

SYMBIOTIC BEACHFRONT DESIGN:

Sharing Southeast Florida's Coast with Sea Turtles



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SEA TURTLE LIFE CYCLE

Coastal Shallow Water Benthic Feeding Zones

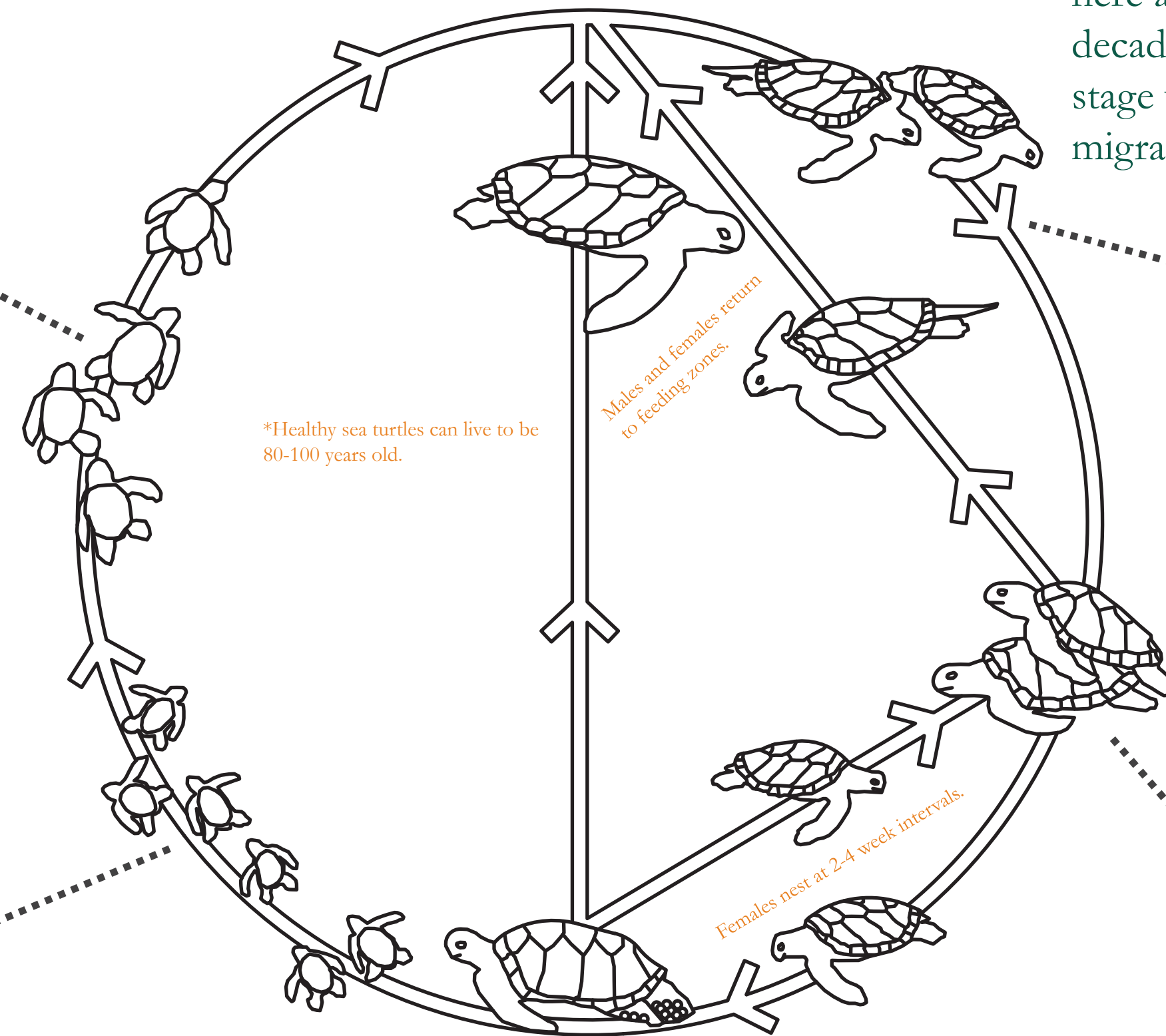
These zones are located on the sea floor, where sea turtles feed on organisms living in places such as coral reefs, kelp forests and sea grass beds. Immature sea turtles will live and feed here after they have gone through the “lost decade” and adult turtles will return to this stage when they finish their breeding migration.

Open Ocean Feeding *Lost Decade

There is little known about this stage in sea turtle development, other than the juveniles spend time feeding on the surface of the open ocean; often traveling extreme distances. For instance some sea turtle species will travel a minimum distance of 12,000 miles in a single year.

Breeding Migration

Adult males and females will migrate to the breeding zones off the coast of which the sea turtle emerged as a hatchling. A sea turtle doesn't reach sexual maturity until it is 20-50 years old. The breeding migration occurs every 2-8 years, and can last several months.



