Dune Breach Susceptibility in Holgate, Long Beach Island, New Jersey

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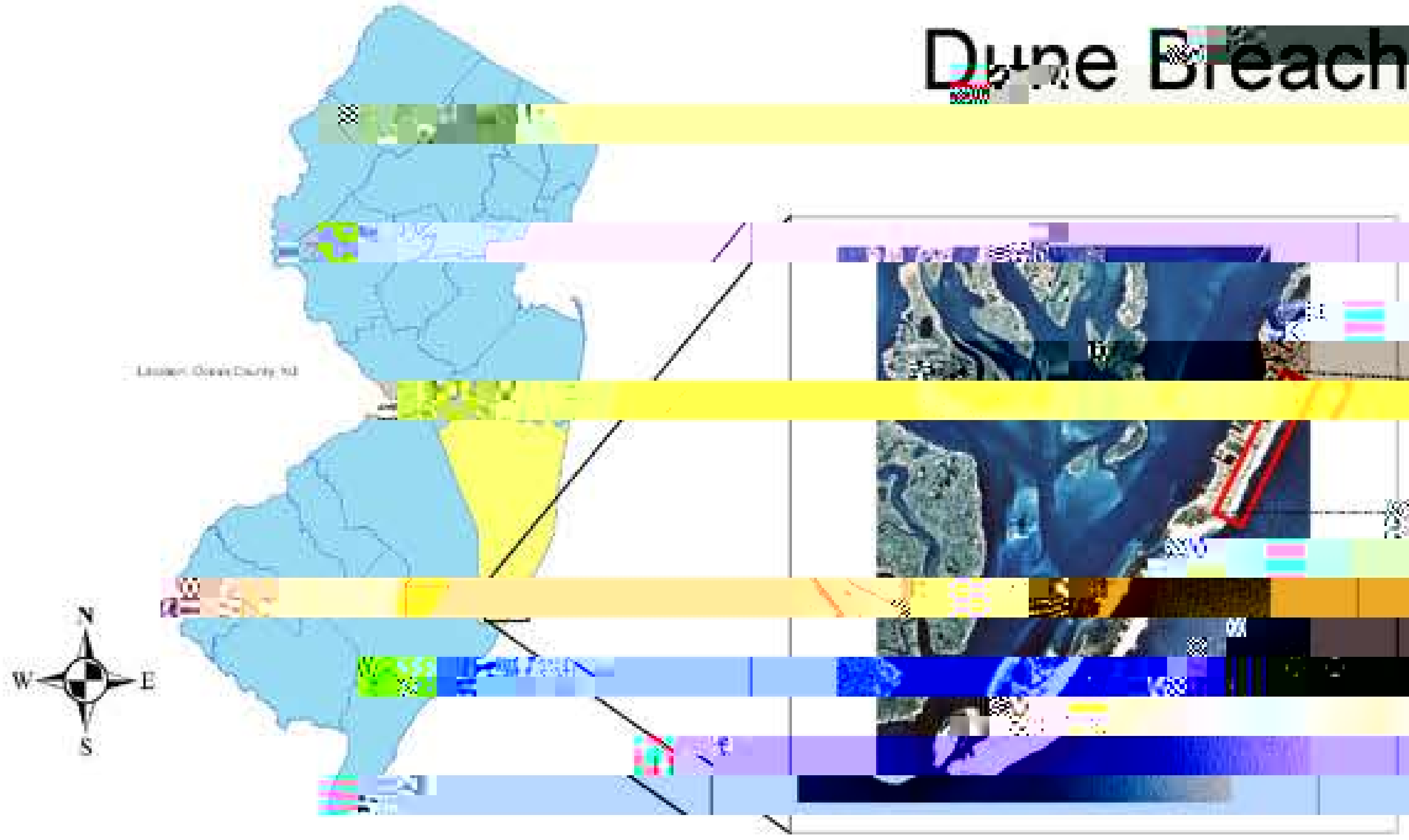
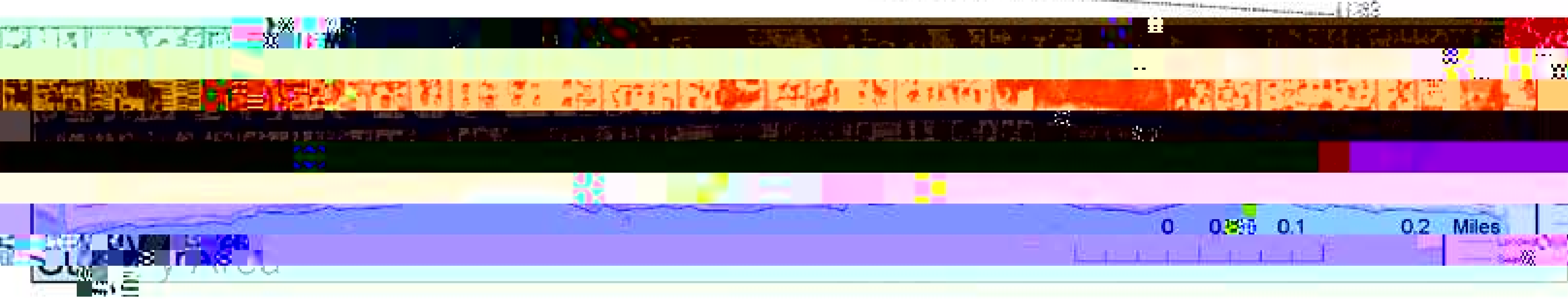


