FINAL REPORT

High School Beach Monitoring Program: A Pilot Project in Education, Public Awareness, and Coastal Management

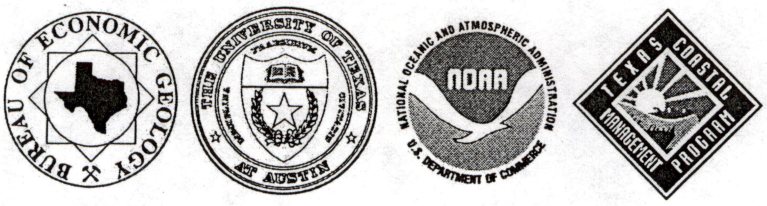
Ball High School, Galveston, Texas, 1997/1998

James C. Gibeaut, Roberto Gutierrez, Brenda L. Kirkland*

*Department of Geological Sciences
The University of Texas at Austin
Austin, Texas 78712

A Report of the Texas Coastal Coordination Council pursuant to National Oceanic and Atmospheric Administration Award No. NA770Z0202

Funding for the Texas High School Coastal Monitoring Program is provided by the Texas Coastal Coordination Council, Conoco, and the Exxon Foundation.



Bureau of Economic Geology
Noel Tyler, Director
The University of Texas at Austin
Austin, Texas 78713-8924

February 1999

CONTENTS

INTRODUCTION

The Texas Coastal Monitoring Program engages people who live along the coast in the study of their natural environment. High school students, teachers, and scientists work together to gain a better understanding of dune and beach dynamics on the Texas coast. Scientists from The University of Texas at Austin (UT) provide the tools and training needed for scientific investigation. Students and teachers learn how to measure the topography, map the vegetation line and shoreline, and observe weather and wave conditions. By participating in an actual research project, the students obtain an enhanced science education. Public awareness of coastal processes and the Texas Coastal Management Program is heightened through this program. The students' efforts also provide coastal communities with valuable data on their changing shoreline.

This report describes the program and our experiences during the pilot year at Ball High School on Galveston Island, Texas (Fig. 1). Discussions of the data collected by the students and recommendations for future high school projects are also included. A manual with detailed field procedures, field forms, classroom exercises, and teaching materials was prepared during the first year. A full-color poster describing the project is also available.

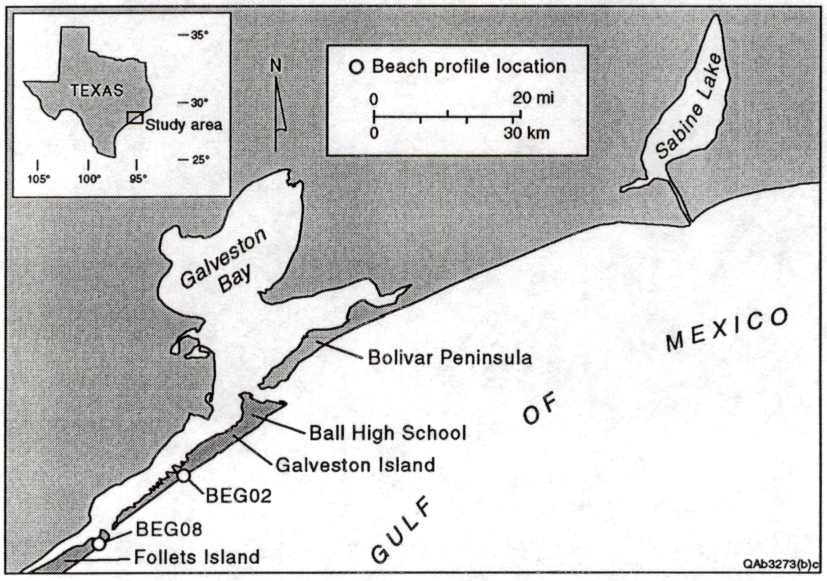


Figure 1. Study area.

PROGRAM DESCRIPTION

Goals

The coastal monitoring program has three major goals:

(1) Provide high school students with an inquiry-based learning experience.

Students make several field trips to their study sites during the school year. Working in teams, they conduct topographic surveys (beach profiles) of the foredune and beach, map the vegetation line and shoreline, collect sediment samples, and observe weather and wave conditions. Back in the classroom, students analyze their data and look for relationships among the observed phenomenon. UT scientists provide background information and guide inquires of the data, but students are encouraged to form their own hypotheses and to test them. Through their collaboration with working scientists on an actual research project, the students gain an enhanced science education.

(2) Increase public awareness and understanding of coastal processes and hazards.

We expect that the participating students will discuss the program with their parents, classmates, and neighbors, further expanding the reach of the program. We expect the program to attract media attention as well. A World Wide Web site containing the latest information will be central to the community outreach portion of the project. Coastal residents may wish to view the effects of a storm that strikes the upper coast. They will be able to do this by accessing the Texas Coastal Monitoring Program web site and view maps, graphs, and photographs collected by Ball High School. Curiosity may drive this inquiry at first, but what is realized is an increased awareness and appreciation of coastal processes and how future storms could affect ones community.

(3) Obtain a better understanding of the relationship between coastal processes, beach morphology, and shoreline change, and make data and findings available for solving coastal management problems.

The Bureau of Economic Geology (Bureau) at UT has conducted a thirty-year research program to monitor shorelines and investigate coastal processes. An important portion of this program is the repeated mapping of the shoreline and measurement of beach profiles. Over time, these data are used to determine the rate of shoreline change. A problem we face is the limited temporal resolution in our shoreline data. The beach is a dynamic environment where significant changes in shape and sand volume can occur over periods of days or even hours. Tides, storms, and seasonal wind patterns cause large, periodic or quasi-period changes in the shape of the beach. If coastal data are not collected often enough, periodic variations in beach morphology could be misinterpreted as secular changes. The High School Coastal Monitoring Program helps address this problem by providing scientific data at key locations along the Texas coast. These data are integrated into the ongoing coastal research program at the Bureau and are made available to other researchers and coastal managers.

Methods

The central element in the high school monitoring program is at least three class field trips during the academic year. During each trip, students visit several locations and apply scientific procedures to measure beach morphology and make observations on beach, weather, and wave conditions. These procedures were developed during the program's pilot year (1997/98) and are presented in detail in a manual that also includes field forms. Following is a general discussion of the field measurements.

(1) Beach profile

Students use a pair of Emery rods, a metric tape, and a hand level to accurately survey a shore-normal beach profile from the foredunes to the waterline. The students begin the profile at a pre-surveyed datum stake so that they can compare each new profile to earlier profiles. Consistently oriented photographs are taken with a digital camera. The beach profiles provide detailed data on the volume of sand and the shape of the beach.

(2) Shoreline mapping

Using a differential Global Positioning System (GPS) receiver, students walk along the vegetation line and shoreline, mapping these features for display on Geographic Information System software. The GPS mapping provides measurements of the rate of shoreline change.

(3) Sediment sampling

Students take sediment samples along the beach profile at the foredune crest, berm top, and beach face. They then sieve the samples, weigh the grain size fractions, and inspect the grains using a microscope. These samples show the dependence of sand characteristics on the various processes acting on the beach.

(4) Beach processes

Students measure wind speed and direction, estimate the width of the surf zone, and observe the breaker type. They note the wave direction, height and period, and estimate the longshore current speed and direction using a float, stop watch, and tape measure. From these measurements, students can infer relationships between physical processes and beach changes in time and space. Students also learn to obtain weather and oceanographic data from resources on the Internet.

Training

UT scientists provide the teachers with all the training, information, field forms, and equipment needed to conduct the field and lab measurements. During the school year, UT scientists accompany the students on at least two of the field trips and make at least two classroom visits. The classroom visits provide students with even more insight in conducting scientific research. The scientists discuss with the students general and theoretical issues regarding scientific research as well as specific techniques and issues related to coastal research. The visits also provide the scientists with an opportunity to ensure the quality of the data.

Data Management, Data Analysis, and Dissemination of Information

The World Wide Web is central to the dissemination of data collected for this program. A web site, which resides on a UT server, is being developed. The web site will provide all the information needed to begin a beach monitoring program as well as curriculum materials for high school teachers. Each school in the program will have an area on the web site to post their data and observations, including photos taken with their electronic camera. UT scientists will manage the data in an electronic database and make it available to the public. UT scientists will also evaluate the data in light of addressing coastal management problems.

STUDENT, TEACHER, AND SCIENTISTS INTERACTIONS

UT scientists, Drs. Gibeaut, Gutierrez, and Kirkland, worked with Ms. Cain and Dr. Agbe of Ball High School in developing and conducting the project. Ms. Cain is the head of the Science Department at Ball High School and Dr. Agbe is the Marine Science teacher. UT scientists worked directly with the Honors Marine Science Class, which had 15 students in the 11^{th} and 12^{th} grades. In addition, Dr. Agbe used the techniques and equipment provided by the program during fieldtrips with his other Marine Science classes.

We had originally intended to meet with teachers and possibly a few students for instruction before the school year began. Because of a late start date for the contract, however, this was not possible. Our first meeting was at Ball High School on September 5, 1997 when UT scientists met with Ms Cain and Dr. Agbe. At this meeting, the objectives and logistics of the project were discussed. Subsequent meetings after school on September 18 and 19 included lectures by UT scientists on coastal processes and beach profiling techniques. On September 20, Drs. Gibeaut, Gutirerrez, and Agbe went on a full-day fieldtrip to conduct all the beach measurements. Several more meetings that involved setting up the classroom computer, instruction, and planning occurred between scientists and teachers. In the beginning phase of the project, UT scientists met with the teachers for a total of 36 hours. Subsequent meetings occurred in conjunction with the fieldtrips.

The first class fieldtrip was on October 1, 1997. Drs. Gibeaut and Gutierrez accompanied Dr. Agbe and his Honors Marine Science Class on this first trip. We chose to go to a beach profile location at Galveston Island State Park because of the short distance from the school, restrooms, and easy parking for a school bus. The students were divided into two teams. One team measured the profile and took sediment samples while the other team collected data on the weather and waves and conducted a GPS survey of the shoreline and vegetation line. Team members had specific tasks, and for this first trip, students took turns performing them. After each team completed their tasks, the teams switched roles so that everyone would have an opportunity to conduct all the measurements. Only one profile was measured on this first trip, but during the second year of the project, we were able to measure two profiles on the first trip.

Dividing the students into two five- to seven-member teams, one that conducts the profile and sediment sampling and the other that measures the processes and the shoreline, works well. Each team finishes at about the same time, although for short profiles, the profiling team may finish early. In this case, an extra task could be assigned to the profiling team. It is important to assign each student a job to keep them focussed and interested. Time for a little fun should also be allowed. People normally think of the beach as a place of recreation, and participation in this project should not change that. In fact, it is hoped that program participants will enjoy going to the beach even more because of their newly acquired knowledge and observation skills.

On October 8 and 10, UT scientists met with students in the classroom. They instructed students on sediment analysis techniques and computer and data management procedures. The scientists also discussed careers in the sciences and opportunities for scholarships at universities. The second field trip occurred on December 9, 1997. Drs. Gutierrez and Kirkland accompanied the class on that trip during which they measured three beach profiles and visited a fourth location at Bermuda Beach to observe erosion impinging on a housing development.

It was originally planned that the students would measure four profiles on each field trip. While it may be possible to visit four locations and return by the end of the school

day (2:30), it is clear that this is too much work for the students. Little time would be allowed for lunch, and the quality of the data and learning experience for the students would suffer. Furthermore, managing and analyzing data from four profiles would require more time in the classroom than is available. Therefore, it was decided to measure two locations during each trip. This allows ample time for careful data collection, and gets the students back to school about one hour before the end of the day. During this hour, equipment and samples are stored, and data are filed or transferred to the computer.

Dr. Gutierrez participated in the third field trip on March 6, 1998, and Dr. Gibeaut attended the fourth fieldtrip on April 28. Two profiles were measured during each of these trips. On March 12, Dr. Gibeaut met with students in the classroom. He discussed the data collected by the students and their progress on analyzing and interpreting it. During the year, UT scientists met with the students during four field trips and three class periods.

AFFECTS ON SCIENCE CURRICULUM

The Texas Coastal Monitoring Program addresses several requirements of the Texas Essential Knowledge and Skills (TEKS) for science. The program would be relevant in the following 1998/1999 Texas high school courses: (1) Environmental Systems; (2) Aquatic Science; and (3) Geology, Meteorology, and Oceanography. TEKS related to applying scientific methods in field and laboratory investigations in these courses are well covered in the Coastal Monitoring Program. Specific requirements such as (1) collect data and make measurements with precision, (2) analyze data using mathematical methods, (3) evaluate data and identify trends, and (4) plan and implement investigative procedures are an excellent fit with the program. TEKS that require students to use critical thinking and scientific problem solving to make informed decisions are also well served. Teachers and scientists can use the program to illustrate to students the role science could, should, or does play in developing public policy. A case study of a local erosion problem could be used for this illustration.

Student evaluation forms are in Appendix B. Overall, the students highly rated the program. It is apparent, however, that the students need to be well prepared with

knowledge of scientific concepts and the problems being addressed before going into the field. Classroom exercises using the field data are also important to reinforce concepts and to give students a sense of purpose and accomplishment for work conducted in the field. There is a general consensus among the teacher and students to have only three field trips with the last trip not close to the end of the school year. Furthermore, apparently classroom lectures by UT scientists were too long. Dr. Agbe suggested limiting lectures to about 20 minutes and separating lectures with hands-on activities.

AFFECTS ON SCIENTIFIC RESEARCH, COASTAL MANAGEMENT, AND PUBLIC AWARENESS

During the 1997/1998 academic year, Ball High School students measured four profiles at a location in Galveston Island State Park (BEG02) and three profiles at a location on Follets Island to the southwest of Galveston Island (BEG08) (Fig. 1). The Bureau conducted quarterly surveys at these locations from 1983 to 1985 following Hurricane Alicia. Since 1985, however, the beaches were surveyed on an irregular schedule about once per year and only when specific projects were funded to do so or when Bureau personnel were in the area conducting other work. The High School Beach Monitoring Program helps ensure that the time series at these key locations are continued.

