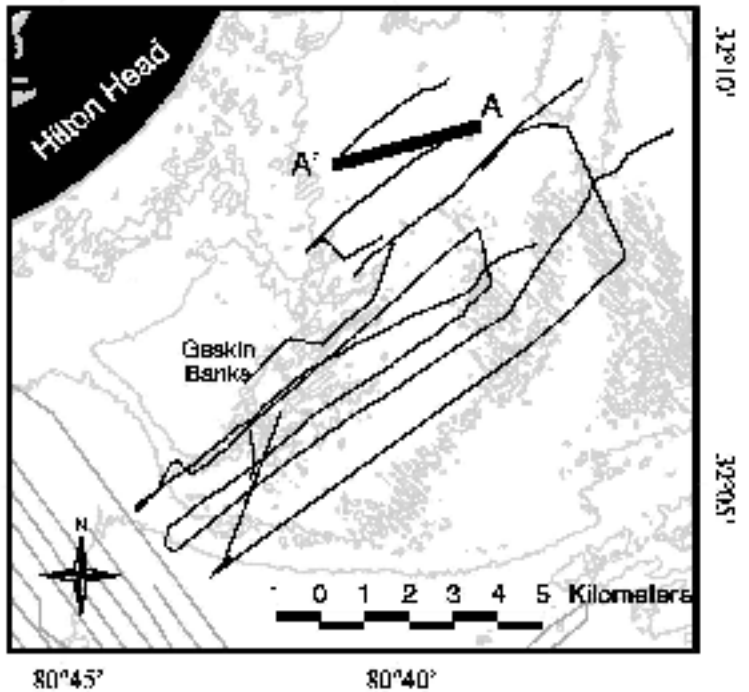




Gaskin Banks
High-Resolution Seismic Profile

Figure 4: Typical high-resolution seismic profile across the seaward portion of Gaskin Banks. The Banks are cored by a series of clinoforms (5m thick), which prograde over a zone of acoustic loss. A layer of sediment (less than 2m thick) overlies the clinoforms and along the seaward edge forms a lensoid-shaped drape of sediment that then thins basinward.





North of Gaskin Banks
High-Resolution Seismic Profile

Figure 5: High-resolution seismic profile from north of Gaskin Banks. A flat-lying reflector forms a thin (less than 2m) surface layer of sediment. The underlying unit shows numerous cut-and-fill structures along its lower boundary.

High-Resolution Seismic Profiles From South Of Gaskin Banks

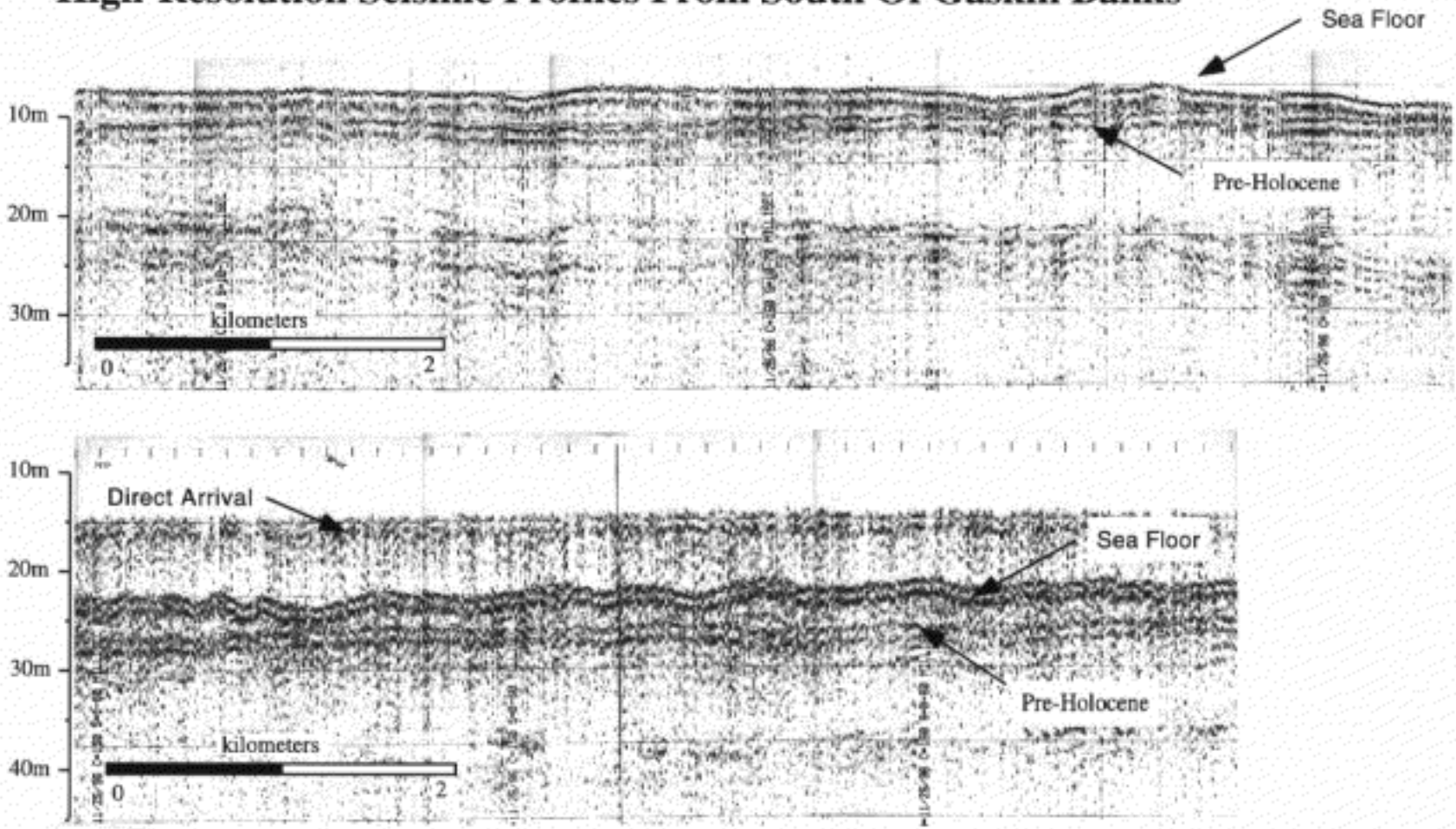
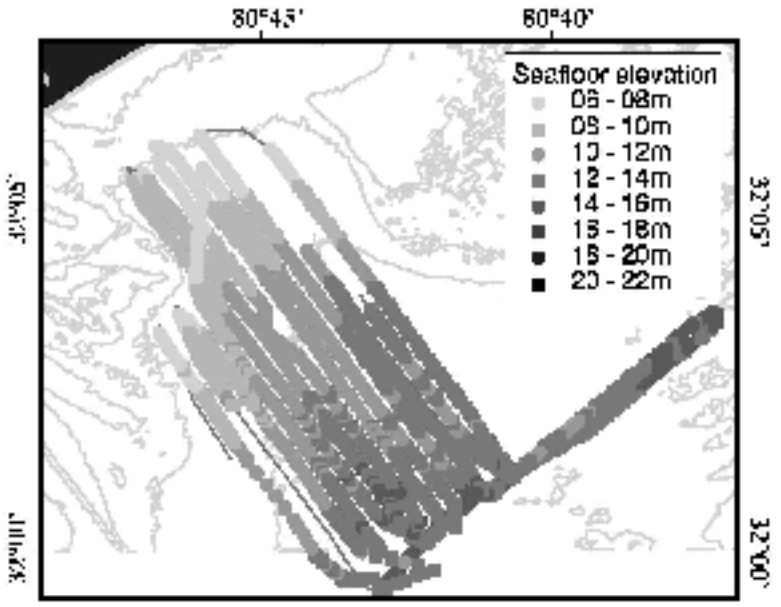
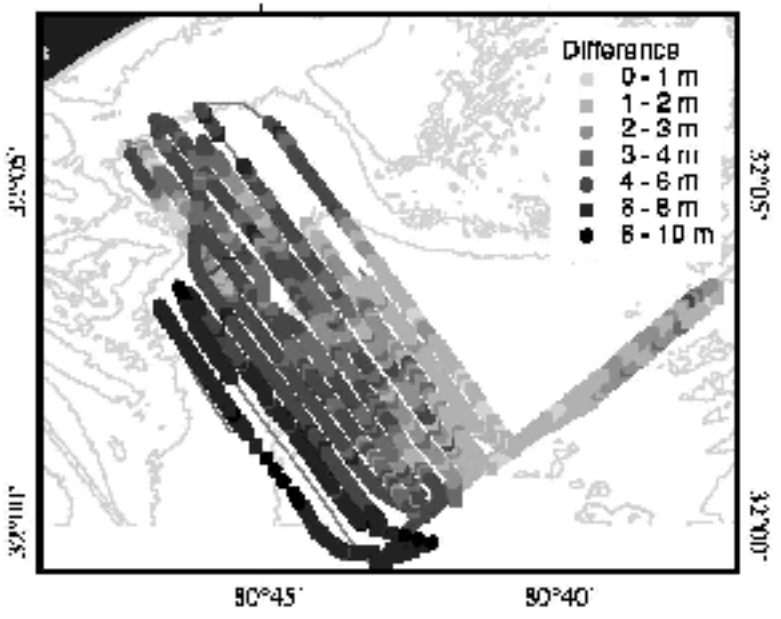
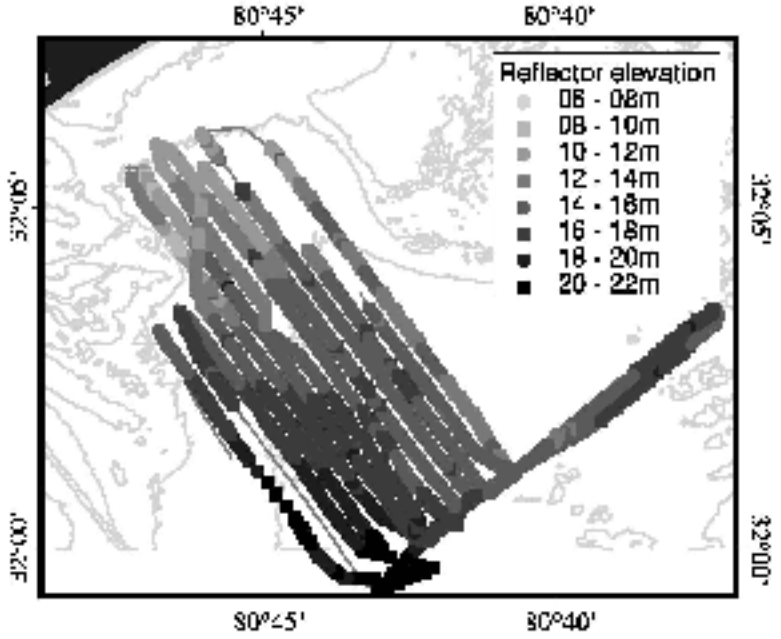


Figure 6: Pre-Holocene (Quarternary?) reflector from deeper water south of Gaskin Banks. This surface is the isopach surface in Figure 6.







South and Basinward of Gaskin Banks High-Resolution Seismic, Isopach Map

Figure 7: Upper maps show seafloor and first continuous reflector elevations as interpreted from high-resolution seismic data (using sound of speed of 1500m/s and correcting for tides). Lower map shows the thickness of this unit resulting from the difference between the seafloor and first continuous reflector.

