Emerald Ocean Engineering LLC

107 Ariola Drive
Pensacola Beach, FL 32561

TEL/FAX (850) 932-9111
www.EmeraldOE.com
bigwave@emeraldoe.com

May 3, 2006

MEMO TO: Mr. Keith Wilkins, Director, Neighborhood & Environmental Services Department
THRU: Mr. Doyle Butler, Chief, Environmental Quality Division
Mr. Timothy Day, Environmental Quality Division

FROM: David McGehee, P.E., M.Oc.E., Manager

SUBJECT: Perdido Key Dune: First Scheduled Site Inspection Report

The first scheduled post construction Site Inspection of the Enhanced Emergency Dune was conducted on May 2 2006. The date was selected to observe the impacts of a strong SE wind event before indicators were erased. Figure 1 shows the wind speed and direction data from a NWS meteorological station located on the open coast at Dauphin Island, AL for the three days prior to the inspection.

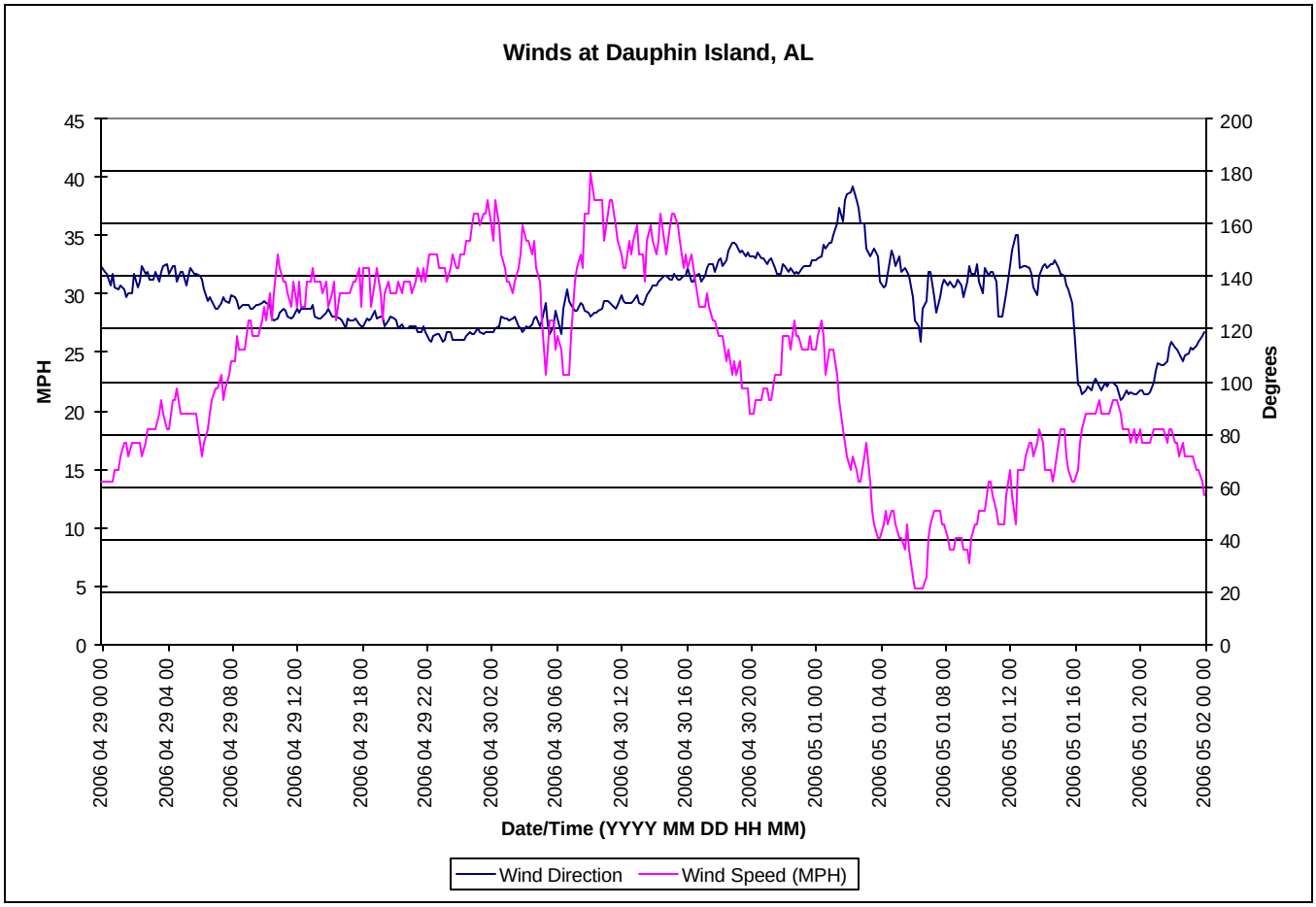


Figure 1 – Wind data from dauphin Island, AL from May 29 through May 1, 2006

With the exception of a few hundred ft of privately installed efforts, neither sand fencing nor vegetation was installed. As a result, the wind event did remove some sand from the beach face in front of the dune, the dune foreslope, and the dune crest. Although there were occasional sites where dune walkovers, construction fences, or other hard structures caused noticeable localized scour and deposition, the overall impact on the EED was minimal. In most locations, the amount of sand removed from the dune is estimated to vary from 0.05 CY to 0.5 CY per linear ft. This represents an average loss in dune elevation ranging from a fraction to, at most, 2 inches or a loss in dune volume of at most a few percent. Most of the displaced sand was re-deposited on the back slope of the dune. There was no significant or even quantifiable impact on the overall protective capability of the project.

