#### THE SHINING SEA BIKEWAY

# A path through the natural history and cultural heritage of Falmouth on Cape Cod



Photo: Stace Beaulieu

The Shining Sea Bikeway is a 10.7 mile (17.2 km) journey of discovery through four of Falmouth's villages, gently traversing glacier-sculpted natural wonders from Woods Hole on Vineyard Sound to North Falmouth along the shore of Buzzards Bay. Officially dedicated as a bicentennial project in 1975, and one of America's first 500 rail trails, it has grown in four phases to its current length concluding with the extension to North Falmouth in 2009. The Bikeway occupies the rail bed of the now defunct New York, New Haven and Hartford Railroad Company\*. Train service ran from New York and Boston to Woods Hole from 1872 to 1965. More than just a paved, multi-use trail for residents and visitors to cycle, walk, jog, skate, and cross-country ski, the Shining Sea Bikeway is an enriching experience to connect people with nature and time - past, present and future. The Bikeway's name honors Katharine Lee Bates, born in Falmouth in 1859, who penned "America the Beautiful," with its line, "And crown thy good with brotherhood, from sea to shining sea!"

## **Natural History**

The Shining Sea Bikeway is the only bikeway on Cape Cod that runs alongside the sea, providing views across salt marshes, barrier beaches, and open water. And with almost 25% of the Bikeway abutting conservation land along at least one side, the Bikeway brings you close to a variety of wooded uplands, cedar swamps, and ponds. Wildlife abounds along the Bikeway, from the microscopic plankton in the sea to quahogs, bluefish, River Herring, eels, egrets, Great Blue Herons, Red-tailed Hawks, Osprey, turtles, Red Fox, muskrats, and deer. The Bikeway makes it possible to follow the advice, "of Louis Agassiz, a founding father of modern American science, who spent summers in Woods Hole: "Study nature, not books."

The southernmost three miles of the Bikeway afford views of Vineyard Sound, a body of water that merges into Nantucket Sound to the east. Warm, turquoise Gulf Stream waters enter Vineyard Sound from the south, and colder Labrador Current waters flow into Nantucket Sound from the north. The mixing of water masses and the shallow depths create ideal conditions that support spawning and nursery habitat for a variety of marine species, like Black Sea Bass, Winter Flounder, tautog, scup, and squid. West of the Bikeway, with views from Mile Markers 5 to 7 is Buzzards Bay, named for the misidentified Osprey, the bird of prey that has made a remarkable recovery after near-extinction in the 1950's-1960's and now nests each summer on the many high platforms visible from the Bikeway. Buzzards Bay is part of the National Estuary Program of the U.S. Environmental Protection Agency, and is noted for its regional importance as marine habitat, in particular as a significant summer and fall feeding area for bluefish, Striped Bass, and many other species.

The Bikeway is nature's classroom, where it is revealed that Falmouth and Cape Cod are a phenomenon of nature and, in geological time, their moment will be fleeting. The spirit of this place speaks of the Ice Age and the massive Laurentide Ice Sheet that formed the Cape and Islands. About 25,000 years ago, the Laurentide Ice Sheet had spread to blanket thousands of square miles of Canada and the United States. Its southern edge lay about where Martha's Vineyard, Nantucket, Block Island, and Long Island lie today. One to two miles thick, the ice sheet had moved south over the previous landscape, bringing with it large boulders, cobbles, and sand that it had scooped up. As its southern edge melted, vast amounts of meltwater and rocky debris were released, forming Martha's Vineyard (visible across Vineyard Sound near Mile Marker 2), Nantucket, and the shoals beyond them. By about 18,000 years ago, the warming climate caused the ice sheet to melt into three massive glacial lobes which lay along the west and northern edges of Cape Cod. The southernmost five miles of the Bikeway primarily lie on or just east of the Buzzards Bay Moraine, the rocky line of irregular hills created along the eastern edge of the Buzzards Bay glacial lobe. Streams of melting ice from the glacial lobe front carried sand and gravel that were deposited to the southeast, forming outwash plains that make up most of Falmouth east of the moraine. Near Mile Marker 4, the section of the Bikeway between Depot Ave. and Ter Heun Dr. is actually cut into the edge of the moraine. Extending east from here is the

low, pitted outwash plain that extends south and east to Vineyard and Nantucket Sounds. Near Mile Marker 5 on the Bikeway, as you cross the moraine, look for the large boulders (glacial erratics) that melted out of the ice and were too heavy to be moved by meltwater streams. Here, the railroad took advantage of a low spot to cross the moraine with as little excavation as possible. This pass is the location of a former tongue of glacial ice that persisted after the ice in the area of Beebe Woods had melted away.