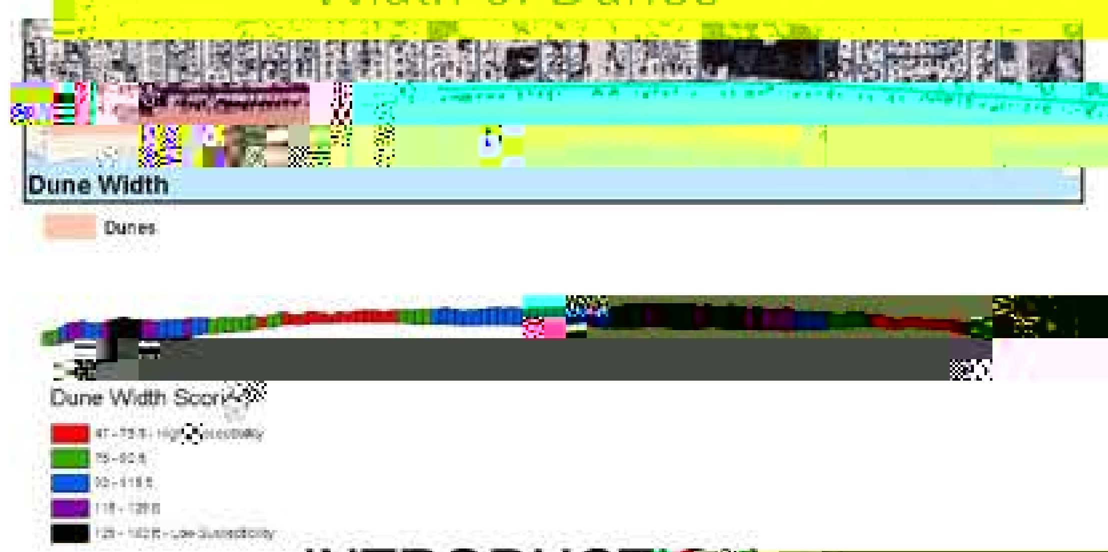


ABSTRACT

by storms annually. The dunes on a barrier island are extremely valuable safeguards against storms for the island and the mainland. A 1.2 mile stretch of beach in Holgate of ... divided into 122 "sampling" bin ... and was surveyed for four ... variables ... placed into 5 categories ranging from most ... to dune breach to least susceptible to dune breach.

