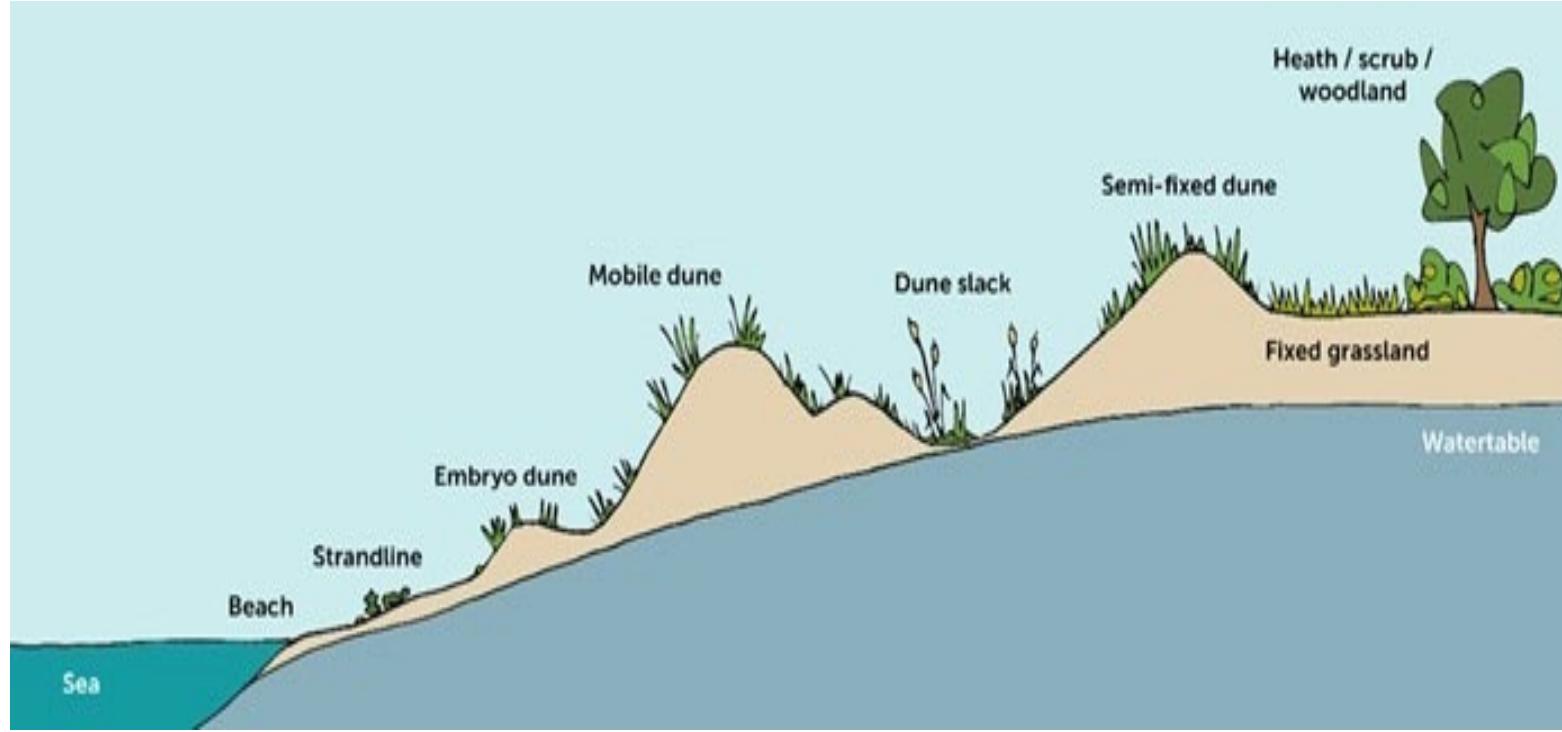


HIGHLAND BEACH DUNE RESTORATION PLAN FOR HOMEOWNERS 4- STEP PROCESS

Presented to the Highland Beach Natural Resources Board
By Maggie Chappelear, February 2, 2022

Dune terminology to familiarize yourself before you begin a dune restoration project. Our dunes stop at the mobile dune



TROPICAL COASTAL STRAND: the stabilized coastal dune with pioneer plants, scrub zone with enhancements that require very little Ecosystem Management.

Beach Dune: active coastal habitat whose traits include: sandy substrate, xeric, marine influences, open herbaceous vegetation, and no canopy. Plants must be sea spray tolerant and tolerant to constant wind and periodic inundation by ocean waves.

Dune Restoration Plan.....The time is now for Highland Beach

It is not too late to act. Here is a summary of suggestions:

