

Responses to Erosion

Seawalls



See the full article: [Seawalls](#)

When coastal buildings or roads are threatened, usually the first suggestion is to "harden" the coast with a seawall. Seawalls are structures built of concrete, wood, steel or boulders that run parallel to the beach at the land/water interface. They may also be called bulkheads or revetments. They are designed to protect structures by stopping the natural movement of sand by the waves. If the walls are maintained they may hold back the ocean temporarily. The construction of a seawall usually displaces the open beach that it is built upon. They also prevent the natural landward migration of an eroding beach.

See [this gallery of photos](#) of seawalls, revetments and other attempts at shoreline armoring from around the world.

When waves hit a smooth, solid seawall, the wave is reflected back towards the ocean. This can make matters worse. The reflected wave (the backwash) takes beach sand with it. Both the beach and the surf may disappear.

Seawalls can cause increased erosion in adjacent areas of the beach that do not have seawalls. This so-called "flanking erosion" takes place at the ends of seawalls. Wave energy can be reflected from a seawall sideways along the shore, causing coastal bluffs without protection to erode faster. When it is necessary to build a seawall, it should have a sloped (not vertical) face. Seawalls should also have pockets and grooves in them that will use up the energy of the waves instead of reflecting it.

Usually the most cost-effective, environmental solution is to move the building away from danger. Building seawalls will buy time against natural processes, but it will not "solve the problem" of erosion by waves.

Building Back the Sand Dunes



Building Back the Sand Dunes

Sand dunes are naturally occurring dynamic coastal features which are formed by the accumulation of wind blown sand. When sand dunes are damaged from storms or human activity they can be repaired or restored. The basic steps are simple but careful planning is needed. Your dune restoration project should be designed to create a dune that matches the existing natural dune pattern in the area. You can help speed up nature's work by using sand fences and dune plants to collect sand more rapidly.

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Before You Start...

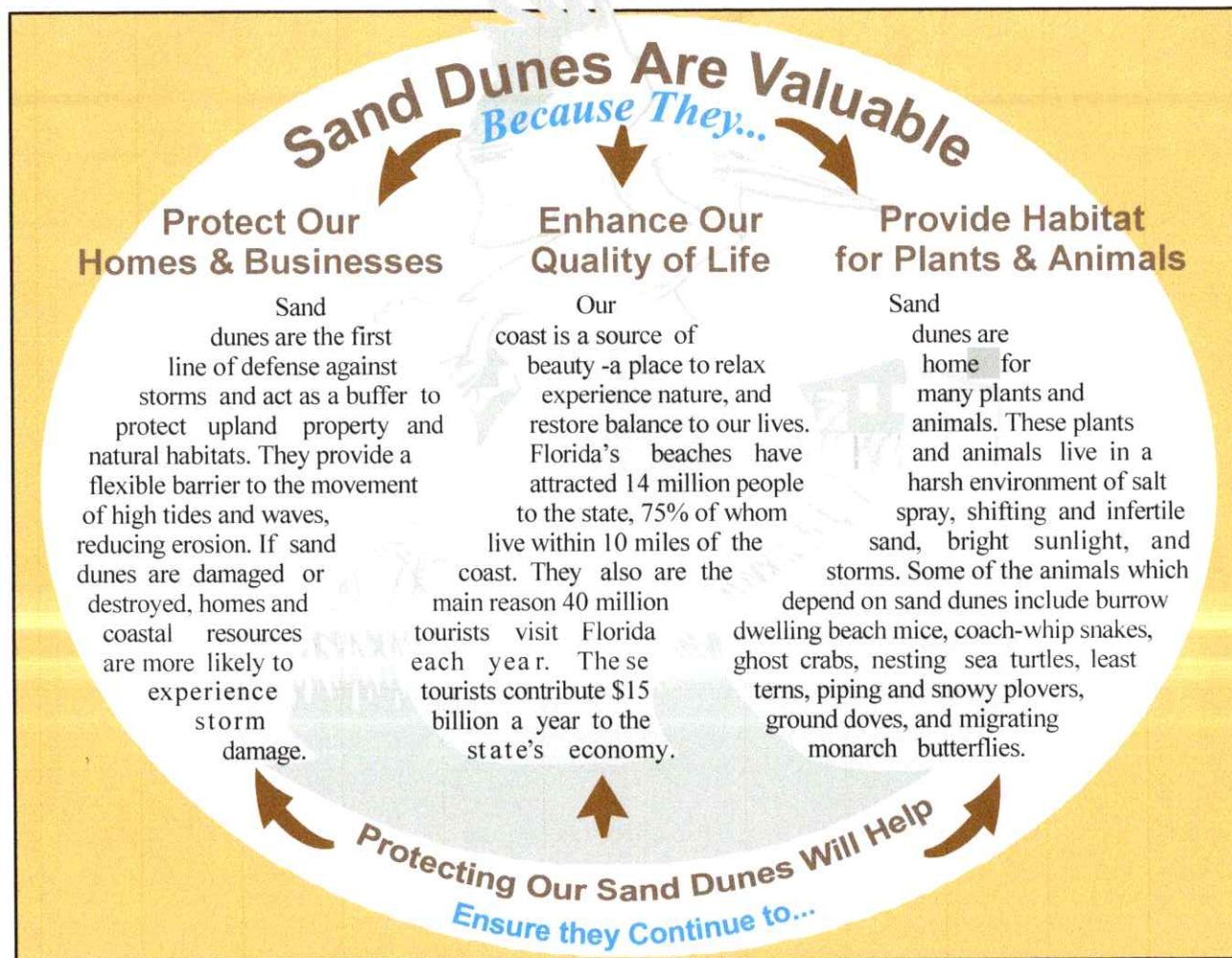
Permits from the Florida Department of Environmental Protection (FDEP) and possibly local governments may be required for installing sand fences, constructing dune walkovers, and dune plantings. This brochure does not provide all the necessary information or authorize any construction. Please contact the appropriate FDEP district office listed on the back for information about obtaining a permit or for guidance to help you get started. There is usually no cost for sand fencing and dune planting permits.

