



## Maine Geological Survey

**Address:** 22 State House Station  
Augusta, Maine 04333

**Telephone:** 207-287-2801

**E-mail:** [mgs@maine.gov](mailto:mgs@maine.gov)

**Home page:** <http://www.maine.gov/doc/nrimc/nrimc.htm>

See back for description of map units.

## Coastal Sand Dune Geology Hills Beach, Fort Hill, Biddeford, Maine

by Peter A. Slovinsky and Stephen M. Dickson

Open-File No. 11-105

2011 **SUPERSEDED**



## MAPPING MAINE'S DYNAMIC DUNES

Maine's coastal beaches and dunes are constantly changing. Erosion or accretion can reshape the beach and dunes over time so remapping is needed for resource protection and coastal development. This map updates and supersedes the previous *Beach and Dune Geology Aerial Photo* series maps (Dickson, 2001) that were based on 1986 aerial photographs and field work. Using ESRI ArcGIS, each 1986 photograph was georeferenced, using a minimum of four ground control points per image, to orthophotographs from spring 2003 ORTHO\_1F (1-ft resolution) and April 2001 ORTHO\_HF (0.5-ft resolution) from the Maine Office of GIS. Previously mapped frontal dune and back dune boundaries were digitized, checked for accuracy, and adjusted using the newer photographs in combination with field work and 2004 Light Detection and Ranging (LiDAR) topography from the NOAA Coastal Services Center (6.5-ft ground spacing; vertical accuracy 0.7 feet at a 95% confidence interval). Some dune boundaries were moved slightly to reflect more accurate data and current geology. Erosion Hazard Area boundaries were mapped according to the existing definition using historical shoreline change data, geomorphology, FEMA flood maps, and field evidence of storm washover in dunes.

### COASTAL SAND DUNE RULES

The Maine Natural Resources Protection Act (NRPA: Title 38 Section 480-D) requires that new coastal development will not unreasonably (1) interfere with the natural supply or movement of sand or gravel within or to the sand dune system; (2) increase the erosion hazard to the sand dune system; (3) cause or increase the flooding of the dunes or adjacent properties; (4) interfere with the natural flow of any surface or subsurface waters; (5) inhibit the natural transfer of soil from the terrestrial to marine or freshwater environments; (6) harm any significant wildlife habitat, threatened or endangered plant habitat, travel corridor, freshwater, estuarine or marine life; or (7) interfere with existing scenic, aesthetic, recreational, or navigational uses.

Permits are usually required for building projects located in Maine's coastal sand dune system. The Coastal Sand Dune Rules, Chapter 355, of the Maine Department of Environmental Protection clarify the criteria for obtaining a permit under NRPA (in regard to coastal sand dune systems). The rules outline classes of projects which are exempt from the requirement of obtaining a permit. For all other projects, the rules outline standards which must be met to satisfy the statutory criteria. The rules are based on the location of the project within the sand dune system.

### Additional Sources of Information

Contact the Maine Department of Environmental Protection, Bureau of Land and Water Quality, 17 State House Station, Augusta, ME 04333 for information regarding the Coastal Sand Dune Rules and the Natural Resources Protection Act.

## EXPLANATION OF MAP UNITS



**D1 Frontal dune.** The frontal dune is the area consisting of the most seaward ridge of sand and gravel and includes former frontal dune areas modified by development. Where the dune has been altered from a natural condition, the dune position may be inferred from the present beach profile, dune positions along the shore, and regional trends in dune width. The frontal dune may or may not be vegetated with dune vegetation and may consist in part or in whole of artificial fill. In areas where smaller ridges of sand are forming in front of an established dune ridge, the frontal dune may include more than one ridge. The frontal dune includes former frontal dune areas modified by development. Where the dune has been modified by structures, the dune position may be inferred from the present beach profile, dune positions along the shore, and regional trends in dune width.

**D2 Back dunes.** Back dunes consist of sand dunes and eolian sand flats that lie landward of the frontal dune or a low energy beach. Back dunes include those areas containing artificial fill over back dune sands or over wetlands adjacent to the coastal sand dune system.



**Erosion hazard area (EHA).** Any portion of the coastal sand dune system that can reasonably be expected to become part of a coastal wetland in the next 100 years due to cumulative and collective changes in the shoreline from: (1) historical long-term erosion; (2) short-term erosion resulting from a 100-year storm; or (3) flooding in a 100-year storm after a two-foot rise in sea level, or any portion of the coastal sand dune system that is mapped as an AO flood zone by the effective FEMA Flood Insurance Rate Map, which is presumed to be located in an Erosion Hazard Area unless the applicant demonstrates based upon site-specific information, as determined by the department, that a coastal wetland will not result from either (1), (2), or (3) occurring on an applicant's lot given the expectation that an AO-Zone, particularly if located immediately behind a frontal dune, is likely to become a V-Zone after 2 feet of sea level rise in 100 years (Ch. 355, Section 3.P.).



Funding was provided by the Maine Geological Survey, the Maine Department of Environmental Protection and, the Maine Coastal Program with financial assistance from the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration under Award No. NA06NOS4190188.