Although the March 6 beach profiles have errors, the other profile and process data the students collected are useful and have been incorporated into the beach profile database at the Bureau. These data will be used in Bureau studies that investigate beach erosion patterns in the area. Two such studies are in progress, one funded by the Texas Coastal Coordination Council and another three-year study sponsored by the National Aeronautic and Space Administration (NASA). During the 1997/1998 academic year, the students data show an increase in sediment volume through the fall at both locations (Appendix A). The beaches vertically accreted about 30 cm on the upper beach while dune volumes remained stable. Over the winter from December 9, 1997 to April 28, 1998, however, the beaches lost a volume of sand that amounted to 14 to 19 cubic meters per meter of shoreline. This sand-volume loss was manifested by a lowering of the beach surface of 30 to 50 cm and shoreline retreat of about 15 m. Dune volumes, however,

remained stable. The student-collected data show a large change that occurred over a winter that was non-eventful with regard to storms. Continuance of the beach profile measurements by students during the 1998/1999 school year may demonstrate if this change is permanent or part of a seasonal cycle. These data will give us insight into how to interpret other periods of the profile time series that do not have seasonal data.

It will take time to incorporate the data into products that support coastal management. It is clear, however, that the data will be useful in understanding beach cycles and defining short-term versus long-term trends. Defining these trends is important for making decisions regarding coastal development and beach nourishment. The program has increased public awareness through the students, but to this date, the increase is mostly confined to the students' friends and families. A World Wide Web site will be instrumental in extending the reach of the program to the public. During this pilot year, we developed the beginnings of such a site, and we will expand and improve it during the following year. The program has also attracted the attention of the Texas Education Administration, and they will be filming students measuring the beach in March 1999, further increasing public awareness of coastal processes.

RECOMMENDATIONS

We consider the pilot year of the coastal monitoring program an overall success and offer the following recommendations for continuance and expansion of the program.

1) Emphasize to the students that they are working on a real research project and are collecting scientifically valid data that will eventually appear in a scientific publication. This is a major point that makes this program different from most other fieldtrips or laboratory exercises. Students are not asked to conduct experiments that have no real consequence. This seems to make a difference to many students, and it probably improves the quality of the data.

2) Clearly state to the students the specific scientific problems being addressed, but also emphasize that what they are gaining experience in is not just how to

measure beaches but how to conduct scientific field research in general. The students are also learning a different way to view their surroundings.

3) Survey a reasonable number of beaches, which in most cases would mean two. The program goals of scientific research and science education could be at odds with one another. From a purely scientific point of view, it would be desirable to acquire as much data as possible. That approach, however, would not allow time for discussions on the beach not directly related to the measurements. It would also hinder the development of observation skills and keep the students from enjoying their work.

4) The number of official fieldtrips depends on the class, but a maximum of four trips is reasonable. Some students might be encouraged to make additional trips on weekends or after school. Interested students should be encouraged to use the program in a science fair project.

5) When adding additional schools to the program, a two- to three-day seminar with all the teachers and before the school year begins is desirable. This would be more efficient instruction and teachers and scientists would benefit by exchanging ideas.

6) A web site adds an important dimension to the project, especially when multiple schools are participating. A web site where students can exchange observations with other schools in Texas will increase the educational value of the program by allowing students to observe differences in the processes acting along the coast. A web site would also introduce the Internet to students and illustrate how it can be used to conduct research. Furthermore, the Internet is important to increase public awareness of coastal processes.

APPENDIX A: STUDENT-COLLECTED DATA AND GRAPHS

Beach Volume Tables and Profile Plots

Profile data were entered into the public domain software package called "Beach Morphology and Analysis Package" (BMAP). BMAP Version 2 was developed by the U.S. Army Corp of Engineers and is commonly used by coastal engineers and scientists for beach profile analysis. Beach volume calculations and profile plots were created using BMAP. Students plotted their data and made volume calculations as class exercises, but UT scientists generated the tables and graphs presented here. We intend to install BMAP on the high school computer and develop protocol and write instructions for its use by students.

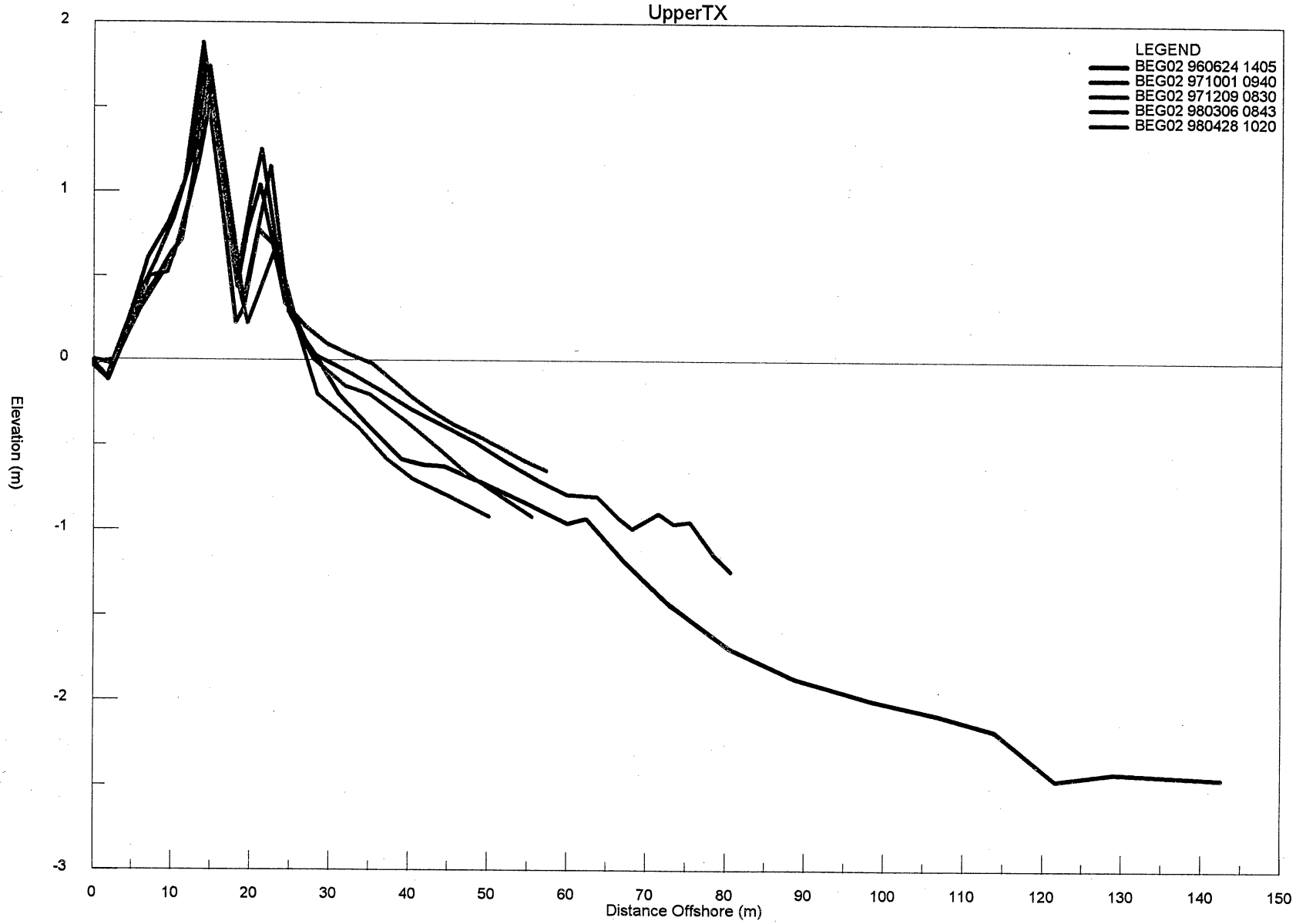
BEG02 Profile Volume (cubic meters/meter)
Volumes calculated from 0 to 80 m and above –1 m. Profiles that did not extend to 80 m distance were extrapolated.

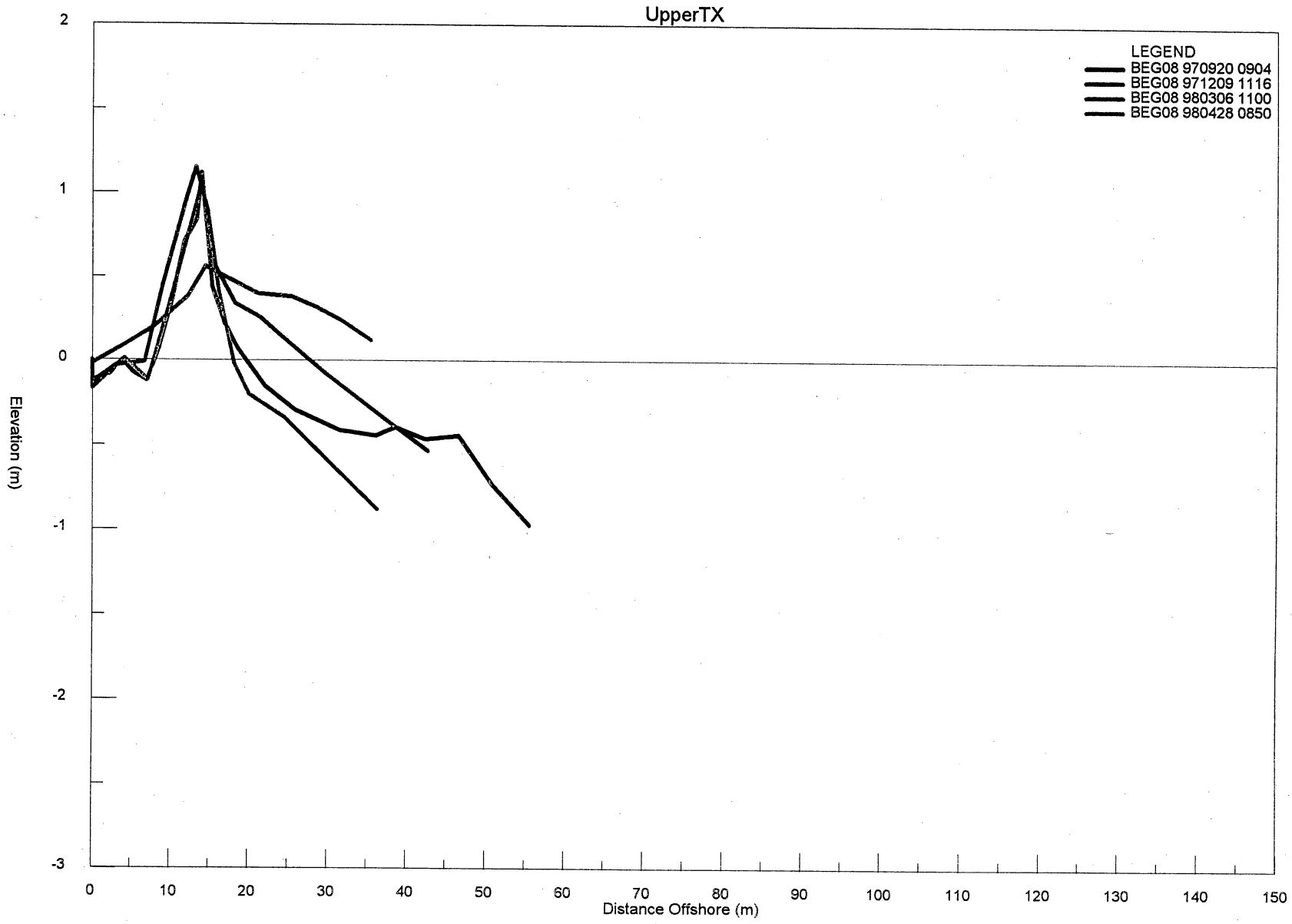
Date	Volume
June 24, 1996 (960624)	56.250
October 1, 1997 (971001)	69.007
December 9, 1997 (971209)	75.631
March 6, 1998 (980306)	*
April 28, 1998 (980428)	61.540

BEG08 Profile Volume (cubic meters/meter)
Volumes calculated from 0 to 60 m and above –1 m. Profiles that did not extend to 80 m distance were extrapolated.

