

It is a pleasure to follow Dr. Kana. I want to offer some quick background – I also have a degree from the University of Virginia – that English degree led me here to learn how to wash pots and pans and bus tables. I've lived in the north end of Nags Head since 1984, most of that time in an oceanfront home that has been there since 1932. I served 6 years as a commissioner on the Nags Head board, and 4 years as the mayor, while the beach nourishment project was done.

My first work on shoreline management was an article for the Nags Head newsletter around 1985 or so, comparing the town's existing policy of retreat with the alternatives. I listened with skepticism to the economic multiplier arguments for the federal nourishment project. But the ever increasing number of sandbags in South Nags Head, and high number of homes at risk, led me to beach nourishment as a response that we had to attempt, if only to gather information about how the system would react to the addition of a significant volume of new sand.

The most likely alternative to nourishment was a wall of sandbags, as each individual owner acted to preserve their homes. This was happening fast in South Nags Head, and the sandbags acted to increase the erosion on the neighbors who had not sandbagged. Surfside Drive and Sea Gull Drive were ground zero to see the effects of an average annual erosion rate of 8 feet per year. Homes were on the beach, east of whatever duneline existed, and the road that gave access to the homes was washed away. The Town retreated from Surfside Drive, and eventually from Sea Gull. The Comfort Inn, one of the largest structures in Nags Head, also had sandbags that were in the surf at high tides.

Nags Head came to the realization that federal funds were not going to materialize for the Dare County Federal project, and engaged Dr. Kana and his firm to begin a program of measurement of the Nags Head beaches. Dr. Kana offered a nourishment plan designed for 10 miles of Nags Head beach, with a reduced volume per linear foot from the federal (Army Corps of Engineers) plan. The plan was ultimately based on the measured historical volume losses, and was designed to offer equal benefits to all oceanfront areas of the town. The plan divided the town into 4 reaches, and added ten years of sand to all areas, based on the erosion rates in each reach. For the north 5 miles, sand was added at 50 cubic yards per linear foot. In south half of the project, up to

170 cubic yards per foot were added because of the high historical erosion rate. 4.6 million cu. yds out of 100 million borrow site.

Permit approvals took years. A federal agency had 6 months to respond, but they took 18 months. You have to get your permits from the feds before you get the state versions. Our project needed special permission to be done in the summer, due to the winter weather off of our coast. That put us in conflict with turtle nesting, and there were observers hired to watch for turtles 24/7, along with special precautions while dredging at our offshore borrow site. It takes very few turtles injured as bycatch to shut your project down. Benthic testing + recovery

The Town began work on possible funding sources after the repeal of the 1% sales tax and the defeat of a General Obligation bond referendum. We focused on the Occupancy Tax as the best revenue source, with the rationale that the two main beneficiaries of nourishment are the tourism industry and oceanfront property owners. Our final funding plan included a 2 cent property tax contribution from all property owners in the Town, based on the premise that the health of the beach is important to the entire community.

The State legislature had approved an additional 1% occupancy tax in 2010 for Dare County, and dedicated it to shoreline management. With permits on the horizon, and the engineering plan in place, Nags Head approached the governing boards of Dare County and each town, since everyone had a stake in the pool of occupancy tax money. Our neighbors were very supportive, but very consistent in wanting to make sure property owners had "skin in the game". Taxes for oceanfront properties doubled for 5 years while the bonds were repaid.

As a permanent resident on the oceanfront, I'm in the minority. The vast majority of oceanfront homes contribute not just property tax to their local governments, but also sales tax and occupancy tax on their rents. We looked at spending \$36 million over 5 years as insurance to protect our \$3 billion oceanfront tax base, and to protect the long term income stream from sales and occupancy taxes directly to the Town.

Our experience showed that adding sand to the beach and nearshore system has the side effect of building dunes. With more sand in the system, there is more sand on the move in a strong wind.

Your survey data is the best and most objective way to assess the condition of your beach and the nearshore system. Ten individuals can look at the beach on ten different days and times and have very different impressions. The system really runs from the top of the dune line, heading east, out past the sandbars. The Army Corps defined a depth of closure at 19 feet for our project. Sand out to that depth is measured and counted in the project, but once it's in deeper water, that sand is lost to the nearshore system. But while sand is in that nearshore system, it's moving back and forth. The best example I've ever seen of this was a historical time lapse at the Duck Research Pier - you could see the seasonal change in the sand bars very clearly over the 15 -20 years of timelapse.

Our expenses for the repair and replacement of Public Beach Access stairs was about \$350,000 after Hurricane Isabel. After Hurricane Sandy, we spent about \$75.

Benthic recovery -

I think there are four key reasons for the longevity of our project. We experienced a hurricane with the project about 85% complete. The waves broke on the outside bars, and resulted in small surf hitting the beach. The Weather Channel on camera guy was standing on the beach south of the Comfort Inn, reporting on the storm - I guarantee that would not have been possible a year before. But the end result was our beach reached a pretty stable profile almost immediately. You put all the sand on the beach because that's the easiest place to put it. But it's a natural process for that sand to spread into the larger system - nothing ever just stays where you put it on the beach. The wind moves the sand to the dunes and the waves move it to the sand bars.

Second, we were fortunate in the compatibility and quality of the sand that was placed on the beach. I watched the new beach being added, and you couldn't tell a division between old and new sand. Great preparation by the engineers in core sampling our proposed borrow area. Just as important, core samples from Oregon Inlet told us that sand was too fine and small grained by a factor of 10 - it would have moved in the wind and water much more quickly than our compatible sand did.

Third, the length and volume of the project was long and large enough. We were told repeatedly that longevity is related to the square of the length – a 10 mile project should last 4 times as long as a 5 mile project.

Lastly, there was an enormous amount of discussion, over several years, and election cycles. That discussion included stakeholders from all facets of the community, and everyone had the opportunity to express their concerns.

Nags Head is preparing to make choices about re-nourishment, and the our decisions should be better informed now than they were in 2011. We have measured the movement of sand along our ten miles of beach, and you can see some clear patterns. The north five miles of the project showed very little loss out of the “sandbox”, but we have lost a majority of sand in the last two miles of South Nags Head. As we look at the collected information, our elected leaders are struggling with the “hotspot” and how to address a relatively stable northern 50% of the project, and the higher erosion rates of the south end of South Nags Head, and the fairest and most effective way to pay for another round of nourishment.