Offshore Nesting Beach

This is where mating occurs between adult males and females. Turtles are not monogamous and will mate with several partners throughout the mating season.

Hatchlings

Sea turtle hatchling survival is very bleak, for instance; typically 1 hatchling from a nest of 100 will survive the first year, and 1 in 1,000 will survive to adulthood and return to reproduce.

Nesting Beach

Females nest at night between the months of May and November, depending on the species. Females typically return to the same beach from which they emerged as hatchlings.

FLORIDA



Boca Raton, West Palm Beach County, Florida

Population: 89,407 Average High: 83.8F

Precipitation: 57 in. Average Low: 67F

Southeast Florida's population has been growing exponentially for the past decade. It is critical to explore opportunities on how to save critical nesting beaches, as this coast provides habitat for tens of thousands of nesting sea turtles. As human development will continue to grow in this area, more stress is being put on nesting females and hatchlings which is driving down sea turtle populations.

Project Goals:

- **Environmental**

Rejuvenate dunes and provide better sea turtle nesting habitat.

Dune vegetation

Beach renourishment

- **Educational**

Inspire sea turtle conservation and awareness.

Conservation programs and tours

- **Economical**

Natural storm protection and future beach development.

Aesthetic design

Unique beachfront opportunities



5 Miles

Atlantic Ocean



BOCA TURTLES

Loggerhead, *Caretta caretta*



Threatened



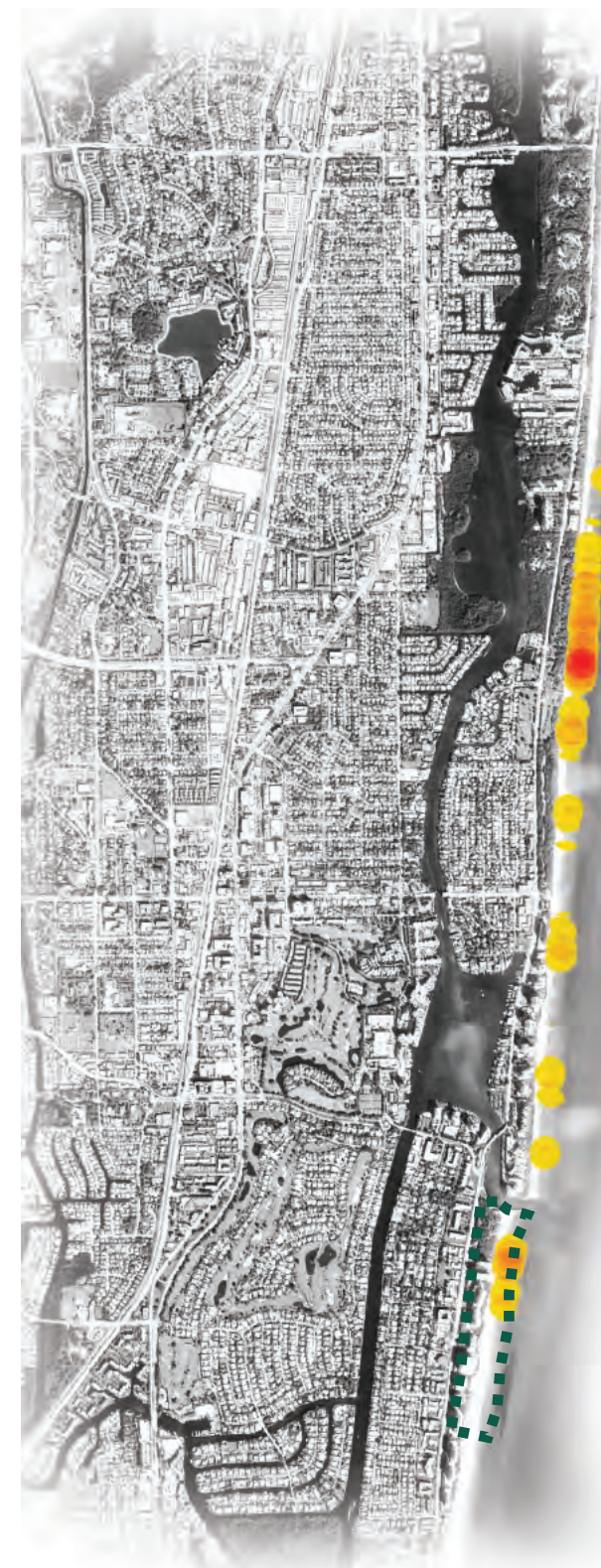
Shell length is 2.5 to 3.5 feet long, reddish brown in color, and can weigh up to 375 pounds.

40-50,000 known nesting females living today.

