



Marine Advisory Bulletin

from the Woods Hole Oceanographic Institution Sea Grant Program

December Storm Damages Cape Coastline — Falmouth's Surf Drive Takes Another Hit

Falmouth, MA. January 1993. Memories of Hurricane Bob and the Halloween nor'easter were still vivid in the minds of many Falmouth residents when the coastal storm of December 11-12 dealt yet another blow to the Cape's coastline and caused more damage to the vulnerable Surf Drive and its beaches.

Photographs taken on Monday, December 14, shown here, remind us all too well of the havoc strong winds combined with high tides can play on exposed beaches and channels such as Trunk River, the herring run, and the narrow inlet to Siders Pond.



Town employees at work following the storm, removing sand from the inlet to Siders Pond on the Vineyard Sound side of Surf Drive. Sand built up on both sides of the road and effectively stopped the flow of water from the Sound to the inlet.

Undercutting was apparent in several locations, including the stretch of Surf Drive between Mill and Elm Roads and at the corner where the Shining Sea Bikeway intersects with Surf Drive. In the latter location, under-

cutting caused the road to collapse for a 25-foot stretch and damaged the wooden guard rails.



Undercutting of the road was most apparent in the area of Surf Drive that is intersected by the Shining Sea Bikeway, near Oyster Pond Road. In one area, the undercutting caused the road to collapse, as the sand supporting the asphalt was washed out to sea.

Many residents have expressed concern and wonder if the pattern that seems apparent in the past two years will continue.

Dr. Graham Giese, a coastal geologist in the WHOI Geology and Geophysics Dept. and Sea Grant Marine Advisor, points out that it is important to realize that the problem is greater than the storms alone. "One has to realize that Surf Drive has been laid out on a barrier beach," he said.

"By their very nature, barrier beaches are dynamic; they respond to rising sea level by migrating landward. This landward migration is largely achieved by processes involving storm waves and storm-elevated sea levels. Storm waves erode the foreshore of the beach and elevated sea levels permit the waves to transport the eroded sand up onto the barrier, thereby raising its elevation, and across the barrier to the back-barrier wetlands, where it is deposited in the form of 'overwash fans.'"



An example of an "overwash fan" heading toward Salt Pond. Other examples of "overwash fans" can be seen along the area of Surf Drive nearest the western portion of Salt Pond and also along the bike path approaching Trunk River as you head west.

The net effect of these processes, said Dr. Giese, is a gradual progression of the entire beach form in a landward direction, as well as a gradual increase in its elevation.



Undercutting was also apparent, to a lesser degree, along the straightway of Surf Drive between the beach houses and Elm Road.

The Sea Grant Program at the Woods Hole Oceanographic Institution provides a service to the community by making the results of marine scientific research available to the community. While it is not the intention nor the desire of the Sea Grant Program to recommend particular actions in a case like this, it is the desire of the program to encourage town planners and managers to plan now for the future. Rather than wait for another severe coastal storm to wash the road out or have several less severe storms weaken the road, Sea Grant suggests that town officials act now to seek out alternative, long-term solutions and, in doing so, save the town and the taxpayers large financial investments for short-term solutions.

The Sea Grant Program at the Woods Hole Oceanographic Institution supports research, education and advisory projects to promote wise use and understanding of ocean and coastal resources for the public benefit. It is part of the National Sea Grant College Program of the National Oceanic and Atmospheric Administration (NOAA), a network of 30 individual programs located in each of the coastal and Great Lakes states to encourage cooperation among government, academia and industry. Sea Grant strives to accomplish this by linking research, outreach and education.

WHOI Sea Grant Program staff are: Judith E. McDowell, Director; Graham S. Giese, Marine Advisor; Tracey I. Crago, Communicator; Sheri D. DeRosa, Communications Assistant. For more information, contact the WHOI Sea Grant Program at (508) 457-2000, ext. 2398. Or, for a recorded list of upcoming events or WHOI Sea Grant news, call the WHOI Sea Grant Information Line at (508) 457-2144.

FOR FURTHER READING ON THE SUBJECT OF COASTAL PROCESSES:

(available at local libraries unless otherwise noted)

Bascom, W. 1964. Waves and Beaches. (Doubleday: Garden City, N.Y.), 366 p.
Good general background on wave and beach processes from a physical perspective rather than a geological perspective.

Giese, G.S. 1990. "The Story Behind the New Tidal Inlet at Chatham," in Nor'easter magazine, University of Rhode Island Sea Grant Program, pp. 28-33.*
Documents the well-known changes taking place at Chatham's Nauset Beach.
* available from WHOI Sea Grant Program, (508) 457-2000, ext. 2398

Giese, G.S. and R. Brown Giese. 1974. The Eroding Shores of Outer Cape Cod, Informational Bulletin #5 of the Association for the Preservation of Cape Cod, 16 p.*
Reprinted in 1994, this booklet is timeless in its description of the erosion of outer Cape Cod shores - a process the authors refer to as "but a tiny part of the great cycle of earth dynamics."
* available from WHOI Sea Grant Program, (508) 457-2000, ext. 2398

Kaufman, W., and Orrin Pilkey, Jr. 1979. The Beaches Are Moving: The Drowning of America's Shoreline. (Duke University Press: Durham, N.C.), 336 p.
Written from geologists' point of view, this book provides a good general background on the developments and changes of coastal features. Highlights the pitfalls of uninformed construction in the coastal zone.