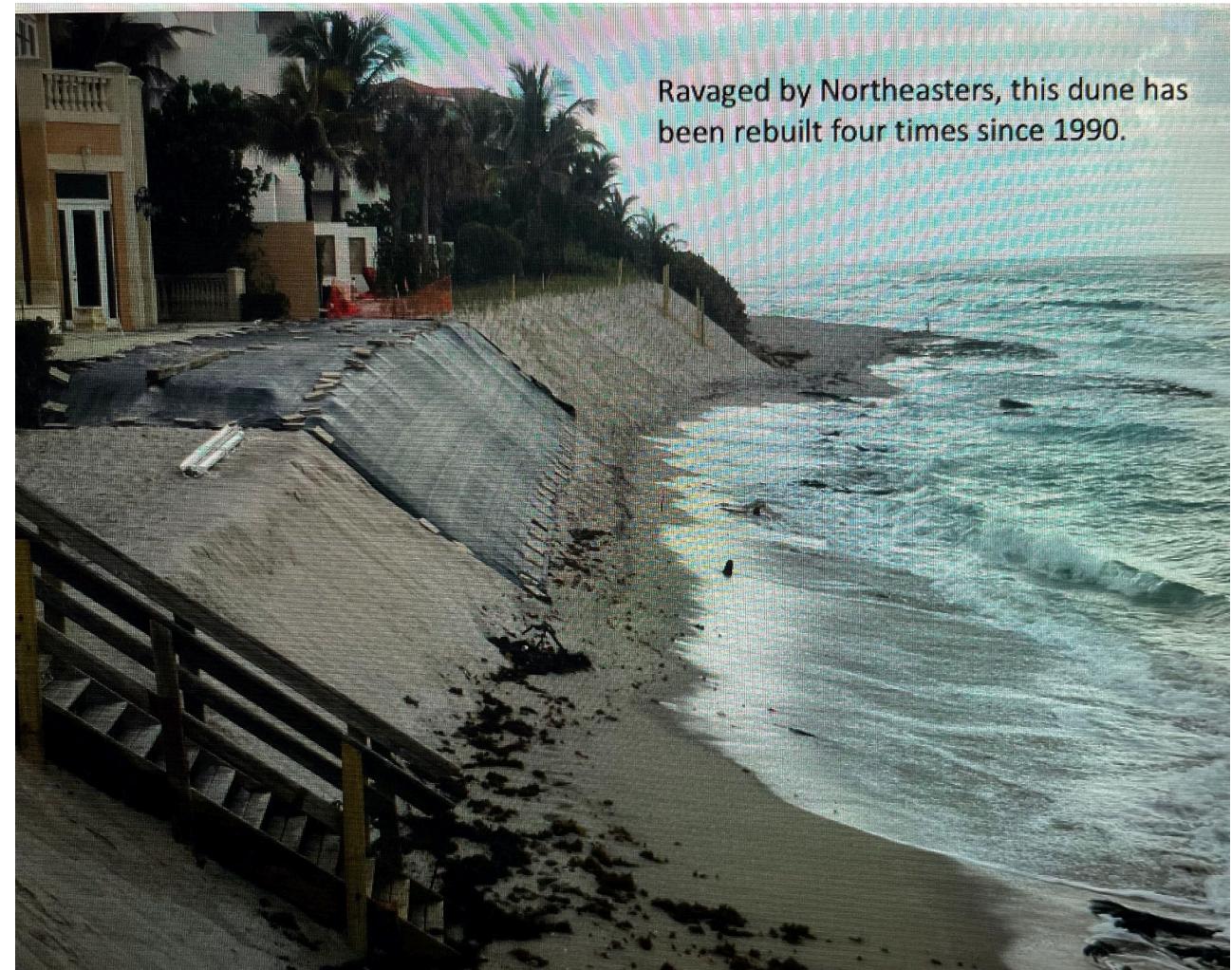
Design Considerations- (complex planting is not usually necessary after the initial stabilizers are planted for example)

Sediment Characteristics- (what works and what doesn't)

Addressing the loss of biota –(building dunes through vegetation...creation of a mature community structure in a restored environment)

Enhancing natural values – diversify using native species that stabilize the dunes

Follow up actions- allowing time for naturalization and Eco-System Management



SOME NATURE IS BETTER THAN NONE.....

There is an impossibility of returning to the pristine nature once there is a human footprint but this should not deter efforts to regain elements of the natural environment and reverse the trend towards environmental loss.

The natural process cannot be relied on to re-establish natural characteristics in developed areas but the restoration process can maintain a semi-natural enhanced biodiversity and create a harmonious landscape.

Graded beaches (Highland Beach) that lack natural dunes such as ours can be modified into a more naturally functioning beach and dune system.

This 4-Step process goal is to educate homeowners and condo dwellers on our beaches as to what they can do to modify their environment to provide protection to our beaches and slow down its erosion process due to climate change challenges: sea level rising, stronger hurricanes, and more beach erosion.

Creating an improved beach habitat involves protecting both flora and fauna (plants and animals). Homeowners on the beach can contribute to the sea turtle population through responsible lighting programs. Sea turtle hatchlings are drawn by brightest light...let the moonlight be their compass.

- Beach front homes and condos must use the proper lighting for protection of sea turtle nesting season.
- The Town will be responsible for the lighting monitoring and enforcement program



EXAMPLE OF THE PROBLEM.



all of these problems were resolved with an active nighttime lighting monitoring and enforcement program.

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THE SOLUTION....REQUIRE APPROPRIATE LIGHTING FOR
TURTLE NESTING SEASON.