Photo: Kevin Lynch

The northern half of the Bikeway lies west of the Buzzards Bay Moraine. The shoreline from Mile Marker 5 north all the way to the Cape Cod Canal (some 7 miles north of the Bikeway terminus) alternates between hills or headlands and bays or marshes: Little Sippewissett Marsh, followed by Saconesset Hills, followed by Great Sippewissett Marsh, and so on north. This unusual topography was created by the ragged shape of the melting ice when its front lay just offshore in what is now Buzzards Bay. That ice was cracked and riven with meltwater streams, leaving tongues or protrusions of ice extending farther east between them. The tongues of ice prevented the deposition of sediment in the areas they occupied, while the areas with no ice filled up with sand and rock and gravel released by the melting ice. When the entire glacier had melted away the areas previously occupied by the tongues of ice were topographic lows, and were soon invaded by the sea. Today they are the bays, harbors, and marshes along Cape Cod's western shore.

The dynamic and delicate ecosystems seen from the Bikeway have much to tell us about the interrelationships in nature. As the glacier receded, terrestrial ecosystems sprouted, probably beginning with pioneers such as lichens and grasses. Today the Cape boasts a wide variety of plants including cranberries and birches that are more characteristic of cooler areas to the north and pines and oaks similar to warmer lands to the south. Some of these Cape Cod environments still maintain globally unique and rare species. Woodlands in the hummocky topography are home to White and Pitch Pine, many kinds of oak, Sassafras, and many shrubs such as the white flowering *Viburnum*, herbaceous plants such as Sweet Fern, and ground covers such as the rare Trailing *Arbutus* with its fragrant pink and white flowers. Be alert for shiny green leaves of poison ivy.

As the majority of glacial ice melted away beginning by about 15,000 years ago, many blocks of that ice that lay in deep depressions were buried in the sediment that had been carried from the north. When these buried blocks of ice finally melted, the overlying sediment collapsed into the resulting hole, and any holes deep enough to intersect the groundwater table filled with water to become "kettlehole ponds" or freshwater wetlands. Several kettlehole ponds are visible from the Bikeway, including one near Mile Marker 2 in Falmouth and another with an overlooking deck near Mile Marker 7 in West Falmouth...both named Oyster Pond!



Photo: Bob Fitzpatrick

As their name suggests, these are both connected to the sea, which is common for kettle holes near the shoreline. A lovely Atlantic White Cedar swamp is visible from the Bikeway near Mile Marker 5. These uncommon wetlands were more widespread before the trees were cut for shingles and fenceposts, and many were converted to cranberry bogs. The White Cedar bogs have much sphagnum moss growing on the wet soil, and harbor globally rare plants, such as the Plymouth Gentian, and invertebrates like Barren's Bluet Damselfly.

As the glacial ice melted, sea level, which had been as much as 400 feet (122 m) lower than it is today, rose again, and estuarine and coastal environments developed, including beaches, sand spits, tidal flats, and salt marshes. Invisible to the eye, the beaches are constantly in motion, with ocean currents, waves, rising tides, and winds shaping and re-shaping their contours. The shoreline, however, is more than a strand of sand and breaking waves. Each rising tide triggers a system of living filters that strain columns of water. Buried mollusks thrust their siphons through the sand and draw the water through their bodies. At the edge of the tide and beyond are legions of sea life, from single- to multi-celled animals and plants - all pursuing their daily routine of finding food, hiding from enemies, capturing prey, producing young and dying. Above the tide, beach dunes are reshaped by the winds, often strong from the southwest in summer. Sprouting on them are Beach Plum, Goldenrod, Beach Rose, Bayberry, Sea Rocket, and Beach Grass. Dunes defend the land from the destructive waves of storms, but are themselves fragile and easily damaged by foot traffic or other impact.