2 Ways to Help Rebuild Sand Dunes

Dune Planting. Plants build and anchor the sand dunes. The roots and stems of sea oats and other native coastal plants trap wind-blown sand. As the sand piles up around the plants, new roots develop on the recently buried stems while new stems emerge from the sand's surface. This traps even more sand and the sand dune builds. Sea oats and other vegetation can be planted along with the installation of sand fences or by themselves.

Sea oats (*Uniola paniculata*) should be planted first and should cover 60-80% of the total area. Bitter panicum (*Panicum amarum*) can be planted in the remaining areas. Seedlings should be planted at least 6 inches deep since shallow plantings may fail. Space

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the plants 24 inches apart in alternate staggered rows. Planting should occur during the early fall or spring so that minimal watering is needed. Planting at other times of the year may require more watering depending on the amount of rainfall. It is better to water heavily and less often than to water lightly and more often. Check with your local nursery, appropriate state or federal agency, or county extension agency for plant sources.

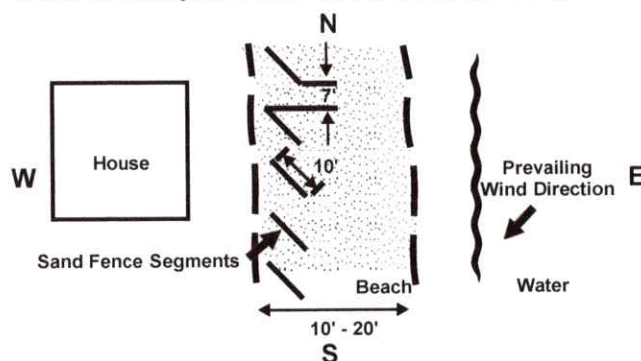
Sand Fencing. Sand is carried along the beach by the wind. Sand fences help build sand dunes by trapping and collecting this wind driven sand. Sand fences are usually made of wood, biodegradable, or plastic material. To keep the dune "growing", raise the fence before the sand accumulates to a depth of 18 inches. If the fence is buried, it will no longer work and it may pose a hazard to nesting birds and sea turtles.

The use of sand fencing may be restricted along the southeast coast due to the potential for adverse impacts in high density marine turtle nesting beaches. Sand fencing may also be restricted in other places such as the barrier islands along the southwest coast where the dry beach area may not be wide enough to supply the necessary amounts of wind driven sand.

The initial dune restoration project area should be about 10 to 20 feet in width. To maximize sand building, the fence should be located as far landward as possible and the spaces between and waterward of the fences should be planted with dune vegetation. The fence should be placed in 10 foot sections with at least 7 feet between each section to provide space for sea turtles to approach the beach, lay their eggs, and return to the sea. Each segment of fence should be angled to take advantage of predominate wind direction and strength. Please refer to the chart below for the recommended sand fence alignment for your area.

