Twenty Three Years of Monitoring at Siasconset, MA





Nantucket Coastal Conference

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History of Monitoring Program

- CP&E with Blackwell Engineering began in 1994
- Woods Hole Group took over in 2000
- M. Buck began working on in 2007



Monitoring Program

- •46+ Beach Profiles over 6 miles of beach
- •Completed 72 Surveys since 1994
- •Quarterly/semiannual topographic beach surreys
- •Semi/annual bathymetric surveys
- Massachusetts State Plane Island in North American Datum of 1927 (NAD27) feet and Mean Low Water (MLW) 1992 Feet
- •Issue a report showing profile comparison and changes in profile volume and shoreline position





Traditional Methods: Rod and Transit

Prism & Rod



Total Station







Modern methods: RTK GPS

Real Time Kinematic (RTK) GPS

• Implemented in 2005 to locate profile monuments and collect topo data, but retain traditional methods for wading shots

WOODS HOLEGROL

 Decreased survey time from 1 week to 2 days

Monument

• Does not rely on beach profile monuments



RTK Receiver/Antenna

Controller





Bathymetric Surveying



Unique and Challenging Environment

- Open Atlantic Ocean exposure Nor'easters
- Strong tidal currents
- Steep surf zone beach slope
- Relatively stable bathymetry with dynamic sand waves do move along coast
- Need site-specific data and analysis!



Surveying on Good Days



Surveying on Other Days



Environmental Concerns & Hazards













Data Export & Products

- RTK GPS data via Trimble Business Center
- Bathy data processed in HYPACK
- Matlab scripts create 2D cross-shore profiles and data export products
- Data presented in a monitoring report



Representative Beach Profiles from Geotube Project Area



- Eroding bluff with a narrow beach
- Stable offshore bathymetry
- Linear relationship between volume and shoreline change
- No significant seasonality tren

IOLEGROUP



Shoreline Change in Geotube Project Area



Shoreline Change 500-1000ft North of Geotubes



Shoreline Change 500-1000ft South of Geotubes



- Eroding bluff with narrow beach
- Separate measures
- Similar Trend at 90.6
- More recent recession, but similar MLW position to 2005



Shoreline Change Far south (Codfish Park)





- Wider beach with dune system
- Relatively stable since 2007





Shoreline Change Far North of Project Area





- Narrow beach with large dune system
- Some recent recession but shoreline position similar to 2002





Measured Change Since 1994

- Shoreline Change
 - Max retreat: -150 ft
 - Max advance: +130 ft
 - Variable in space and time
- Volume Change
 - Overall stable
 - Eroded >500,000 c.y.
 above -5ft MLW over
 2 miles





Summary/Lessons Learned

- High quality data set (72 Surveys!)
- Unique conditions offshore Nantucket
- Emphasizes need for site-specific data and analysis
- Trends and variability
 - Shoreline position highly variable
 - Volume change variable
 - Linear relationship volume and shoreline change
 - Seasonal influence (no discernable trend)
- Survey planning and methods
 - Selection of benchmarks
 - Location of baseline
 - Respect!



Acknowledgements

•Siasconset Beach Preservation Fund (<u>sconsetbeach.org</u>)

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Questions?