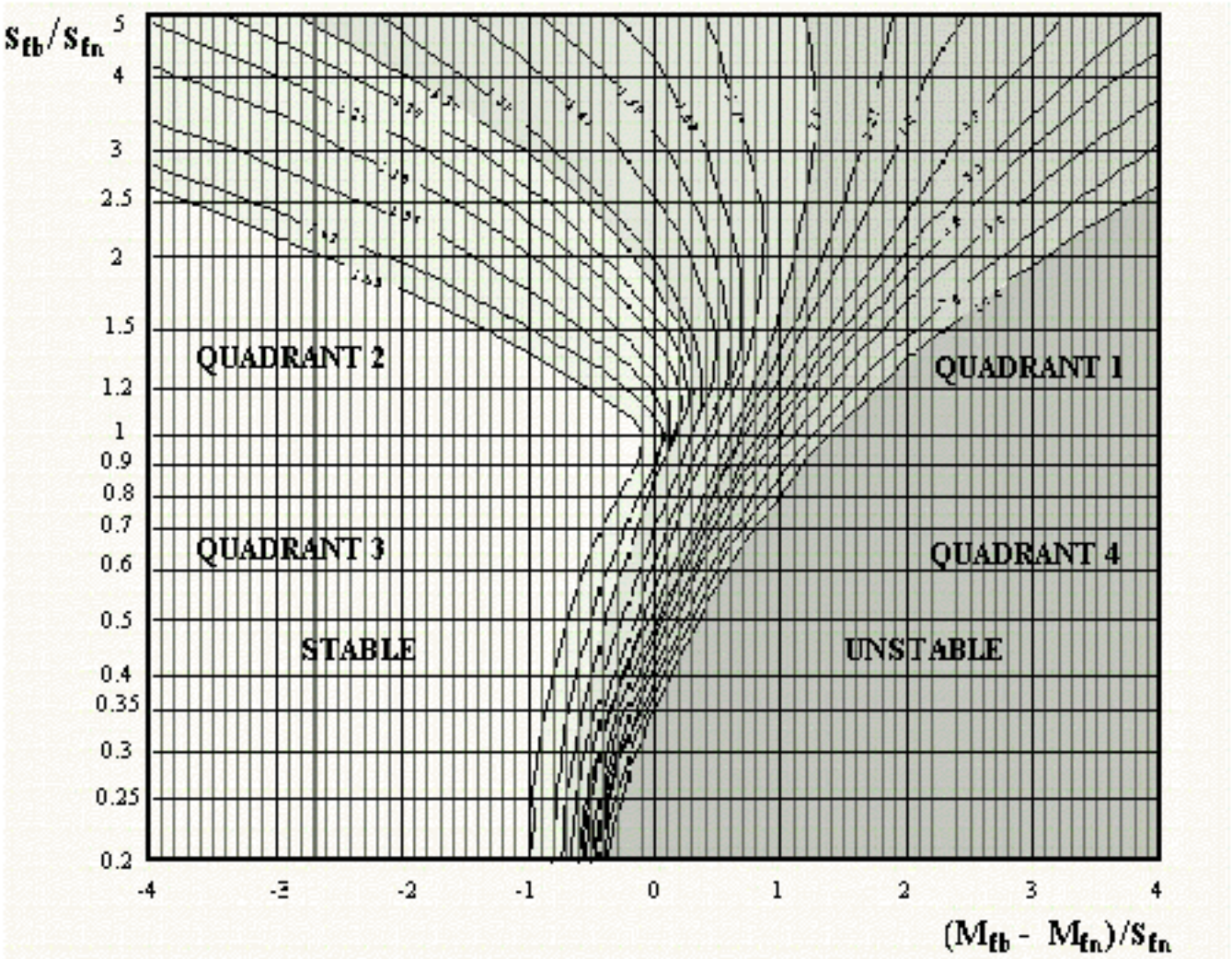


Figure 8: Nomogram used to determine overfill ratio Ra (modified after James (1975)).
Overfill ratios greater than 1.25 are generally considered unstable and unsuitable as beach fill material.

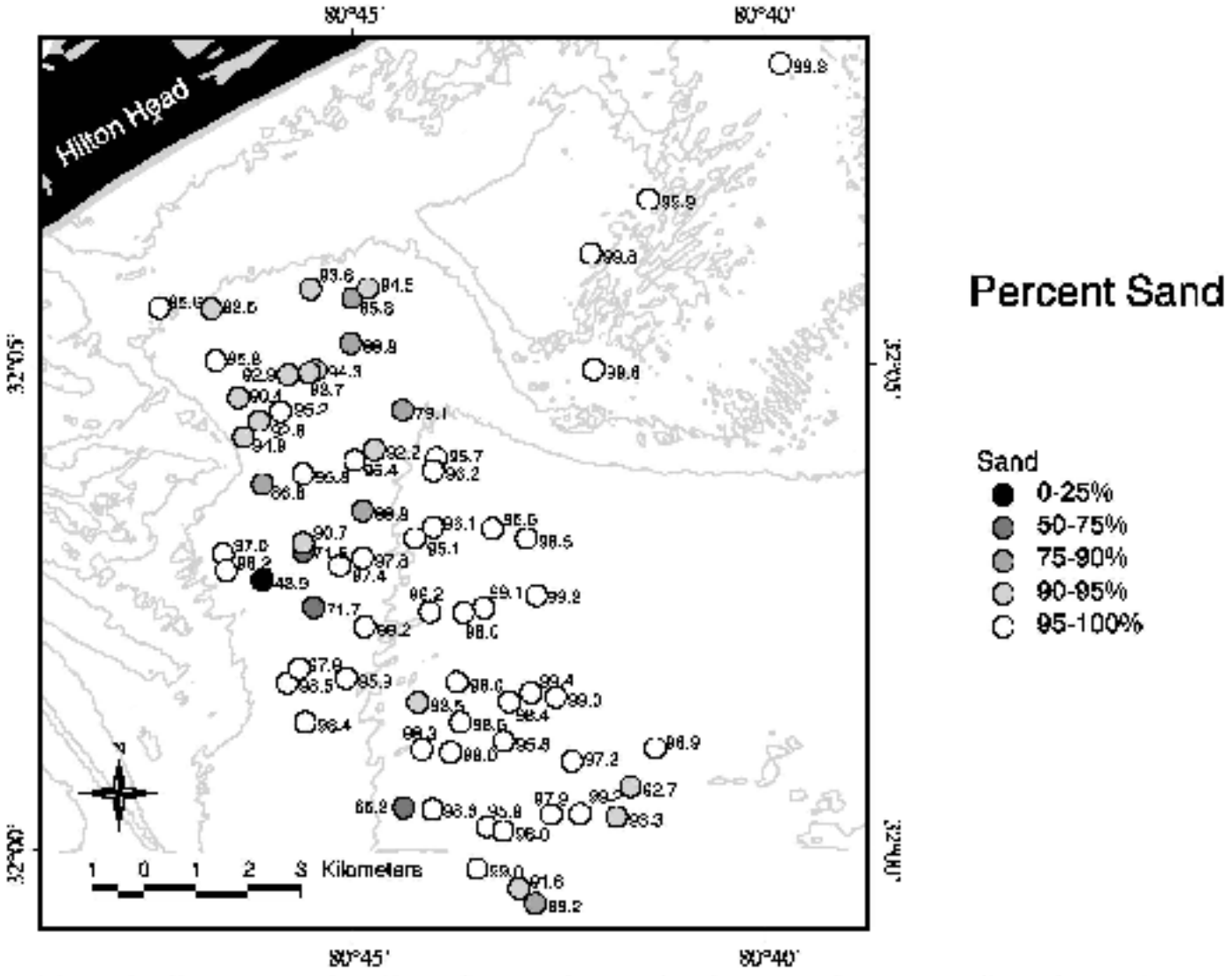


Figure 9: Percent sand within surface sediments (surface samples and top 2cm of cores).

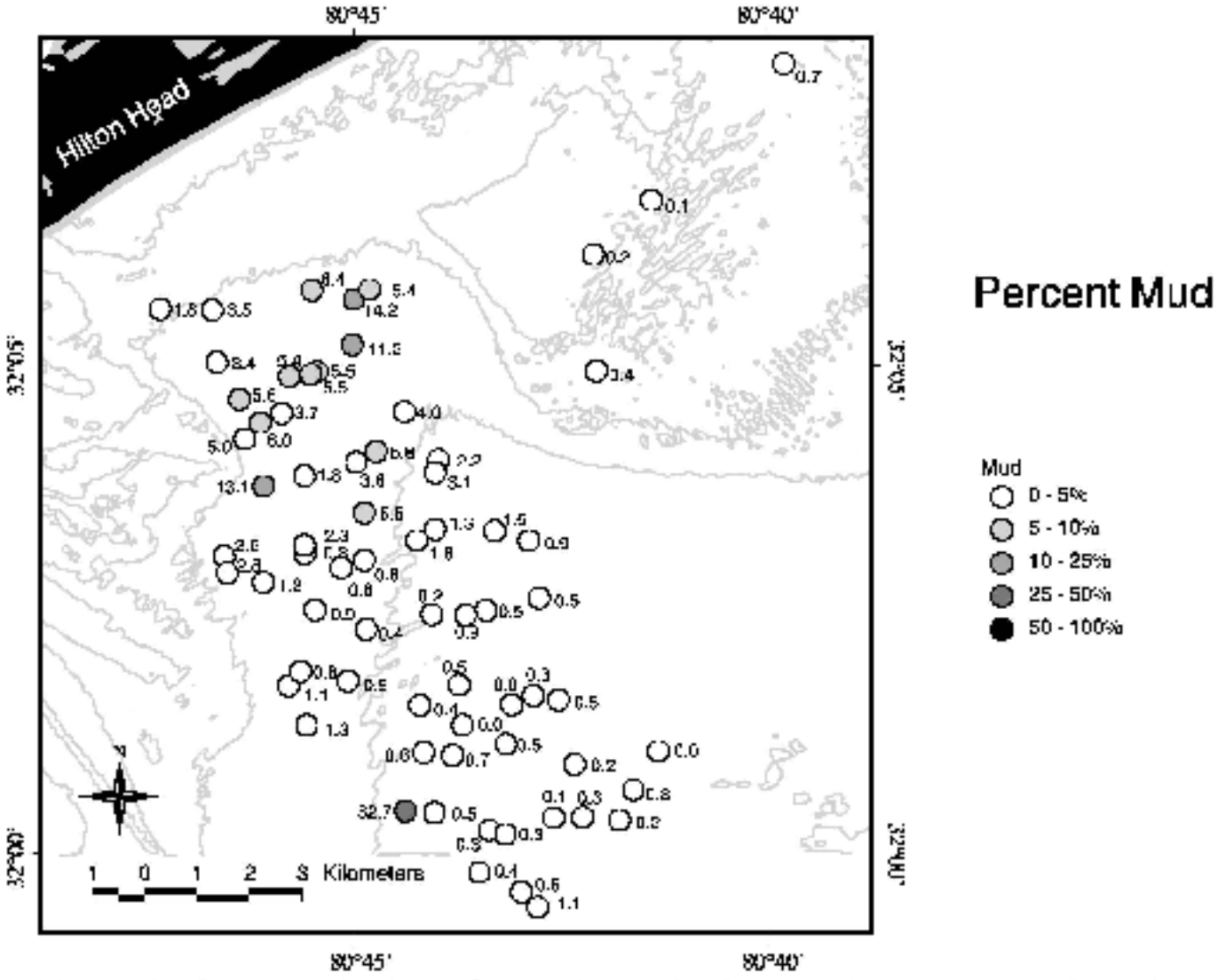


Figure 10: Percent mud within surface sediments (surface samples and top 2cm of cores).

southwest also corresponds to a band of increased percent coarse values. Higher percent coarse values are also indicated for the farthest seaward samples (Figure 11).

Percent carbonate values are low in Gaskin Banks (<5%) but increase significantly in the deeper water samples (> 10%) southward of Gaskin Banks (Figure 12). The Highest values (>25%) correlate with areas of higher coarse grain-size values described above.

The lowest mean grain size values were identified in the areas containing higher percent mud values, to the southwest of Gaskin Banks while highest values are associated with areas of coarser, carbonate material (Figure 13). Ra values are lowest at the center of Gaskin Banks and in the coarser carbonate sediment to the southeast (Figure 14). Higher values are located with the muddier sediments to the southeast of Gaskin Banks.

Vibracore Data:

Core collection information, descriptions and values of subsample sediment analyses (grain size, percent carbonate, calculated sedimentary moments and Ra values) are shown in APPENDIX II.

The cores collected across Gaskin Banks are very short, however, they indicate sands. Situated close to the muddy surface sediments to the southwest of the Banks, core C2_hh4, collected along the southward edge of Gaskin Banks, indicates some lenticular bedding. The other cores collected in the area to the southwest show increased muddier sediments (>5%) with depth.

Sand Resource Potential:

As previously identified by Olsen and Associates, Inc. (1994), the Gaskin Banks area remains the best source of nearby sands (Figure 15). Assuming an average depth of one yard, the area could yield over eight million cubic yards. As indicated by high-resolution seismic data, the layer of sand continues seaward, where it overlies prograding clinoforms. The few cores collected along this more seaward part of Gaskin Banks, indicate that the sediments are clean sands, however, the mean grain size is less than the mean grain size of the natural beach (Olsen and Associates, Inc., 1986) and, therefore, higher Ra values result. If this seaward site becomes a potential resource site, further core studies to determine sediment quality will be required to augment the high-resolution seismic data.

