



EROSION FAQs

Why does the RI shoreline seem to just lose sand during storms?

The south shore of Rhode Island is considered by geologists to be a wave-dominated coastline. This means that the position, shape, and general behavior of the beaches are controlled by waves, especially large waves from storm events. There are both seasonal and long-term patterns in erosion in Rhode Island (Beach SAMP 4.3.1.2.1).

Seasonally, strong storms create large waves which erode the upper beach face, and sometimes the dunes as well. In the long-term, however, the Rhode Island coast is systematically retreating. Ninety five percent of the Rhode Island shore is erosional, meaning despite losing and gaining sand over the course of the seasons, Rhode Island's coastline is eroding constantly, with some of the sand never returning (Beach SAMP 4.3.2.1.2.2).

Where does the sand go? Will it come back?

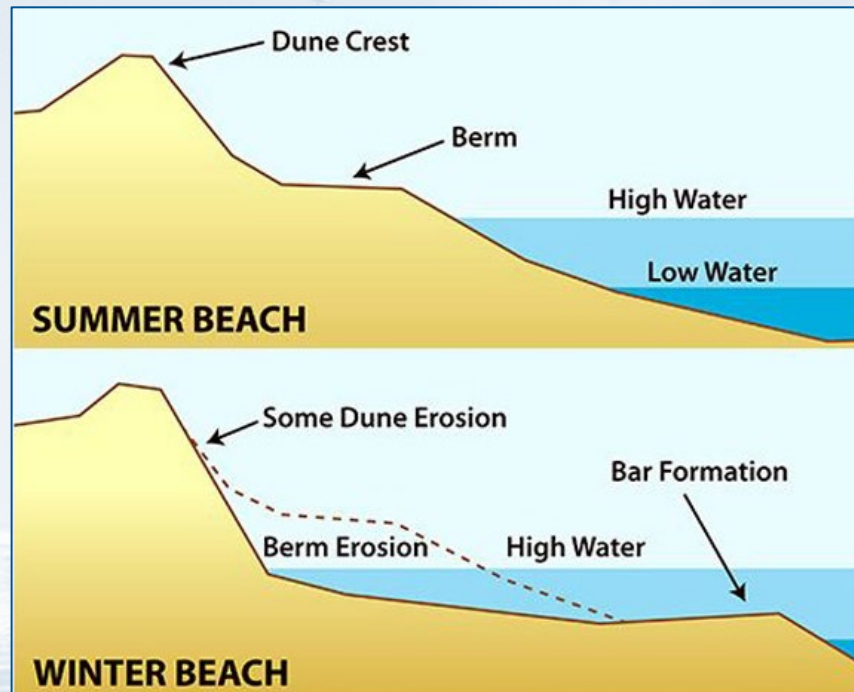
Where the sand goes in a storm is largely determined by how severe the storm is - specifically, the size and power of the waves that reach the beach. In smaller storms, the sand is washed away from the beach or dune system but stays in the nearshore zone. In larger storms where waves are breaking on top of the dune, sand can either be pushed farther inland to create an overwash deposit and gradual migration of the barrier, or the sand is transported offshore beyond the closure depth, or the point at which the water cannot bring the sand back onto the beach.

In calm conditions, as is seen in summer months, sediment from the nearshore is molded into sand bars by the gentler waves, and those sand bars slowly migrate back onto the beach face, building the beach back up. It is possible for beaches to recover to their pre-storm width in a matter of months. However, it takes much longer for dunes to rebuild. Dunes are formed by the wind, so the beach needs to be wide enough and dry enough for long enough that wind can pick up the dry sand and deposit on the face of the dune.

Storms are expected to have increasingly severe impacts in the coming years (Beach SAMP, 1.1.11). As a result, more sand from the beach is likely to be deposited beyond the closure depth, and less sand from the nearshore zone is likely to come back onto the beaches in the summer.

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Schematic of shore zone demonstrating movement of sand between dune / intertidal / nearshore ([source](#))

Are there ways to mitigate erosion?

CRMC prohibits new structural shoreline protection on barriers as well as shoreline abutting Conservation Area Waters (Type 1) (RI CRMP 1.3.1(G)(3)). Cement or rock walls, revetments, bulkheads, retaining walls, etc. are therefore prohibited on the South Shore. Although structural shoreline protection can protect the land immediately behind it, construction of these permanent actions along eroding shorelines leads to increased erosion of the beaches directly in front of the structure, as well as to beaches on either side of it (Beach SAMP, 4.3.1.5).

As such, non-structural shoreline protection is permitted in appropriate locations (RI CRMP 1.1.2(A)(97); 1.3.1(G)(1)). This includes but is not expressly limited to: dune enhancement (i.e., trucking in sand and replenishing the seaward side of the dune to a gradual, natural slope), revegetation (i.e., planting of American beach grass or other native plants as an erosion prevention measure), and snow fencing (i.e., placement of fences at the base of the existing scarp to encourage sand deposition) (Beach SAMP, 7.2.6).