SAND FENCE ALIGNMENT	Northern Atlantic coast:	NW-SE
	Southern Atlantic coast:	NE-SW
	Eastern panhandle coast:	NE-SW
	Central panhandle coast:	NE-SW
	Western panhandle coast:	NW-SE
	Southern Gulf coast:	NW-SE

Change the alignment to take advantage of local and seasonal variations in the predominate wind direction and strength.



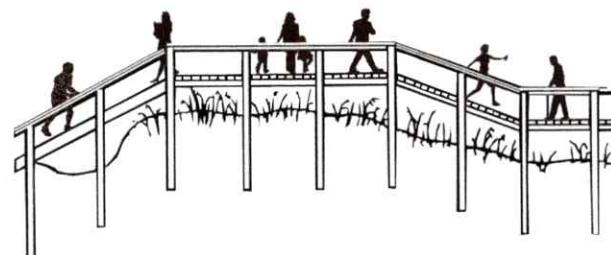
The figure above illustrates the placement and NW-SE alignment of sand fences for the northern Atlantic coast.

3 Things You Can Do to Protect Sand Dunes

Use Dune Walkovers and Designated Beach Access Points to Cross the Dunes. Without dune vegetation, sand dunes become unstable. Dune plants tolerate harsh beach conditions including wind, salt spray, storms, scarce nutrients, limited fresh water, and intense sunlight and heat. However, they cannot withstand the pounding of feet and vehicles.

Restore Damaged Sand Dunes. Established sand dunes provide a strong defense against storms. When sand dunes are damaged, you can help speed their recovery by installing sand fences and planting native dune vegetation. Increase the benefits of your work by encouraging your neighbors to join with you in your dune restoration projects.

Learn More About Sand Dunes and the Ways You Can Help Protect Them. If you aren't a good steward of the coastal environment, who will be? Tell others about the importance of protecting sand dunes and the coastal environment. You don't have to be an environmental expert to help protect sand dunes, you just have to care. For more information about the coastal environment and volunteer opportunities in your area, contact the U.S. Fish and Wildlife Service or the Florida Department of Environmental Protection at the numbers listed on the back of this brochure.



FDEP District Offices

For Bay, Escambia, Franklin, Gulf, Okaloosa, Santa Rosa, or Walton Counties:

Northwest District

160 W. Government Street, Suite 308
Pensacola, FL 32502
(850) 595-8300

For Duval, Flagler, Nassau, or St. Johns Counties:

Northeast District

8808 Baymeadows Way West, Suite 100
Jacksonville, FL 32256
(904) 256-1700

For Manatee or Pinellas Counties:

Southwest District

13051 N. Telecom Parkway
Temple Terrace, FL 33637
(813) 470-5700

For Brevard or Volusia Counties:

Central District

3319 Maguire Boulevard, Suite 232
Orlando, FL 32803
(407) 897-4100

For Charlotte, Collier, Lee, or Sarasota Counties:

South District

Post Office Box 2549
Fort Myers, FL 33902
(239) 344-5600

For Broward, Dade, Indian River, Martin, Palm Beach, or St. Lucie Counties:

Southeast District

3301 Gun Club Road, MSC7210-1
West Palm Beach, FL 33406
(561) 681-6600



State of Florida
Department of Environmental Protection
Coastal Construction Control Line Program
Mail Station 3522
2600 Blair Stone Road
Tallahassee, FL 32399
(850) 245-8336
<http://www.dep.state.fl.us/beaches/>



U.S. Fish and Wildlife Service
<http://www.fws.gov/>
<http://southeast.fws.gov/>

Jacksonville Field Office:
7915 Baymeadows Way
Suite 200
Jacksonville, Florida 32256
(904) 731-3045

Panama City Field Office:
1601 Balboa Avenue
Panama City, Florida 32405
(850) 769-0552

S. Fla. Ecosystem Field Office:
1339 20th Street
Vero Beach, Florida 32960
(772) 562-3909

Removal of Species Require Expertise

Brazilian Pepper Removal 5 Things Every Property Owner Should Know



1. A Permit may be required.

Permit requirements vary according to whether the property is developed or vacant and whether Brazilian pepper will be cleared using hand-held equipment or heavy machinery. Permits are issued by the City's Planning Department. You may obtain the permit yourself or authorize your contractor to do so.

Property	Equipment	
	Hand-held	Heavy Machinery
Developed	No Permit Required	Development Permit
Undeveloped	Vegetation Permit	Development Permit

2. In order to successfully control Brazilian pepper, all Brazilian pepper tree stumps **MUST** be treated with an appropriate herbicide.