In the deeper waters to the south and southwest of Gaskin Banks, surface sediment analysis indicates a potential sand resource site (higher carbonate values (~10%) as compared to Gaskin Banks) to the south of the Banks. The depth of this layer,

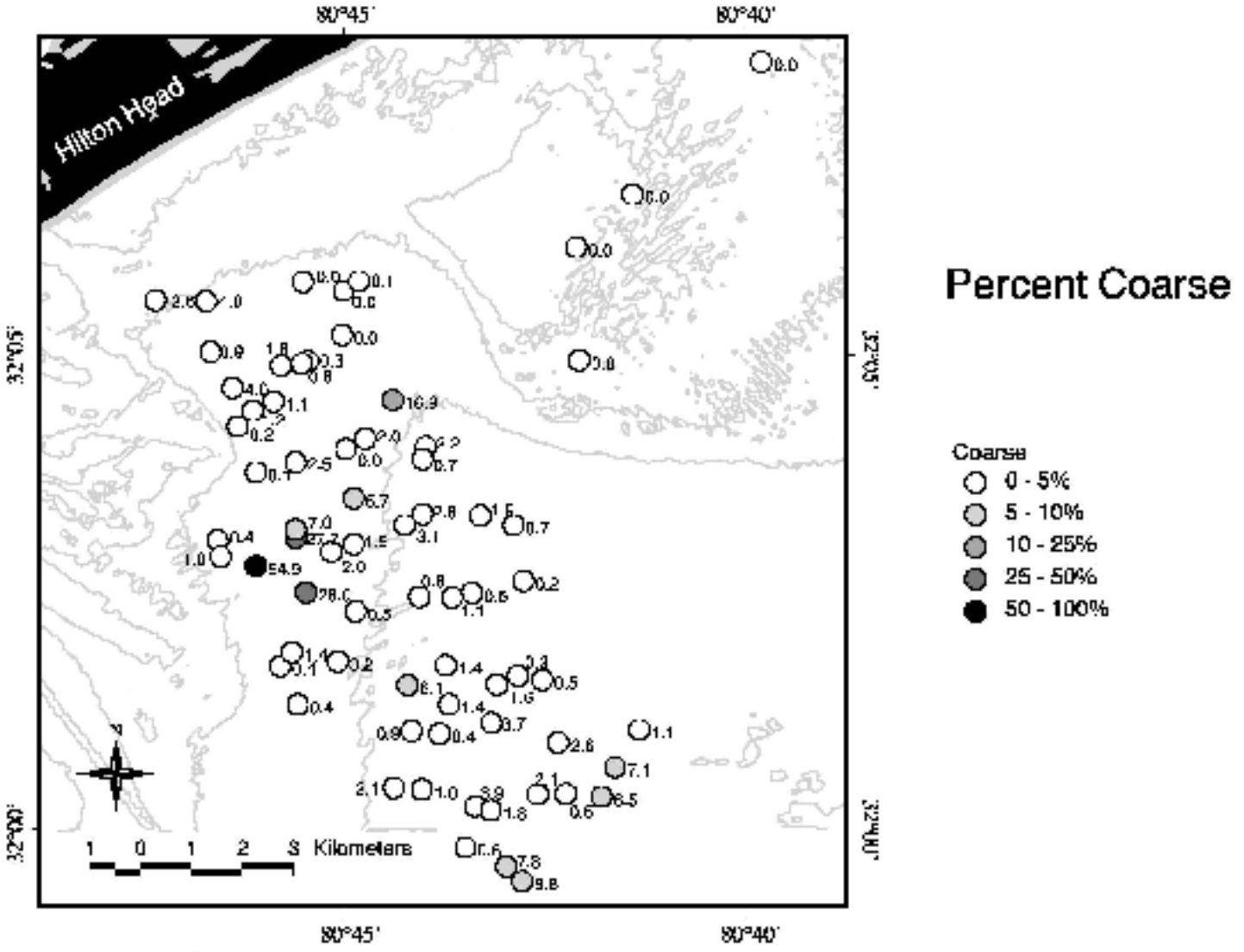


Figure 11: Percent coarse within surface sediments (surface samples and top 2cm of cores).

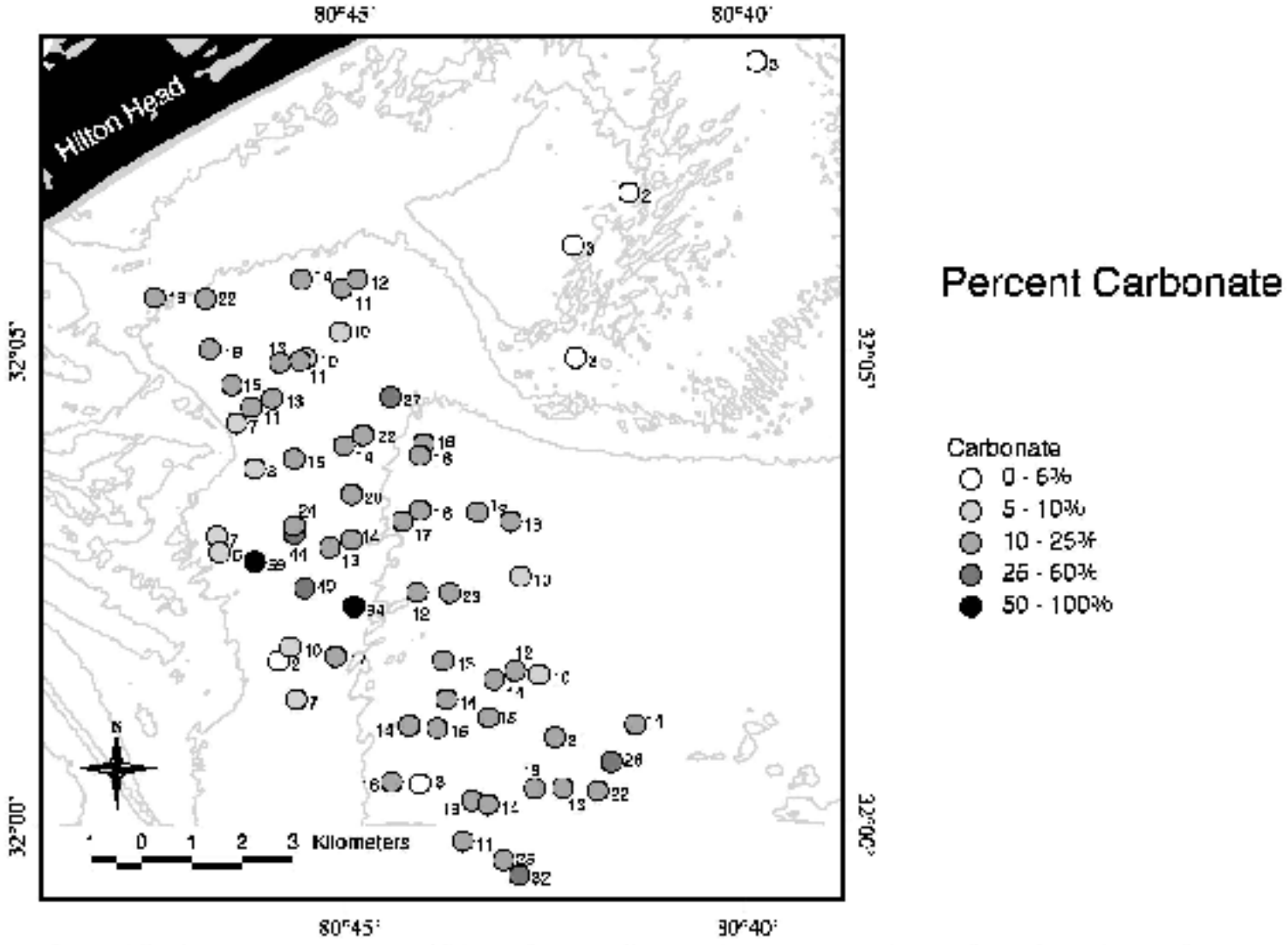


Figure 12: Percent carbonate within surface sediments (surface samples and top 2cm of cores).

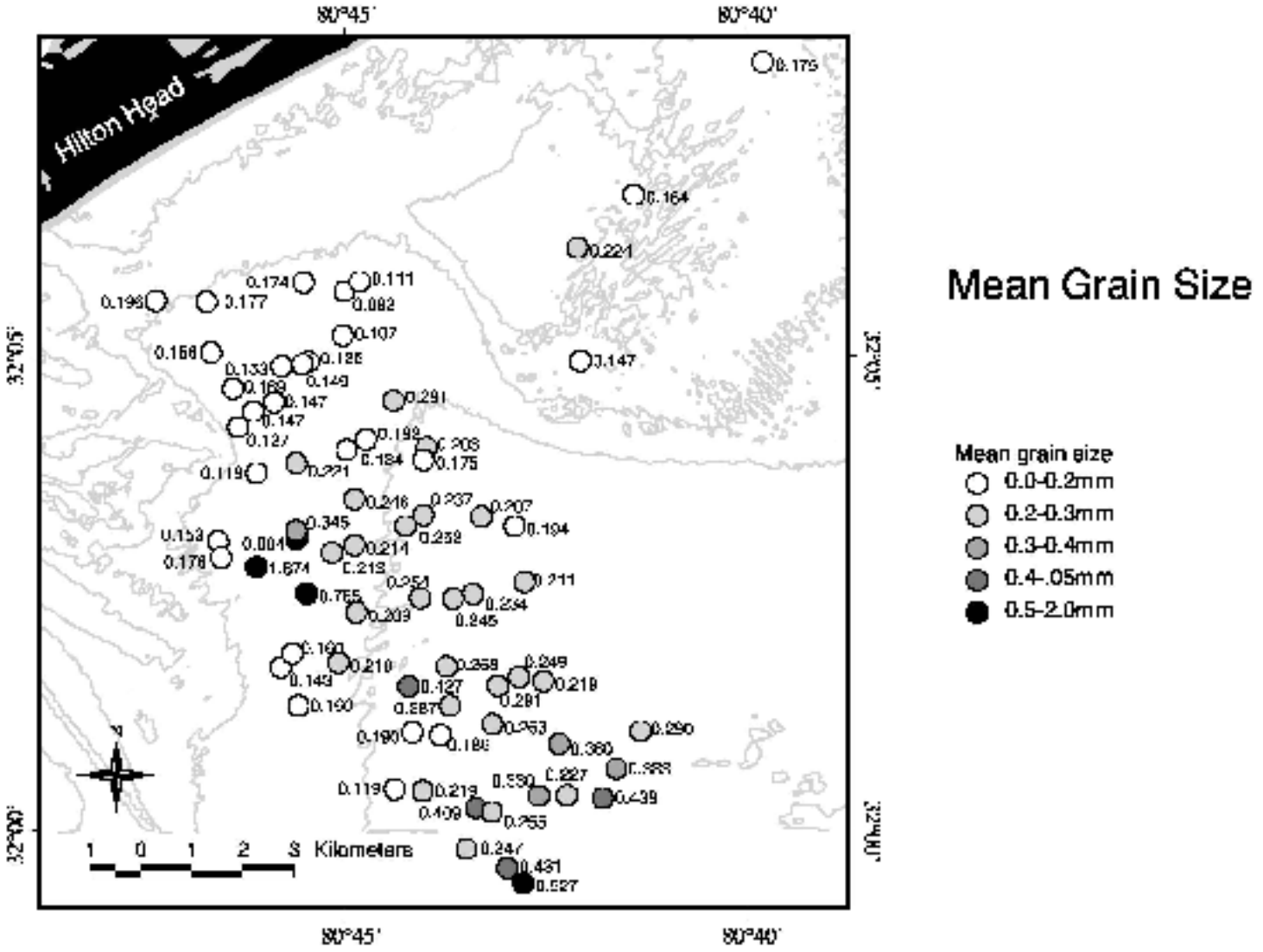


Figure 13: Mean grain size values for surface sediments (surface samples and top 2cm of cores).