Salt marshes are shallow intertidal environments where Cordgrass, Salt Marsh Hay, and other plants grow. Salt marshes are among the most productive natural habitats on earth, and their productivity supports many populations of fin and shellfish of commercial importance. The nursery and breeding site role of salt marshes is among their most important ecological services. In addition, salt marshes are key migratory stop-over sites that make the long-distance migrations of many wildfowl and shorebirds feasible. Great Sippewissett Marsh, through which the Bikeway runs on an elevated causeway just north of Mile Marker 6, has been the site of much research by scientists and students of the nearby Woods Hole science community, and is one of the most studied salt marshes in the world.

The Bikeway therefore crosses a mosaic of different environments, including forests, marshes, ponds, all of which although seemingly separate, are tightly coupled by the flow of water. In Cape Cod, nutrients—particularly inorganic forms of nitrogen—deposited on land by rain and snow, fertilizers, and, pre-eminently, by wastewater disposal, find their way to the aquifer below the surface of the land, and move toward the shores as groundwater moves slowly down-gradient. Some of the nutrients make it to the coast, where they may be intercepted within the salt marshes that are found interposed between land and sea. In salt marsh environments, nutrients can be either buried in sediments, or converted to innocuous nitrogen gas by microbes. These coastal

wetlands therefore furnish an additional ecological service, one that helps maintain water quality in adjacent coastal waters.

Cape Cod's marvels lie not only in its dramatic creation and rich diversity of living and life-giving features, but also in its destiny. Winds and tidal dynamics have will continue to alter the Cape's coastline. Estimates of erosion rates for the southern shore of Falmouth over the past 150 years vary by about 0.5-1 ft/yr (15-30 cm/yr) near Woods Hole, stable near Falmouth Heights, and greater than 1 ft/yr (30 cm/yr) near Waquoit. Rising sea level will increase the rate of erosion. Based on long-term tide gauge records and photographs of sea walls in Woods Hole, the sea level in Falmouth has risen approximately 1 ft (30 cm) in the last 100 years. In a few thousand years, the Cape may follow the fate of Stellwagen Bank north of Provincetown and Billingsgate Island off Wellfleet, becoming a submerged bed of sand on the ocean floor.

# **Cultural Heritage**

The Bikeway enables a connection to the diverse cultural heritage of Falmouth, starting with this region's first people of the enduring Wampanoag Nation, and continuing with other cultures fascinated by what they found here, from Vikings who some believe may have visited over 1,000 years ago, to English colonists 400 years ago, to more recent settlers from many nations.



Photo: © 2000, Kathy Sharp Frisbee

The Wampanoag, whose name means, "People of the First Light," arrived about 10,000 years ago. Before other cultures arrived, there were about 65,000 Wampanoag among over 60 sub-tribes, scattered over much of southern New England. They shared this sacred place as a common wealth. They were dedicated stewards of the land and waters then, as they are now. The Wampanoag Nation's major turning points in history include a peace agreement signed by the Great Sachem Massasoit Ousamequin "Yellow Feather" with the Mayflower Pilgrims of 1620, and King Philip's War of 1675 to reclaim the nation's homeland from the flood of English colonists. The most recent turning point came in February 2007, when the largest remaining tribe, the Mashpee Wampanoag of 1,500 members, achieved federal recognition, thus becoming the 564<sup>th</sup> indigenous tribe recognized by the U.S. federal government.

Ancient Wampanoag place names echo across much of the landscape of Falmouth. Nobska means "rocky point," Quissett, "at the place of small pines," Sippewissett, "at the little river," Suckanesset, "place of the black shells" or "black clams," which are hard-shell clams known as quahogs, valuable as food and source of wampum once used as currency.

The vista at Mile Marker 2 across Vineyard Sound invites your mind's eye to see cultures that came after the Wampanoag, to explore this pristine place. Vikings may have sailed here on Drakkar ships some 1,000 years ago, although we lack real evidence for such a visit. In 1602, Captain Bartholomew Gosnold and his crew sailed by on the Concord," and mapped and named our shorelines, giving Cape Cod its name for the sea's bounty of cod fish. Within 60 years of Gosnold's visit, a rushing tide of English and other colonists settled in Falmouth. The Wampanoag place name of Suckanesset continued as the town's name for 60 years, when it was changed to "Falmouth" to honor Gosnold and his home port, Falmouth, England.