Date	Volume
September 20, 1997 (970920)	43.923
December 9, 1997 (971209)	53.443
March 6, 1998 (980306)	*
April 28, 1998 (980428)	34.721

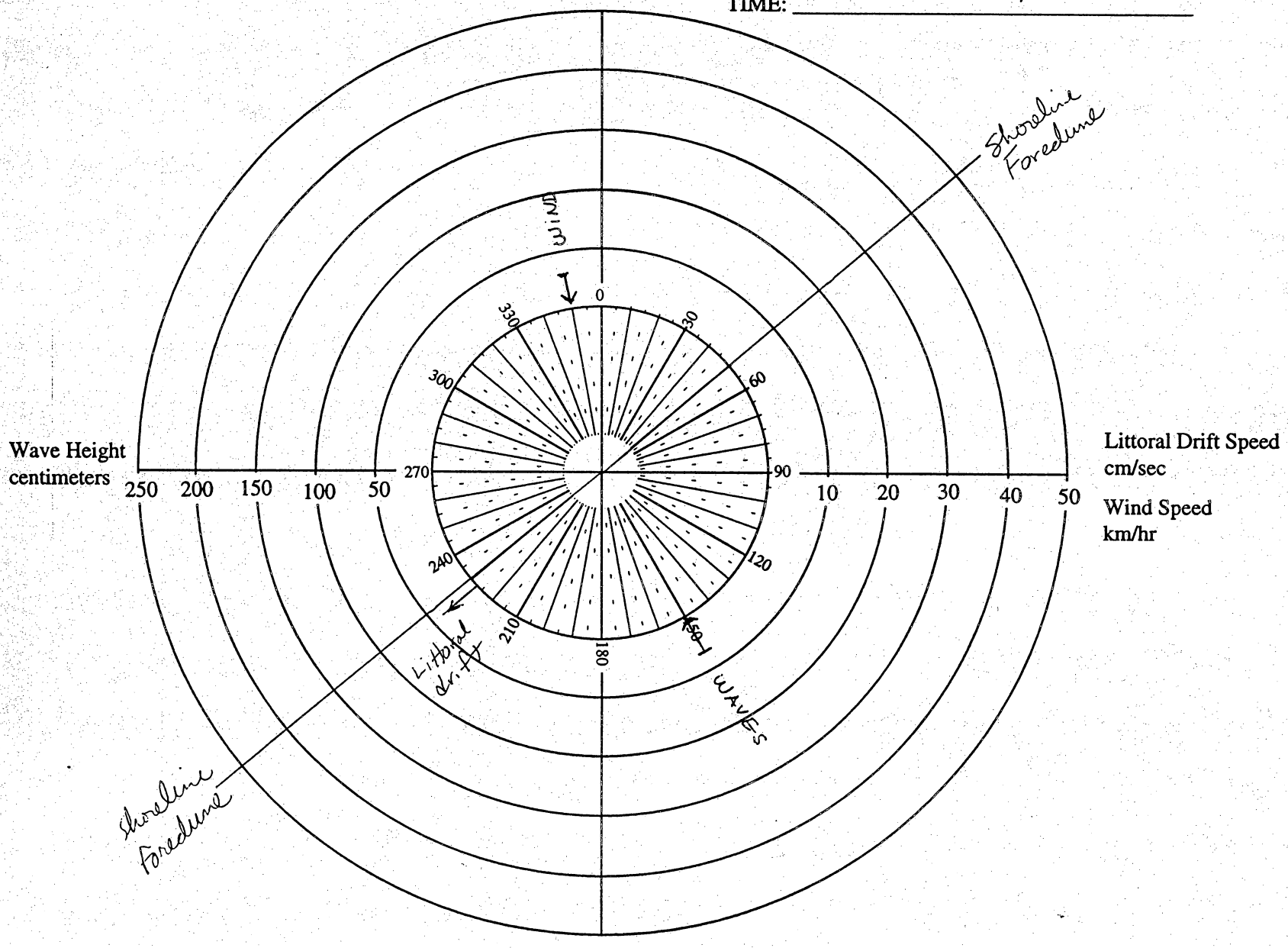
*Profiling errors make volume calculations erroneous.


UpperTX
LEGEND
BEG02 960624 1405
BEG02 971001 0940
BEG02 971209 0830
BEG02 980306 0843
BEG02 980428 1020
Elevation (m)
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Distance Offshore (m)

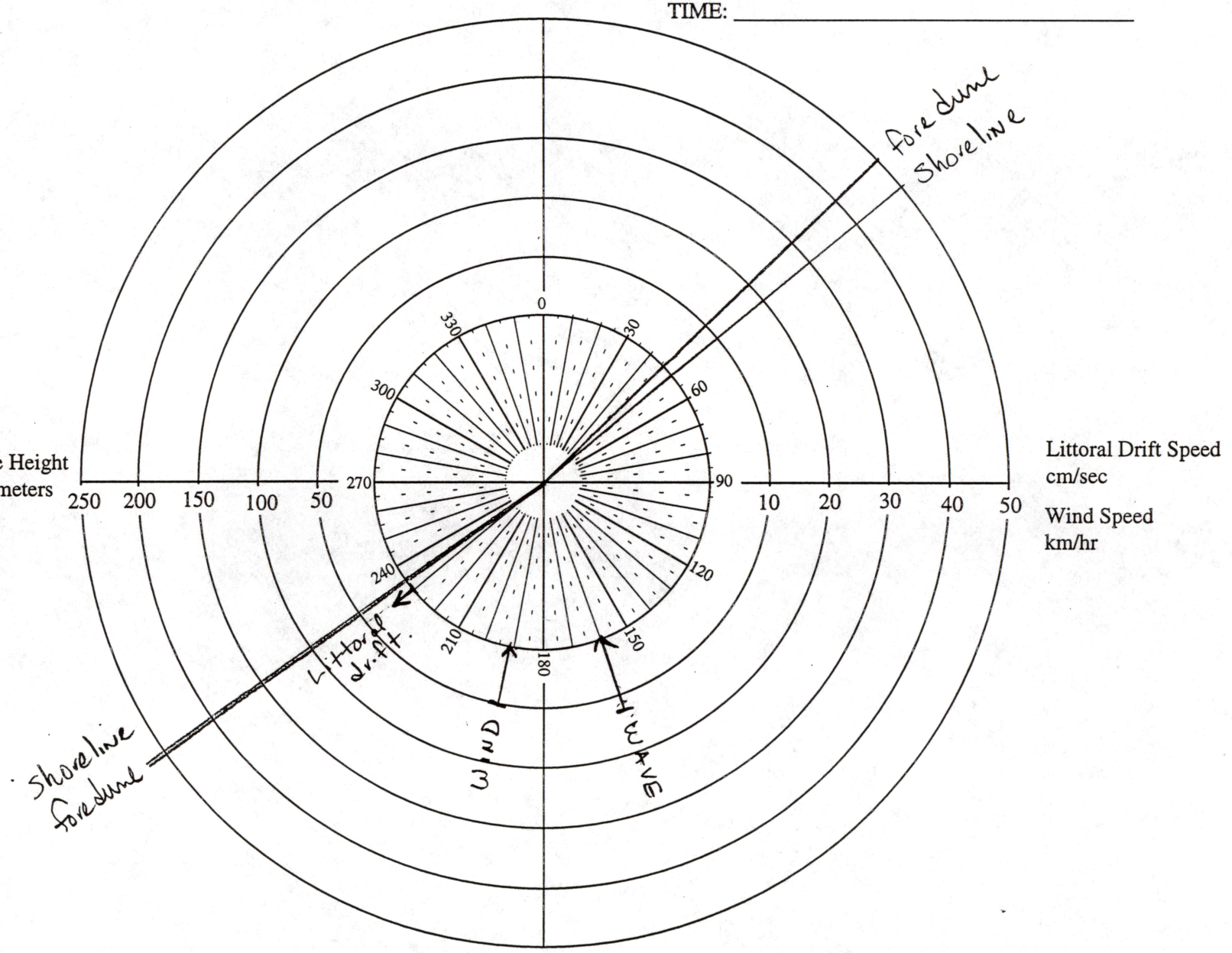

UpperTX
LEGEND
BEG08 970920 0904
BEG08 971209 1116
BEG08 980306 1100
BEG08 980428 0850
Elevation (m)
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Distance Offshore (m)

Example Plots of Wind, Wave, and Longshore Current

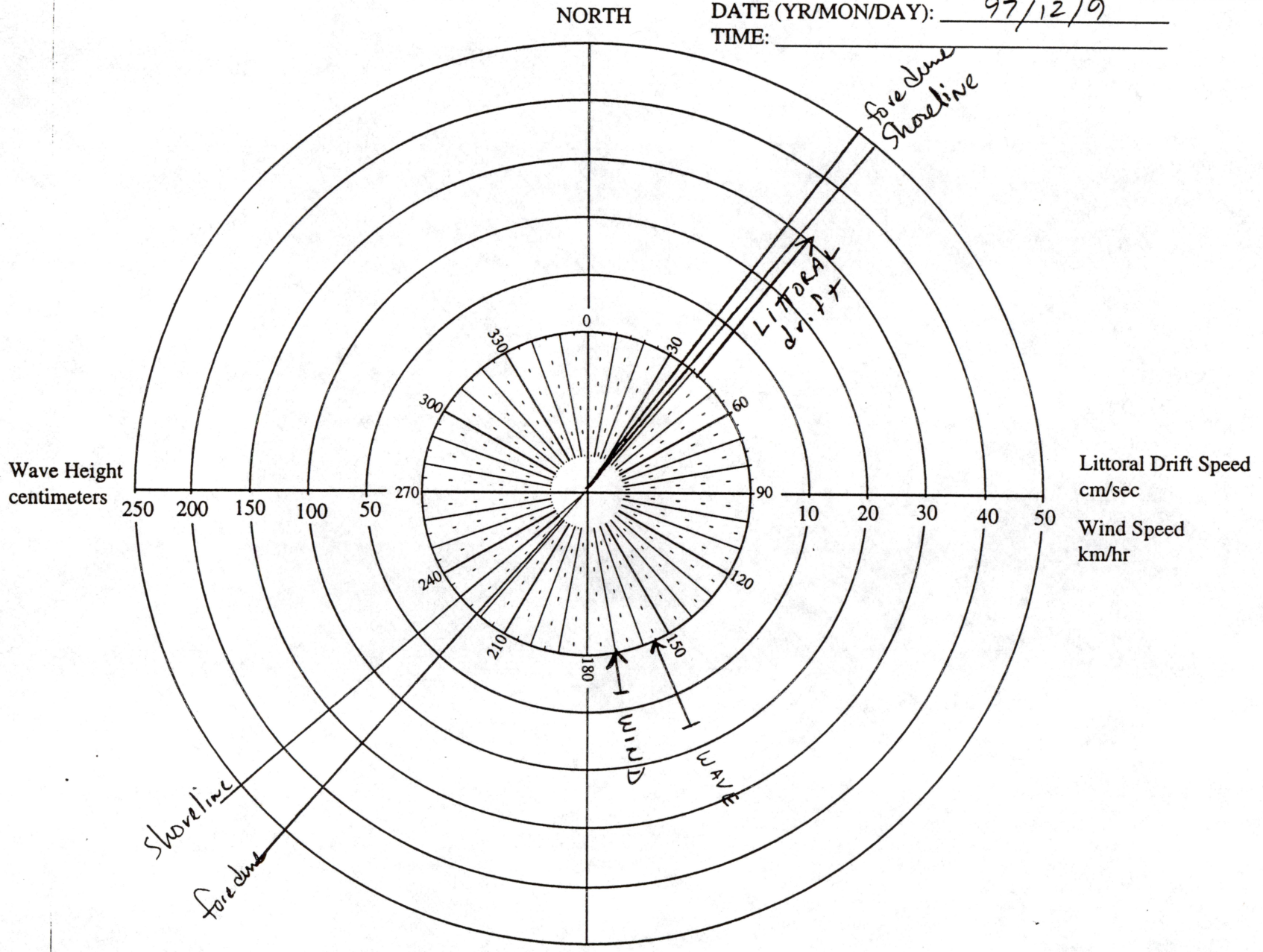
PROFILE NAME: BEG02 BAIL H.S.
DATE (YR/MON/DAY): 97/10/01
TIME: _____



PROFILE NAME: BEG02 (GISA Ball HS.
DATE (YR/MON/DAY): 97-12-9
TIME: _____



PROFILE NAME: BEG 8 - Bull H.S.
DATE (YR/MON/DAY): 97/12/9
TIME: _____



Example Sediment Analyses

GUIDELINES FOR BEACH GRAIN ANALYSIS

Sample No: BEGØ2 -TR 1997 168 | Sample Date: _____ Time: 11:00

Profile: _____ Sample Location: _____

Students: Bunce, Audry, Bernalino, Wilson, Puccetti School: Ball High

Beaker + dry sample weight 141.1 gm

Empty beaker weight 55.1 gm

dry sample weight 86.0 gm

	A. Container Empty	B. Container Full	Amount (B minus A)	% of Total
Gravel	55.5gm	55.5 gm	0	0
V. coarse sand	55.2gm	55.2 gm	0	0
Coarse sand	55.3gm	55.2 gm	0	0
Medium sand	55.4gm	92.8 gm	37.4	
Fine sand	55.2gm	93.6 gm	38.4	
V. fine sand	55.5gm	58.7 gm	3.2	
Silt	55.3gm	55.3 gm	0	0
Clay	—	—	—	—
		Total weight:	_____ gm	100%

	Grain Shape	Grain rounding	Color	Magnetic minerals	% calcite or shell
Gravel					
V. coarse sand					
Coarse sand					
Medium sand	equant	Subrounded	yellowish orange		
Fine sand	equant	Subrounded	yellowish orange		
V. fine sand	equant	Subrounded	yellowish orange		
Silt					
Clay					

Lavion M.
Chris B.
Cody A.

GUIDELINES FOR BEACH GRAIN ANALYSIS 100% 100%

Sample No: BE602-FD-1997 Sample Date: 12/9/97 Time: 9:05
Profile: _____ Sample Location: _____
Students: _____ School: _____

Beaker + dry sample weight 148.4 gm
Empty beaker weight 55.5 gm
dry sample weight 92.9 gm

	A. Container Empty	B. Container Full	Amount (B minus A)	% of Total
Gravel	8.0	8.3	.3	.3%
V. coarse sand	7.5	7.7	.2	.2%
Coarse sand	7.7	7.8	.1	.1%
Medium sand	7.7	40.9	33.3	37.9%
Fine sand	8.3	57.0	48.7	55.4%
V. fine sand	7.7	12.9	5.2	.06%
Silt	8.0	8.1	.1	.1%
Clay	N/A	N/A	N/A	N/A
		Total weight:	87.9 gm	100%

	Grain Shape	Grain rounding	Color	Magnetic minerals	% calcite or shell
Gravel	elongate	angular	Dark grey		
V. coarse sand	elongate	angular	light brown		
Coarse sand	elongate	angular	light brown		
Medium sand	equate	rounded	Yellowish orange		
Fine sand	equate	angular	Yellowish orange		
V. fine sand	equate	angular	Yellowish		
Silt					
Clay					

Date completed 1-21-98

GUIDELINES FOR BEACH GRAIN ANALYSIS

Sample No: Beg 08 - FD Sample Date: 1997/12/09 Time: 11:20
Profile: Sand Analysis Sample Location:
Students: Kathy, Janet, Becky, Lindsey Steven School: Ball High

Beaker + dry sample weight	119.6	gm
Empty beaker weight	54.9	gm
dry sample weight	64.7	gm

	A. Container Empty	B. Container Full	Amount (B minus A)	% of Total
Gravel	8.2	8.2	0	0 %
V. coarse sand	7.9	7.9	0	0 %
Coarse sand	7.5	8.2	0.7	1.2 %
Medium sand	7.4	12.1	4.7	8.0 %
Fine sand	7.9	55.8	47.9	81.8 %
V. fine sand	7.4	12.8	5.2	8.8 %
Silt	8.2	8.2	0	0 %
Clay	8.2	NA	NA	0 %
		Total weight:	58.5 gm	100%