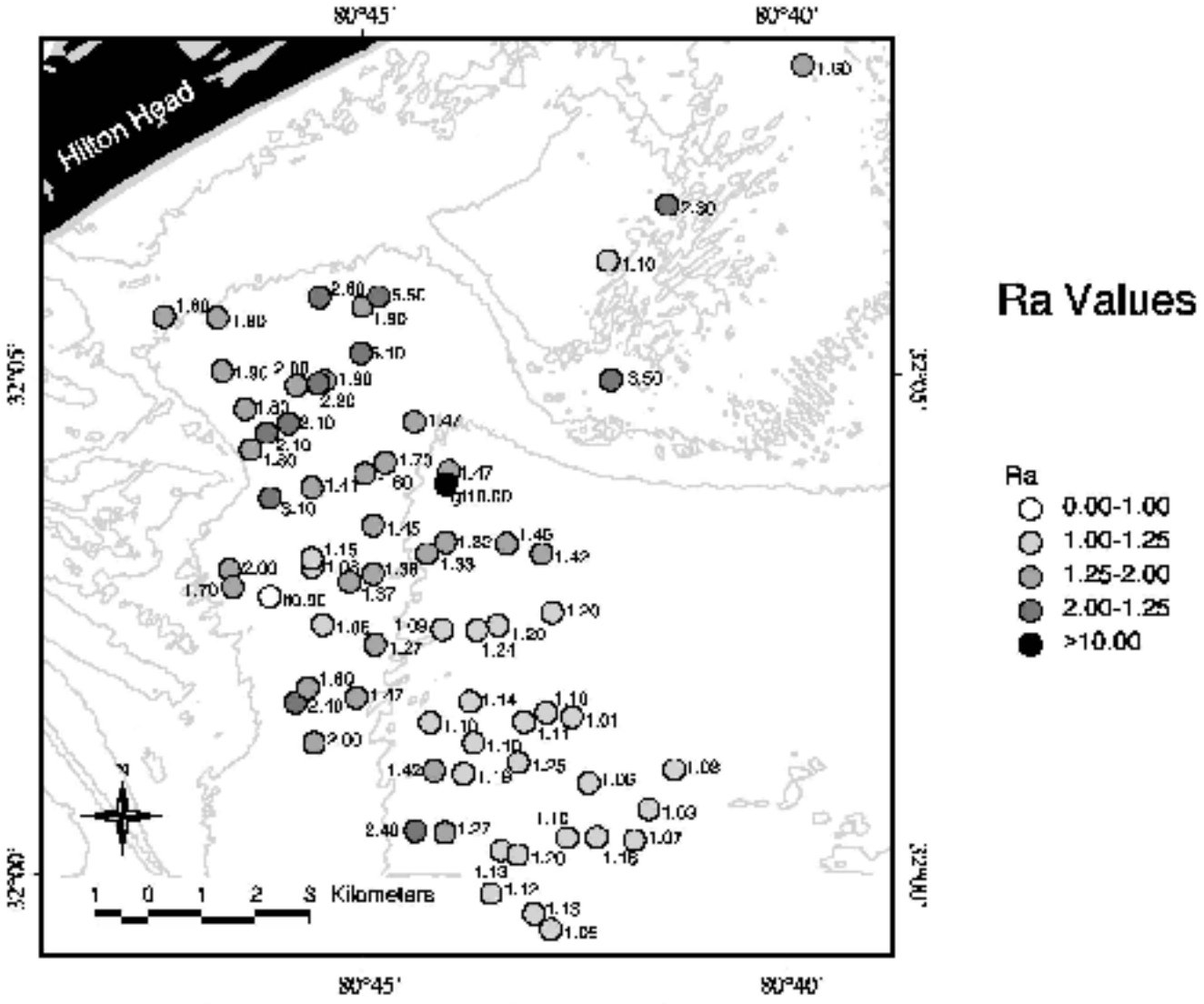


Figure 14: Ra values for surface sediments (surface samples and top 2cm of cores).

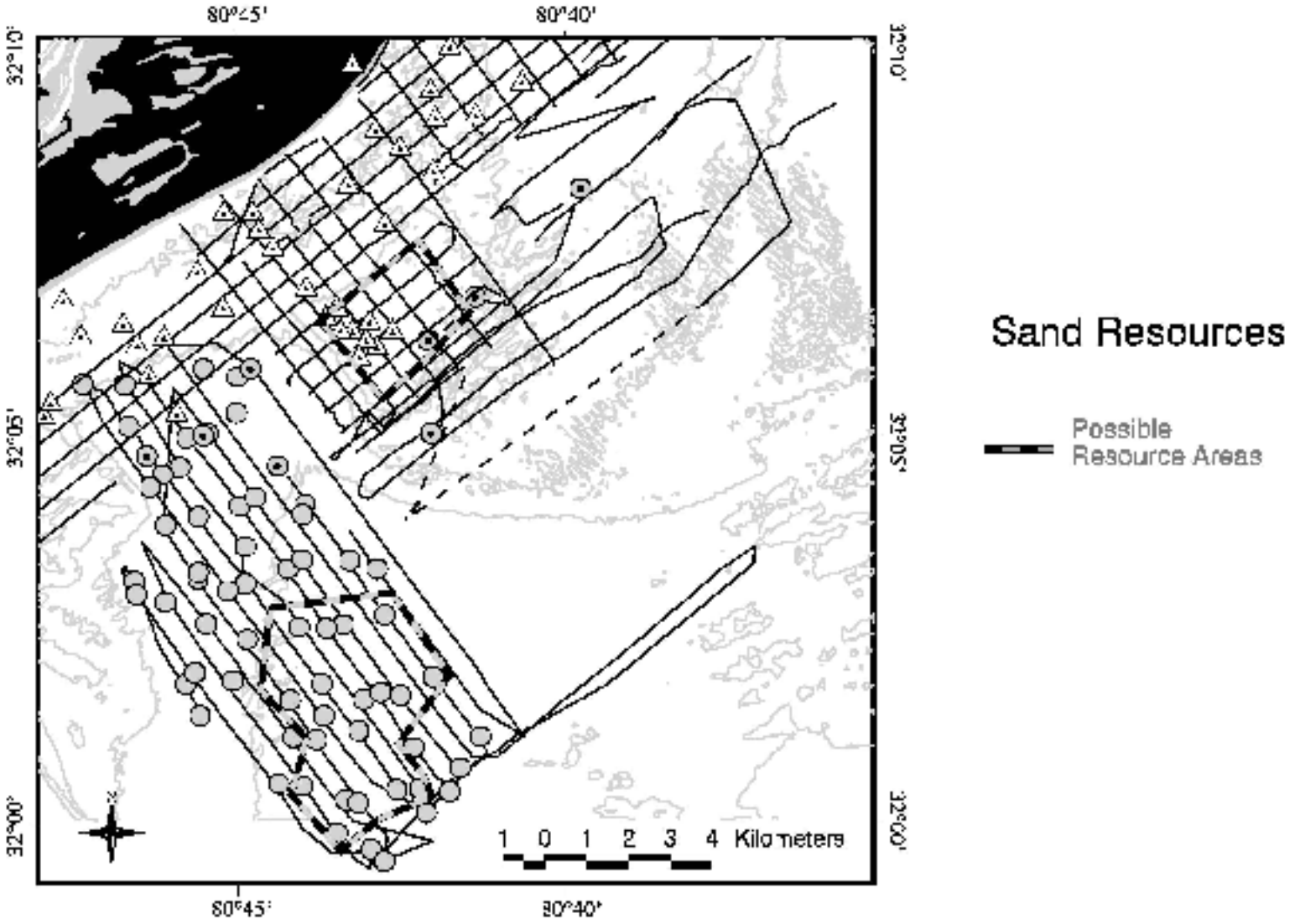


Figure 15: Potential sand resource sites seaward of Hilton Head Island, SC. Both will require further study to identify thickness of potential renourishment sands.

however, could not be resolved with the seismic data collected. If needed as a resource, this more seaward site will require further study with cores to properly assess sediment depth. To the southwest of the banks, higher mud contents eliminate this area as a potential sand resource site.

Acknowledgments

We would like to thank several people for their contributions to the development of this report and associated field work: Bob Van Dolah for assistance in planning the field work and as well as critical review of the final report; the members of the South Carolina Task Force for reviews of the objectives and manuscripts; the officers and crew of the NOAA ship Ferrel and Richard Goldberg and the crew of the RV Coastal II for their cooperation and assistance in field collection; Neil Gielstra for technical support of field equipment; students at Coastal Carolina University for help with data collection and analysis; M. Scott Harris for help with data display; and finally, Tony Giordono with Minerals Management Service INTERMAR program for providing funding and advice on the project.

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APPENDIX I

Surface Sediment Data

Surface Sediment Data From Seaward Of Hilton Head Island, SC

Sample ID	Date	Latitude	Longitude	Gravel (%)	Sand (%)	Mud (%)	Carbonate (%)	Mean (bulk) (phi)	Mean (bulk) (mm)
NF96-01	Nov-96	32.0942883	-80.7893750	2.63	95.57	1.81	18.64	2.35	0.1959
NF96-02	Nov-96	32.0940750	-80.7787780	4.03	92.48	3.49	21.50	2.50	0.1769
NF96-03	Nov-96	32.0850750	-80.7778780	0.88	95.75	3.37	16.14	2.68	0.1563
NF96-04	Nov-96	32.0974317	-80.7587280	0.00	93.56	6.44	14.20	3.11	0.1741
NF96-05	Nov-96	32.0958450	-80.7502370	0.00	85.84	14.16	10.80	3.44	0.0923
NF96-06	Nov-96	32.0880733	-80.7505420	0.00	88.84	11.16	9.64	3.22	0.1070
NF96-07	Nov-96	32.0834817	-80.7577520	0.26	94.28	5.46	10.23	2.99	0.1259
NF96-08	Nov-96	32.0825733	-80.7631920	1.77	92.86	5.38	13.28	2.74	0.1494
NF96-09	Nov-96	32.0762717	-80.7648620	1.11	95.21	3.68	12.56	2.77	0.1468
NF96-10	Nov-96	32.0746567	-80.7692100	1.21	92.79	6.00	11.17	2.76	0.1474
NF96-11	Nov-96	32.0718917	-80.7723000	0.18	94.85	4.97	6.71	2.98	0.1266
NF96-12	Nov-96	32.0654900	-80.7602770	2.48	95.76	1.75	14.69	2.18	0.2214
NF96-13	Nov-96	32.0637433	-80.7686000	0.11	86.78	13.11	7.71	3.07	0.1187
NF96-14	Nov-96	32.0677950	-80.7497870	0.00	96.44	3.56	14.21	2.45	0.1837
NF96-15	Nov-96	32.0696800	-80.7458120	2.02	92.16	5.82	21.92	2.46	0.1818
NF96-16	Nov-96	32.0681350	-80.7331770	2.15	95.65	2.20	16.11	2.30	0.2032
NF96-17	Nov-96	32.0659983	-80.7338030	0.70	96.23	3.07	16.01	2.51	0.1754
NF96-18	Nov-96	32.0590317	-80.7482070	5.69	88.77	5.54	20.01	2.02	0.2459
NF96-19	Nov-96	32.0509867	-80.7482600	1.45	97.75	0.80	13.80	2.22	0.2140
NF96-20	Nov-96	32.0495567	-80.7528530	2.02	97.39	0.59	12.56	2.23	0.2129
NF96-21	Nov-96	32.0424050	-80.7582100	27.96	71.68	0.88	48.93	0.35	0.7848
NF96-22	Nov-96	32.0520550	-80.7603680	27.73	71.45	0.82	43.95	0.32	0.8036
NF96-23	Nov-96	32.0535200	-80.7602770	7.01	90.71	2.28	24.17	1.54	0.3445
NF96-24	Nov-96	32.0470767	-80.7685780	54.86	43.91	1.24	59.45	-0.91	1.8743
NF96-25	Nov-96	32.0515750	-80.7765050	0.39	97.03	2.58	6.62	2.71	0.1525