In most cases, a product containing the active ingredient **triclopyr** is the best choice for controlling Brazilian pepper; however, the method of application may vary depending on the maturity of the pepper being treated. **Mature** trees should be cut as close to the ground as possible. **Within 5 minutes**, herbicide should be applied to the cambium (living tissue just inside the bark). This is known as "cut stump" application. In some cases, mature trees that are not visible from adjacent properties, roadways, or other structures may be treated by "basal bark" application (killing the tree in place). Small **seedlings and re-sprouts** may be treated with either basal bark or foliar treatments.

3. The State of Florida requires professionals that apply **ANY pesticide (including herbicides)** as part of their job to be certified to do so.

A contractor hired to remove and treat Brazilian pepper must have a City Vegetation Competency Card AND an Herbicide Applicator's license/certification from the State of Florida. A list of Contractors that meet these requirements is available from the Natural Resources Department.

4. Brazilian pepper debris must either be removed completely *and* hauled away or chipped on site.

Stumps do not have to be removed as long as they have been cut flush to the ground. **Pepper debris to be picked up by Waste Pro MUST be placed *neatly* within 6 ft of the curb by 6:30 AM on your regular yard waste day and MUST be less than 4 ft in length and less than 50 lbs per container, plastic bag, or tied bundle.** Brazilian pepper mulch can be used for landscaping; however, if the mulch contains berries it should be allowed to sit and compost (thus killing the seeds) for at least 28 days before spreading.

5. Even when treated properly, some Brazilian pepper is likely to re-sprout and new seedlings may appear.

It is highly recommended that your entire property be inspected and retreated for any new seedlings or re-sprouts within 3 months of the initial treatment and every 6 months thereafter. If this is not done, more extensive and expensive pepper removal work can be expected.

For additional information contact the City of Sanibel Natural Resources Department at (239) 472-3700.

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Dept of Env. Resources Mgmt

Palm Beach

discover.pbcgov.org

Preserving Your Beach

The Department of Environmental Resources Management sponsors beach restoration projects throughout the county. The projects include dune restoration, beach nourishment, inlet sand transfer operations and the construction of breakwaters, groins, and other erosion control structures. Project funding is obtained through county, state, federal and local governments. County funds for beach restoration and enhancement projects are primarily obtained through taxes paid by tourists on hotel and motel rooms. County staff are also available to provide technical assistance and suggestions for managing dunes on private property.



Palm Beach County
Board of County Commissioners

Department of Environmental
Resources Management
2300 N. Jog Road - Fourth Floor
West Palm Beach, FL 33411-2743
561-233-2400
www.co.palm-beach.fl.us/erm



Department of Environmental
Resources Management

Guidelines for Beach & Dune Management



PROTECTING THE COAST
PRESERVING OUR NATURE
ENJOYING THE BENEFITS

Preserving Native Dune Plants

Dunes are important reservoirs of sand, replacing sand lost from the beach through erosion. Native dune plants are important parts of a healthy dune.

Native salt-resistant vegetation is essential to the beach and dune system as it both accumulates and stabilizes sand. Vegetation traps wind blown sand which collects around the plant and builds up the dune - a process known as "accretion". As the plants become buried, new roots develop on the recently buried stems while new stems emerge from the sand. A dense stand of sea oats and sea grapes can significantly minimize erosion during high tides and storms.

Sea oats are protected under regulations of the Florida Department of Environmental Protection (FDEP). Sea oats seed can not be collected without a permit and the plants can not be cut back or removed.



Sea grapes, which grow on the back dune and have large ping-pong paddle-shaped leaves, act as a highly efficient barrier to blowing sand and result in significant accretion of the backdune. They are also protected under FDEP regulations.

NATIVE DUNE VEGETATION SHOULD BE:

- ☒ PROTECTED from pedestrian traffic
- ☒ PRUNED SPARINGLY without exposing light to the beach
- ☒ REPLANTED AS NEEDED to keep it healthy

Removing Exotic Dune Plants

The Hawaiian half-flower (*Scaevola frutescens*) is a common invasive exotic dune plant. The plant's shallow roots and fragile stems are easily destroyed in high winds or storms making it far less effective in dune stabilization than sea oats and other native species. Don't confuse this exotic with its endangered native counterpart - inkberry (*Scaevola plumieri*) - which is protected by Federal law.