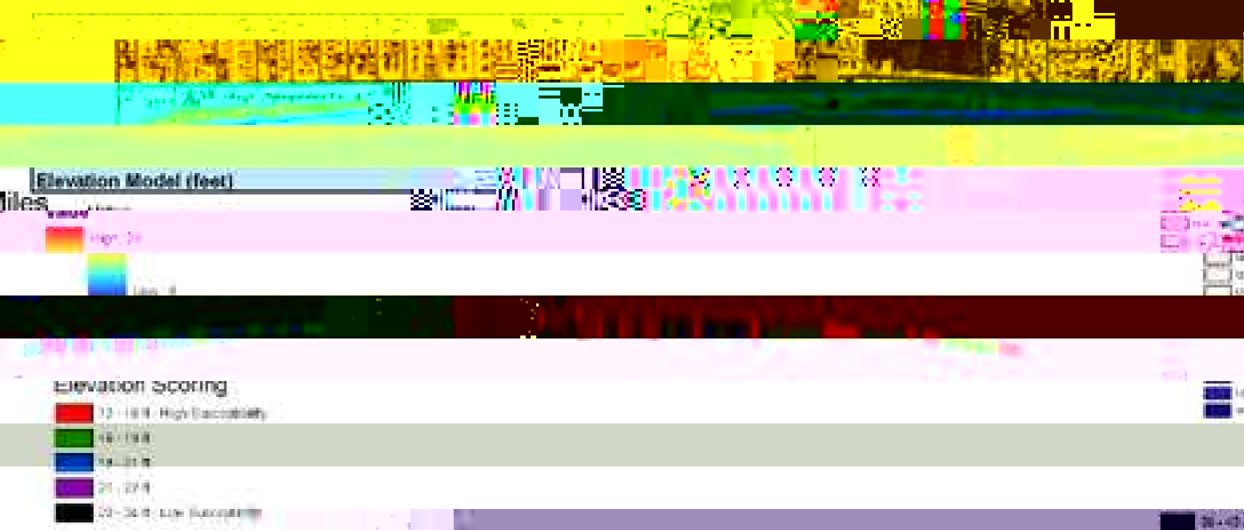
variable and the ranking of each bin are shown ... as well as

Width of Dunes

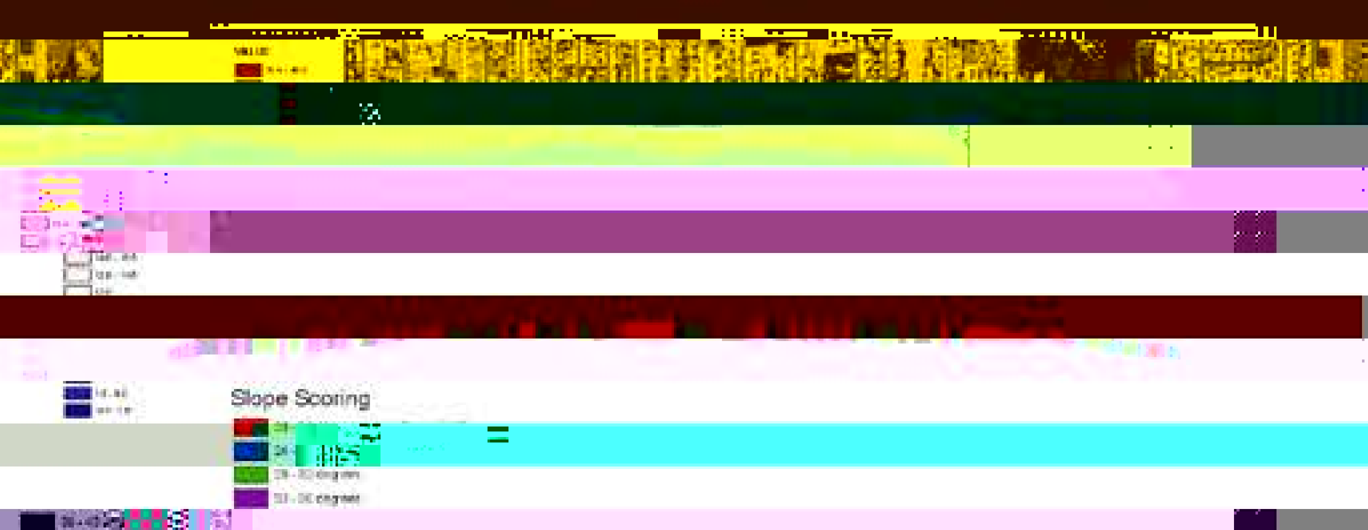


Vegetation on Dunes

Elevation of Dunes



Slope of Foredunes



INTRODUCTION

In the spring of 2002, an analysis of dune stability was carried out for ... Island, New ... collected and examined in order t... the vulnerability of dunes to overwash and erosion from storm activity. These variables include (1) dune width, (2) dune height, (3) dune slope, and (4) presence/absence of dune-stabilizing vegetation. The combined influence of these variables was used to determine which sections of dune are most susceptible to breaching. GIS was used to visually compare, analyze, and weigh the importance of each variable, and to mathematically integrate the variables across "s... bins" along the length of the dune field.

OBJECTIVE

The purpose of this project was to determine and q... the susceptibility of dunes to overwash and erosion. The goal was to produce a "dune susceptibility map" that ... where residential areas, particularly beach-front homes and property, may be at risk and exposed to dune overwash and flooding.