Surface Sediment Data From Seaward Of Hilton Head Island, SC

Sample ID	Date	Latitude	Longitude	Gravel (%)	Sand (%)	Mud (%)	Carbonate (%)	Mean (bulk) (phi)	Mean (bulk) (mm)
NF96-26	Nov-96	32.0488017	-80.7759780	1.04	96.19	2.77	6.29	2.49	0.1777
NF96-27	Nov-96	32.0293733	-80.7635730	0.39	98.52	1.09	2.49	2.80	0.1432
NF96-28	Nov-96	32.0317733	-80.7611920	1.39	97.86	0.75	9.59	2.64	0.1602
NF96-29	Nov-96	32.0224883	-80.7599480	0.38	98.37	1.25	6.53	2.65	0.1595
NF96-30	Nov-96	32.0300900	-80.7516170	3.21	95.94	0.85	16.69	2.25	0.2100
NF96-31	Nov-96	32.0390133	-80.7478630	0.47	99.15	0.38	94.48	2.26	0.2087
NF96-32	Nov-96	32.0542867	-80.7375480	3.09	95.13	1.78	16.96	1.99	0.2523
NF96-33	Nov-96	32.0562133	-80.7339100	2.55	96.12	1.33	15.97	2.08	0.2368
NF96-34	Nov-96	32.0559383	-80.7218250	1.93	96.57	1.50	15.24	2.27	0.2068
NF96-35	Nov-96	32.0541683	-80.7149580	0.66	98.48	0.86	16.10	2.36	0.1944
NF96-36	Nov-96	32.0442850	-80.7128600	0.23	99.22	0.54	9.69	2.25	0.2106
NF96-37[2]	Nov-96	32.0421683	-80.7235720	0.47	99.08	0.45	-	2.10	0.2336
NF96-38	Nov-96	32.0413783	-80.7277680	1.13	97.97	0.89	23.38	2.03	0.2447
NF96-39	Nov-96	32.0415617	-80.7346500	0.63	99.16	0.21	12.25	1.98	0.2540
NF96-40	Nov-96	32.0293433	-80.7290730	1.43	98.04	0.53	13.13	1.90	0.2678
NF96-41	Nov-96	32.0224800	-80.7284470	1.36	98.60	0.04	13.66	1.80	0.2871
NF96-42	Nov-96	32.0172967	-80.7304830	0.35	98.95	0.71	15.84	2.43	0.1862
NF96-43[2]	Nov-96	32.0259017	-80.7371070	6.11	93.45	0.44	-	1.23	0.4270
NF96-44	Nov-96	32.0178000	-80.7362900	0.94	98.30	0.76	14.42	2.40	0.1895
NF96-45	Nov-96	32.0077317	-80.7399370	2.12	65.19	32.68	15.70	3.08	0.1187
NF96-46	Nov-96	32.0073467	-80.7341080	0.96	98.55	0.48	3.46	2.19	0.2188
NF96-47	Nov-96	31.9971317	-80.7251430	0.63	98.95	0.42	11.14	2.02	0.2468
NF96-48	Nov-96	32.0042833	-80.7231670	3.88	95.86	0.26	19.06	1.29	0.4089
NF96-49	Nov-96	32.0036133	-80.7198180	1.76	97.97	0.27	14.23	1.97	0.2552

[2]Unable to complete carbonate analysis.

Surface Sediment Data From Seaward Of Hilton Head Island, SC

Sample ID	Date	Latitude	Longitude	Gravel (%)	Sand (%)	Mud (%)	Carbonate (%)	Mean (bulk) (phi)	Mean (bulk) (mm)
NF96-50	Nov-96	31.9936017	-80.7165920	7.81	91.62	0.57	25.20	1.22	0.4306
NF96-51	Nov-96	31.9910267	-80.7132800	9.79	89.17	1.05	32.19	0.92	0.5271
NF96-52	Nov-96	32.0064200	-80.7100450	2.07	97.86	0.07	18.69	1.60	0.3300
NF96-53	Nov-96	32.0191567	-80.7196050	3.69	95.82	0.50	18.01	1.93	0.2627
NF96-54	Nov-96	32.0259583	-80.7183980	1.63	98.37	0.00	14.32	1.78	0.2908
NF96-55	Nov-96	32.0274500	-80.7140430	0.31	99.43	0.26	12.15	2.01	0.2488
NF96-56	Nov-96	32.0268167	-80.7090300	0.51	98.99	0.51	10.47	2.19	0.2192
NF96-57	Nov-96	32.0156217	-80.7056880	2.57	97.22	0.21	21.10	1.47	0.3600
NF96-58	Nov-96	32.0065567	-80.7041700	0.45	99.22	0.33	13.45	2.14	0.2271
NF96-59[3]	Nov-96	32.0014717	-80.7025150	-	-	-	-	-	-
NF96-60	Nov-96	32.0060533	-80.6967020	6.47	93.33	0.20	22.49	1.19	0.4382
NF96-61	Nov-96	32.0111583	-80.6939400	7.07	92.67	0.26	25.91	1.39	0.3825
NF96-62	Nov-96	32.0178867	-80.6888430	1.05	98.91	0.04	13.88	1.79	0.2900
NF96-63[3]	Nov-96	32.0308150	-80.7007220	-	-	-	-	-	-
Tazz-1	Nov-96	32.0975000	-80.7470000	0.11	94.46	5.43	11.61	3.17	0.1109
Tazz-2	Nov-96	32.0786667	-80.7733330	4.01	90.39	5.60	14.93	2.57	0.1686
Tazz-3	Nov-96	32.0765000	-80.7400000	16.92	79.12	3.96	26.79	1.83	0.2809
Tazz-4	Nov-96	32.0830000	-80.7590000	0.75	93.71	5.54	11.45	2.71	0.1531
C2_hh01	Feb-97	32.1362700	-80.6629900	0.03	99.29	0.68	2.65	2.51	0.1751
C2_hh02	Feb-97	32.1129117	-80.6898520	0.03	99.89	0.08	2.42	2.61	0.1635
C2_hh03	Feb-97	32.1034933	-80.7016570	0.00	99.82	0.18	2.90	2.16	0.2243
C2_hh04	Feb-97	32.0834417	-80.7010980	0.03	99.58	0.39	3.34	2.77	0.1466

[3]Unable to complete sediment analysis.

Surface Sediment Texture Data From Seaward Of Hilton Head Island, SC

Sample ID	Bulk Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Carbonate Free Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Carbonate Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)
NF96-01	0.1959	1.190	-1.538	6.698	0.1689	0.810	-0.328	4.686	0.4172	1.870	-0.542	2.095
NF96-02	0.1769	1.497	-1.372	4.638	0.1344	1.001	-1.095	5.128	0.4253	1.977	-0.353	1.861
NF96-03	0.1563	1.083	-1.152	5.397	0.1336	0.907	-0.908	4.801	0.2622	1.252	-1.347	4.229
NF96-04	0.1741	0.671	0.812	6.656	0.1107	0.629	1.380	5.940	0.1741	0.745	-0.436	7.976
NF96-05	0.0923	0.796	0.185	4.690	0.0952	0.793	0.415	4.266	0.0879	0.808	-0.925	7.598
NF96-06	0.1070	0.787	0.456	5.789	0.1041	0.814	0.473	4.600	0.1524	0.486	-5.732	39.775
NF96-07	0.1259	0.757	-0.627	11.105	0.1253	0.691	0.939	6.257	0.1405	1.181	-2.585	9.247
NF96-08	0.1494	1.101	-1.759	9.965	0.1267	0.780	0.095	6.080	0.3512	1.657	-1.313	3.343
NF96-09	0.1468	0.963	-1.767	10.805	0.1377	0.750	0.039	5.821	0.2265	1.628	-1.571	4.288
NF96-10	0.1474	1.026	-1.266	8.990	0.1322	0.808	0.444	5.177	0.3412	1.674	-1.000	2.873
NF96-11	0.1266	0.697	-0.286	11.058	0.1225	0.651	0.683	7.692	0.1929	0.990	-2.734	10.219
NF96-12	0.2214	1.135	-1.385	6.944	0.1922	0.871	0.269	4.682	0.4170	1.866	-0.666	2.164
NF96-13	0.1187	0.978	0.152	4.200	0.1148	0.963	0.361	3.727	0.1744	1.095	-1.261	4.400
NF96-14	0.1837	0.974	-1.121	6.840	0.1702	0.812	0.067	5.753	0.2753	1.552	-0.977	2.552
NF96-15	0.1818	1.167	-1.016	6.739	0.1524	0.859	0.571	5.501	0.4477	1.591	-0.643	2.454
NF96-16	0.2032	1.048	-1.431	7.749	0.1599	0.874	-0.481	4.357	0.2062	1.176	-2.472	8.436
NF96-17	0.1754	0.086	-0.979	9.799	0.1522	0.753	0.345	5.973	0.2211	1.123	-1.810	6.995
NF96-18	0.2459	1.510	-0.828	4.131	0.1720	1.028	0.455	4.262	0.8281	1.734	0.160	1.802
NF96-19	0.2140	0.943	-1.623	7.544	0.1909	0.713	0.459	7.041	0.3333	1.673	-0.667	1.962
NF96-20	0.2129	0.907	-2.406	11.942	0.1826	0.604	0.918	9.464	0.4764	1.638	-0.711	2.225
NF96-21	0.7848	1.810	0.040	2.019	0.2878	1.162	0.055	3.030	1.8255	1.448	1.125	4.166
NF96-22	0.8036	1.817	0.216	2.167	0.3782	1.411	-0.145	2.585	1.6060	1.705	1.234	4.001
NF96-23	0.3445	1.154	-0.565	3.135	0.2293	1.154	-0.196	3.176	0.8830	1.595	0.082	2.120
NF96-24	1.8743	1.836	0.908	3.024	0.5550	1.596	0.449	3.212	3.9329	1.057	2.046	6.192
NF96-25	0.1525	0.939	-1.121	6.631	0.1225	1.015	0.137	4.226	0.1400	1.243	-1.804	5.761

Surface Sediment Texture Data From Seaward Of Hilton Head Island, SC

Sample ID	Bulk				Carbonate Free				Carbonate			
	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)
NF96-26	0.1777	1.024	-1.109	6.080	0.1694	0.876	-0.537	5.444	0.3451	1.976	-0.328	1.531
NF96-27	0.1432	0.765	-1.434	10.676	0.1511	0.473	0.715	9.427	0.1167	1.253	-2.265	7.756
NF96-28	0.1602	0.817	-3.264	19.781	0.1470	0.533	0.008	8.347	0.2696	1.653	-1.677	4.270
NF96-29	0.1595	0.644	-1.788	16.829	0.1516	0.596	-0.001	9.754	0.2441	1.062	-2.620	9.771
NF96-30	0.2100	1.118	-2.063	8.582	0.1822	0.693	-0.319	5.830	0.3858	1.911	-0.812	2.134
NF96-31	0.2087	0.694	-1.686	11.256	0.1885	0.970	0.834	5.245	0.2098	0.675	-2.117	11.853
NF96-32	0.2523	1.164	-1.224	6.109	0.2011	0.899	-0.002	4.893	0.5523	1.508	-0.831	2.498
NF96-33	0.2368	1.076	-1.586	7.760	0.2047	0.763	-0.152	5.663	0.4763	1.671	-0.797	2.403
NF96-34	0.2068	1.039	-1.339	7.116	0.1921	0.761	-0.385	6.495	0.2374	1.680	-1.036	3.115
NF96-35	0.1944	0.826	-1.640	8.926	0.1821	0.670	-0.469	6.763	0.2262	1.150	-1.844	5.676
NF96-36	0.2106	0.595	-1.366	13.674	0.2107	0.502	0.274	10.558	0.2223	1.034	-2.115	7.192
NF96-37[2]	0.2336	0.761	-1.169	6.866	-	-	-	-	-	-	-	-
NF96-38	0.2447	0.951	-1.103	5.791	0.2016	0.598	0.181	8.126	0.4460	1.267	-0.090	2.752
NF96-39	0.2540	0.684	-1.294	9.075	0.2678	0.563	0.150	5.297	0.2678	1.108	-1.776	5.727
NF96-40	0.2678	0.840	-1.563	9.704	0.2565	0.639	0.367	5.717	0.3491	1.423	-1.450	3.923
NF96-41	0.2871	0.842	-0.981	6.794	0.2741	0.672	0.190	4.183	0.3461	1.438	-0.920	3.154
NF96-42	0.1862	0.744	-1.461	9.567	0.1784	0.627	-0.129	6.210	0.2121	1.062	-2.057	6.672
NF96-43[2]	0.4270	1.237	-0.653	3.812	-	-	-	-	-	-	-	-
NF96-44	0.1895	0.738	-2.522	19.525	0.1844	0.482	0.709	11.538	0.2091	1.462	-1.844	6.234
NF96-45	0.1187	1.672	-0.624	3.343	0.0984	1.470	-0.311	2.322	0.3184	1.829	-0.936	2.515
NF96-46	0.2188	0.784	-1.869	10.905	0.2178	0.693	-0.684	6.048	0.2709	1.516	-1.456	4.116
NF96-47	0.2468	0.713	-1.402	10.258	0.2321	0.583	0.034	6.172	0.3518	1.171	-1.444	4.653
NF96-48	0.4089	1.023	-0.930	4.968	0.3301	0.703	0.204	4.905	0.9188	1.210	-0.121	2.656
NF96-49	0.2552	0.864	-1.856	8.876	0.2318	0.594	-0.438	5.572	0.4557	1.522	-0.677	2.339

[2]Unable to complete carbonate analysis.