	Grain Shape	Grain rounding	Color	Magnetic minerals	% calcite or shell
Gravel	non equant	Subrounded	Yellow Brown		
V. coarse sand	non equant	Subrounded	Yellow Brown		
Coarse sand	non equant	Subrounded	Yellow Brown		
Medium sand	equant	Subrounded	Yellow Brown		
Fine sand	equant	Subrounded	Yellow Brown		
V. fine sand	equant	Subrounded	Yellow Brown		
Silt	equant	rounded	Yellow Brown		
Clay					

Date Completed 1-23-98

Field Data

entered J. Gibeaut

971001 0940

EMERY BEACH PROFILE

Profile Name BEG02 **Date (yr/mo/dy)** 1997/10/01 **Start Time** 0940

Back rod person Lauren Hernandez **Back rod assistant** Taylor Wilson

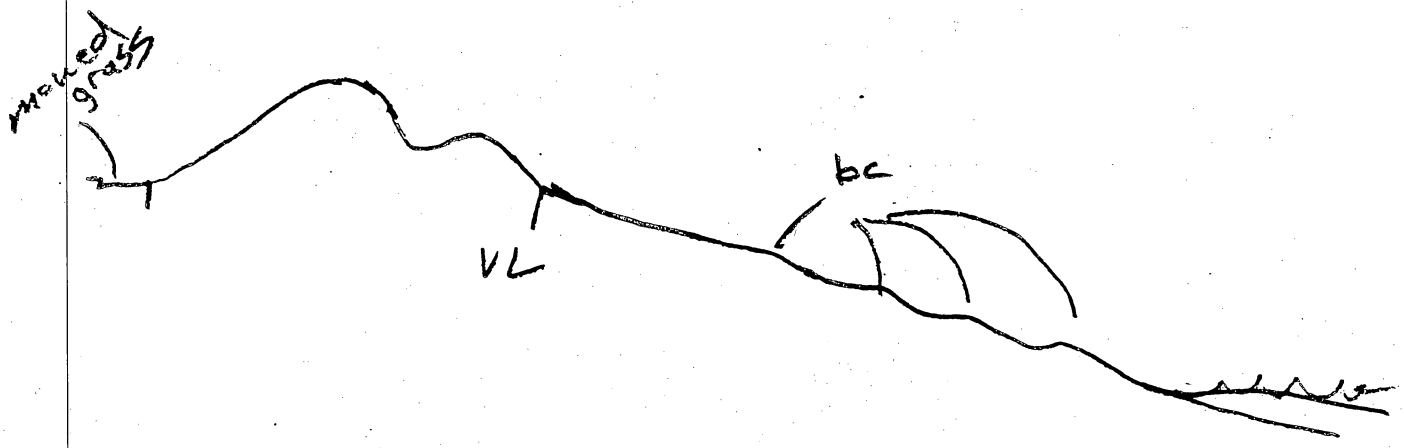
Front rod person Chris Bertilino **Front rod assistant** Becky Bunce

Data recorder Cody Autrey **Observer/sampler** J. Gibeaut

Datum description Corner of concrete pad

Profile Azimuth 139 **(Magnetic degrees)**

Sketch/Notes



Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	-2cm	Ground surface below/above datum point
3	185cm	-10cm	edge of mowed grass
4	318cm	+44cm	100% natural vegatation cover
5	192cm	+29 cm	100% natural vegatation cover
6	265cm	+21cm	100% natural vegatation cover
7	203cm	+24cm	100% natural vegatation cover
8	234cm	+82cm	foredune crest (BEG02-FD-19971001) 10:32
9	225cm	-72cm	fore dune
10	225cm	-61cm	foredune

EMERY BEACH PROFILE

Profile Name BEGØ2 **Date (yr/mo/dy)** 1997/10/01 **Start Time** 0940

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	160cm	+41cm	top incipient dune
12	128cm	+29cm	crest incipient dune
13	172cm	-52cm	front incipient dune
14	180cm	-40cm	bottom incipient dune
15	198cm	-21cm	vegetation line
16	134cm	-9cm	begin berm top
17	462cm	-11cm	berm
18	408cm	-11cm	berm
19	347cm	-10cm	berm
20	341cm	-8cm	berm
21	443cm	-11cm	berm BEGØ2 1997/10/01 11.00
22	405cm	-12cm	berm
23	414cm	-11cm	berm
24	350cm	-8cm	a wrack line
25	385cm	-1cm	berm 1
26	275cm	-13cm	berm 2 last high tide swash line
27	1168cm	-6cm	runnel
28	331cm	+9cm	berm 3 crest
29	191cm	-6cm	berm 3
30	204cm	+1cm	berm 3
31	297cm	-19cm	beachface BEGØ2 1997/10/01 (11:20)
32	216cm	-10cm	beachface waterline (11:22)

Bull High Training 1st group

SHORELINE AND PROCESSES MEASUREMENTS

GPS Survey

Profile Name BEG02 Date (yr/mo/dy) 97-10-1 Start Time 0940

GPS equipment _____ Recorder: STEPHANIE SANDERSON

Shoreline GPS survey:

File name _____

Start time (local) 11:30 AM

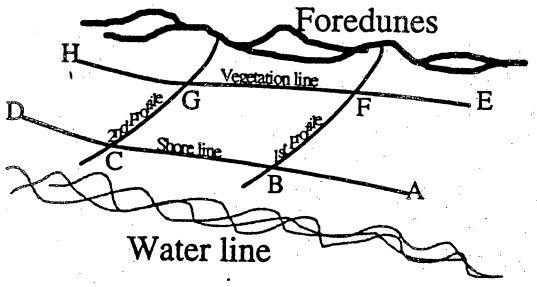
A. Start Point latitude/longitude (degrees, decimal minutes) 29°, 11.659 lat. 94°, 56.997 long.

B. Latitude/longitude at 1st profile 29°, 11.619 lat. 94°, 57.049 long.

C. Latitude/longitude at 2nd profile 29°, 11.610 lat. 94°, 57.067 long.

D. End Point latitude/longitude 29°, 11.580 lat. 94°, 57.120 long.

End time (local) _____



Vegetation line survey:

File name _____

Start time (local) _____

E. Start Point latitude/longitude (degrees, decimal minutes) 29°, 11.671 lat. 94°, 57.014 long.

F. Latitude/longitude at 1st profile 29°, 11.640 lat. 94°, 57.067 long.

G. Latitude/longitude at 2nd profile 29°, 11.632 at. 94°, 57.084 long.

H. End Point latitude/longitude 29°, 11.599 lat. 94°, 57.133 long.

End time (local) _____

Wind, Waves, and Littoral Drift Current

Profile Name BEG02 **Date (yr/mo/dy)** 97-10-1 **Start Time** 9:40AM

Observers #1 Hopkins Kovich **#2** Schlotter Grebb **#3** Lattimore **Recorder:** Sanderson

Wind:

Wind direction
(magnetic bearing pointing into wind) 10°, 340°, 350°, 340°, 342°, 20°

Sustained wind speed (kilometers/hour) 5 km/hr., 4 km/hr., 7 km/hr., 10 km/hr., 8 km/hr.

Wind gust speed (kilometers/hour 10 Km/hr. 9 Km/hr.

Waves:

Wave direction
(magnetic bearing pointing into waves)

Observer #1 150 165 *Observer #2* 140 170 *Observer #3* 170 RECORDER 184

Wave breaking height
(estimated for seaward breakers when standing at waterline, centimeters)

Observer #1 30 cm 30 cm *Observer #2* 15cm 25cm *Observer #3* 28cm RECORDER 35cm

Wave period
(# seconds for 10 waves to pass stationary point divided by 10)

Observer #1 3.9 3.6 *Observer #2* 3.3 3.3 *Observer #3* 3.5 RECORDER 3.1

Surf/breaker zone width
(distance in meters from waterline to seaward most breakers)

Observer #1 15m 10m *Observer #2* 15m 15m *Observer #3* 18m RECORDER 20m

Wave breaker type (plunging, spilling, surging, combinations) SPILLING

Number of subtidal longshore bars 1

Rip currents (yes/no) — **spacing (meters)** —

Littoral drift current:	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore (meters)	20	10	10
Distance float moved alongshore in 50 seconds (meters)	4.3	14.2	3.1
Littoral drift speed in centimeters per second (above distance in meters times 2)	8.6 cm/sec	28.4 cm/sec	6.2 cm/sec
Littoral drift direction (direction in which float moved, north or south)	SOUTH	SOUTH	SOUTH

Beach Cusps and Shoreline and Foredune Orientations

Profile Name BEG02 **Date (yr/mo/dy)** 97-10-1 **Start Time** 0940

GREB SCHLOTTER KOVICH HOPKINS SANDERSON LATTIMORE

Foredune trend to north (magnetic) 48°, 50°, 55°, 50°, 51°, 60°

Foredune trend to south (magnetic) 235°, 230°, 233°, 230°, 235°, 230°

GREB. SCHLOTTER KOVICH HOPKINS SANDERSON LATTIMORE

Shoreline trend to north (magnetic) 53°, 50°, 51°, 50°, 61°, 60°

Shoreline trend to south (magnetic) 230°, 230°, 231°, 230°, 236°, 230°

# of lower beach cusps in 50 meters —

# of upper beach cusps in 50 meters —

Topographic relief of lower beach cusps (centimeters) —

Topographic relief of upper beach cusps (centimeters) —

Field Sketch and Photographs

Profile Name BEG02 **Date (yr/mo/dy)** 97-10-01 **Start Time** 0940

Sketcher: _____ **Photographer:** _____ **Photos (frame counts)** _____

PHOTO #(3) - DUNES LOOKING NORTH
PHOTO #(4) - SHORELINE LOOKING NORTH
PHOTO #(5-6) DUNES LOOKING SOUTH
PHOTO #(7) - SHORELINE LOOKING SOUTH

Bull High Training 2nd ground

SHORELINE AND PROCESSES MEASUREMENTS

GPS Survey

Profile Name BEG02 Date (yr/mo/dy) 152/10/1 Start Time 1:32

GPS equipment Garmen +Z Recorder: WILSON

Shoreline GPS survey:

File name _____

Start time (local) _____

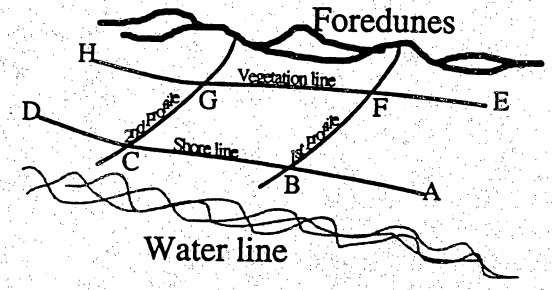
A. Start Point latitude/longitude (degrees, decimal minutes) 29°N 11.650' lat. 94°W 56.99' long.

B. Latitude/longitude at 1st profile 29°N 11.620' lat. 94°W 57.049' long.

C. Latitude/longitude at 2nd profile 29°N 11.610' lat. 94°W 57.067' long.

D. End Point latitude/longitude 29°N 11.578' lat. 94°W 57.120' long.

End time (local) _____



Vegetation line survey:

File name _____

Start time (local) _____

E. Start Point latitude/longitude (degrees, decimal minutes) 29°N 11.61' lat. 94° 57.04' long.

F. Latitude/longitude at 1st profile 29°N 11.641' lat. 94°W 57.066' long.

G. Latitude/longitude at 2nd profile 29°N 11.631' at. 94°W 57.089' long.

H. End Point latitude/longitude 29°N 11.602 lat. 94°W 57.12' long.

End time (local) _____

Photo #8 dunes looking North

Wind, Waves, and Littoral Drift Current

Profile Name BEG 02 Date (yr/mo/dy) 1997/10/1 Start Time 12:25

Observers #1 Hernandez #2 Autry #3 Bertolino Recorder: Wilson

#4 Bunce

Wind:

Wind direction
(magnetic bearing pointing into wind) 350, 350, 350, 340, 350

Sustained wind speed (kilometers/hour) 5, 6, 7, 6, 6

Wind gust speed (kilometers/hour up to 10

Waves:

Wave direction
(magnetic bearing pointing into waves)

Observer #1 145 *Observer #2* 140 *Observer #3* 150, 155, 161

Wave breaking height
(estimated for seaward breakers when standing at waterline, centimeters)

Observer #1 28 *Observer #2* 35 *Observer #3* 32, 30, 31

Wave period
(# seconds for 10 waves to pass stationary point divided by 10)

Observer #1 4.3 *Observer #2* 5 *Observer #3* 2, 4.8, 4.4

Surf/breaker zone width
(distance in meters from waterline to seaward most breakers)

Observer #1 11 *Observer #2* 15 *Observer #3* 10, 15, 20

Wave breaker type (plunging, spilling, surging, combinations) Spilling

Number of subtidal longshore bars 1

Rip currents (yes/no) _____ **spacing (meters)** _____

Littoral drift current:	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore (meters)	50	40	10
Distance float moved alongshore in 50 seconds (meters)	.75	2.7	2.6
Littoral drift speed in centimeters per second (above distance in meters times 2)	1.50 cm/sec	5.14 cm/sec	5.12 cm/sec
Littoral drift direction (direction in which float moved, north or south)	South	North	South

Beach Cusps and Shoreline and Foredune Orientations

Profile Name BEG02 **Date (yr/mo/dy)** 1997-10-01 **Start Time** 12:25

Foredune trend to north (magnetic) 50

Foredune trend to south (magnetic) 230

Shoreline trend to north (magnetic) 50

Shoreline trend to south (magnetic) 230

# of lower beach cusps in 50 meters _____

# of upper beach cusps in 50 meters _____

Topographic relief of lower beach cusps (centimeters) _____

Topographic relief of upper beach cusps (centimeters) _____

Entered JCD

971209 0850

EMERY BEACH PROFILE

Profile Name BEGC2 Date (yr/mo/dy) 97/12/9 Start Time 8:30

Back rod person Lindsey Back rod assistant Kathy

Front rod person Chris Front rod assistant

Data recorder Cody Observer/sampler

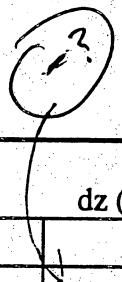
Datum description

2nd profile

Profile Azimuth 140° (Magnetic degrees)