METHODOLOGY

Data were collected in the field as part of the larger Marine Geology (MARS-3310) class project, and acquired from several federal and state agencies, including the National ... Administration (NOAA) ... the New Jersey Department of Environmental Protection (NJDEP). In the field, dune profile measurements were taken perpe... the beach ... 100ft. Dune measurements included (1) distance from seaward toe to crest, (2) distance from crest to landward toe, and (3) slope of fore- and backdune. Trigonometry was used to calculate the true dune width from the slope and toe-to-crest measurements. Vegetation was field mapped as either "present" or "absent." Both the dune and vegetation data were digitized from the field maps into the GIS.

The base map image and related data are from NJDEP. Elevation data are from NOAA LIDAR, flown in September, 2000. The LIDAR ... were used to (1) constrain the locations of the seaward and landward dune toe ... and (3) create a foredune slope map.

In order to measure the variables in a consistent manner, the study area was subdivided into 122 uniform "sampling bins", measuring 1... For each bin, summary statistics or area ratios were calculated individually for the four dune stability variables.

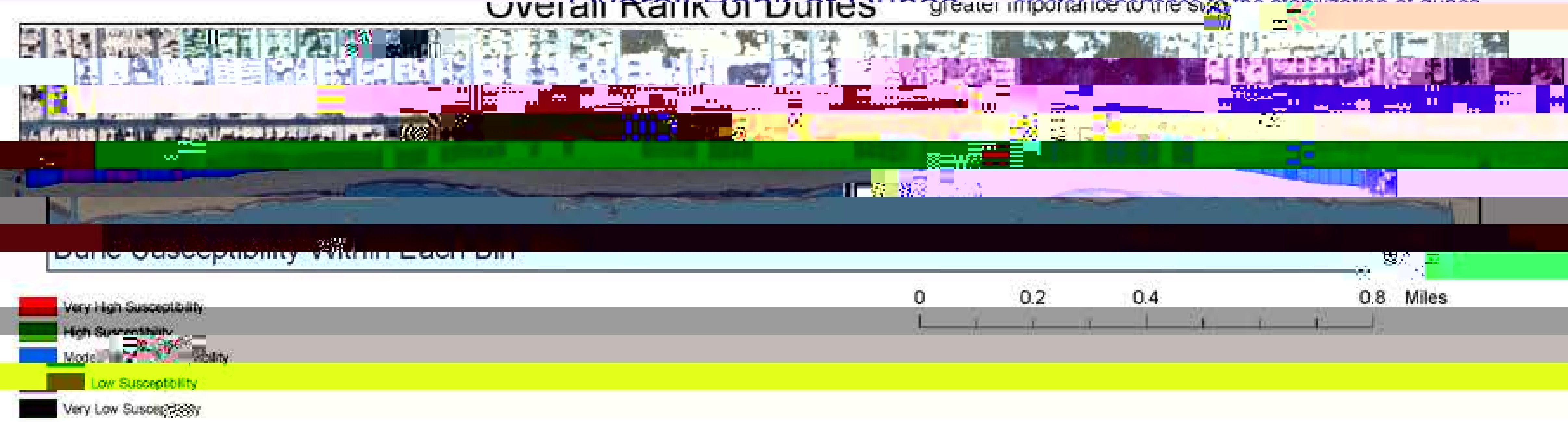
Dune ... and vegetation were measured as ... within a given bin. Average dune ... Dune height and slopes were measured for each bin and the ... maximum values were determined using summary statistics. All ... disrupt the maximum ...

Each variable was further grouped using a scoring system of 1 to 5, where 1 is ... to dune breach and 5 is the le... determining natural breaks in the data distribution. The overall susceptibility of a given bin was calcu... variable scores using the following equation:

(3 Elevation + 2 Slope + Width + Vegetation ...

Elevation and slope were given more weight because of their greater importance to the stabilization of dunes.

Overall Rank of Dunes



RESULTS

clipped to the width of ... bins are the most s...

The dune susceptibility map shows the overall rank of the bins ... have very h... susceptibility and only 4 bins w... susceptibility.

CONCLUSION

mile stretch of beach. It is obvious by performing fieldwork that the ... dunes were lev... to create a view ... beach, a walk-way ... backyard. Dunes are natural beach ... of beach-front homeow... Perhaps this project will give coastal residents new insight into how their actions affect the beach front and the consequences they are promoting.