Surface Sediment Texture Data From Seaward Of Hilton Head Island, SC

Sample ID	Bulk				Carbonate Free				Carbonate			
	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)
NF96-50	0.4306	1.342	-0.837	3.520	0.3238	0.992	-1.147	7.285	0.9469	1.536	0.412	2.346
NF96-51	0.5271	1.406	-0.307	3.057	0.3450	1.044	0.295	3.904	0.9609	1.579	0.364	2.276
NF96-52	0.3300	0.965	-1.152	4.847	0.2762	0.692	0.035	3.908	0.4307	1.505	-0.378	1.936
NF96-53	0.2627	1.105	-1.853	7.366	0.2174	0.646	-0.736	7.789	0.5781	1.732	-0.372	1.969
NF96-54	0.2908	0.873	-1.538	7.091	0.2610	0.630	-0.424	3.455	0.5371	1.389	-0.549	2.610
NF96-55	0.2488	0.676	-0.970	6.841	0.2272	0.636	0.393	4.101	0.2358	1.021	-1.430	4.204
NF96-56	0.2192	0.633	-1.586	12.495	0.2098	0.474	0.659	10.028	0.3051	1.189	-1.154	3.475
NF96-57	0.3600	0.936	-1.034	4.966	0.2957	0.681	0.238	5.303	0.5418	1.400	-0.097	1.958
NF96-58	0.2271	0.699	-1.517	8.956	0.2153	0.497	-0.256	8.497	0.3011	1.338	-0.610	2.409
NF96-59[3]	-	-	-	-	-	-	-	-	-	-	-	-
NF96-60	0.4382	1.124	-1.091	4.498	0.3463	0.759	-0.233	4.453	0.9221	1.409	-0.194	1.865
NF96-61	0.3825	1.205	-1.199	4.297	0.2777	0.623	-0.034	5.537	0.9172	1.496	0.282	2.274
NF96-62	0.2900	0.774	-1.563	7.322	0.2653	0.575	-0.443	3.832	0.4973	1.246	-0.687	2.546
NF96-63[3]	-	-	-	-	-	-	-	-	-	-	-	-
Tazz-1	0.1109	0.736	-0.918	9.723	0.0978	0.674	-0.696	9.841	0.1764	0.663	-3.546	16.452
Tazz-2	0.1686	1.351	-1.656	7.292	0.1280	0.908	-0.226	5.037	0.3943	1.852	-1.064	2.625
Tazz-3	0.2809	2.092	-1.105	2.972	0.1316	0.952	-0.409	6.071	1.6396	2.059	0.698	1.840
Tazz-4	0.1531	0.696	-0.891	8.220	0.1304	0.820	0.716	5.284	0.3348	1.298	-1.187	4.074
C2_hh01	0.1751	0.528	-0.430	10.884	0.1718	0.498	0.130	9.567	0.2562	0.823	-1.850	7.264
C2_hh02	0.1635	0.487	-0.585	6.365	0.1654	0.439	-0.446	7.299	0.1351	0.681	-1.736	7.915
C2_hh03	0.2243	0.556	-0.435	6.041	0.2226	0.551	-0.308	6.064	0.2453	0.732	-1.000	4.499
C2_hh04	0.1466	0.535	-2.248	15.709	0.1425	0.506	-2.028	15.493	0.2038	0.738	-2.749	10.869

[3]Unable to complete sediment analysis.

R_A Values for Surficial Sediments From Seaward Of Hilton Head Island, SC

Sample ID	M_b	$Sort_b$	M_b-M_n/$Sort_n$	$sort_b$/$sort_n$	R_A[1]
NF96-01	2.352	1.190	0.24	3.16	1.6
NF96-02	2.499	1.497	0.63	3.97	1.8
NF96-03	2.678	1.083	1.11	2.87	1.9
NF96-04	3.108	0.671	2.25	1.78	2.6
NF96-05	3.438	0.796	3.12	2.11	1.9
NF96-06	3.224	0.787	2.56	2.09	5.1
NF96-07	2.989	0.757	1.93	2.01	1.8
NF96-08	2.743	1.101	1.28	2.92	2.0
NF96-09	2.768	0.963	1.35	2.55	2.1
NF96-10	2.763	1.026	1.33	2.72	2.1
NF96-11	2.982	0.697	1.92	1.85	1.8
NF96-12	2.175	1.135	-0.23	3.01	1.41
NF96-13	3.074	0.978	2.16	2.59	3.1
NF96-14	2.445	0.974	0.49	2.58	1.6
NF96-15	2.459	1.167	0.53	3.10	1.7
NF96-16	2.299	1.048	0.10	2.78	1.47
NF96-17	2.512	0.086	0.67	0.23	>10.0
NF96-18	2.024	1.510	-0.63	4.01	1.45
NF96-19	2.224	0.943	-0.10	2.50	1.38
NF96-20	2.232	0.907	-0.07	2.41	1.37
NF96-21	0.350	1.810	-5.07	4.80	1.08
NF96-22	0.316	1.817	-5.16	4.82	1.08
NF96-23	1.537	1.154	-1.92	3.06	1.15
NF96-24	-0.906	1.836	-8.40	4.87	<1.00
NF96-25	2.713	0.939	1.20	2.49	2.0
NF96-26	2.492	1.024	0.62	2.72	1.7
NF96-27	2.804	0.765	1.44	2.03	2.4

M = Mean Grain Size
b = Borrow site
n = Native Sand
M_n = 2.26
$sort_n$ = 0.377

[1] R_a reported to 2 decimal places for values <=1.5 and 1 decimal place for values >1.5.

R_A Values for Surficial Sediments From Seaward Of Hilton Head Island, SC

Sample ID	M_b	$Sort_b$	M_b-M_n/$Sort_n$	$sort_b/sort_n$	R_A[1]
NF96-28	2.642	0.817	1.01	2.17	1.8
NF96-29	2.648	0.644	1.03	1.71	2.0
NF96-30	2.252	1.118	-0.02	2.97	1.47
NF96-31	2.261	0.694	0.00	1.84	1.27
NF96-32	1.987	1.164	-0.72	3.09	1.33
NF96-33	2.079	1.076	-0.48	2.85	1.32
NF96-34	2.274	1.039	0.04	2.76	1.46
NF96-35	2.363	0.826	0.27	2.19	1.42
NF96-36	2.247	0.595	-0.03	1.58	1.20
NF96-37	2.098	0.761	-0.43	2.02	1.20
NF96-38	2.031	0.951	-0.61	2.52	1.24
NF96-39	1.977	0.684	-0.75	1.81	1.09
NF96-40	1.901	0.840	-0.95	2.23	1.14
NF96-41	1.801	0.842	-1.22	2.23	1.10
NF96-42	2.425	0.744	0.44	1.97	1.19
NF96-43	1.228	1.237	-2.74	3.28	1.10
NF96-44	2.400	0.738	0.37	1.96	1.42
NF96-45	3.075	1.672	2.16	4.44	2.4
NF96-46	2.193	0.784	-0.18	2.08	1.27
NF96-47	2.019	0.713	-0.64	1.89	1.12
NF96-48	1.290	1.023	-2.57	2.71	1.13
NF96-49	1.970	0.864	-0.77	2.29	1.20
NF96-50	1.215	1.342	-2.77	3.56	1.13
NF96-51	0.924	1.406	-3.54	3.73	1.09
NF96-52	1.600	0.965	-1.75	2.56	1.10
NF96-53	1.929	1.105	-0.88	2.93	1.25
NF96-54	1.782	0.873	-1.27	2.32	1.11
NF96-55	2.007	0.676	-0.67	1.79	1.10

M = Mean Grain Size
b = Borrow site
n = Native Sand
M_n = 2.26
$sort_n$ = 0.377

R_A Values for Surficial Sediments From Seaward Of Hilton Head Island, SC

Sample ID	M_b	$Sort_b$	M_b-M_n/$Sort_n$	$sort_b$/$sort_n$	R_A[1]
NF96-56	1.712	0.633	-1.45	1.68	1.01
NF96-57	1.474	0.936	-2.08	2.48	1.06
NF96-58	2.139	0.699	-0.32	1.85	1.18
NF96-59[2]	-	-	-	-	-
NF96-60	1.190	1.124	-2.84	2.98	1.07
NF96-61	1.387	1.205	-2.32	3.20	1.03
NF96-62	1.786	0.774	-1.26	2.05	1.08
NF96-63[2]	-	-	-	-	-
Tazz-1	3.173	0.736	2.42	1.95	5.5
Tazz-2	2.568	1.351	0.82	3.58	1.8
Tazz-3	1.832	2.092	-1.14	5.55	1.47
Tazz-4	2.707	0.696	1.19	1.85	2.2
C2_hh01	2.513	0.528	0.67	1.40	1.6
C2_hh02	2.613	0.487	0.94	1.29	2.3
C2_hh03	2.156	0.556	-0.28	1.47	1.10
C2_hh04	2.770	0.535	1.35	1.42	3.5

M = Mean Grain Size
b = Borrow site
n = Native Sand
M_n = 2.26
$sort_n$ = 0.377

[2]Unable to complete sediment analysis.

APPENDIX II

Vibracore Descriptions And Subsample Sediment Data

Vibracore Data From Seaward Of Hilton Head Island, SC

Core ID	Date	Latitude	Longitude	Length	H_2O Depth (m)
Tazz-1	Nov-96	32.0975000	-80.7470000	2.41	7.92
Tazz-2	Nov-96	32.0786667	-80.7733330	2.89	8.66
Tazz-3	Nov-96	32.0765000	-80.7400000	2.39	12.19
Tazz-4	Nov-96	32.0830000	-80.7590000	2.18	8.99
C2_hh01	Feb-97	32.1362700	-80.6629900	1.65	5.12
C2_hh02	Feb-97	32.1129117	-80.6898520	0.89	4.88
C2_hh03	Feb-97	32.1034933	-80.7016570	0.72	4.94
C2_hh04	Feb-97	32.0834417	-80.7010980	0.63	4.85

Vibracore Sediment Data From Seaward Of Hilton Head Island, SC

Core ID	Depth	Gravel (%)	Sand (%)	Mud (%)	Carbonate (%)	Mean (bulk) (phi)	Mean (bulk) (mm)
Tazz-1	0.00-0.26	0.00	90.02	9.98	9.55	3.323	0.0999
	0.26-1.20	0.15	84.43	15.42	10.56	3.257	0.1046
	1.20-2.35	1.74	84.55	13.71	14.76	2.986	0.1262
	2.35-2.41	6.91	86.17	6.92	35.77	1.105	0.4649
Tazz-2	0.00-0.38	3.46	87.18	9.35	19.80	2.406	0.1887
	0.38-0.97	19.54	75.07	5.39	50.32	1.026	0.4912
	0.97-2.01	3.93	88.71	7.36	9.73	2.323	0.1999
	2.01-2.89	0.69	93.88	5.43	18.54	2.649	0.1594
Tazz-3	0.00-1.31	7.44	83.44	9.12	21.71	2.335	0.1982
	1.31-2.26	0.13	81.54	18.33	5.21	2.983	0.1265
	2.26-2.38	0.11	92.76	7.13	4.90	2.615	0.1633
Tazz-4	0.00-1.08	12.45	81.01	6.54	35.56	1.689	0.3101
	1.08-2.18	15.49	79.23	5.29	41.43	1.536	0.3449
C2_hh01	0.00-0.86	0.13	98.48	1.39	3.56	2.612	0.1636
	0.86-0.89	3.22	94.68	2.09	8.22	1.433	0.3705
	0.89-1.65	0.55	93.96	5.49	4.30	2.534	0.1762
C2_hh02	0.00-0.88	0.08	99.07	0.09	2.95	2.511	0.1754
C2_hh03	0.00-0.35	0.00	99.87	0.13	2.61	2.265	0.2080
	0.35-72.5	0.03	99.52	0.45	3.07	2.512	0.1753
C2_hh04	0.00-0.63	0.08	99.57	0.35	3.52	2.773	0.1463