**Photo for Code Enforcement use to locate and resolve
non compliant light sources. Red lighting is FWC
approved.**

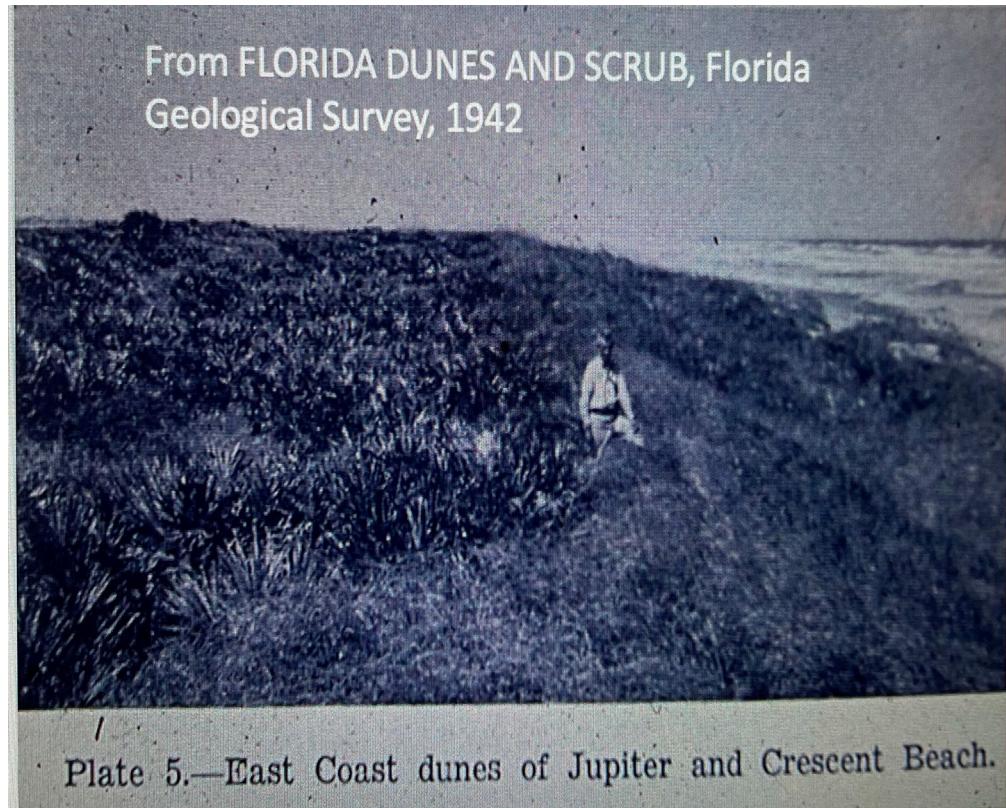
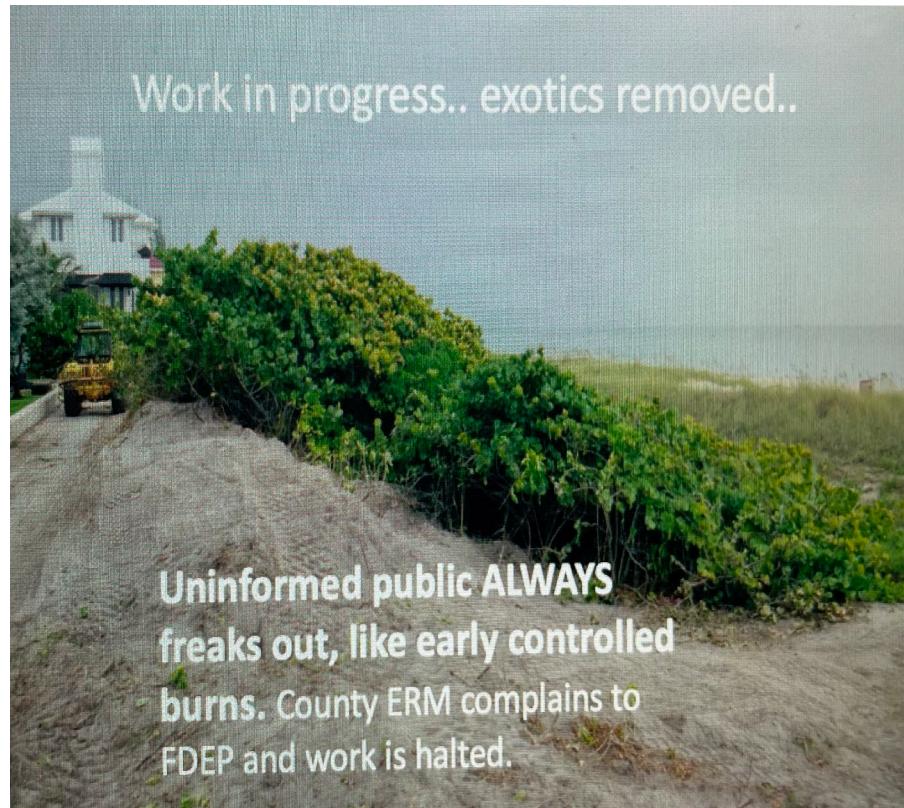
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This is what a Florida pristine native dune and scrub looks like....our goal is to regain some of the natural elements of the environment and reverse the trend to environmental loss.



STEP 1: Removal and Control of Exotic Species to allow the system to work

- Invasive plants harm the ecosystem of the natural dune by competing for sunshine, water, and nutrients with beneficial native species.



Protect the native plants by control of the exotics: Here are some common exotics that may be found in your backyard.



HAWAIIAN SEAGRAPE, *Scaevola taccada*. A large sprawling competitive shrub. Recruits aggressively from white seeds. Florida Exotic Pest Plant Council Category I invasive exotic.

BRAZILIAN PEPPER, *Shinus terebinthifolia*, a sprawling shrub and heavy seeder, infests coastal and inland areas. Specimen across from the Marriot main entrance. FLEPPC Category 1 invasive exotic species.



LATHER LEAF, *Colubrina Asiatica*. A profuse seeder, like most of the other invasives, overshadows and displaces natives with typically single plant masses. Specimen at meter B-119. FLEPPC Category I.



GREY NICKERBEAN, *Ceasalpinia bonduc*, is a thorny overshadowing native vine, which forms dense invasive mats and kills large areas of beneficial plants below. Specimen at parking meter B-180.



St. Augustine grass, *Stenotaphrum secundatum*, is a common turfgrass escaped from cultivation, which invades dunes and competes with native pioneer zone species. Large area at parking meter B-85 –B-90.



SNAKE PLANT, MOTHER IN LAWS TONGUE, *Sansevieria* species. An escaped landscape plant that is difficult to eradicate once established since root fragments regrow. FLEPPC Category II. Meter B-160



- All these plant species were removed from the dune, in 1917, by hand or mechanical means with regrowth controlled by a program of regular inspection and seedling control, as a condition of FDEP dune pruning permits.

COIN VINE, *Dalbergia ecastophyllum*. A native but invasive overshadowing vine, with floating seeds. Kills large areas below within a few years of establishment. Specimen and large mass at meter B-168



Native dune species can be invasive too.

STEP 2: Creation of the PIONEER PLANT ZONE: grasses and vines as first line of defense against erosion of the dunes.. They should be installed by professional dune restoration landscaping firms (require 3 months to establish fully)



Planting and sometimes frequent replanting pioneer zone dune grasses is needed to counter erosive forces.