Invasive exotic plant species tend to overgrow native plant species and are less effective in maintaining the dune ecosystem.



Exotic Hawaiian half-flower
Note white fruit and long leaves



Endangered Native Inkberry
Note black fruit and rounded leaves



Another invasive exotic dune plant is the Australian pine. Australian pines inhibit the growth of other plants by their shading effect and the acidic nature of their needles. They eventually create a "weak spot" that makes the dune vulnerable to storm erosion. In all cases where exotics have been removed, the area should be replanted with natives typical of that portion of the dune. Where lawn grasses adjoin the dune area, a distinct buffer zone should be maintained by herbiciding, mulching, and edging to control the encroachment of these grasses into the dune.

Guidelines

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Pruning Vegetation

Pruning dune vegetation may seem desirable to a property owner in order to provide a clear ocean view. Removing too much vegetation can hurt the fragile dune structure and impact sea turtles.

A well-developed stand of sea grapes is essential to the stability of the beach and dune, and protection of upland buildings from storm-induced erosion and blowing sand and salt spray. Sea grapes also block light from the beach where it could otherwise interfere with sea turtle nesting and disorient emerging hatchlings. For these reasons, it is recommended that property owners limit pruning to only that necessary for a view.

SEA GRAPE PRUNING GUIDELINES:

- ☑ Do not remove more than 1/3 of the height
- ☑ Do not remove more than 1/3 of the leaf area
- ☑ Do not reduce the height to less than 6 ft.
- ☑ Do not expose lights to the beach

**ANY PRUNING BEYOND THIS LIMIT
REQUIRES AN FDEP PERMIT**

All pruning of sea grapes seaward of the Coastal Construction Control Line is subject to the permitting requirements of the FDEP. The best policy is to let a hard winter freeze and salt spray control the height of dune sea grapes naturally. Consider creating "view corridors" to reduce pruning requirements.

Beach Raking

Beach raking is the mechanized removal of seaweed and other natural materials from the beach. Removing this nutrient-rich organic layer can seriously effect the health of the beach and dune.

Seaweed is beneficial to the beach and an important component of the ecosystem. The Department of Environmental Resources Management recommends that beach raking be limited to the more heavily used beaches. Beach raking too close to the dune can destroy new seedlings establishing at the leading edge of the dune. Although seedlings in this pioneer zone often become buried by wind-blown or storm-deposited sand, they usually grow through the new sand layer and continue to stabilize the area. Beach rake operators should stay well away from the toe of the dune. Seaweed removed from the beach can be deposited in a thin layer (2-3") at the toe of the dune.



Seaweed is valuable to the dune system as a source of nutrients and a sand stabilizer.

Irrigation & Fertilization

In contrast to ornamental plants, dune vegetation is adapted to low water and nutrient requirements. Irrigation and fertilization of dune areas should be done sparingly.

Excessive watering of the dune usually results in the establishment of undesirable, invasive exotic plants. It is therefore important that all sprinklers near the dune be adjusted to avoid overspray onto the dune. New plantings may require temporary watering until the plants establish a well-developed root system.



Native dune plants require very little maintenance to remain healthy.
Top left to right: dune sunflower, sea purslane, agave, beach peanut
Bottom left to right: railroad vine, sea lavender

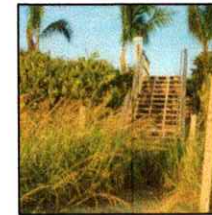
The nutrient requirements of native dune plants are generally low and fertilization can result in impacts similar to those caused by excessive watering such as promoting weeds and noxious vines. The best method to ensure an adequate nutrient supply is to leave organic material such as leaf litter and seaweed in place on the dune.

Recreational Activities

Dune plants are highly sensitive to human disturbances. Even minimal impact can cause damage and increase erosion. Recreational activities should be moved away from the dune.

To protect valuable dune plants, all recreational activities should be kept at least 10 feet away from the leading edge of the foredune. Do not walk on the dune. Use dune crossovers to access the beach. Boats, surfboards, beach chairs and cabanas should never be stored on the dune or within 10 feet of the foredune. Repeated disturbances to the dune will destroy the vegetation and weaken the dune system, leaving the beach as well as upland buildings vulnerable to storm damage.

Following storm events, the change in beach profile should be noted. Has erosion occurred, or has sand simply been pushed higher on the beach covering previously exposed vegetation? In the case of the latter, recreational activities and cabanas should be kept far enough away from this location to allow the buried vegetation to re-emerge through the sand.



Use dune crossovers when accessing the beach.