

Nature-Based Design Practices Case Study

Preliminary

Popham Beach, Maine

For More Information Contact
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Description

After winter storms in early winter 2023, the Maine Geological Survey (MGS) worked with the Bureau of Parks and Lands Popham Beach State Park staff to test the beneficial reuse of washed up driftwood in helping to restore eroded sand dunes. This pilot project, also undertaken at Pemaquid Beach in Bristol, ME was highlighted in [NOAA's State Stories](#). These pilot projects helped trap sand and restore dunes, though the winter storms of December 2023 and January 2024 once again flattened sand dunes at Popham Beach State Park.

Maine Department of Agriculture, Conservation and Forestry put out a [social media call](#) to the public to drop off their used Christmas trees in order to test a pilot project that beneficially reused discarded holiday trees to rebuild the sand dunes at Popham Beach. This technique has been proven to be effective at several other State Parks on the east coast, notably at Fort Macon State Park in North Carolina.

Close to 1,000 trees were dropped off at Popham Beach by March 2024. The pilot project was designed by MGS and incorporated several rows of Christmas trees oriented parallel to the shoreline. The original project design (Figure 1) included the placement of over 500 trees in multiple rows along 2,800 linear feet of shoreline.

Permitting

State permitting required a Permit-by-Rule pursuant to Chapter 305 of the Natural Resources Protection Act from the Maine Department of Environmental Protection, and a Beneficial Use of Solid Waste Permit from Maine DEP. No federal permitting was required. Areas of dune vegetation were avoided to the maximum extent practicable, which reduced the length of the overall project..



Photo 1 (July 17, 2024) Looking east at center beach at trees fourth months after placement. A fourth row was added and is almost completely covered. Note dune grass growth. N. Whiteman, MGS



Figure 1. Sketch showing proposed locations of tree rows along West, Center, and East Beaches as part of the permit application. The actual locations and lengths of tree rows had to be altered in the field due to ground conditions. 2023 image from Google Earth.



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Lessons Learned

Spring and early summer 2024 was not dominated by strong south-to-southwest winds, and the near-shore location of the Morse River channel inhibited some aeolian transport due to reduced beach width. These factors slowed the rate of sediment capture by the trees somewhat, as we had expected all of the rows to be about 75% covered by late July 2024. Waiting to place an additional row of trees until after king tides had passed was integral to success given the proximity of the Morse River channel. Shallow trenching and placement of trees “tip to tail” allowed for trees to stabilize themselves within the trenches without the need for stakes/twine. Placement of excess wrack (e.g. seaweed) into the trees helped capture more sand. Avoiding areas of the dunes where dune grass had not been completely decimated allowed for natural recovery of some areas. Trees are an effective method for trapping sand to help restore flattened and eroded dunes.

As shown in Figure 3, 580 trees were placed in multiple rows along about 1,800 feet of the beach. Shore-parallel, narrow and shallow trenches were hand-excavated using shovels and trees placed “tip to tail” within the trenches. Even several months after the storms, the beach remained denuded of dune ridges and vegetation (Photo 2). Over the next several months, windblown and high-tide deposited sediment was trapped by the trees and dune vegetation established (Photos 1-5).

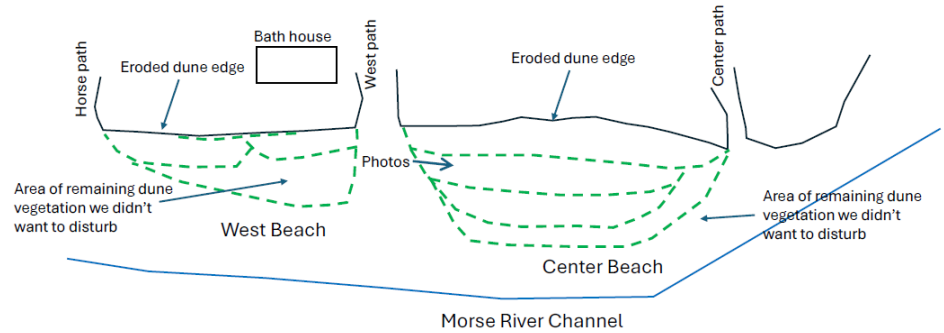


Figure 2. Field sketch showing approximated locations of placed holiday trees (dashed green lines). Over 500 trees were placed along over 1,800 linear feet. Subsequent photo location is shown for the center beach area. A fourth row was eventually added to the design in the center beach area.

Photo 2:
Looking east along center beach at flattened and eroded dunes prior to tree placement. P. Slovinsky, MGS.



March 22, 2024

Photo 3:
Looking east at center beach at trees placed in 3 rows on the beach. A fourth row was not added yet due to proximity of the Morse River channel. P. Slovinsky, MGS.



March 25, 2024

Photo 4:
Looking east at center beach at trees about a month after placement. Higher tides are washing sediment into the trees. P. Slovinsky, MGS.



April 13, 2024

Photo 5:
Looking east at center beach. Note sand elevation is slightly increased and dune grass is beginning to establish. P. Slovinsky, MGS.



May 3, 2024