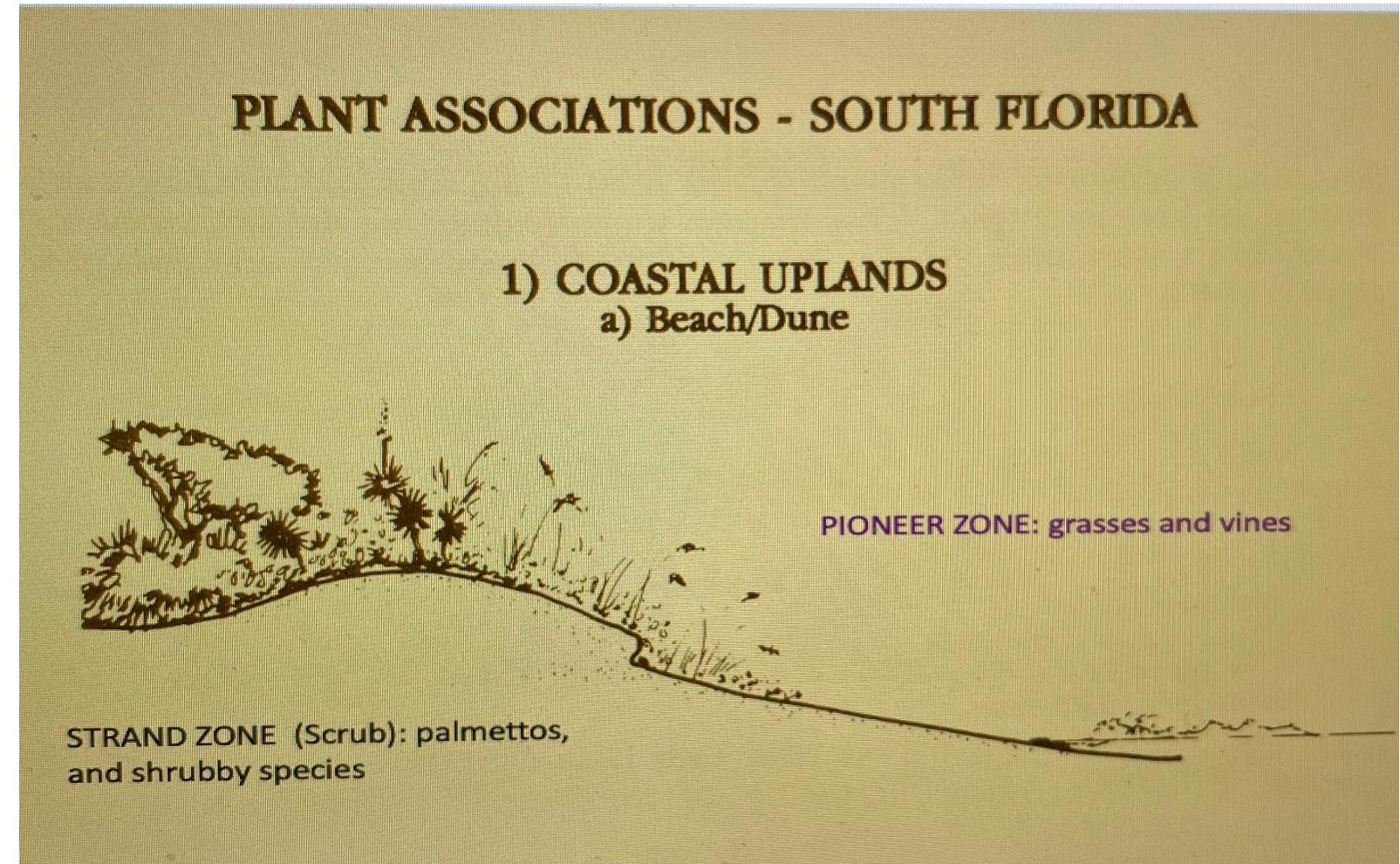
When plants are carefully grown, carefully shipped, and carefully installed, using best quality materials, then no supplemental irrigation is necessary to achieve dune function in first season



SAME LOCATION AFTER 7 MONTHS and HURRICANE IRMA

STEP 3: Creation of the Strand Zone...(shrub zone)

This zone may require regular pruning to create wind resistant low shrubs. Without Ecosystem management, the entire beach would become monoculture...(no diversity)

