

FACT SHEET #1

Nags Head Emergency Nourishment Project

Q. *What is the life expectancy of the proposed locally funded project?*

A. Greater than ten years using the following definition of Life Expectancy (LE).

LE – The time in years following nourishment in which a measurable quantity of nourished sand remains on the “recreational beach within the project limits.”

We consider the “recreational beach” to encompass (a) the dry beach starting at the toe of the foredune, (b) the wet-sand beach, and (c) the inshore breaker zone to wading depth — in short, the area of beach that people use. A “measurable” quantity is considered to be ~10 percent or more of the original nourishment volume. Therefore, if 4 million cubic yards are placed and ~400,000 cubic yards remain on the beach after a decade, the ten-year life expectancy has been achieved by this definition.

Another way to measure longevity of the project is to monitor the annual losses. If an average of 10 percent of the nourishment volume is lost each year, there will be no nourishment sand left after ten years. In this case, the life expectancy would be achieved (under the above definition) in the ninth year when the project is down to the last 10 percent of the nourishment volume.

The best available data show that Nags Head loses sand at an average rate of ~275,000 cubic yards per year (data from 1994 and 2005). If that rate continues after nourishment, it would take over 14 years to lose all of the sand. Four million cubic yards provides a reasonable margin of safety to achieve the ten-year LE at Nags Head.

Q. *What would the erosion rate have to be along Nags Head for the nourishment project to wash away completely in 2-3 years?*

A. It would have to average 23-35 cubic yards per foot per year (cy/ft/yr). Such rates of sand loss would be 5–7 times higher than the historical rate of erosion along Nags Head. We are aware of no developed coast in the U.S. where annual erosion losses this high have been sustained over an 11-mile reach.

Q. *What about sand losses during a major hurricane? They can reach well over 30 cy/ft.*

A. Without question, hurricanes and major northeasters cause large-scale erosion. Dunes can be cut back 50 ft or more very quickly. But storms do not last long enough to cause permanent losses of nourishment sand. Instead, much of the erosion in storms consists of “profile adjustment.” High waves cut away the dry beach and dunes, shifting sand toward the outer bar. This is nature’s way of absorbing the force of the storm waves. The erosion of the dunes in storms is offset by a buildup of sand in the surf zone. When the dune losses are combined with the gains offshore, the net result is a much lower erosion rate due to the storm. The offshore buildup serves as a reservoir from which sand returns to the beach during fair weather conditions.

We often see seasonal erosion of the dry beach in winter and buildups in the summer due to the same processes of profile adjustment. This is sometimes referred to as the “beach cycle” whereby the beach continually adjusts to changes in wave energy. The primary erosion of concern is the volume of sand permanently lost each year. This volume is the net result of all the onshore/offshore profile adjustment that occurs in storms or fair weather during the year. “Permanent” sand losses have averaged 5.2 cy/ft of shoreline per year along Nags Head since 1994. This equates to 275,000 cy permanently lost each year.