



Photo © Gordon Peabody

Above: Collected sand after a storm.

## The Strength of Community Spirit

THE BALLSTON BEACH BARRIER DUNE RESTORATION PROJECT By Gordon Peabody

I watched in fascination as the only pair of nesting ducks, living in what used to be a freshwater marsh, walked out to a beach parking lot to drink rainwater from a puddle. I remember thinking, “We can do better than this. We need to make better choices because children are going to inherit our decisions.”

### The Fragile Barrier Dune

Barrier dunes are among the most fragile and easily damaged coastal resource in Massachusetts. The barrier dune on the ocean side at Truro’s Ballston Beach protects the freshwater marsh at the headwaters of Truro’s Pamet River. The river flows from the marsh across the thin wrist of the Cape and into Pamet Harbor on Cape Cod Bay. The Pamet River estuary provides legendary oyster and shellfish habitat. When we view natural resources as systems, we begin to understand that everything is connected. The health of the marsh behind the barrier dune is linked to the health of the estuary and harbor.

### Human Impact

There was no way for visitors to have understood that crossing this barrier dune to get to the beach would destroy the freshwater marsh behind it.

Vegetation stabilizes dunes by collecting and holding sand. Dune grass can withstand 80 mph winds but dies when it is walked on. Without vegetation, storm winds quickly strip off sand and lower pathway elevations six or eight feet. This allows ocean storm overwash to degrade the freshwater marsh with salt water. Storm energy is a natural component of coastal resource systems and storm overwash is part of these processes. But this marsh system was being impacted every few years, breaking down the stability of the area before it could repair itself.

### Intervention and Restoration

What makes an entire Cape community come together in an environmental intervention? As if attempting to restore a barrier beach dune was not enough of a challenge, there were multiple jurisdictional and political entities that needed to be involved and in cooperation with each other. These

included: the federal government (the Cape Cod National Seashore); Truro Conservation Commission; Truro Beach Commission; Truro Department of Public Works; and Safe Harbor Environmental Services. We used common ground to create a unique restoration partnership. The barrier dune was a critical component of our coastal resources and the dune was eroded to the point that ocean overwash was now degrading the freshwater marsh the dune was supposed to protect.

### Using Nature’s Energy

We wanted to minimize our intrusion by redirecting natural energy. Traditionally, dune restoration projects meant the delivery of truckloads of sand and heavy equipment. We decided to use a passive strategy, utilizing the same storm energy that had almost destroyed the dune to restore it.

Coastal restoration can be compared to baking bread. You need to understand the relationship of ingredients being combined and then put them in the oven; then get out of the way. Except our oven was the Atlantic Coast of Cape Cod.



Photo © Gordon Peabody

### The Challenges

We knew there would be risks. Gale-force winds, blowing along the coast at speeds over 35 mph, begin to pick up sand. Storm-force winds, over 48 mph, blow enough sand to obscure the first few feet of beach. This winter, the sand was already in motion but we had no way of capturing it. Two years earlier, we had developed an innovative restoration model using storm winds to restore eroded coastal habitat. This low-tech system was based on short, 24-inch sand fencing set in patterns to duplicate the wind-resistant qualities of beach grass. As sand collects, new layers of fencing can be placed to match

adjacent dune profiles. Once sand elevations are restored, American beachgrass is planted. The beachgrass stems usually double each year and the grass has no problem growing up through collected sand. Within four years, the grass will begin performing on its own. Pedestrian access is also reconfigured, into a zigzag pathway to prevent a repetition of “shotgun blow outs.”

### The Story

“The fences are gone; it didn’t work.” The Truro Department of Public Works had donated the fencing we needed and we donated the labor for

installation. Ten days later, following a big ocean storm, several phone calls came into our office informing us that nearly all of our sand-collection fences were gone. It took a few days before I finally mustered up the courage to go out to the beach and see for myself. It was mid-afternoon on Christmas Eve. The fences were gone all right, buried beneath two feet of collected sand!

### A Community’s Energy

The success of our volunteer efforts was going to bankrupt us. We were collecting so much sand that a second set of fencing was needed to meet the



Photo © Sarah Hutto Bruns



Photo © Traci Harmon Hay

demand. Then two weeks later, the site was ready for a third set. Bob Byrnes, a Truro resident and teacher at Harwich High School, stepped up with his environmental studies class to provide volunteer labor for installation of the third set of sand-collection fences. The enthusiasm of these students caught the attention of the whole community.

We were ready to begin planting beachgrass but there was a problem. The restoration partnership did not have any money. How could we collect donations for beachgrass from an entire community? Before things became complicated, another group joined our partnership, Friends of the Cape Cod National

Seashore. This nonprofit group agreed to help us collect and hold donations. As of April 2011, approximately \$5,500 has been collected for this restoration project.

Why were people from Colorado donating money for beachgrass? The answer comes from a group called the Truro Non-Resident Taxpayers Association. This well-informed, large association represents second homeowners in Truro. They joined us to make the finishing touches of this project a reality.

A wonderful community beachgrass-planting party on May 14 celebrated the restoration efforts. The overall restoration process will take four years and can be

Above: Unexpected amount of sand collected by matrix fence system. Bottom Left: Harwich High School Environmental Studies class worked on restoration.

Bottom Right: Gordon Peabody, Safe Harbor.

tracked on our website at [www.SafeHarborEnv.com](http://www.SafeHarborEnv.com). If you would like to support this project, or other community projects like it, please contact me directly at [gordonsafeharbor@yahoo.com](mailto:gordonsafeharbor@yahoo.com). **cha**

**Gordon Peabody** is Director of Safe Harbor Environmental Services, in Wellfleet, MA. Safe Harbor designs sustainable coastal habitat restoration systems and provides permitting and construction management services.