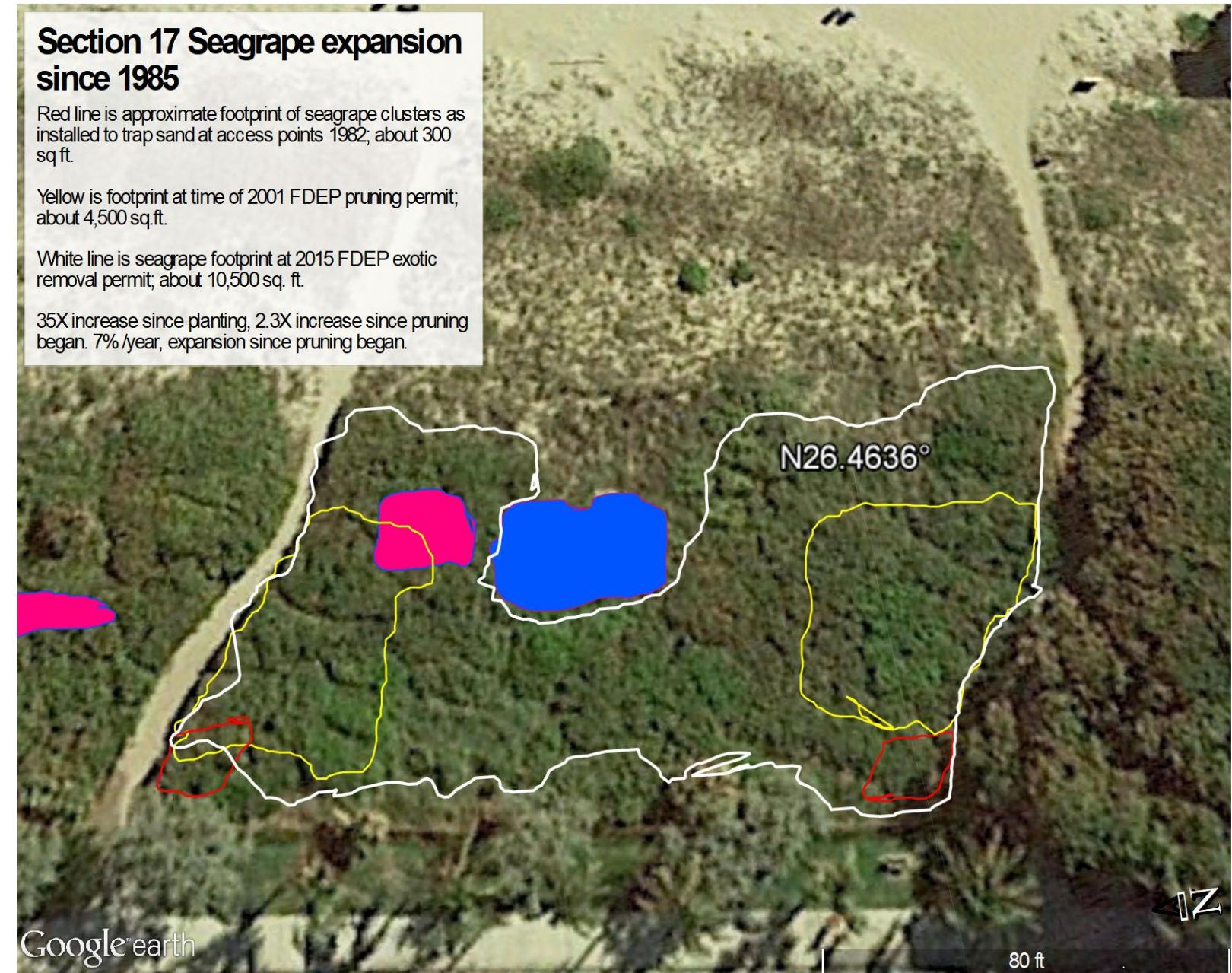




Without management, entire beach area
would be monoculture in 10 years.

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Example of unwanted monoculture...Seagrape expand 10% laterally per year. They choke out the sunlight and nutrients of native plants. They are top heavy shallow rooted plants and provide no protection from hurricanes. They can be used in the Stand Zone only if they are regularly maintained at a shrub size height. Otherwise they will encroach on entire landscaping and are difficult to remove. Scorched earth approach is sometimes necessary to re-establish natural characteristics of developed areas. Sea Grapes are not predominant in Highland Beach. Wise move.



STEP 4: Strand Enhancement...creating a unique and beautiful landscape dune design that can be easily managed