142°

Sketch/Notes



Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	1.5	Ground surface below/above datum point
3	171	-8	edge of mowed grass
4	318	40	fore dune thick vegetation
5	294	28	fore dune "
6	243	26	fore dune "
7	223	36	fore dune "
8	168	60	FD sample fore dune crest "
9	146	-34	"
10	110	-50	"

EMERY BEACH PROFILE

Profile Name BEG-02 **Date (yr/mo/dy)** 97/12/9 **Start Time** 8:30

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	160	-52	thick vegatation
12	130	34	"
13	155	26	"
14	313	-70	vegetation line
15	265	-14	alot of shells
16	259	-10	a lot of seaweed & red algae
17	272	-6	BT ? (seems to have eroded) sample taken
18	312	-6	
19	256	-16	
20	252	-10	
21	245	-8	alot of shells
22	277	-8	
23	277	-6	
24	334	-8	BF Sample shells
25	265	-7	
26	285	-6	shells waterfront

971209 0830

SHORELINE AND PROCESSES MEASUREMENTS

GPS Survey

Profile Name BG02 Date (yr/mo/dy) 12-9-97 Start Time 9.59

GPS equipment garmin Recorder: Kristy

Shoreline GPS survey:

File name _____

Start time (local) 9.59

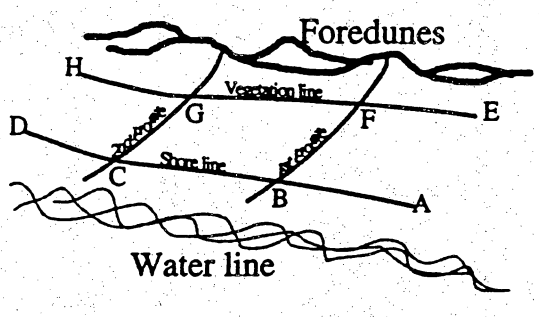
A. Start Point latitude/longitude (degrees, decimal minutes) 29°N 11.36 lat. 94°W 57.02 long.

B. Latitude/longitude at 1st profile _____ lat. _____ long.

C. Latitude/longitude at 2nd profile 29°N 11.38 lat. 94°W 57.03 long.

D. End Point latitude/longitude 29°N 11.38 lat. 94°W 57.06 long.

End time (local) _____



Vegetation line survey:

File name _____

Start time (local) _____

E. Start Point latitude/longitude (degrees, decimal minutes) _____ lat. _____ long.

F. Latitude/longitude at 1st profile _____ lat. _____ long.

G. Latitude/longitude at 2nd profile _____ at. _____ long.

H. End Point latitude/longitude _____ lat. _____ long.

End time (local) _____

Wind, Waves, and Littoral Drift Current

Profile Name Beg-02 **Date (yr/mo/dy)** 97/12/9 **Start Time** 8:30AM

Observers #1 Kristy **#2** Steven **#3** Janice **Recorder:** Theresa

Wind:

Wind direction (magnetic bearing pointing into wind) 192, 190, 190, 194

Sustained wind speed (kilometers/hour) 10, 6, 7, 5

Wind gust speed (kilometers/hour 10

Waves:

Wave direction
(magnetic bearing pointing into waves)

Observer #1 163 *Observer #2* 150 *Observer #3* 147 160

Wave breaking height
(estimated for seaward breakers when standing at waterline, centimeters)

Observer #1 60cm *Observer #2* 60cm *Observer #3* 40cm 53 cm

Wave period
(# seconds for 10 waves to pass stationary point divided by 10)

Observer #1 5 sec. *Observer #2* 6.9 sec. *Observer #3* 5.9 sec. 6.6 sec

Surf/breaker zone width
(distance in meters from waterline to seaward most breakers)

Observer #1 35m *Observer #2* 30m *Observer #3* 27m 25m

Wave breaker type (plunging, spilling, surging, combinations) Spilling

Number of subtidal longshore bars 3, 3, 3, 3

Rip currents (yes/no) NO **spacing (meters)** ____

Littoral drift current:

	Trial #1	*Trial #2*	*Trial #3*
Distance float thrown offshore (meters)	10m	10m	10m
Distance float moved alongshore in 50 seconds (meters)	50cm	210cm	180cm
Littoral drift speed in centimeters per second (above distance in meters times 2)	1cm	4.2cm	3.6cm
Littoral drift direction (direction in which float moved, north or south)	SW	SW	NE

Beach Cusps and Shoreline and Foredune Orientations

Profile Name BEG-2 **Date (yr/mo/dy)** 97-12-9 **Start Time**

Foredune trend to north (magnetic) 47
Foredune trend to south (magnetic) 234

Shoreline trend to north (magnetic) 50
Shoreline trend to south (magnetic) 235

# of lower beach cusps in 50 meters 19 m,
# of upper beach cusps in 50 meters _____

Topographic relief of lower beach cusps (centimeters) 2 cm,
Topographic relief of upper beach cusps (centimeters) _____

Entered 980310 J.G.Beaty

980506 0845

Emery Beach Profile

Profile Name BEG02 **Date (yr/mo/dy)** 98-3-06 **Start Time** 08[illegible]

Back rod person Theresa Puckett **Back rod assistant** [illegible]

Front rod person Kristi Mellner **Front rod assistant** Becky Bunce

Data recorder Becky Bunce **Observer/sampler** Dr. Hapke

Datum description _____

Profile Azimuth 133 **(Magnetic degrees)**

Sketch/Notes

maybe not

(.85, -2)

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	-3	Ground surface below/above datum point
3	+12	2.82m	vegetation
4	+30	3.1m	" "
5	+32	4.3m	" "
6	+54	3.1m	" "
7	+40	1.65m	9:27 brow! top of dune
8	-98	2.8m	slope of hill vegetation
9	-36	1.80m	bottom of hill
10	+42	3.20m	top of 2nd dune

Emery Beach Profile

Profile Name BEL-C 2 **Date (yr/mo/dy)** 980306 **Start Time** 0843

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	-8.4	5.6	vegetation line
12	-4.5	5.5	beginning of beach slope
13	-15	3.5	beach slope
14	-12	3.3	berm face
15	-15	4.4	beach line
16	-12	5.0	waterline
17			

Wind, Waves, and Littoral Drift Current

Profile Name Beg 02 Date (yr/mo/dy) 98-3-6 Start Time 8:34 am

Observers #1 Lindsey #2 Kathy Camera #3 Cody Recorder: Bert

WIND		
Direction (pointing into wind)	Sustained wind speed	Wind gust speed
340 °magnetic	12 km/hour	16+ km/hour

WAVES	*Observer #1*	*Observer #2*	*Observer #3*
Direction (pointing into waves)	140 °magnetic	140 °magnetic	145 °magnetic
Breaker height: estimated for seaward-most breakers.	90 cm	85 cm	100 cm
Period: # seconds for 10 waves to pass stationary point divided by 10.	4.8 seconds	4.53 seconds	3.5 seconds
Surf zone width: distance from waterline to seaward most breakers.	75 meters	85 meters	75 meters
Number of longshore bars	2	2	2
Wave breaker type (check one):	☐ plunging	☑ spilling	☐ surging

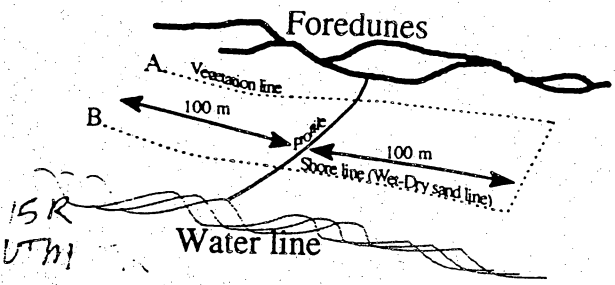
LITTORAL DRIFT CURRENT	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore	30 meters	25 meters	20 meters
Distance float moves along shore in 50 seconds	13 meters	9.35 meters	3.2 meters
Littoral drift speed (cm/sec) = twice the drift distance (m)	____ cm/sec	____ cm/sec	____ cm/sec
Littoral drift direction: direction in which float moved	☐N ☐S ☐E ☑W	☐N ☐S ☐E ☑W	☐N ☐S ☑E ☐W

Beach Orientation, Beach Shape and GPS Survey,

Profile Name 3FG02 Date (yr/mo/dy) [illegible] Start Time 9: 5 am

GPS equipment [illegible] Recorder: [illegible]

GPS Survey: Walk along vegetation line and wet-dry sand line 100m on either side of profile while recording the GPS track.



Start time (local) 9: 26 am

A. Start Point (degrees, decimal minutes):

[illegible] lat. [illegible] long. 15R UTM

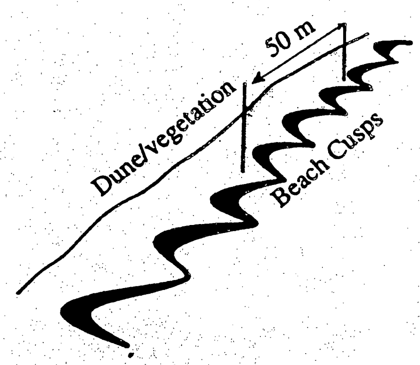
B. End Point (degrees, decimal minutes):

[illegible]357 lat. 3231[illegible]7 long. 15R UTM

End time (local) 9 : 33

SHORELINE and FOREDUNE ORIENTATION	to north	to south
Foredune trend	52 °magnetic	247 °magnetic
Shoreline trend	50 °magnetic	230 °magnetic

BEACH CUSPS (if present)	lower set	upper set
Number of beach cusps in 50 meters	2	1
Elevation change across beach cusp	4 cm	4-5 cm



980428 1020

Emery Beach Profile

Profile Name BEG-02 **Date (yr/mo/dy)** 98-04-28 **Start Time** 10:20

Back rod person Cody **Back rod assistant** Taylor

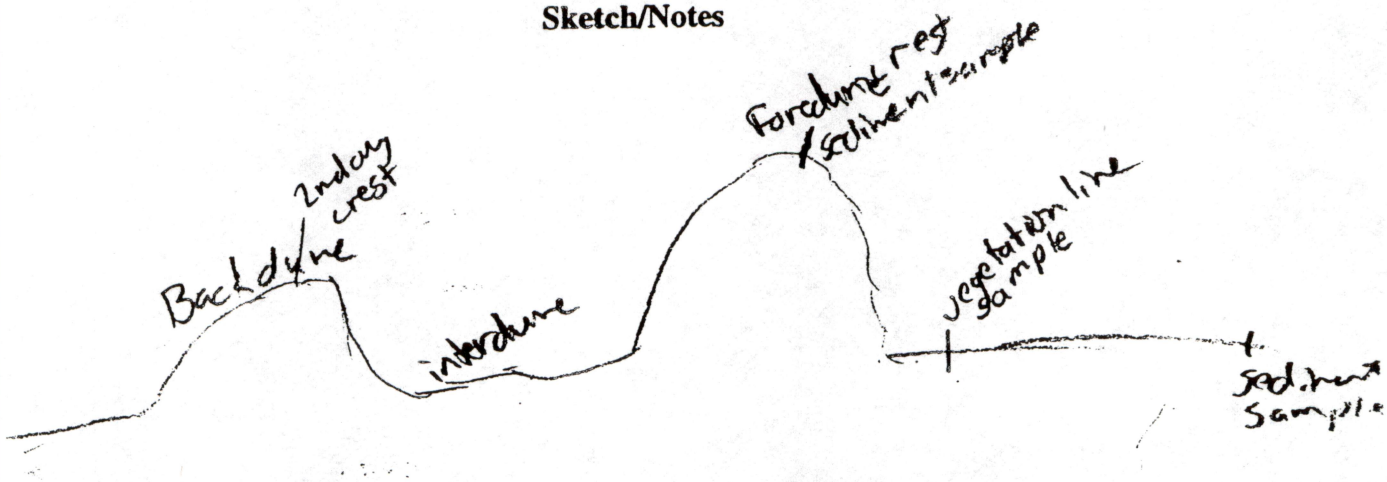
Front rod person Kristy **Front rod assistant** _____

Data recorder Becky **Observer/sampler** _____

Datum description Started at the edge of cement

Profile Azimuth _____ **(Magnetic degrees)**

Sketch/Notes



Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	-4	Ground surface below/above datum point
3	192	-8	edge of mowed grass - back dune
4	262	30	back dune
5	263	32	back dune
6	223	2	back dune
7	211	30	back dune
8	134	27	back dune
9	194	65	top of back dune - 2ndary crest
10	228	-73	dune crest

Emery Beach Profile

Profile Name BEB07 **Date (yr/mo/dy)** 98-04-28 **Start Time** 1020

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	140	-95	inter dune
12	190	43	inter dune
13	159	36	foredune - sediment sample
14	225	-86	front of dune
15	315	-28	vegetation line - sediment sample
16	405	-16	beg. of beach face
17	316	-5	beach face
18	460	-16	beach face / beg. of wet line
19	410	-16	wet line
20	342	-14	wet line / beach face
21	391	-12	beach face
22	460	-14	waterline

Wind, Waves, and Littoral Drift Current

Profile Name BEGOZ Date (yr/mo/dy) 1998/04/28 Start Time 10:15

Observers #1 Chris #2 Lindsey #3 Kathy Recorder: Lauren

WIND		
Direction (pointing into wind)	Sustained wind speed	Wind gust speed
20 °magnetic	7.5 km/hour	10 km/hour

WAVES	*Observer #1*	*Observer #2*	*Observer #3*
Direction (pointing into waves)	129 °magnetic	130 °magnetic	135 °magnetic
Breaker height: estimated for seaward-most breakers.	60 cm	70 cm	65 cm
Period: # seconds for 10 waves to pass stationary point divided by 10.	.8 seconds	.71 seconds	.74 seconds
Surf zone width: distance from waterline to seaward most breakers.	95 meters	90 meters	85 meters
Number of longshore bars	2	2	2
Wave breaker type (check one):	☐ plunging	☒ spilling	☐ surging

LITTORAL DRIFT CURRENT	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore	25 meters	35 meters	40 meters
Distance float moves along shore in 50 seconds	12.4 meters	20.2 meters	14 meters
Littoral drift speed (cm/sec) = twice the drift distance (m)	____ cm/sec	____ cm/sec	____ cm/sec
Littoral drift direction: direction in which float moved	☐N ☐S ☐E ☒W	☐N ☐S ☐E ☒W	☐N ☐S ☐E ☒W

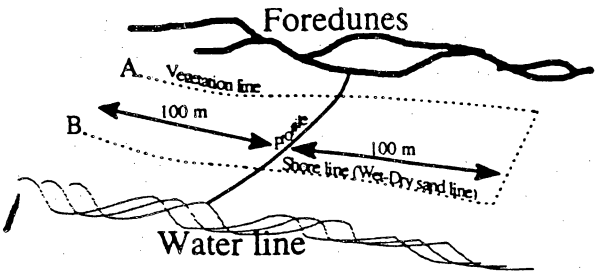
Beach Orientation, Beach Shape and GPS Survey,

Profile Name BEG02 Date (yr/mo/dy) 1998/04/28 Start Time 10:35

GPS equipment Chris Recorder: Lauren

GPS Survey: Walk along vegetation line and wet-dry sand line 100m on either side of profile while recording the GPS track.