Vibracore Sediment Texture Data From Seaward Of Hilton Head Island, SC

		Bulk				Carbonate Free				Carbonate			
Core ID	Depth	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)	Mean (mm)	Sorting (phi)	Skew (phi)	Kurtosis (phi)
Tazz-1	0.00-0.26	0.0999	0.701	0.649	5.684	0.0936	0.669	0.753	5.219	0.1507	0.503	-0.873	24.505
	0.26-1.20	0.1046	0.965	-0.112	4.779	0.0890	0.860	0.307	3.490	0.2093	0.791	-2.389	9.458
	1.20-2.35	0.1262	1.264	-1.095	6.404	0.1002	0.933	0.245	3.628	0.4057	1.517	-1.028	2.903
	2.35-2.41	0.4649	1.650	0.578	3.315	0.2726	1.426	0.990	3.031	1.2165	1.056	0.484	4.520
Tazz-2	0.00-0.38	0.1887	1.498	-0.651	3.636	0.1194	1.110	-0.100	3.211	0.4825	1.484	-0.494	1.999
	0.38-0.97	0.4912	2.016	-0.072	2.163	0.1593	1.198	0.452	2.863	1.4332	1.435	0.516	2.658
	0.97-2.01	0.1999	1.302	-0.927	5.941	0.1470	0.837	1.554	5.439	0.7013	1.491	-0.352	1.758
	2.01-2.89	0.1594	0.843	-0.478	11.179	0.1589	0.822	1.303	6.069	0.1677	1.058	-3.363	13.781
Tazz-3	0.00-1.31	0.1982	1.685	-1.045	4.129	0.1278	1.041	0.202	3.624	0.8711	1.862	0.127	1.588
	1.31-2.26	0.1265	1.080	0.704	3.386	0.1204	1.054	1.008	2.567	0.2127	0.976	-1.769	5.351
	2.26-2.38	0.1633	0.793	1.494	7.566	0.1617	0.783	2.090	7.043	0.1887	0.834	-2.361	8.460
Tazz-4	0.00-1.08	0.3101	1.936	-0.573	2.632	0.1372	1.166	-0.071	3.277	0.9936	1.716	0.101	1.782
	1.08-2.18	0.3449	1.91	-0.717	2.796	0.1562	0.830	1.246	6.028	1.1631	1.753	0.271	1.800
C2_hh01	0.00-0.86	0.1636	0.648	-0.608	9.224	0.1692	0.624	-0.545	10.877	0.1237	0.797	-2.398	8.476
	0.86-0.89	0.3705	1.456	0.032	2.319	0.3594	1.383	0.123	2.378	0.4594	1.950	-0.120	1.493
	0.89-1.65	0.1762	1.062	-0.561	5.491	0.1649	0.988	-0.215	4.685	0.3447	1.486	-0.993	3.721
C2_hh02	0.00-0.88	0.1754	0.657	-1.114	8.329	0.1743	0.664	-0.885	6.917	0.1657	0.684	-3.685	20.389
C2_hh03	0.00-0.35	0.2080	0.642	-1.078	5.803	0.2995	0.631	-0.024	4.648	0.1648	0.334	0.699	4.163
	0.35-0.73	0.1753	0.655	-1.189	7.133	0.1786	0.652	-1.036	7.110	0.1384	0.605	-3.322	19.450
C2_hh04	0.00-0.63	0.1463	0.483	-2.047	16.394	0.1499	0.542	-1.837	12.678	0.1481	0.107	20.905	438.002

R_A Values for Vibracore Sediments From Seaward Of Hilton Head Island, SC

Core ID	Depth	M_b	$Sort_b$	M_b-M_n/$Sort_n$	$sort_b$/$sort_n$	R_A[1]
Tazz-1	0.00-0.26	3.323	0.701	2.82	1.86	9.5
	0.26-1.20	3.257	0.965	2.64	2.56	4.1
	1.20-2.35	2.986	1.264	1.93	3.35	2.5
	2.35-2.41	1.105	1.650	-3.06	4.38	1.18
Tazz-2	0.00-0.38	2.406	1.498	0.39	3.97	1.7
	0.38-0.97	1.026	2.016	-3.27	5.35	1.24
	0.97-2.01	2.323	1.302	0.17	3.45	1.6
	2.01-2.89	2.649	0.843	1.03	2.24	1.9
Tazz-3	0.00-1.31	2.335	1.685	0.20	4.47	1.6
	1.31-2.26	2.983	1.080	1.92	2.86	2.6
	2.26-2.38	2.615	0.793	0.94	2.10	1.8
Tazz-4	0.00-1.08	1.689	1.936	-1.51	5.14	1.40
	1.08-2.18	1.536	1.91	-1.92	5.07	1.33
C2_hh01	0.00-0.86	2.612	0.648	0.93	1.72	1.9
	0.86-0.89	1.433	1.456	-2.19	3.86	1.20
	0.89-1.65	2.534	1.062	0.73	2.82	1.7
C2_hh02	0.00-0.88	2.511	0.657	0.67	1.74	1.6
C2_hh03	0.00-0.35	2.265	0.642	0.01	1.70	1.23
	0.35-72.5	2.512	0.655	0.67	1.74	1.6
C2_hh04	0.00-0.63	2.773	0.483	1.36	1.28	3.9

M = Mean Grain Size
b = Borrow site
n = Native Sand
M_n = 2.26
$sort_n$ = 0.377

[1] R_a reported to 2 decimal places for values <=1.5 and 1 decimal place for values >1.5.

KEY

- Fine Sand
- Med. sand
- Coarse sand
- Pebbles
- Shells
- Silt
- Clay
- Burrows
- Wood Frags.
- Roots
- Peat
- Mud Rollers
- Flaser beds

Core ID TAZZ 01

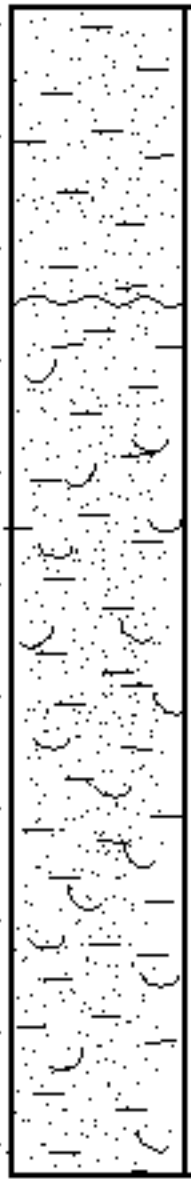
Total Depth 241 cm

Date cored 6-2396

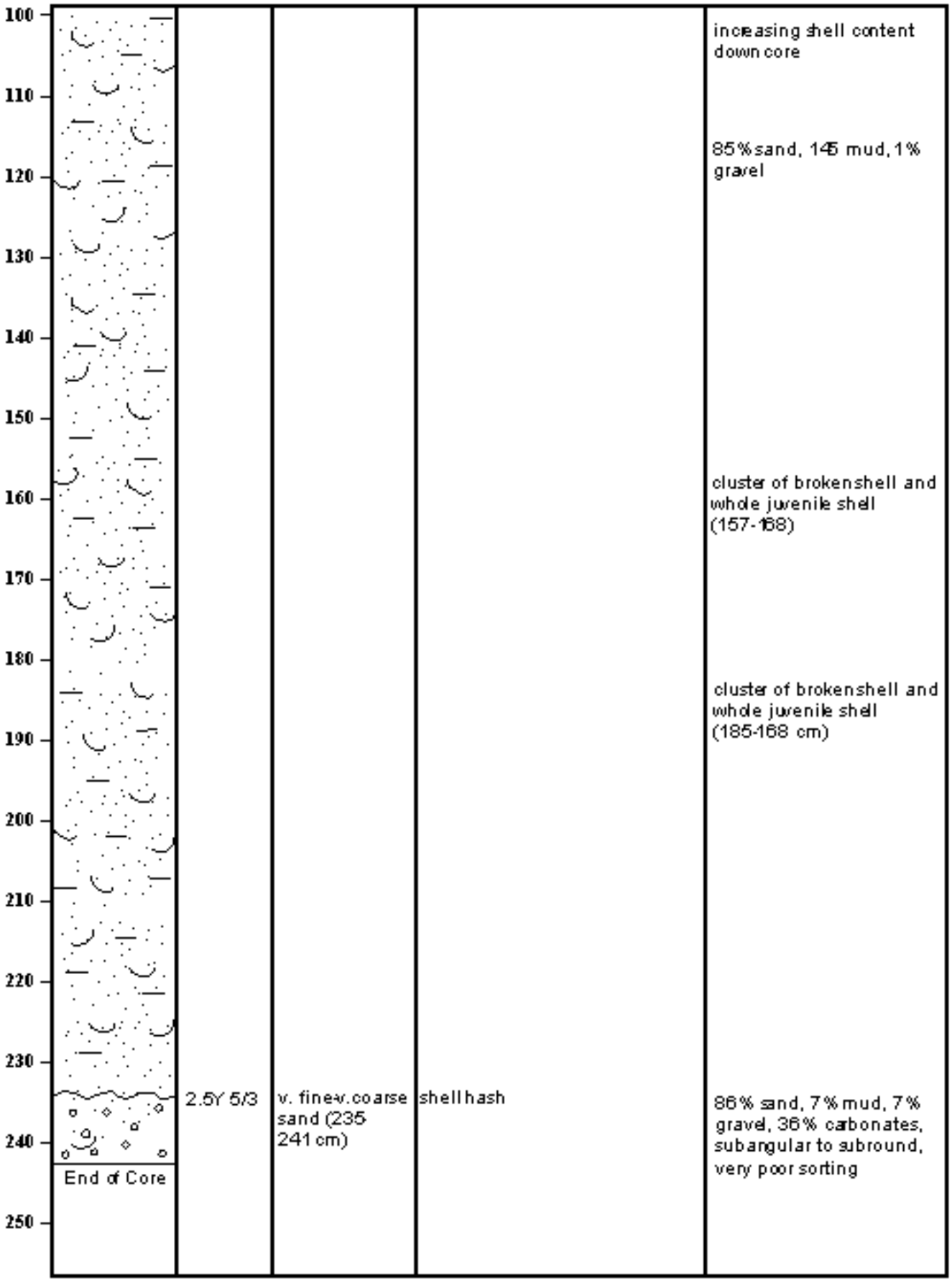
Equipment Rossfelder

Location 32° 04.98'N -80° 45.54'W

Analyst/Date described Kathleen Ladd

cm	Sketch	Color	Texture	Sed. Structures	Comments
0 – 10 – 20		5GY4/1	v. fine sandy-mud	gradational beds	90% sand, 9% carbonate, 10% mud (0-26cm) subrounded, wellsorted
30 – 40 – 50 – 60 – 70 – 80 – 90 – 100		5BG4/1	v.fine sand and mud (26-120cm)	sharp beds	84% sand, 15% mud, 11% carbonate(26-120cm) subround to sub-angular, poorly sorted, sharp beds

Core ID TAZZ_01



KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags.
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID TAZZ_02