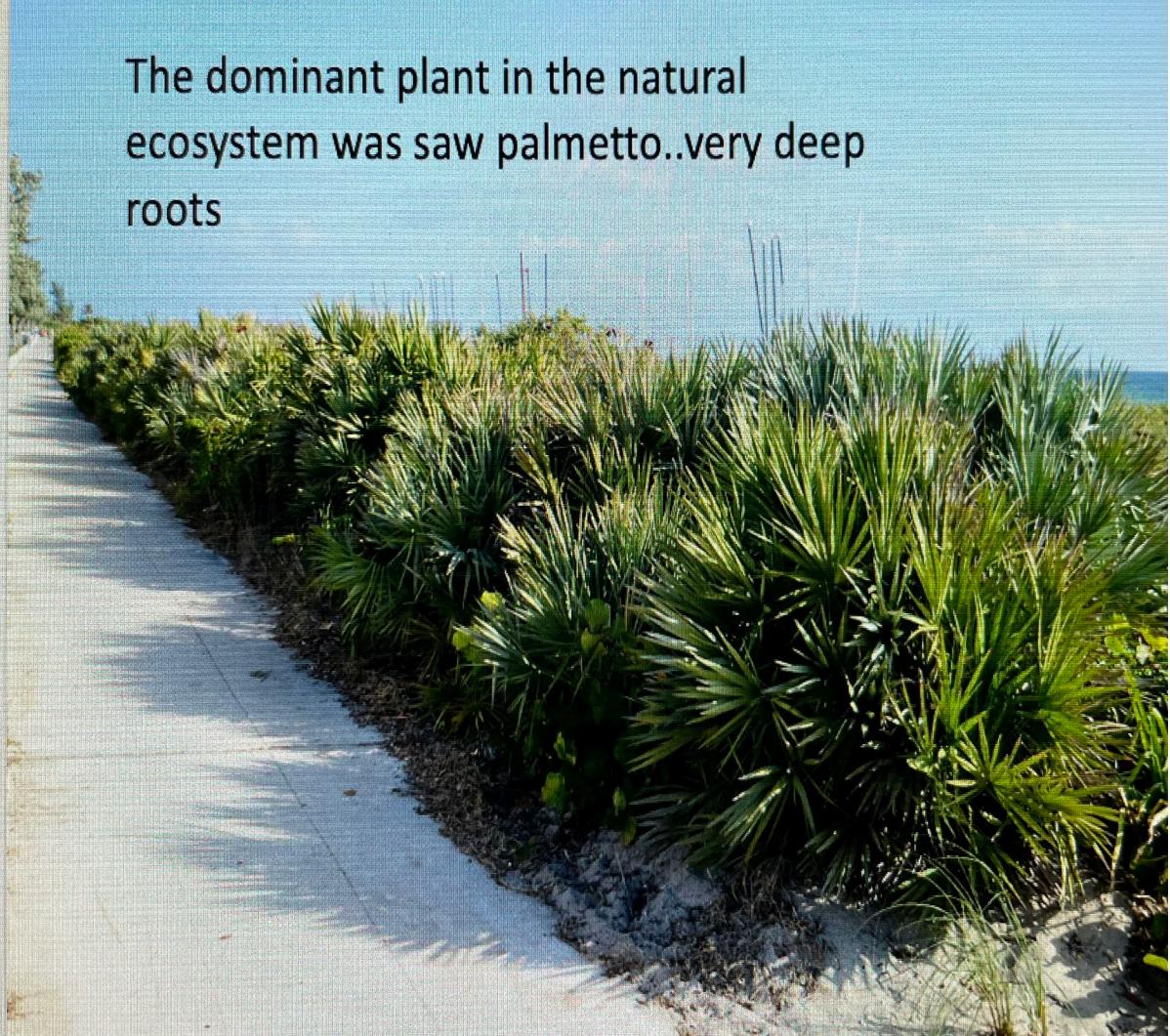


FACT: NATIVE DUNE SPECIES WITHSTAND HURRICANES BETTER THAN EXOTICS



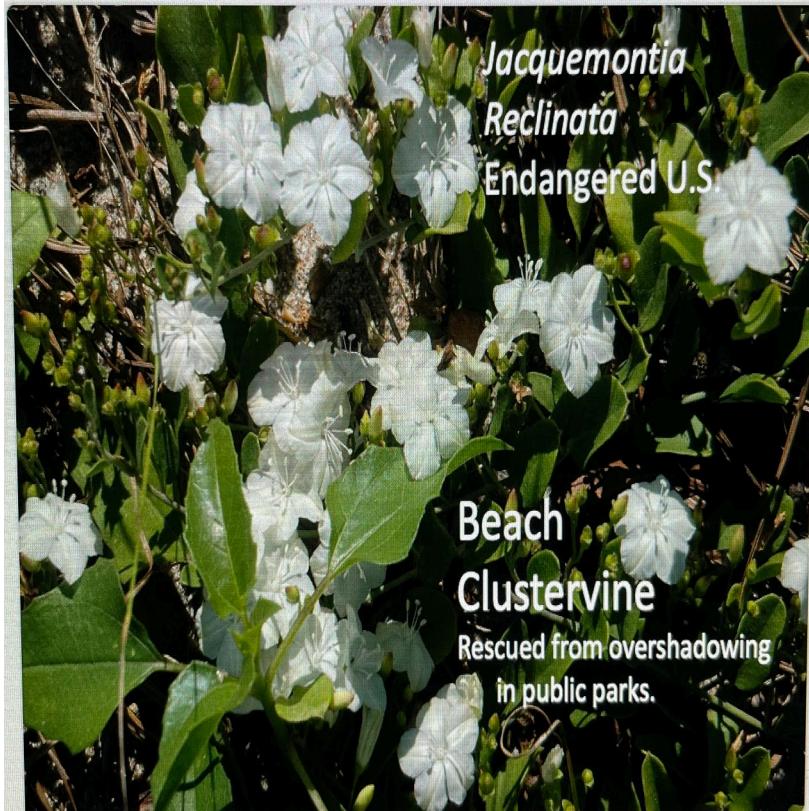
The Strand Zone at this property in Hillsboro Beach was not damaged by 100 mph winds from Wilma as did the coconut palms (non-native). The palms did make a come back after a few months.

MODEL AFTER NATURE...NATURAL ECOSYSTEM



The dominant plant in the natural ecosystem was saw palmetto..very deep roots

The landscape design does not have to be boring...it can be as colorful and adventurous as you want....



Over 190 species to choose from....a quality nursery specializing in beach restoration plants can provide you with ideas.



ECOSYSTEM MANAGEMENT

To restore the complete natural plant complex and full habitat function of the dune ecosystem with periodic evaluations and maintenance.