Start time (local) 10:42



A. Start Point (degrees, decimal minutes):

29° 11.596' lat. 94° 57.133' long.

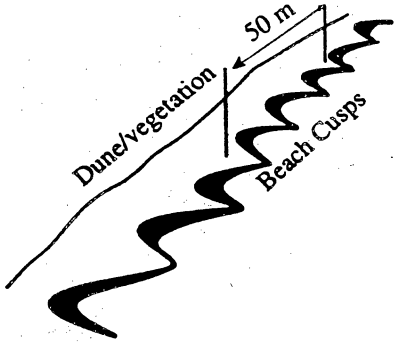
B. End Point (degrees, decimal minutes):

29° 11.656' lat. 94° 57.030' long.

End time (local) 10:50

SHORELINE and FOREDUNE ORIENTATION	to north	to south
Foredune trend	50 °magnetic	230 °magnetic
Shoreline trend	48 °magnetic	233 magnetic

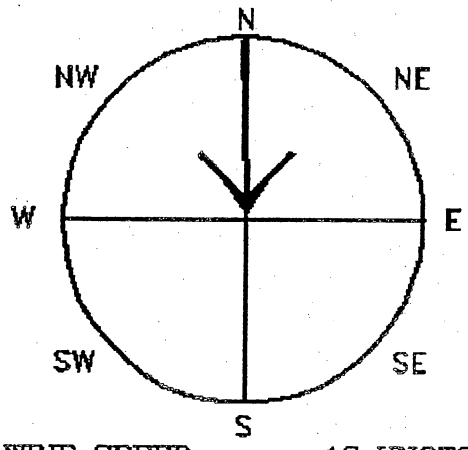
BEACH CUSPS (if present)	lower set	upper set
Number of beach cusps in 50 meters	_____	_____
Elevation change across beach cusp	_____ cm	_____ cm



Oceanographic Products and Services Division

Houston/Galveston PORTS: All Meteorological Data

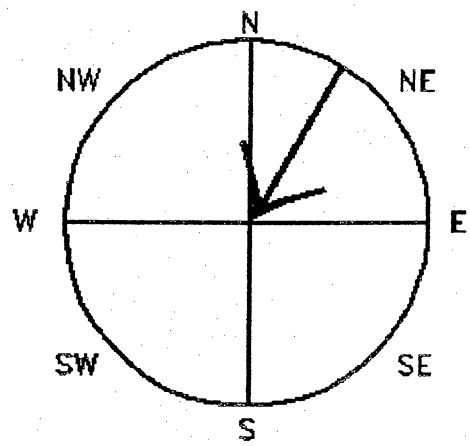
PLEASURE PIER



WIND SPEED: 13 KNOTS
GUSTING TO: 16 KNOTS
AIR TEMPERATURE: 66 °F

Valid Time: 0700 (CDT) 4/28/98

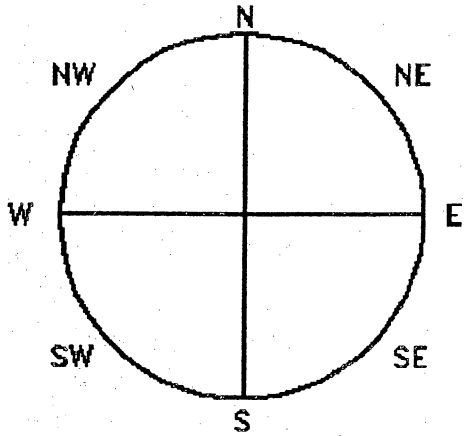
BOLIVAR ROADS



WIND SPEED: 9 KNOTS
GUSTING TO: 14 KNOTS
AIR TEMPERATURE: 66 °F

Valid Time: 0700 (CDT) 4/28/98

MORGANS POINT

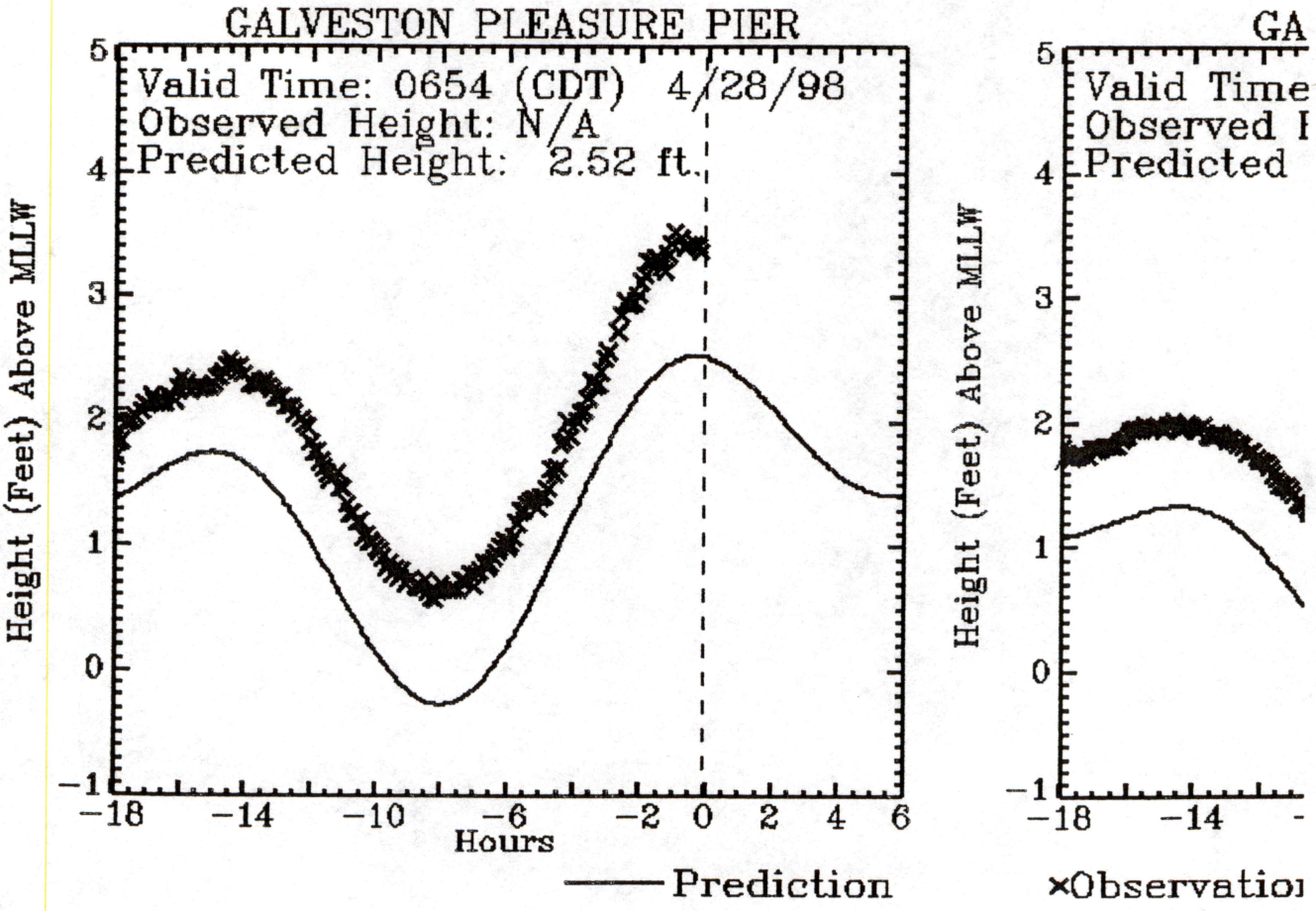


WIND SPEED: N/A
GUSTING TO: N/A
AIR TEMPERATURE: N/A

Valid Time: 0700 (CDT) 4/28/98

Oceanographic Products and Services Division

Houston/Galveston PORTS: NOS Water Levels



entered D. Gibeaut

Emery Beach Profile

Profile Name BEG8 Date (yr/mo/dy) 1997/09/20 Start Time 09:04

Back rod person Ade Agbe Back rod assistant J. Gibeaut

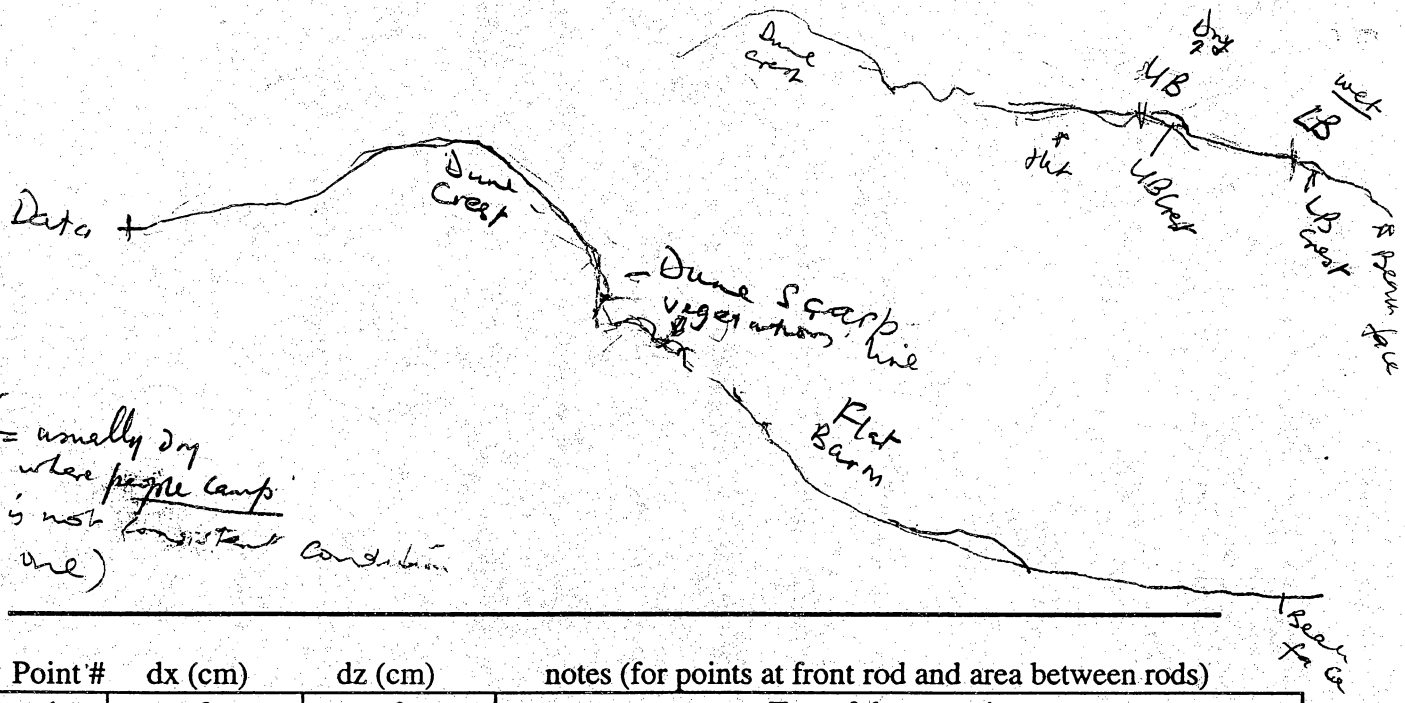
Front rod person R. Gutierrez Front rod assistant R. Gutierrez

Data recorder J. Gibeaut Observer/sampler R. Gutierrez

Datum description Red pipe

Profile Azimuth 145 (Magnetic degrees)

Sketch/Notes



Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	-12	Ground surface below/above datum point
3	221	+4	Disturbed sand - ~30% grass
4	162	+8	60% grass
5	129	-7	40% grass upon foredune platform
6	193	-5	
7	145	+19	
8	161	+27	back of dune
9	170	+37	
10	155	+13	

Emery Beach Profile

Profile Name BE68 **Date (yr/mo/dy)** 1997/09/20 **Start Time** 0904

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	61	+28	foredune crest
12	93	-44	top of foredune scarp
13	46	-24	base of scarp
14	163	-22	vegetation line
15	162	-15	foredune ramp
16	343	-22	foredune ramp
17	375	-14	
18	567	-12	edge of beach road
19	471	~~-5~~ -3	edge of beach road
20	92	+2	LHTS
21	146	+3	berm crest
22	376	-7	sed. sample BE608-TB-19970920-1012
23	424	~~0~~ +2	berm crest - lower
24	427	-29	beachface - Profile went across cusp horn
25	469	-24	waterline 10:20

24 satellites above the earth
at least 4 overhead for our GPS

GPS Survey

Profile Name BEG08 **Date (yr/mo/dy)** 1997/09/20 **Start Time** 10:45

GPS equipment BEG Omnistar **Recorder:** Ade Agle

Shoreline GPS survey:

File name 00920154 obtained from GPS machine

Start time (local) 10:50 am

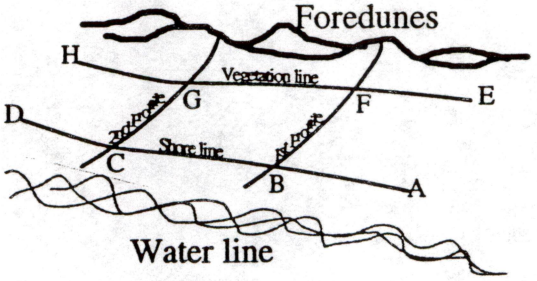
A. Start Point latitude/longitude (degrees, decimal minutes) 29° 03.146 N **lat.** 95 08.925 W **long.**

B. Latitude/longitude at 1st profile 29° 03.180' **lat.** 95° 08.873' **long.**

C. Latitude/longitude at 2nd profile 29° 03.194' **lat.** 95 08.846' **long.**

D. End Point latitude/longitude 29 03.231 **lat.** 95 08.794 **long.**

End time (local) 10:56



Vegetation line survey: Stamps lost one trip A

File name 00920168

Start time (local) 11:08

E. Start Point latitude/longitude (degrees, decimal minutes) 29° 03.239' **lat.** 95° 08.803' **long.**

F. Latitude/longitude at 1st profile 29° 03. **lat.** _____ **long.**

G. Latitude/longitude at 2nd profile _____ **at.** _____ **long.**

H. End Point latitude/longitude _____ **lat.** _____ **long.**

End time (local) _____

Omnistar lost signals when on vegetation line

Wind, Waves, and Littoral Drift Current

Profile Name BEG08 **Date (yr/mo/dy)** 1997/09/20 **Start Time** 11:27

Observers #1 A. Agle **#2** R. Gutierrez **#3** T. Gibeaut **Recorder:** A. Agle

Wind:

Wind direction
(magnetic bearing pointing into wind) 100°

Sustained wind speed (kilometers/hour) 14

Wind gust speed (kilometers/hour 20

Waves:

Wave direction
(magnetic bearing pointing into waves)

Observer #1 100 *Observer #2* 130 *Observer #3* 115

Wave breaking height
(estimated for seaward breakers when standing at waterline, ~~meters~~) centimeters

Observer #1 90 *Observer #2* 80 *Observer #3* 100

get stop watch!

Wave period
(# seconds for 10 waves to pass stationary point divided by 10)

Observer #1 8 *Observer #2* 8 *Observer #3* 8

Surf/breaker zone width
(distance in meters from waterline to seaward most breakers)

Observer #1 70 *Observer #2* 230 *Observer #3* 180

Wave breaker type (plunging, spilling, surging, combinations) spilling/plunging

Number of subtidal longshore bars 2

Rip currents (yes/no) no **spacing (meters)** N/A

Littoral drift current:	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore (meters)	15	20	20
Distance float moved alongshore in 50 seconds (meters)	12	20	10
Littoral drift speed in centimeters per second (above distance in meters times 2)	24	40	20
Littoral drift direction (direction in which float moved, north or south)	S	S	S

24 m / 100 s

Throwing a red ball in the ocean saw a line on sand and timed it. how long it takes to come to shore

Marsh Mound

Beach Cusps and Shoreline and Foredune Orientations

Profile Name BE608 Date (yr/mo/dy) 1997/09/20 Start Time 1250

~~Observers #1~~ ~~#2~~ ~~#3~~ Recorder: J. Gibeaut

Foredune trend to north (magnetic) 42

Foredune trend to south (magnetic) 231

Shoreline trend to north (magnetic) 45 LHTS

Shoreline trend to south (magnetic) 229 LHTS

# of lower beach cusps in ~~60~~ 50 meters 1.5

# of upper beach cusps in 60 meters N/A

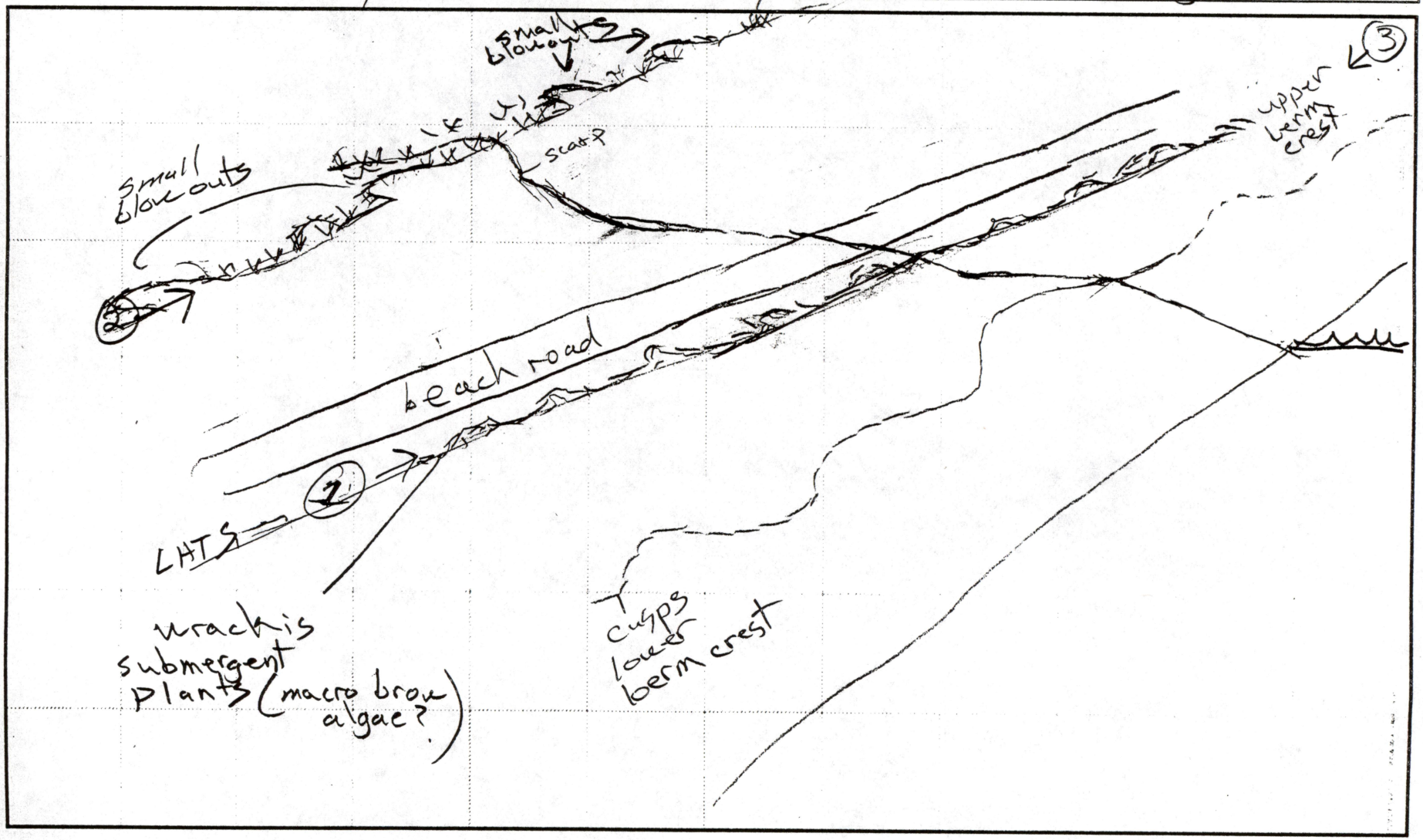
Topographic relief of lower beach cusps (centimeters) 14cm

Topographic relief of upper beach cusps (centimeters) N/A

Field Sketch and Photographs

Profile Name BEG08 Date (yr/mo/dy) 1997/09/20 Start Time 1305

Sketcher: J. Gibeaut/A. Agbe Photographer: J. Gibeaut/A. Agbe Photographs 4 starting from 15



entered 980204 J. Gibeaut

BEG08 971209 1116

Emery Beach Profile

Profile Name BEG08 Date (yr/mo/dy) 97-12-9 Start Time 11:16

Back rod person Steven Schlotter Back rod assistant Dr. Agbe

Front rod person Kristey Muller Front rod assistant Theresa Puccetti

Data recorder Janet Lattimore Observer/sampler Dr. George

Datum description _____

Profile Azimuth_____ (Magnetic degrees)

Sketch/Notes

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	13	Ground surface below/above datum point
3	300	10	Moderate vegetation
4	375	2	
5	230	46	
6	295	50	
7	130	20	↑
8	150	-26	Foredune Crest
9	100	-33	Vegetation line
10	250	-22	

Emery Beach Profile

Profile Name BEG-08 Date (yr/mo/dy) 97-12-9 Start Time 11:36

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	310	-8	
12	235	-10	Took Sample BT.
13	255	-10	
14	325	-13	
15	370	-13	
16	390	-14	
17	555	-19	More shells / Not as many shells, as the other beach. (State Park).

SHORELINE AND PROCESSES MEASUREMENTS

GPS Survey

Profile Name BEG08 **Date (yr/mo/dy)** 97/12/09 **Start Time** 11:12

GPS equipment _____ **Recorder:** _____

Shoreline GPS survey:

File name BEG8

Start time (local) 11:55

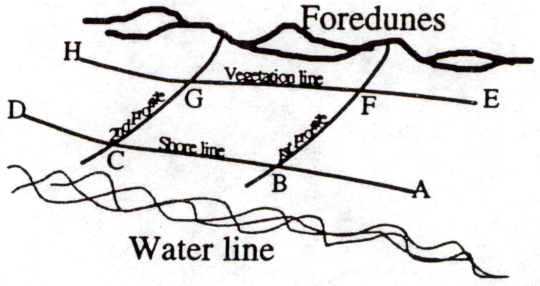
A. Start Point latitude/longitude (degrees, decimal minutes) _____ **lat.** _____ **long.**

B. Latitude/longitude at 1st profile _____ **lat.** _____ **long.**

C. Latitude/longitude at 2nd profile _____ **lat.** _____ **long.**

D. End Point latitude/longitude _____ **lat.** _____ **long.**

End time (local) _____



Vegetation line survey:

File name _____

Start time (local) _____

E. Start Point latitude/longitude (degrees, decimal minutes) _____ **lat.** _____ **long.**

F. Latitude/longitude at 1st profile _____ **lat.** _____ **long.**

G. Latitude/longitude at 2nd profile _____ **at.** _____ **long.**

H. End Point latitude/longitude _____ **lat.** _____ **long.**

End time (local) _____

Wind, Waves, and Littoral Drift Current

Profile Name BEG 8 Date (yr/mo/dy) 97/12/9 Start Time 11:12 PM

Observers #1 Chris #2 Lindsey #3 Kathy Recorder: Cody

Wind:

Wind direction (magnetic bearing pointing into wind) 172°

Sustained wind speed (kilometers/hour) 5

Wind gust speed (kilometers/hour 7

Waves:

Wave direction
(magnetic bearing pointing into waves)

Observer #1 159° *Observer #2* _____ *Observer #3* 155°

Wave breaking height
(estimated for seaward breakers when standing at waterline, centimeters)

Observer #1 .5m *Observer #2* .75m *Observer #3* 1m

Wave period
(# seconds for 10 waves to pass stationary point divided by 10)

Observer #1 6.6 *Observer #2* 6.5 *Observer #3* 6.7

Surf/breaker zone width
(distance in meters from waterline to seaward most breakers)

Observer #1 100m *Observer #2* 75m *Observer #3* 90m

Wave breaker type (plunging, spilling, surging, combinations) spilling

Number of subtidal longshore bars 2

Rip currents (yes/no) no spacing (meters) no

Littoral drift current:	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore (meters)	30m	40m	30m
Distance float moved alongshore in 50 seconds (meters)	17.3m	8.4m	14.6
Littoral drift speed in centimeters per second (above distance in meters times 2)	34.6m	30.8m	29.2m
Littoral drift direction (direction in which float moved, north or south)	NE	NE	NE

Beach Cusps and Shoreline and Foredune Orientations

Profile Name BE6-8 **Date (yr/mo/dy)** 97-12-9 **Start Time** 11:55

Foredune trend to north (magnetic) 35°
Foredune trend to south (magnetic) 223°

Shoreline trend to north (magnetic) 38°
Shoreline trend to south (magnetic) 230°

# of lower beach cusps in 50 meters 2½
# of upper beach cusps in 50 meters none

Topographic relief of lower beach cusps (centimeters) 1cm
Topographic relief of upper beach cusps (centimeters) none

entered 980310 J. Gibeaut

BEG98 980506 1100 Page 1 of 2

Emery Beach Profile

Profile Name BEG98 Date (yr/mo/dy) 98/05/06 Start Time 11:00

Back rod person Becky Hale Back rod assistant Janet Lathrop

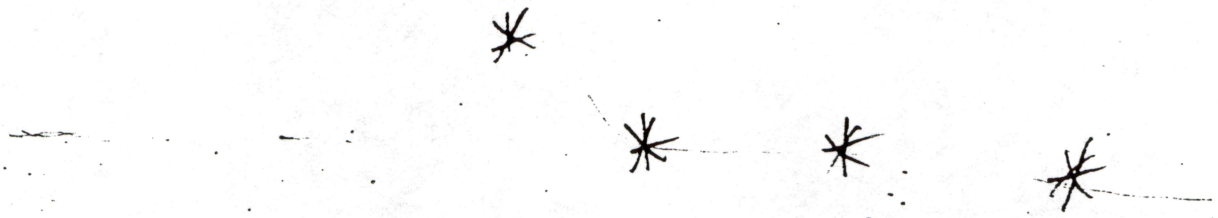
Front rod person Janet Lathrop Front rod assistant Amy Spurgeon

Data recorder Kelly Mueller Observer/sampler Dr. Tybe

Datum description _____

Profile Azimuth 133 (Magnetic degrees)

Sketch/Notes



Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	-2	Ground surface below/above datum point
3	10	3.8m	vegetation
4	12	4.2m	vegetation
5	18	4.2	slope of hill (brow)
6	18	2.25	top of hill
7	-8	3.35	slope of hill
8	-8	3.35	slope to beach
9	-2	4.25	beach crest
10	-6	3.1	beach crest