There are a number of ways to try to minimize erosion, but all coastal property owners must realize that significant storm events will result in erosion and property damage, both of which will likely increase due to climate change. Non-structural shoreline protection projects on eroding coastlines like the sandy barriers we have along the south shore must be approached as maintenance activities rather than one-time solutions. The CRMC also strongly encourages all coastal property owners to elevate and move structures back where applicable.

What is CRMC doing about the erosion?

The CRMC gets this question often. The quick answer is that there is no permanent solution to this natural process. We strongly encourage property owners to elevate their structures and move them back if they are able. There is no stopping the process of erosion, however. Rhode Island is known for its beaches. If CRMC permits bulkheads and cement walls, we lose our sandy beaches forever. Shoreline public access would also be threatened as the sand disappeared. It's always been a complex issue and increasing erosion will continue to present threats to coastal properties.

Does CRMC (or the state) have any regulations or policies that apply to erosion?

In accordance with the federal Coastal Zone Management Act of 1972 (16 U.S.C. §§ 1451 through 1466) and R.I. Gen. Laws Chapter 46-23, the regulations laid out in the RI Coastal Resources Management Program (CRMP) are intended to protect natural resources, promote reasonable coastal development, and improve protection of life and property from coastal hazards. As such, all CRMC policies are crafted with coastal hazards in mind, including erosion from coastal storms.

Specific guidance on erosion can be found in the RI CRMC Shoreline Change Special Area Management Plan (Beach SAMP) (http://www.crmc.ri.gov/samp_beach.html). Adopted in 2018, the Beach SAMP's goal is to "provide guidance and tools for state and local decision makers to prepare and plan for, absorb, recover from, and successfully adapt to the impacts of coastal storms, erosion, and sea level rise." The SAMP is informed by the best available science, gives historical context for shoreline change, and provides guidance on how to plan for, recover from, and adapt to impacts of coastal storms and sea level rise.

Decision makers, planners, and applicants seeking a comprehensive understanding of how coastal erosion impacts the coastal resources of the state are encouraged to review relevant sections. Chapters 1-4 provide information on coastal hazards and how those hazards impact Rhode Island, while Chapters 5-7 provide specific guidance for applicants and coastal planners.

What can be done about structures damaged during storms due to erosion?

As soon as possible after a storm, contact your local building official and have an assessment done. You might also need to contact the RI Department of Environmental Management (they can assess onsite wastewater treatment systems that might have been exposed by the storm and have the power to condemn a structure if the OWTS cannot be relocated), and CRMC for any repairs or to apply to move the structure, if possible, to the back of the lot.

The US Army Corps of Engineers conducted a feasibility study and plan to elevate nearly 250 (predominantly) residential structures and 21 businesses, and more information can be found here - <https://www.nae.usace.army.mil/Missions/Projects-Topics/Pawcatuck-River-CSRMC-Feasibility-Study/>

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The CRMC also issued a number of emergency permits, including those to demolish and rebuild structures on the landward edge of lots, after Superstorm Sandy.

If you need to make minor repairs, they might qualify for a maintenance permit from the CRMC. For structures that have incurred more than 50 percent damage (this can be determined by your local building official in cooperation with CRMC), you must submit a full assent application to CRMC. Check here for application forms - <http://www.crmc.ri.gov/applicationforms.html> and check out our FAQs for additional information - <http://www.crmc.ri.gov/faqs.html>

Is there a plan for the state for the future in regard to erosion and avoiding additional damage to properties?

Education is key. Through tools like STORMTOOLS (<http://www.crmc.ri.gov/maps.html>) and the Coastal Hazard Analysis or CHA (<http://www.crmc.ri.gov/coastal hazardapp.html>) the CRMC hopes to educate property owners and prospective owners on the risks associated with owning and living in coastal properties. STORMTOOLS shows different inundation scenarios based on sea level rise, differing storm events, and the two combined. And the CHA provides a formula through which people can calculate the level of sea level rise or flooding frequency of a property based on a 30-year mortgage. These tools are part of the Rhode Island Shoreline Special Area Management Plan, and more information is available here - http://www.crmc.ri.gov/samp_beach.html .

I've had erosion on my property. What can I do?

Any alteration to the coastal beach and/or coastal dune must be permitted by CRMC. Property owners must file a new assent application with CRMC (<http://www.crmc.ri.gov/applicationforms/Assentapp.pdf>).

As part of the application, Applicants must include a proposed site plan. Plans should show the proposed location of the project. The placement and configuration of any proposed non-structural shoreline protection measures must be clearly indicated. Annotated site photographs, or aerial images (e.g., GoogleEarth) are acceptable.