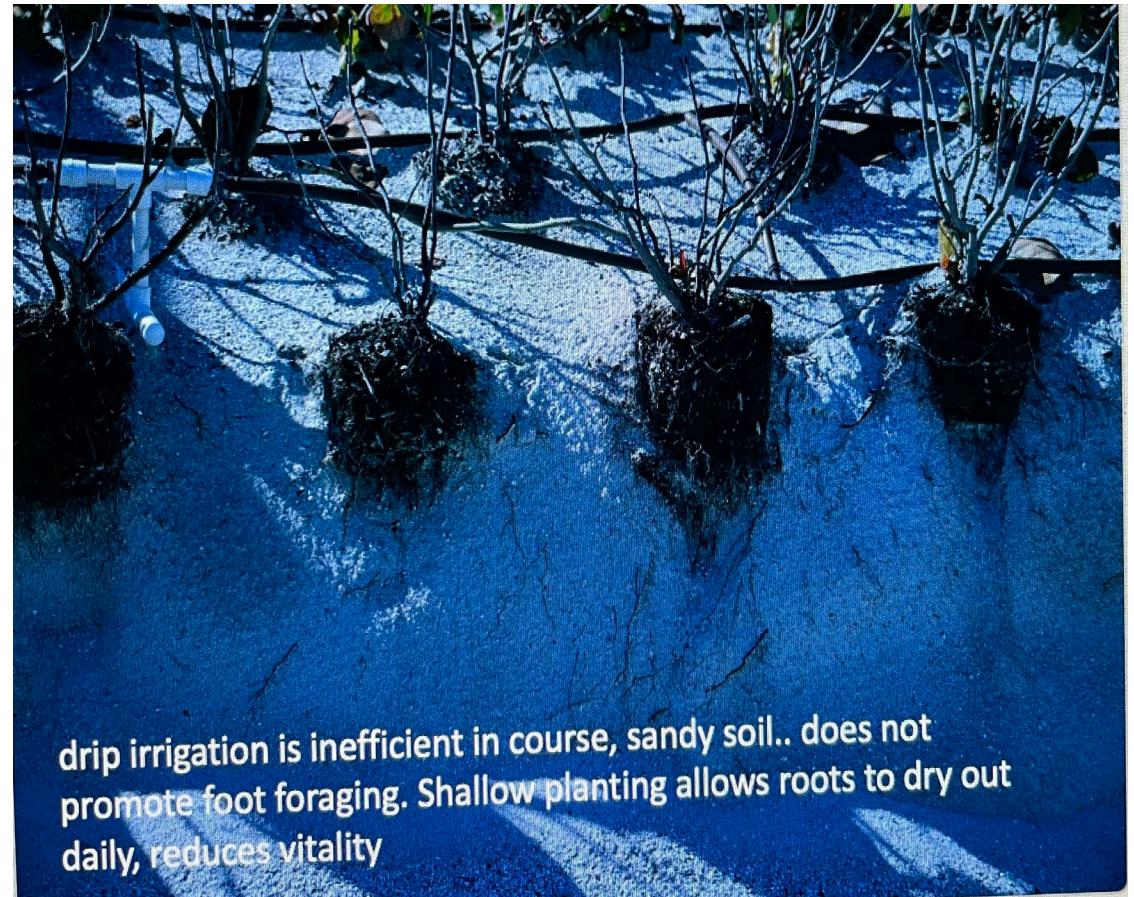
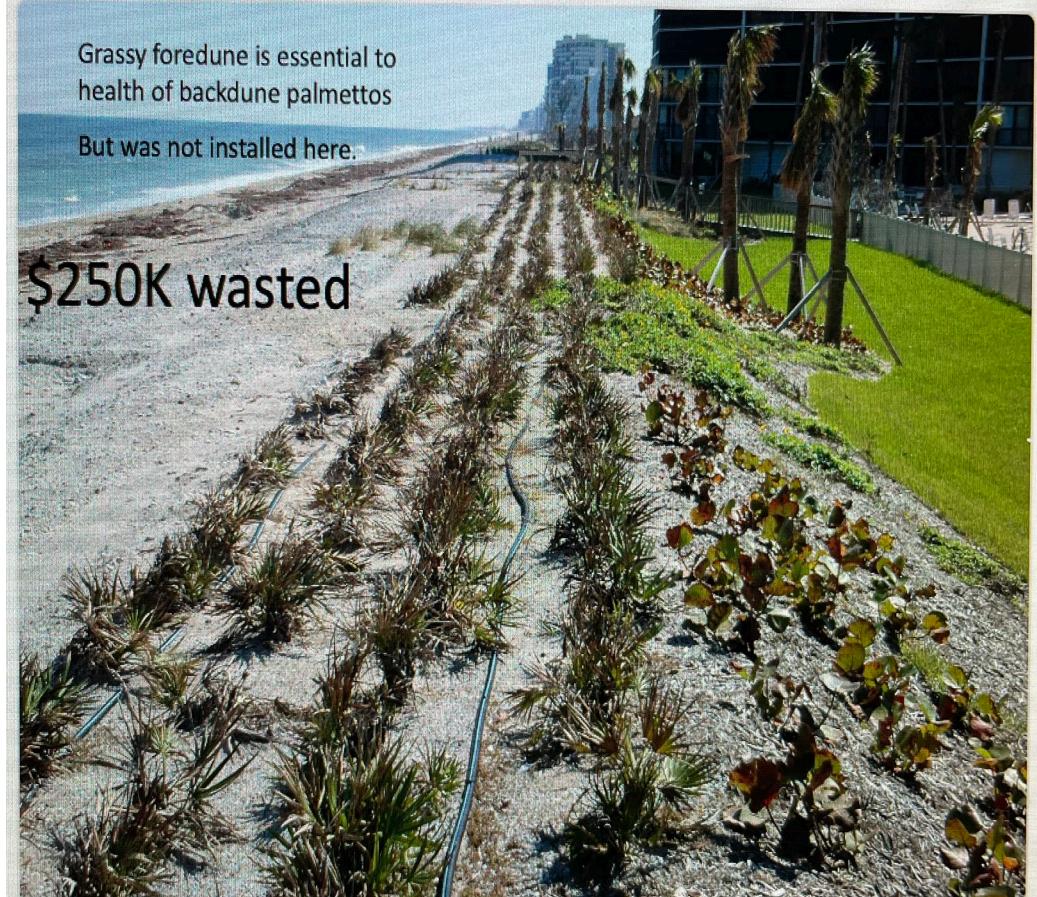
There are **196 species of native plants** that can be used in dune restoration (some endangered and threatened). **Landscapers commonly only use six (6).**

Explore your options beforehand so you can create a unique sustainable environment and even opt to include some not on this list provided by the Natural Resources Conservation Service of the USDA.

