NAME: _____ PERIOD: _____ DATE: _____

LAB PARTNERS: _____ LAB #14

BEACH PROFILE INVESTGATION

INTRODUCTION

The shoreline is a dynamic environment, affected by many processes including waves, tides, wind, and human activities. It is important to understand the long-term trends of erosion and deposition on a beach, because the beach helps prevent damage to man-made structures. One method of analyzing a shoreline is to take profiles or cross sections of a beach over a period of time. Figure 1 shows a generalized beach profile. By comparing successive profiles, it can be determined whether waves are building up the beach, deposition, or taking material away, erosion.

OBJECTIVES

At the conclusion of this investigation you will be able to:

1. Relate the effect of beach erosion and deposition during summer and winter
2. Compare two beach profiles.

MATERIALS

Glue
Colored pencils
Construction paper: 8 ½ in x 11 in.
Scissors

APPROXIMATE TIME 2 periods

PROCEDURE

1. Use a colored pencil or marker to mark sea level at a height of zero feet on the two graphs (Figure 2) on the worksheet.

2. Using Profile A data in Table 1, plot the height of the beach and the distance from the dunes on Profile A on the worksheet. Connect the points with a smooth line.

3. For Profile B data in Table 1, repeat step 2, on Profile B on the worksheet.

4. Cut along each profile line, and discard the portion above it.

5. Glue Profile A, the higher one, onto a sheet of construction paper. Position Profile B on top of Profile A so that the twp profiles are aligned along the vertical and horizontal axes. Glue Profile B into place.

6. Label the following zones on each profile: dunes, berm, foreshore, and sandbar.

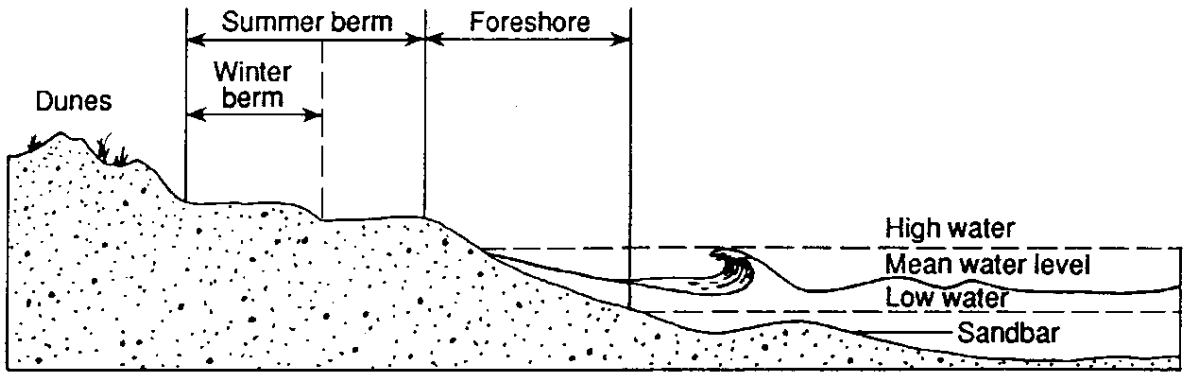

Figure 1. Generalized summer beach profile.

Fire Island is a barrier beach located south of Long Island, New York. It is typical of the barrier beach system found along the eastern coast of the United States. A barrier island is a ridge of sand that is parallel to a shoreline and about three to 30 km (two to 19 mi.) offshore.

Two profiles of the beach were made at the same location over a period of six months. One was made during January (winter) and the other during June (summer). The data for each profile are found in Table 1.

A beach profile shows several features that may change as a result of seasonal weather conditions. During the winter months, waves are generally high, and there are more storms, producing more frequent waves. Wave and tide action tend to erode the beach by carrying away material that may be deposited offshore, forming an underwater sandbar. Because of this erosion, the berm, the nearby horizontal section of a beach usually known as "the beach," is narrower in the winter months than in the summer months. The foreshore, the section between the low tide shoreline and the beginning of the berm, is less steep in winter than in summer. The foreshore is regularly covered and uncovered by the rise and fall of the tide.

During the summer months, waves are generally low and flat and tend to deposit sand and other particles on the beach. This deposition builds up the berm, making it wider, and steepness the foreshore. Sandbars may disappear.