Other necessary materials include photos of the site in its current state, an application fee (<http://www.crmc.ri.gov/applicationforms.html#forms> and scroll down for schedule of fees), and proof of ownership (tax records suffice). More details on these materials may be found on the CRMC Assent Checklist (http://www.crmc.ri.gov/applicationforms/Assentapp_Checklist.pdf). If no alterations are proposed to any structures, a CRMC Building Official Form is not needed.

What are the CRMC guidelines for dune enhancement?

After a storm, it may be appropriate to fill in the eroded seaward edge of a dune with sand to recreate the gradual, natural slope that was present before the erosion (Beach SAMP, 7.2.6.8). Some broad guidelines for applicants include:

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- Establishment of a slope of at least 3:1 (base: height), but preferably shallower (e.g., greater than three horizontal feet for every vertical foot)
- Sand is to be sourced from an upland source and consist of natural sand grains that are similar in size, shape, and composition to sand currently on the beach.
- Sediment is to consist of 90% or more sand sized grains (i.e., 0.05-2.0 mm)

Dune enhancement is the practice of restoring existing dunes as a means of dissipating wave energy and addressing storm surge and coastal erosion. For non-structural projects, sediment is either placed on an existing dune, or a mound of sediment is built up in an appropriate site in order to create an artificial dune.

The added sediment from dune enhancements supports the protective capacity of the entire beach system (i.e., dune, beach, and nearshore area). Sand eroded from the dune during a storm can be transported to the nearshore area and will supply a reservoir of sand for the natural deposition that occurs during summer seasons. The low slope of dunes dissipates wave energy, protects landward coastal resources, and reduces overwash events.

Given the seasonal erosion and accretion patterns of the beaches, it is recommended that dune enhancement projects be undertaken after the winter storm season. If sediment is placed too early, it may be washed away by normal high tides before the dune can naturally compact and provide any protection.

What are CRMC guidelines for revegetation of dunes?

Vegetation is best used as a preventative measure for erosion and can be used in addition to dune sand enhancement (RI CRMP, 1.2.2(G)(1)(a)). Some broad guidelines for applicants include:

- Only native plants may be used; American beachgrass is strongly recommended for initial plantings on dunes
- Plantings are recommended to be spaced between 12 and 18 inches apart

Dunes provide habitat for fragile plants and endangered wildlife like piping plovers, protect inland developments from flooding, and act as reservoirs of sand to replenish eroded beaches. Coastal dunes are built and shaped by the wind. Once sand is deposited on the dune, vegetation can colonize the area, hold the sand in place, and create a wider, more stable dune system.

Plant roots hold sand in place and stabilize the physical system. Additionally, vegetation physically interrupts and slows down the water flowing over it, which reduces erosion. The shoots also help trap windblown sand, leading to a net deposition of sediment on the dune. American beach grass is strongly recommended due to its unique adaptive capacity in the coastal zone, in addition to its strong root system. In addition to having roots that extend down

into the sand, underground stems (rhizomes) extend laterally as well, and create new plants nearby.

What are CRMC guidelines for snow fences?

Snow fences (also referred to as sand or wind fences) help slow down onshore winds and increase deposition of sand onto the seaward edges of coastal dunes. Property owners considering a dune enhancement fencing project will be required to ensure that new structures do not impede public shoreline access (RI Gen.Laws § 46-23-26), and that fences remain at least 10 feet landward of the recognizable high tide line.

Assent applications for fences are reviewed on a site-by-site basis, but some broad guidelines for applicants include:

- Fences are to be installed parallel to the dune ridge, with panels installed in a zigzag configuration
- Fences are to be placed at the base (toe) of the dune, generally within 5 feet of existing vegetation
- If new fence posts are installed, they must be untreated wood, and are recommended to be no larger than 3 inches in diameter for circular posts or 2x4" for rectangular posts

Generally, the more landward a fence is, the more successful it will be at building the dune and increasing the resiliency of the coastal barrier system. Fences that are regularly inundated may increase erosion rather than slow it. As such, fences will not be appropriate shoreline protection for every site. In that case, dune enhancement and revegetation are recommended (RI CRMP, 1.3.1(G)(1)(c)).

Snow fences are most effective when they are perpendicular to the prevailing wind direction. Winds along the southern part of Rhode Island tend to blow from the southwest in summer, and from the northwest in winter. Snow fences installed in a zig-zag pattern trap the most sand along the south shore throughout the year (Beach SAMP, 4.3.1.4).

Why should I wait? Working with natural processes is much easier than working against them. Winter tends to bring larger storms and more coastal damage and erosion. The best bet of getting the sand to stay (and use of money and resources) is by planting repaired dunes with vegetation, which requires waiting for the growing season to start.

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Charlestown Beach Road, South Kingstown



Charlestown Beach Road, South Kingstown



East Matunuck State Beach



Sand Hill Cove



Green Hill Beach Club



Green Hill Ocean Drive



Narrow River Mouth