Emery Beach Profile

Profile Name BEGOE **Date (yr/mo/dy)** 98-03-06 **Start Time** 1:00

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	-8	3.2	vegetation line
12	-12	3.8	waterfront water line

Wind, Waves, and Littoral Drift Current

Profile Name Beg 08 Date (yr/mo/dy) 98-3-6 Start Time 10:49

Observers #1 Kathy #2 Lindsey #3 Cody Recorder: Bert

WIND		
Direction (pointing into wind)	Sustained wind speed	Wind gust speed
35 °magnetic	7.9 km/hour	9 km/hour

WAVES	*Observer #1*	*Observer #2*	*Observer #3*
Direction (pointing into waves)	130 °magnetic	130 °magnetic	125 °magnetic
Breaker height: estimated for seaward-most breakers.	120 cm	110 cm	100 cm
Period: # seconds for 10 waves to pass stationary point divided by 10.	5.5 seconds	5.5 seconds	6.1 seconds
Surf zone width: distance from waterline to seaward most breakers.	117 meters	110 meters	100 meters
Number of longshore bars	2	2	2
Wave breaker type (check one):	☑ plunging	☑ spilling	☐ surging

LITTORAL DRIFT CURRENT	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore	20 meters	35 meters	30 meters
Distance float moves along shore in 50 seconds	11.35 meters	1.9 meters	5.2 meters
Littoral drift speed (cm/sec) = twice the drift distance (m)	_____ cm/sec	_____ cm/sec	_____ cm/sec
Littoral drift direction: direction in which float moved	☐N ☐S ☐E ☑W	☐N ☐S ☐E ☑W	☐N ☐S ☑E ☐W

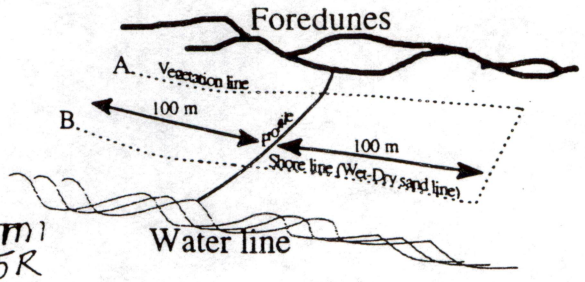
Beach Orientation, Beach Shape and GPS Survey,

Profile Name BEG 05 **Date (yr/mo/dy)** 08/3/26 **Start Time** 11:15 a.m.

GPS equipment Garmin 72 **Recorder:** Lindsey Spikings

GPS Survey: Walk along vegetation line and wet-dry sand line 100m on either side of profile while recording the GPS track.

Start time (local) 11:17 a.m.



A. Start Point (degrees, decimal minutes):

0296789 **lat.** 3215710 **long.** UTM 15R

B. End Point (degrees, decimal minutes):

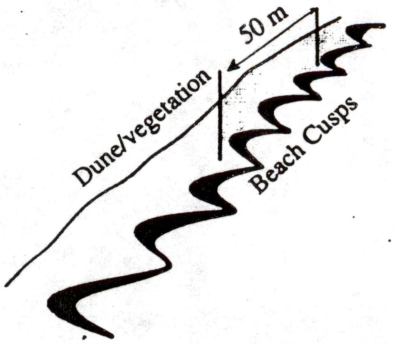
0296952 **lat.** 3215829 **long.** UTM 15R

End time (local) 11:22 a.m.

SHORELINE and FOREDUNE ORIENTATION	to north	to south
Foredune trend	50 °magnetic	230 °magnetic
Shoreline trend	45 °magnetic	225 °magnetic

NO

BEACH CUSPS (if present) NONE VISIBLE	lower set	upper set
Number of beach cusps in 50 meters	none	none
Elevation change across beach cusp	none cm	none cm



Emery Beach Profile

Profile Name RL-08 **Date (yr/mo/dy)** 98-04-28 **Start Time** 08:50

Back rod person Cody Aalfs **Back rod assistant** Taylor W.

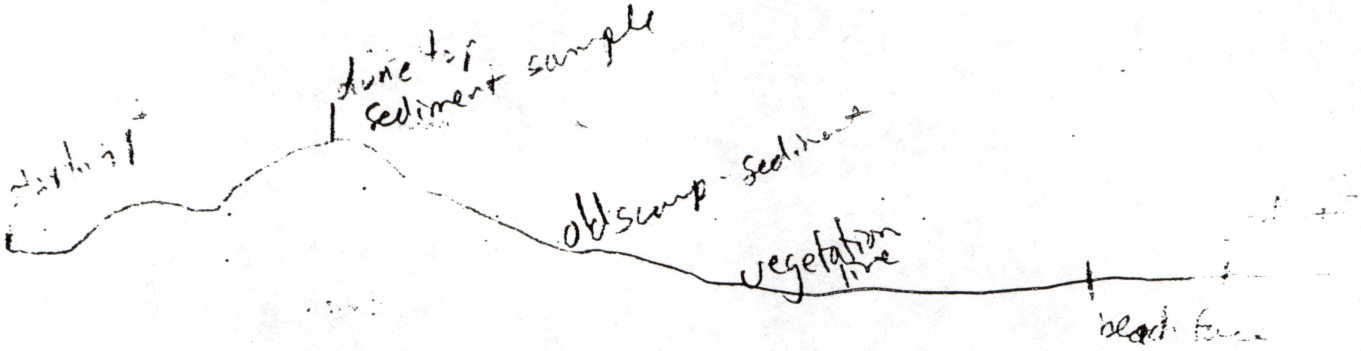
Front rod person Kristy Mudge **Front rod assistant** _____

Data recorder Becky Burns **Observer/sampler** _____

Datum description Wood on top of orange pole

Profile Azimuth 145 **(Magnetic degrees)**

Sketch/Notes



Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
1	0	0	Top of datum point.
2	0	−17	Ground surface below/above datum point
3	413	+18	inter dune area
4	304	−13	inter dune area
5	286	+48	backside of foredune
6	400	+70	foredune crest - sediment sample
7	224	−63	dune crest
8	190	−43	vegetation line
9	188	−18	obscarp - sediment sample
10	450	−14	berm crest - wet/dry sand

Emery Beach Profile

Profile Name BEC-0x **Date (yr/mo/dy)** 98-0[illegible]-2[illegible] **Start Time** 0[illegible]

Point #	dx (cm)	dz (cm)	notes (for points at front rod and area between rods)
11	300	-14	beach face
12	290	-13	beach face sediment sample
13	588	-27	swash

Wind, Waves, and Littoral Drift Current

Profile Name BEG08 Date (yr/mo/dy) 1998/04/28 Start Time 8:50

Observers #1 Chris #2 Lindsey #3 Kathy Recorder: Lauren

WIND		
Direction (pointing into wind)	Sustained wind speed	Wind gust speed
345 °magnetic	10 km/hour	15 km/hour

WAVES	*Observer #1*	*Observer #2*	*Observer #3*
Direction (pointing into waves)	144 °magnetic	130 °magnetic	142 °magnetic
Breaker height: estimated for seaward-most breakers.	100 cm	85 cm	90 cm
Period: # seconds for 10 waves to pass stationary point divided by 10.	.75 seconds	.7 seconds	.67 seconds
Surf zone width: distance from waterline to seaward most breakers.	15 meters	95 meters	85 meters
Number of longshore bars	3	2	2
Wave breaker type (check one):	☐ plunging	X spilling	☐ surging

LITTORAL DRIFT CURRENT	*Trial #1*	*Trial #2*	*Trial #3*
Distance float thrown offshore	30 meters	30 meters	25 meters
Distance float moves along shore in 50 seconds	18.8 meters	10.6 meters	28.2 meters
Littoral drift speed (cm/sec) = twice the drift distance (m)	_____ cm/sec	_____ cm/sec	_____ cm/sec
Littoral drift direction: direction in which float moved	☐N ☐S ☐E X W	☐N ☐S ☐E X W	☐N ☐S ☐E X W

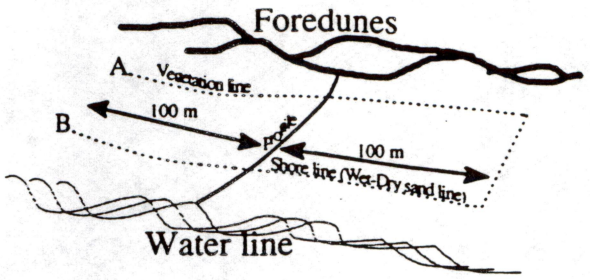
Beach Orientation, Beach Shape and GPS Survey,

Profile Name BEG08 Date (yr/mo/dy) 998/04/28 Start Time 9:10

GPS equipment Chris Recorder: Lauren

GPS Survey: Walk along vegetation line and wet-dry sand line 100m on either side of profile while recording the GPS track.

Start time (local) 9:30



A. Start Point (degrees, decimal minutes):

29° 03.156' lat. 95° 08.929' long.

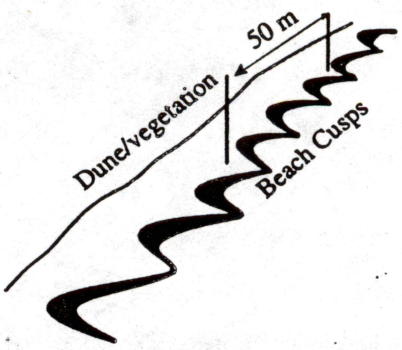
B. End Point (degrees, decimal minutes):

29° 03.219' lat. 95° 08.830' long.

End time (local) 9:40

SHORELINE and FOREDUNE ORIENTATION	to north	to south
Foredune trend	_____ °magnetic	_____ °magnetic
Shoreline trend	_____ °magnetic	_____ °magnetic

BEACH CUSPS (if present)	lower set	upper set
Number of beach cusps in 50 meters	_____	_____
Elevation change across beach cusp	_____ cm	_____ cm



APPENDIX B: EVALUATION FORMS BY STUDENTS

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☐ Relevant ☑ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☐ Helped ☑ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☐ Recommend ☑ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☐ Yes ☑ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).

The graphed data. We learned that the beach is eroding.

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.

Not Really

Please list up to three facts or concepts you learned as a result of your beach studies.

① Our beach is slowly but surely eroding
② how to measure waves, wind direction etc.
③ how to conduct the procedures for a beach profile Memory. DM. x

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☐ Relevant ☑ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☐ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☐ Recommend ☑ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☐ Yes ☑ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).

The graphs of the data we collected.

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.

NO

Please list up to three facts or concepts you learned as a result of your beach studies.

① Erosion affects everyone near a beach.
② The vegetation line is parallel to the water line.
③ There were usually 2 longshore bars at the beach

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☐ Relevant ☑ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☐ Helped ☑ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☐ Recommend ☑ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☐ Yes ☑ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).

No, the were all very instructional

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.

No

Please list up to three facts or concepts you learned as a result of your beach studies.

measuring with Aggie Staff

Sand analysis

GPS tracking

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☐ Relevant ☑ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☑ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☐ Recommend ☑ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☑ Weakly recommend ☐ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☑ Yes ☐ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).
All I ever did was measure the dunes & the beach face so I got good at that.

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.
The time that we went to the beach & there was not a horizon and we messed up very much. I think you should always go w/ a horizon.

Please list up to three facts or concepts you learned as a result of your beach studies.
1. how to measure the beach
2. why it is important to measure the beach
3.

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☑ Slightly relevant ☐ Relevant ☐ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☑ Helped a little ☐ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☑ Not recommend ☐ Weakly recommend ☐ Recommend ☐ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☑ Weakly recommend ☐ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☑ A little bit ☐ Yes ☐ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).
measurements + analyses

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.
I feel that the things we had to do on the field trip was rather complicated. They should have been explained better.

Please list up to three facts or concepts you learned as a result of your beach studies.

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☐ Relevant ☑ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☑ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☐ Recommend ☑ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☐ Yes ☑ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).

Measuring the change for the dunes

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.

No

Please list up to three facts or concepts you learned as a result of your beach studies.

Sand analysis
Erosion effect

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☑ Relevant ☐ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☑ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☑ Recommend ☐ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☐ Yes ☑ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).

- I learned about the changes occurring to the sand dunes & why it was happening
- learned about the timing of the waves.

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.

NO

Please list up to three facts or concepts you learned as a result of your beach studies.

sand analysis
Erosion & its effects.

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☑ Relevant ☐ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☑ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☑ Recommend ☐ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☑ Yes ☐ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.).

I learned the most from the field trips

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it.

Yes the work that had noting to do with marin science

Please list up to three facts or concepts you learned as a result of your beach studies.

How to measure sand dunes and erosion.

1997/98 Ball High School Beach Monitoring Program Evaluation

We would greatly appreciate you taking a few minutes to answer a few questions regarding your experience in the beach monitoring program.

Were the beach field trips relevant to the things you studied in your marine science class ?
☐ Not relevant ☐ Slightly relevant ☐ Relevant ☑ Very relevant

Did the beach field trips help you understand topics discussed in your marine science class ?
☐ Did not help ☐ Helped a little ☑ Helped ☐ Helped very much

Would you recommend a course that included these beach field trips to another student ?
☐ Not recommend ☐ Weakly recommend ☑ Recommend ☐ Strongly recommend

Were the observations you were asked to make on the beach clearly explained ?
☐ Poorly explained ☐ Weakly recommend ☑ Well explained

Generally speaking, did the beach monitoring program give you insight to conducting scientific research?
☐ Not at all ☐ A little bit ☑ Yes ☐ Yes, a whole bunch

Is there one portion of the beach monitoring program from which you learned the most? Please list/explain (e.g., certain field measurements or analyses, lectures, etc.). I learned how to measure the wave currents for every 10 waves that pass, and measure the wind volicity.

Is there a particular portion or aspect of the beach monitoring program in which you were disappointed? If so, please state how we can improve it. NO

Please list up to three facts or concepts you learned as a result of your beach studies. I learned that that.. beach studies keep me alert with the importance of the beach. These studies are used to test how much the beach has eroded over a period of time. From the beach studies, I found out that every study informs me about the beach surroundings,