Total Depth 289 cm

Date cored 6-23-96

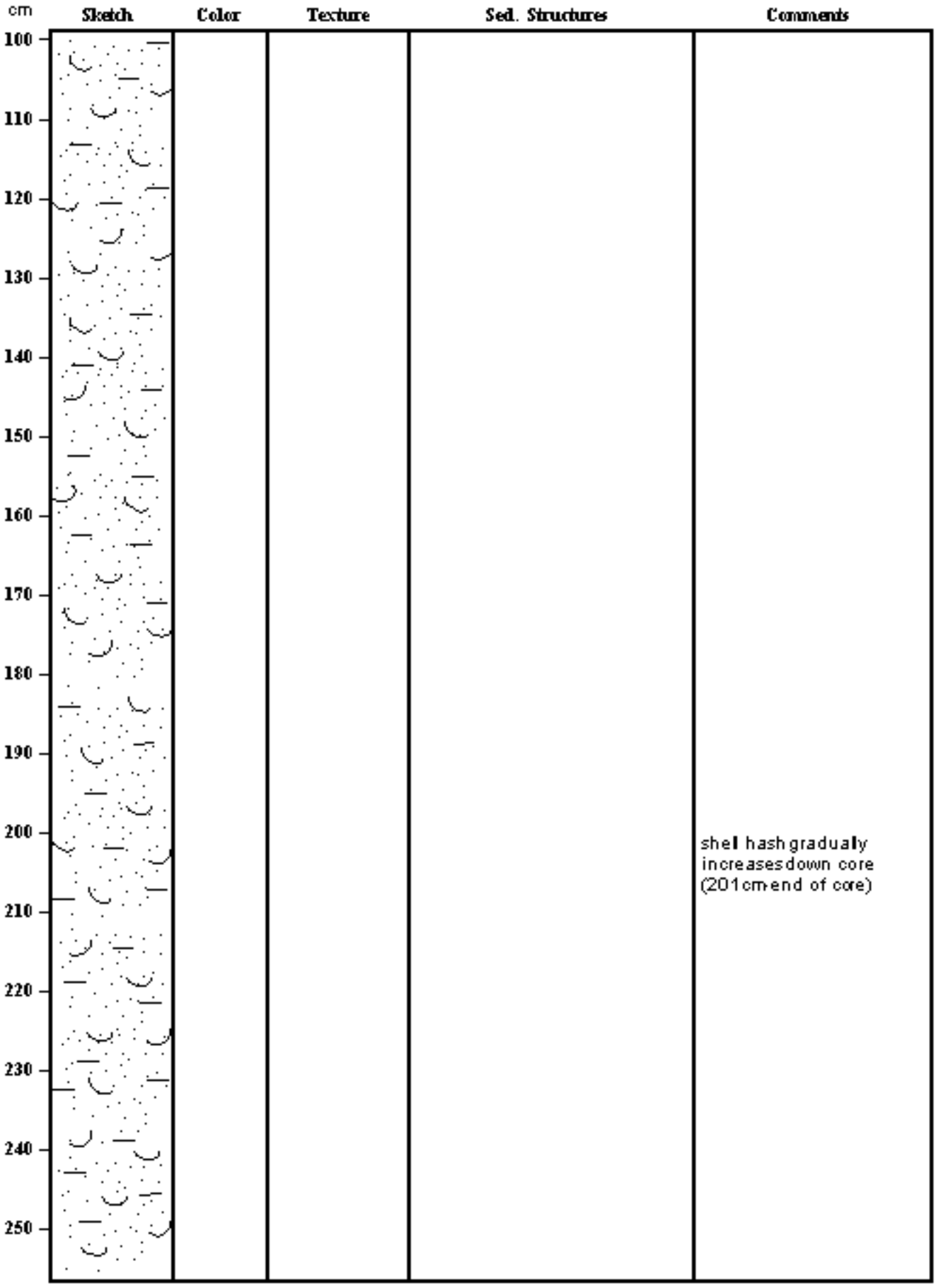
Equipment Rossfelder

Location 32° 04.98'N -80° 45.54'W

Analyst/Date described Kathleen Ladd

cm	Sketch	Color	Texture	Sed. Structures	Comments
0 — 10 — 20 — 30 — 40 — 50 — 60 — 70 — 80 — 90 — 100 —		5GY4/2	v. fine sandy-mud with shell debris		87% sand, 19% carbonate, 9% mud, 4% gravel (0-38 cm)
		5BG4/1	med.- fine sand mixed w/ shells (38-97 cm)	muddy shell hash both fragmented, large white juvenile shell	75% sand, 20% gravel, 5% mud, 50% carbonate (38-97 cm), subround to sub angular, poorly sorted, sharp beds
		5BG5/1 transitional to 5G 5/1 @ 262 cm to end	v. muddy-v fine sand (97-201 cm)		89% sand, 7% mud, 4% sand, 10% carbonate subround, poorly sorted, juvenille shells core catcher @ top 2/3 (100-116 cm)

Core ID TAZZ_02



Core ID TAZZ_02

cm	Sketch	Color	Texture	Sed. Structures	Comments
260					cluster of shells @260cm
270					
280					
290	End of Core				
300					
310					
320					
330					
340					
350					
360					
370					
380					
390					
400					
410					

KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID TAZZ 03

Total Depth 238 cm

Date cored 6-2396

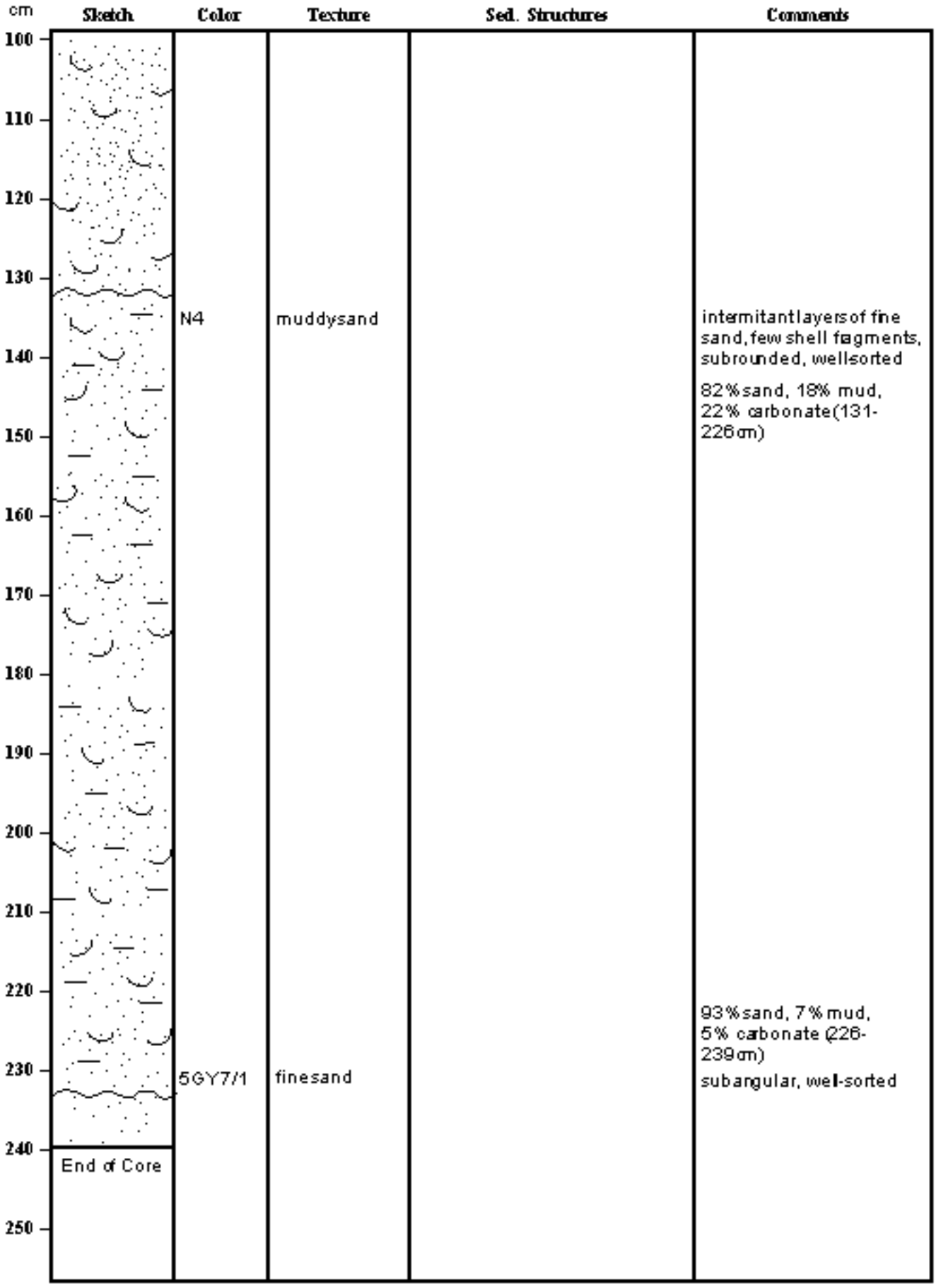
Equipment Rossfelder

Location 32° 04.98'N -80° 45.54'W

Analyst/Date described Baten/Baldwin

cm	Sketch	Color	Texture	Sed. Structures	Comments
0 – 10		5BG4/1	sandywith some mud		83% sand, 21% carbonate, 9% mud, 7% gravel (0 131cm) well-sorted (sand), poorly-sorted (shell), very abund-antin articulated shells and shell hash
10 – 20			fine med sand		
20 – 30					
30 – 40					
40 – 50					
50 – 60					
60 – 70					
70 – 80					
80 – 90					
90 – 100					

Core ID TAZZ_03



KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags.
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID TAZZ 04

Total Depth 218 cm

Date cored 6-23-96

Equipment Rossfelder

Location 32° 04.98'N -80° 45.54'W

Analyst/Date described Baten/Baldwin

cm	Sketch	Color	Texture	Sed. Structures	Comments
0		N3	fine sand-mud poor sorting		36% carbonate, 7% mud, 81% sand, 12% gravel (0-108 cm) Candium 15-21.5cm and 6.5cm in diameter shell hash throughout sandy layer 23.5-29cm
10					
20					
30					
40					
50					
60					
70					
80					
90					clean sandy layer 89-95.5cm
100					

Core ID TAZZ_04

cm	Sketch	Color	Texture	Sed. Structures	Comments
100					103-108.2cm at bottom of 1/1 large gap in core 108.2-120cm, gap in 2/2 80% sand, 15% gravel, 5% mud, 41% carbonate
110					
120					
130					
140					shelly layer 140-147cm
150					
160					
170					
180					
190					
200					
210					
220	End of Core				
230					
240					
250					

KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID C2-HH-01-97

Total Depth 165 cm

Date cored 2-2-97

Equipment NURC vibracore

Location 32°08.176'N -80°39.779'W **Analyst/Date described** Baten/Baldwin

cm	Sketch	Color	Texture	Sed. Structures	Comments
0		5GY7/1	v. fine-med sand	few muddy burrows (<1cm in diameter), sand	wellsorted,subangular to subround, 90% quartz, 9% phosphates,1%shell
10					
20		5GY4/1		mud	
30					
40				lenticular bedding	
50					
60					
70					
80					
90		2.5Y 6/3 (0.89cm to end)			84-88cm high shell content
100					

Core ID C2_HH-0197

cm	Sketch	Color	Texture	Sed. Structures	Comments
100–160		2.5Y 6/3	v. fine-med. sand slightly muddy down core	few larger shell fragments(<3cm)	?% sand, ?% gravel, ?% mud, ?% carbonate well-sorted, subround to subangular mud burrows (1cm in diameter)
170	End of Core				

100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250

KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID C2-HH-02-97

Total Depth 88 cm

Date cored 2-2-97

Equipment NURC vibracore

Location 32° 06.775'N -80° 41.391'W

Analyst/Date described Baten/Baldwin

Color	Texture	Sed. Structures	Comments
			0-3cm missing
5GY6/1	fine med sand	slight gradational coarsening, rare filled mud burrows	well sorted, subangular to subround, 99% sand, 1% mud, 3% carbonate decreases in opaques downsection
5GY7/1			
5GY7/1	fine med sand		well sorted, subround to subangular 77.5cm mud roller
5GY7/1	med-fine sand	few mud-filled burrows	

KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags.
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID C2-HH-03-97

Total Depth 725 cm

Date cored 2-2-97

Equipment NURC vibracore

Location 32° 06.210'N -80° 42.100'W **Analyst/Date described** Baten/Baldwin

cm	Sketch	Color	Texture	Sed. Structures	Comments
0		5GY7/1	med-fine sand	mud-filled borrows (3cm) rare bioturbation	well sorted, subround, 100% sand
40		5GY6/1	med-fine sand		
70	End of Core				

KEY

Fine Sand	Clay
Med. sand	Burrows
Coarse sand	Wood Frags.
Pebbles	Roots
Shells	Peat
Silt	Mud Rollers
	Flaser beds

Core ID C2-HH-04-97

Total Depth 63 cm

Date cored 2-2-97

Equipment NURC vibracore

Location 32°05.007'N -80°42.066'W

Analyst/Date described Baten/Baldwin

cm	Sketch	Color	Texture	Sed. Structures	Comments
0		5GY5/1	med-fine sand		well sorted, subround, 100% sand
10		5G6/2	med-fine sand		well sorted, subround to subangular
20					
30					
40					
50					
60	End of Core				
70					
80					
90					
100					