Strahler, Arthur N. 1966. A Geologist's View of Cape Cod. (American Museum of Natural History, Natural History Press).
Though somewhat dated, this book provides the lay reader with an exceptionally clear view of the geological processes that have shaped and are shaping the shores of Cape Cod.

VIDEOS:

"Portrait of a Coast," produced by Jim Gabriel, funded by the Cape Cod National Seashore, 1979.

*Highlights the effect of the "blizzard" of 1978 on both developed and undeveloped shorelines in southeastern Massachusetts. This production helps us learn more about the importance of barrier beaches (there are over 650 in Massachusetts).**

"America's Vanishing Coastline"

*An interesting look at the issue of coastal erosion presented by the National Committee on Property Insurance (NCPI). Narrated by Dr. Orrin H. Pilkey.**

"Dune Replenishment," Produced by TKR Cablevision for the Men's Garden Club of Long Beach Island, New Jersey.*

"Vanishing Lands," produced by the University of Maryland Foundation

*This video explores the issue of sea-level rise, featuring graphics, archival photography, and scenes from coastal areas to illustrate commentary from the world's leading experts on sea-level rise and coastal impacts.**

* These videos are periodically shown on local cable stations throughout Massachusetts as part of the SHOREWATCH video series, co-sponsored by WHOI Sea Grant and the Massachusetts Coastal Zone Management Office. Some may be available for a short loan. Please call the WHOI Sea Grant Office at (508) 457-2000, ext. 2665 for more information.

FOR FURTHER READING ON THE SUBJECT OF COASTAL PROCESSES:

(available at local libraries unless otherwise noted)

Bascom, W. 1964. Waves and Beaches. (Doubleday: Garden City, N.Y.), 366 p.
Good general background on wave and beach processes from a physical perspective rather than a geological perspective.

Giese, G.S. 1990. "The Story Behind the New Tidal Inlet at Chatham," in Nor'easter magazine, University of Rhode Island Sea Grant Program, pp. 28-33.*
Documents the well-known changes taking place at Chatham's Nauset Beach.
* available from WHOI Sea Grant Program, (508) 457-2000, ext. 2398

Giese, G.S. and R. Brown Giese. 1974. The Eroding Shores of Outer Cape Cod, Informational Bulletin #5 of the Association for the Preservation of Cape Cod, 16 p.*
Reprinted in 1994, this booklet is timeless in its description of the erosion of outer Cape Cod shores - a process the authors refer to as "but a tiny part of the great cycle of earth dynamics."
* available from WHOI Sea Grant Program, (508) 457-2000, ext. 2398

Kaufman, W., and Orrin Pilkey, Jr. 1979. The Beaches Are Moving: The Drowning of America's Shoreline. (Duke University Press: Durham, N.C.), 336 p.
Written from geologists' point of view, this book provides a good general background on the developments and changes of coastal features. Highlights the pitfalls of uninformed construction in the coastal zone.

Strahler, Arthur N. 1966. A Geologist's View of Cape Cod. (American Museum of Natural History, Natural History Press).
Though somewhat dated, this book provides the lay reader with an exceptionally clear view of the geological processes that have shaped and are shaping the shores of Cape Cod.

VIDEOS:

"Portrait of a Coast," produced by Jim Gabriel, funded by the Cape Cod National Seashore, 1979.
*Highlights the effect of the "blizzard" of 1978 on both developed and undeveloped shorelines in southeastern Massachusetts. This production helps us learn more about the importance of barrier beaches (there are over 650 in Massachusetts).**

"America's Vanishing Coastline"
*An interesting look at the issue of coastal erosion presented by the National Committee on Property Insurance (NCPI). Narrated by Dr. Orrin H. Pilkey.**

"Dune Replenishment," Produced by TKR Cablevision for the Men's Garden Club of Long Beach Island, New Jersey.*

"Vanishing Lands," produced by the University of Maryland Foundation
*This video explores the issue of sea-level rise, featuring graphics, archival photography, and scenes from coastal areas to illustrate commentary from the world's leading experts on sea-level rise and coastal impacts.**

* These videos are periodically shown on local cable stations throughout Massachusetts as part of the SHOREWATCH video series, co-sponsored by WHOI Sea Grant and the Massachusetts Coastal Zone Management Office. Some may be available for a short loan. Please call the WHOI Sea Grant Office at (508) 457-2000, ext. 2665 for more information.