*Barrier beaches and barrier dunes are among the most fragile and most highly protected resource systems in Massachusetts. These systems are fragile because they change location in response to storm events, which discourages establishment of stabilizing vegetation. These systems are valuable because they offer protection to important inland resource areas. The Barrier dune system at Ballston Beach protects the freshwater marsh at the head of Truro's Pamet River.*



*For thousands of appreciative visitors crossing these dunes each year, Ballston Beach is a second home. Being visitors, there was no way for them to understand, that barrier dunes are only held together by vegetation, which keeps sand in place and collects new sand during storms. That same vegetation that withstands 80 mph storm winds, cannot survive being directly walked on. Without the vegetation layer, storm winds quickly strip off sand, lowering the walkway elevations by as much as six or eight feet.*



*Storm overwash events are a fact of life for barrier dunes and a part of the overall coastal process on the Outer Cape. However, Ballston Beach's barrier dune system has had uncomfortably frequent overwash events. Each event begins with storm waves gaining access to the freshwater marsh through the lowered elevations of the pathways. Storm waves, surging through the center profile of the dunes, transport sand and saltwater deep into the freshwater marsh. At this point, North Truro and Provincetown are islands and connecting public roads face the possibility of flooding.*



*Safe Harbor has developed an innovative restoration model, which uses storm winds to restore eroded coastal habitat. This low-tech system uses specific patterns of 24" sand fencing, to duplicate the wind resisting performance of beach grass.*



*This passive strategy stabilizes eroded areas while collecting new sand, often raising elevations up to two feet a year.*



*The fencing system can be quickly installed, using a rubber mallet to tap each slat into the sand. No excavation or posts are required. New layers of fencing can be placed to create a form compatible with adjacent dune profiles. American beach grass is planted throughout the area, with 3 stems per planting, set six inches deep on 8-inch random centers. The beach grass stems usually double each year and the grass has no problem growing up through collected sand. Within four years, the grass will begin performing on its own. Pedestrian access is reconfigured into a zigzag pathway to prevent a repetition of “shotgun blow outs”. Pathway elevations increase from direct collection and indirect spill down.*

*Each partner plays a contributing role in this challenging restoration effort. Safe Harbor is coordinating restoration efforts, without financial consideration. The Friends of the Cape Cod National Seashore are coordinating donations for American Beach Grass, which needs to be winter planted. This grass will provide sustainability to the restoration efforts. **Safe Harbor is also coordinating volunteers for this project: Contact [gordonpeabody@gmail.com](mailto:gordonpeabody@gmail.com)***

## **BALLSTON BEACH BARRIER DUNE COMMUNITY RESTORATION PROJECT**

### **Safe Harbor strategy uses storm winds to restore eroded coastal barrier dunes**

Barrier dunes are tricky to read and nearly impossible to restore, unless you find a strategy that uses the natural energy already flowing through the system. A unique Community Partnership was created, to meet this challenging restoration effort. The photo directly below was taken at the end of one year of restoration efforts, using an innovative, biomimicry sand collection system. The system raised the broken dune elevation by 14 feet, ending our concerns about over wash.



*Safe Harbor has developed an innovative restoration model, which uses storm winds to restore eroded coastal habitat. This low-tech system uses specific patterns of 24" sand fencing, to duplicate the wind resisting performance of beach grass. This passive strategy stabilizes eroded areas while collecting new sand, often raising elevations up to two feet a year. The fencing system can be quickly installed, using a rubber mallet to tap each slat into the sand. No excavation or posts are required. New layers of fencing can be placed to create a form compatible with adjacent dune profiles.*

This Community Restoration Project partnered: the **Cape Cod National Seashore**; Truro Conservation Commission; Truro Beach Commission; Truro Department of Public Works and Safe Harbor. Donations for materials were supported by additional partners: **Friends o**

**the Cape Cod National Seashore**; Truro Non Resident Taxpayers Association; Mac's Seafood and countless community donations. Safe Harbor designed and installed low-cost modifications to standard sand fencing, in a low-impact matrix intended to capture sand from winter storm winds. When storm winds blew last winter, instead of eroding the dune, they built up nearly five feet of new sand. On two days last spring, community volunteers showed up to plant beach grass. In about four years, the grass will become sustainable and fencing will no longer be needed. Pedestrian access is now zig-zag, to prevent re-occurrence of shotgun blowouts. Safe Harbor will continue working on this 4 year project and regular reports will be available on our website [www.SafeHarborEnv.com](http://www.SafeHarborEnv.com).



***Zig zag pedestrian paths avoid shotgun blow outs. 24" sand fence collects sand from storm winds.***



***The restoration system we believe in, works with and not against, the natural energy of coastal habitats.***

*Perhaps the most unique features of this innovative sand capture system are the front rows of "surflines" fencing. This is only the second time we have used this strategy, which is based on our research with fencing failures, which determined the need for wave wash to move into and then back out of this wash zone. These low impact surflines fences have every other slat removed, are shorter than the 24" sand capture fencing and are cut every 5 feet of fence length, to prevent full wash away. We believe this new strategy has the ability to slow down wave wash just enough to capture sand from it.*



Unique and innovative, this surflines fencing is designed to capture sand from wave overwash.

*Standard responses to coastal erosion use structural components and cost hundreds of thousands of dollars. When the coastline itself moves, we can't put it back.*

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<http://tnrta.org/2011/05/tnrta-co-sponsors-ballston-beach-restoration-project/>