

APPLIED COASTAL

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Project: Sedimentation At Hyannis Marina
Resulting From Steamship Authority
Vessel Operations In The East Basin Of
Hyannis Harbor

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Applied Coastal was contracted to evaluate sedimentation and erosion patterns in Hyannis Inner Harbor, MA, relative to vessel operations. The largest vessels operating in the harbor are passenger and freight ferries that belong to the Woods Hole, Martha's Vineyard, and Nantucket Steamship Authority (SSA). Although the harbor channel was on a dredging maintenance schedule of a decade or more, the owner and operator of Hyannis Marina was encountering sedimentation problems that required annual maintenance dredging. Hyannis Marina contended that high rates of sedimentation in the marina were the result of SSA vessel operations scouring the seafloor and propelling sediment toward the marina during turning and docking maneuvers. Applied Coastal personnel were asked to provide a scientific evaluation of existing data sets (bathymetric surveys, turbidity measurements, sediment traps, and video surveys) and collect data where necessary (current and backscatter measurements) to test this hypothesis. The following conclusions were developed using each of these data sets to document erosion processes in the Inner Harbor and subsequent deposition in Hyannis Marina resulting from SSA vessel operations.

First, measurements of suspended sediment in the Harbor before and during SSA vessel operations documents the amount of sediment available for deposition in Hyannis Marina per vessel run and on an annual basis. Because SSA vessels direct large quantities of water and sediment at Hyannis Marina during docking procedures, the net amount of sediment projected at and deposited in the Marina during docking of deep-draft SSA vessels since 1989 is about 33,000 cy. This quantity is greater than the amount of sediment dredged from the Marina for an equivalent period of time (approximately 27,000 cy).

Second, measurements of sediment deposition near Hyannis Marina Dock A (using sediment traps) document some of the highest accumulation rates in the inner harbor. Underwater video of sediment and fluid motion near the Hyannis Marina Dock A recorded a strong plume of sediment associated with maneuvering and docking of the M/V Eagle. This result provides visual corroboration of sediment trap data.

Third, well-defined areas of erosion and deposition were documented for the central East Basin and entrance channel of Hyannis Inner Harbor using bathymetry data sets from 1996, 1998, and 1999. A concentrated zone of erosion in the Inner Harbor was associated with SSA vessel docking, and sediment deposition in front of Hyannis Marina (particularly Dock A) resulted from these activities.

Fourth, measurements of suspended material, current speed, and current direction, simultaneously with depth and time, using an Acoustic Doppler Current Profiler clearly documents the movement of water and sediment into Hyannis Marina from SSA vessel transit and docking operations. During a four-day period, docking events were directly correlated with high suspended particle concentrations at Dock A in Hyannis Marina. Although current speeds were slow (about 5 cm/sec), the direction of sediment plume migration was always into the Marina, providing direct evidence of the process of infilling.