| Native Plants for Coastal Dune Restoration Sites in Florida ¹ | | |
|--|--------------------------------|---------------------------------|
| Common name | Scientific name | Most likely occurrence |
| | | Frontal Zone Backdune Zone |
| Grasses | | |
| Saltgrass | <i>Distichlis spicata</i> | X |
| Gulfhairawn muhly | <i>Muhlenbergia filipes</i> | X |
| Bitter panicum, bitter panicgrass | <i>Panicum amarum</i> | X |
| Seashore paspalum | <i>Paspalum vaginatum</i> | X |
| Seacoast bluestem, coastal little bluestem | <i>Schizachyrium spp.</i> | X |
| Saltmeadow cordgrass, marshhay cordgrass | <i>Spartina patens</i> | X |
| Seashore dropseed | <i>Sporobolus virginicus</i> | X |
| Sea oats | <i>Uniola paniculata</i> | X |
| Other herbaceous plants | | |
| Searocket | <i>Cakile spp.</i> | X |
| Baybean, beachbean | <i>Canavalia rosea</i> | X |
| Beach sunflower | <i>Helianthus debilis</i> | X |
| Largeleaf pennywort | <i>Hydrocotyle bonariensis</i> | X |
| Beach morningglory, fiddle-leaf morningglory | <i>Ipomoea imperati</i> | X |
| Railroad vine, bayhops | <i>Ipomoea pes-caprae</i> | X |
| Seapurslane, shoreline purslane | <i>Sesuvium portulacastrum</i> | X |
| Trees and shrubs | | |
| Sea lavender, sea rosemary | <i>Argusia gnaphalodes</i> | X |
| Florida rosemary, sandheath rosemary | <i>Ceratiola ericoides</i> | X |
| Cocoplum | <i>Chrysobalanus icaco</i> | X |
| Seagrape | <i>Coccoloba uvifera</i> | X |
| Buttonwood, button mangrove | <i>Conocarpus erectus</i> | X |
| Silverleaf croton, gulf croton, beach tea | <i>Croton punctatus</i> | X |
| Coinvine | <i>Dalbergia ecastaphyllum</i> | X |
| Yaupon holly | <i>Ilex vomitoria</i> | X |
| Seacoast marshelder, seashore elder | <i>Iva imbricata</i> | X |
| Buttonsage, lantana | <i>Lantana involucrata</i> | X |
| Waxmyrtle, southern bayberry | <i>Morella cerifera</i> | X |
| Plum | <i>Prunus spp.</i> | X |
| Sand live oak | <i>Quercus geminata</i> | X |
| Cabbage palm, cabbage palmetto | <i>Sabal palmetto</i> | X |
| Gullfeed, inkberry | <i>Scaevola plumieri</i> | X |
| Saw palmetto | <i>Serenoa repens</i> | X |
| Bay cedar | <i>Suriana maritima</i> | X |
| Spanish bayonet, aloe yucca | <i>Yucca aloifolia</i> | X |

¹Adapted from Craig, 1991.

WORK WITH A DUNE RESTORATION SPECIALIST LANDSCAPE DESIGNER TO SAVE YOU MONEY IN YOUR INVESTMENT...your yard gardener won't be able to establish the plants correctly.



Nature dictates what works and doesn't work....



Foredune plant species die off quickly when cut off from open beach habitat.

This is an example of why you should use a landscaper who specializes in dune restoration.. the pioneer plants belong down by the beach and don't do well next to A-1-A

How to create a better dune system that protects our shorelines and enhances the value of the property



Ocean Estates A-1-A Highland Beach

This works because it has its pioneer plants (sea oats) are the front line and there are some vines as well. Further back you have the strand zone scrub bushes well maintained and the dune has a pleasing slope. This would stand up to a storm quite well. It does need bio-diversity and with 196 species to choose from, this dune would be less vanilla and more beautiful.

This meets the half way mark....half way there!



This dune needs more pioneer plants for the erosion in the middle. The sea grape strand zone is not well maintained and is too far down towards the beach. It is also choking any other plants that could enhance the dune. This dune is failing right now and needs professional dune restoration.

Solution: Plants sea oats and vines in the foredune (front) then add palmetto and more native species along with sea grapes that are cut to a maximum height to protect property from erosion and add biodiversity for enhancement.

The Town of Highland Beach needs to reach out to this owner



This property will be literally falling off a cliff because of its current condition and it greatly effects adjacent properties by contributing to dune beach erosion.

Next major storm will knock the pool off this cliff!

This “wall like hedge” does contribute to dune erosion adjacent to this property. It does not allow the natural dune system to thrive.



Even though it looks like this “hedge wall” is holding back the dune by creating a barrier...this just hurts everyone...the beach dunes, the marine ecosystem, and adds dune erosion to adjacent properties.

With a professional dune restoration, this “monoculture” landscape could be a show stopper by enhancing the dune with biodiversity.

There is and never will be a natural dune system here because of this abrupt barrier concrete wall too close to the waterline. Adjacent properties will need to protect their own dune erosion with a well-maintained dune ecosystem.



I am sure the residents of this condominium in today's world would have preferred a view of lovely landscaped dune gently sloping to the sea than this imposing wall structure.

Adjacent properties will be subjected to more erosion from this type of wall too close to the ocean. A further set back of the building would have allowed for a dune system to flourish

Famous Quotes: The time to prepare is when you can; by failing to prepare you are preparing to fail.



I WOULD LIKE TO THANK ROBERT BARRON, OF COASTAL MANAGEMENT AND CONSULTING, WHO VOLUNTEERED HIS TIME TO EDUCATE ME ON THE TOPIC OF DUNE RESTORATION. DELRAY BEACH'S DUNE RESTORATION WAS ONE OF HIS LOCAL PROJECTS THAT RECEIVED MUCH ACCLAIM.

THE PURPOSE OF THIS POWER POINT PRESENTATION IS TO CREATE AWARENESS THAT DUNE RESTORATION NOT ONLY PROTECTS PROPERTY OWNERS ON OUR BEACHES, BUT CAN HELP THE HOMEOWNER REGAIN SOME OF THE NATURAL ELEMENTS OF DUNE LANDSCAPING AND REVERSE THE TREND OF ENVIRONMENTAL LOSS WHILE THERE IS STILL TIME. (Climate Change)

RESOURCES FOR FURTHER READING

K. Nordstrom (2008) Beach and Dune Restoration. Cambridge University Press.

Internet: Institute for Regional Conservation: Native Plants for Neighborhoods Program and The Floristic Inventory of South Florida.

Internet: USDA Natural Resources Conservation Service: Native Plants for Coastal Dune Restoration: What, When, and How for Florida

Internet: Florida Department of Environmental Protection: Dune Restoration