Falmouth has a rich agricultural heritage, including crops, cattle and sheep-raising and corn-grinding mills. During the mid-1800's the surface of Cape Cod was largely cleared for timber and also to provide pasture land. From the Bikeway, look for rock walls that separated pastures, and try to find the seven cattle tunnels that cross underneath the Bikeway. Cranberries – plants whose native habitat was low-lying troughs between dunes, where the groundwater table was exposed – were essential to the Wampanoag diet and are now cultivated in carefully maintained bogs. One such bog can be viewed from the Bikeway near Mile Marker 9 in West Falmouth. This privately-owned site is one of the oldest cultivated and working cranberry bogs in Falmouth, on the Cape and in Massachusetts, dating to the 1860's.

The soil-rich heartland of Falmouth was in the villages of East Falmouth, Hatchville, Teaticket and Waquoit, where Wampanoag, English, Quaker, African-American, Cape Verdean, and Portuguese lived and worked. In addition to the turnips, beets, broccoli, corn, carrots, potatoes, tomatoes, and assorted greens grown here, strawberries, became the town's largest agricultural enterprise and main cash crop at the turn of the

last century (1900). However, by 1986, less than 15 acres of strawberries continued to be cultivated, a decline due in part to the scarcity of farm workers, younger people having less interest in farming, and increasing urbanization.

Falmouth's economic phases have also included fishing, shipbuilding, coastal trading, and worldwide whaling ventures. Whaling was such a prime industry in Falmouth during the maritime era of the early to mid-1800's that half of the town's 300 homes were owned by ship captains. At the end of the Bikeway in Woods Hole, imagine the whaling ships making port in the mid-1800's. Whale ships were built at Bar Neck Wharf in Woods Hole, just west of the Eel Pond Bridge. One whale ship, the "William Penn", was built on Chapoquoit Island (then known as Hog Island, since hogs were raised there) in West Falmouth Harbor. As one example of an important fish in Falmouth's heritage, River Herring have been an essential protein source in the Wampanoag diet for ages. River Herring were important to fertilize corn crops. Near Mile Marker 2 the Bikeway crosses Trunk River, the outlet from Oyster Pond into Vineyard Sound, which serves as a conduit for River Herring returning from the sea each spring to spawn in fresh water.



Photo: courtesy, archives of the Woods Hole Oceanographic Institution

Falmouth has hosted a wave of major to minor industries over four centuries. Salt works were a prime industry for almost 100 years, from 1776 to 1870. Sixty shoreline windmills pumped sea water into rows of wooden vats to evaporate the water. There were 42 salt manufacturers between Falmouth Heights and Woods Hole. The views from the Bikeway overlook at Little Sippewissett Marsh in West Falmouth and Little Harbor in Woods Hole would have included salt works in the century prior to the railroad. In addition to the need for a link to the steamships to the Islands, it was the

fertilizer industry -- specifically, the Pacific Guano Company -- that created the need for the railroad to extend to Woods Hole. From 1863 to 1889, the Pacific Guano Works was in operation near the entrance to what is known now as Penzance Point in Woods Hole. From Woods Hole the railroad route purportedly followed a Wampanoag trail that ran from Nobska Point along the base of the moraine to Falmouth.



Photo: Bob Fitzpatrick

Two major Falmouth industries have endured for over a century. The world-renowned biological, environmental, geological, and oceanographic science community in Woods Hole village brings people from around the world for intellectual focus on the interaction of the ocean, the earth and atmosphere, and stewardship of the nation's living marine resources and their habitats. Major organizations include NOAA'S Northeast Fisheries Science Center, Marine Biological Laboratory, Woods Hole Oceanographic Institution, Woods Hole Research Center, U.S. Geological Survey, Sea Education Association, and U.S. Coast Guard. And Tourism continues as a vibrant cultural and economic engine in Falmouth, bringing travelers from around the world. In the last century, the railroad brought visitors from New York City and Boston, which spurred this region's seaside summer resorts. Now, the Shining Sea Bikeway provides a pathway that beckons to residents and visitors alike to explore Falmouth, Massachusetts.

\* According to Wikipedia online, the New York, New Haven and Hartford Railroad Company (also called the New Haven) leased the Old Colony Railroad system of southeastern Massachusetts in 1893. A timetable of the New York, New Haven and Hartford Railroad Company from 1896 is printed in Falmouth-by-the-Sea: The Naples of America (1896), reprinted by the Falmouth Chamber of Commerce (1976). The "Dude" Train from Boston to Woods Hole took 1 hr 48 min. The New Haven merged with Penn Central Railroad in 1968.

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# **Credits (Version 2009)**

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