The principal reason more sand was not eroded by the wind was the self-armoring of the dune surface by the larger particles contained in the sediments – principally shell fragments. This armoring effect was most pronounced at those sites exposed to the most direct wind. The armoring effect was generally more noticeable on the Eastern Portion than the Western Portion, and consequently the erosion was slightly less on the Eastern than the Western Portion.

While wind erosion was no more pronounced than normal between stations 64+00 and 66+00 (behind the Crab Trap Restaurant), the foreslope of the dune at this location experienced moderate wave erosion. This is a result of the severe seaward displacement of the dune, as described in the memo of April 3, 2006 describing the As-Built surveys. Figure 11 shows the actual and design position of the crest at this location. Figure 12 shows an erosion scarp forming at the base of the dune. In other locations the wave runup approached the toe of the dune, but no further.

As long as the armoring of shell particles remains in place, additional erosion from subsequent wind events of similar magnitude will be negligible. Foot traffic is the most likely factor that would disturb this layer. Stronger winds, on the range of 50 + MPH, are at the threshold of tropical storm conditions. The approach of a tropical storm would probably be accompanied by a surge of several ft, which, combined with longer period wave runup, would begin to erode the dune significantly.

The following photographs and their captions will serve to illustrate the previous statements.

Example of distribution of areas of self-armoring on dune foreslope. View looking north near station 100+00, east side. Armoring extends further upslope to right (windward) side of private sand fencing.

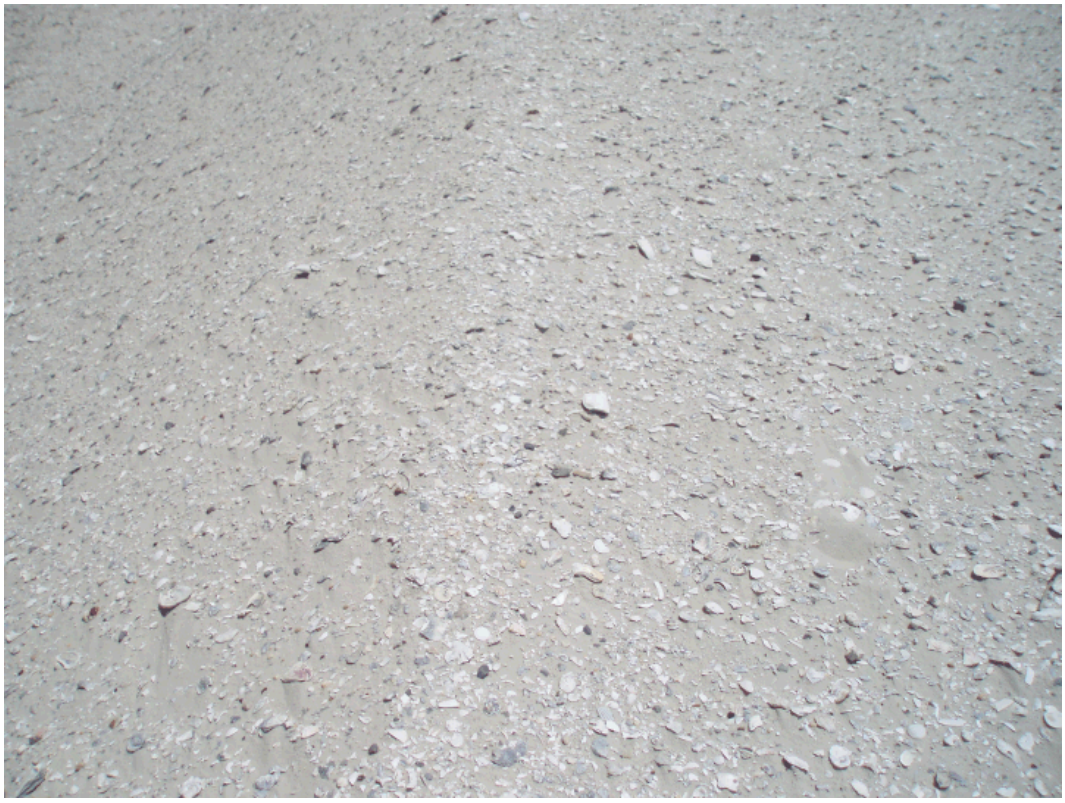
Close-up of self-armoring by shell fragments. Note how easily footprints disturb the armor layer.

Accumulation of several inches depth of sand behind private sand fencing

View looking west near station 60+00 , east side. Limit of wave runup is visible near toe of dune.

Accumulation of wind-blown sand immediately behind dune, with relatively little accumulation further landward.

Localized deposition around lumber, with more modest accumulation behind dune away from obstructions.



Another detail of self armoring.

Reduced deposition behind dune on windward side of structure.

Reduced deposition behind dune directly in front of structure, and increased deposition in lee.

Another illustration of localized impact by a structure.

More significant accumulation (up to 1 ft thick) behind dune caused by walkover. Note dog for scale.

Good illustration of quantity of sand accumulated behind dune. Note relative modest burial of grass behind fence.

Runup approached dune toe on western side. Note reduced degree of self armoring.

Relatively modest accumulation by sand fences, due to alignment with wind direction.

Burial of some grasses on back of dune, relatively far from sand fencing, while there is no deposition in immediately behind sand fences.

Walkover serving as large scale sand fence.

Another example of quantity of sand transported landward by event.

Indentation in shoreline directly behind Crab Trap Restaurant.

Actual and Design Location of EED Crest behind the Crab Trap Restaurant

Erosion scarp on dune face behind the Crab Trap Restaurant, observed on March 2, 2006