LABORATORY QUESTIONS

1. Which profile was made in January? How can you tell?

2. Which profile was made in June? How can you tell?

3. Why do beaches typically show seasonal variations?

Table 1

Beach profiles of Fire Island, New York.*

Profile A		Profile B	
Height above sea level (ft.)	**Distance from dunes (ft.)**	**Height above sea level (ft.)**	**Distance from dunes (ft.)**
3.4	0	3.2	0
3.2	6	3.0	8
3.0	12	2.8	16
2.8	24	2.6	26
2.8	30	2.4	36
2.8	36	2.0	44
3.0	54	1.6	50
2.8	64	1.0	60
2.4	72	0.6	68
1.8	78	0.2	78
1.4	86	-0.2	88
0.6	98	-0.6	98
0.0	108	-1.0	110
-0.4	118	-1.0	118
-0.4	122	-0.8	128
-0.2	130	-1.4	142
-0.6	136		
-0.8	138		
-1.2	146		
-1.4	156		

* English units are used rather than metric units because the data were collected in English units. Conversion to metric units would result in fractional data that are more difficult to use.

Beach Profile Investigation

Worksheet

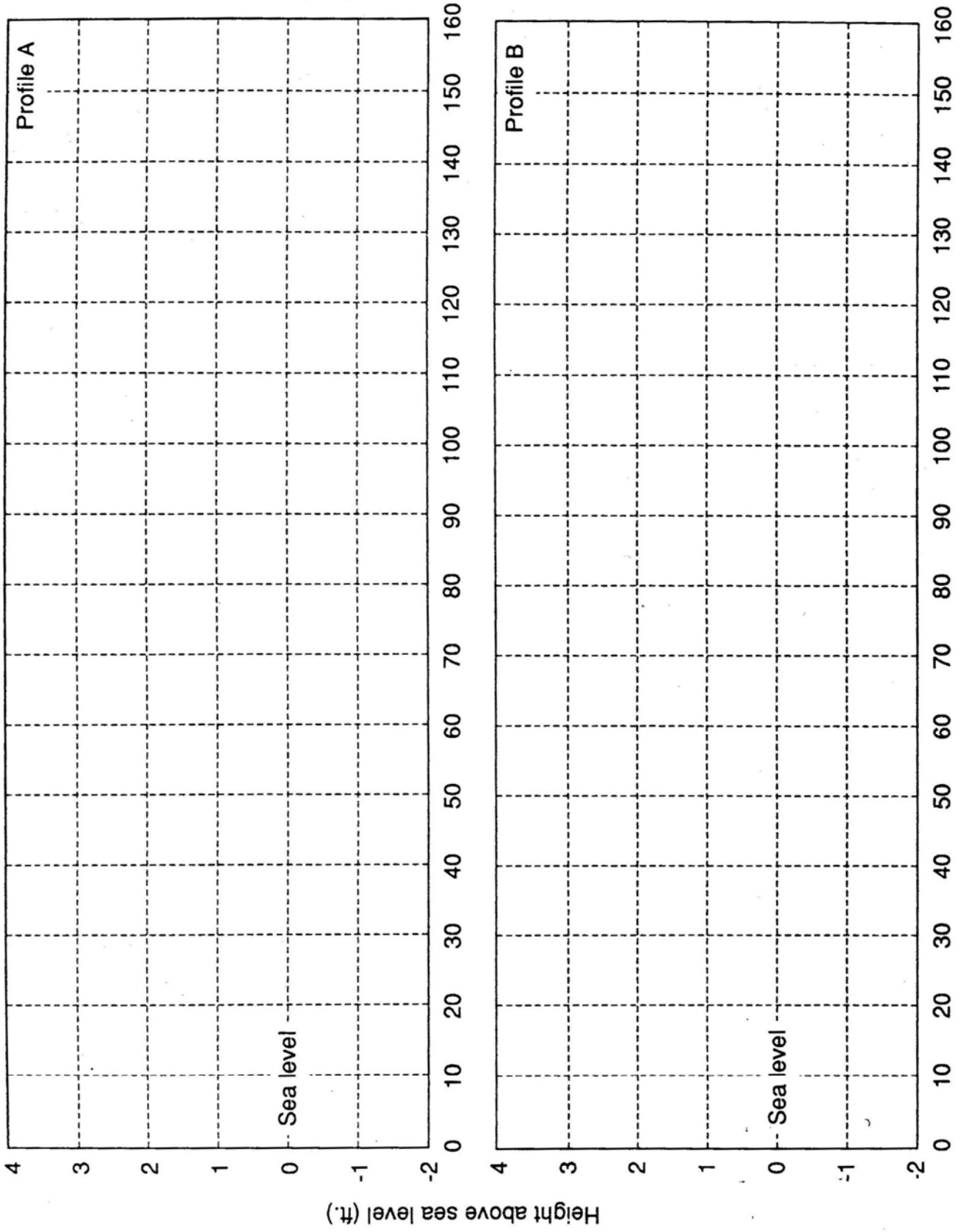

Figure 2. Summer and winter beach profiles of Fire Island, New York.