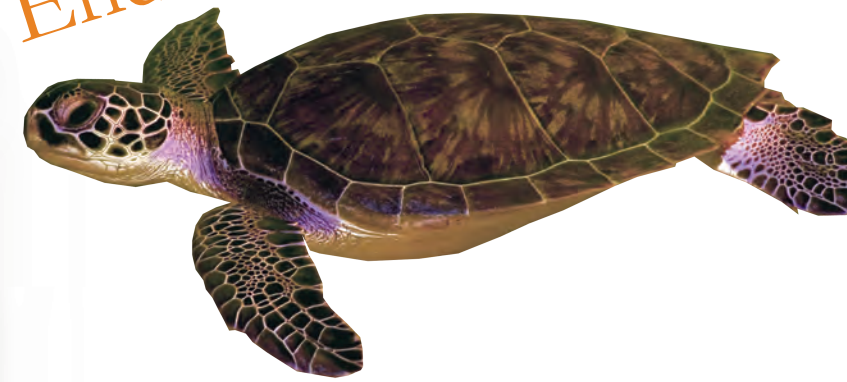
Nests in Boca Raton April-September.

1,893 nests in 2014

Green, *Chelonia mydas*



Endangered



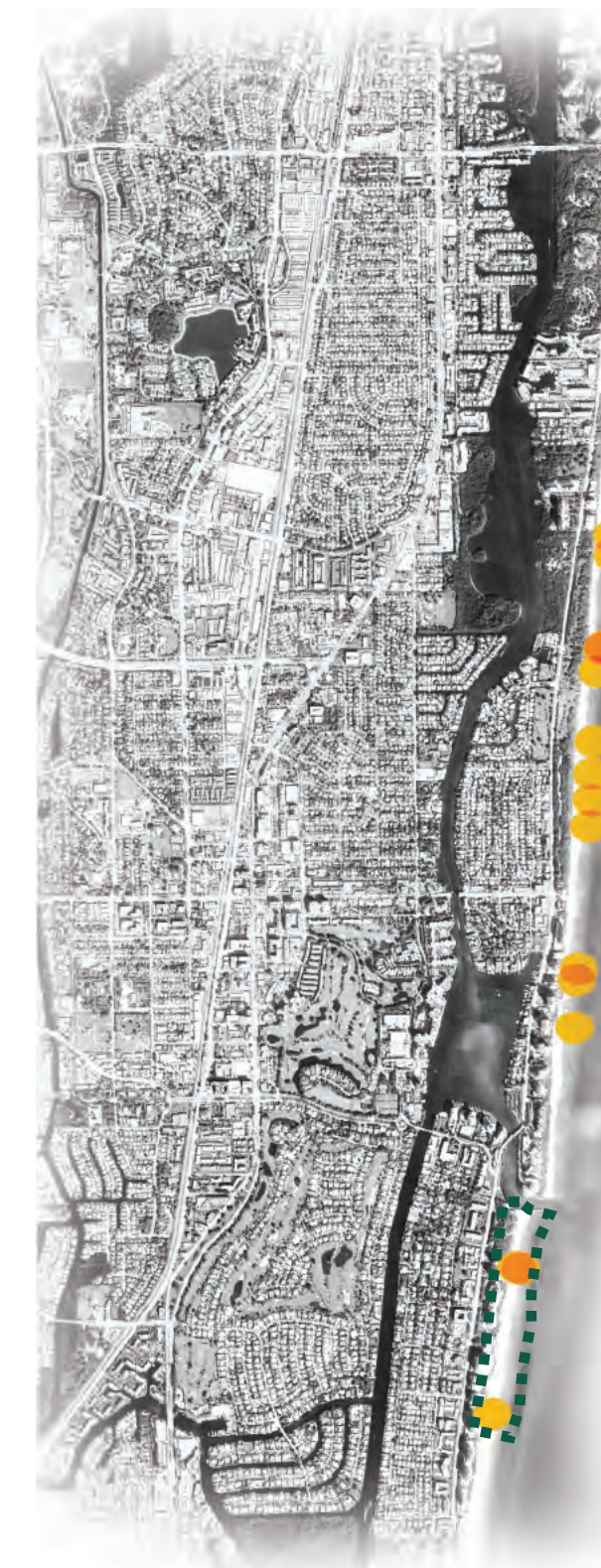
Shell length is 3-4 feet long, pale/dark green or yellow color, and weighs 240-420 pounds.

85-90,000 known nesting females living today.

Nests in Boca Raton June-August.

135 nests in 2014

Leatherback, *Dermochelys coriacea*



Critically endangered



Shell length is 4-6 feet long, gray/black with white spots and weighs 660-1,100 pounds.

34-36,000 known nesting females living today.

Nests in Boca Raton April-October.

22 nests in 2014

*Detrimental impacts: Artificial lighting, human activity, fishing, and beach structures.

PROJECT SITE

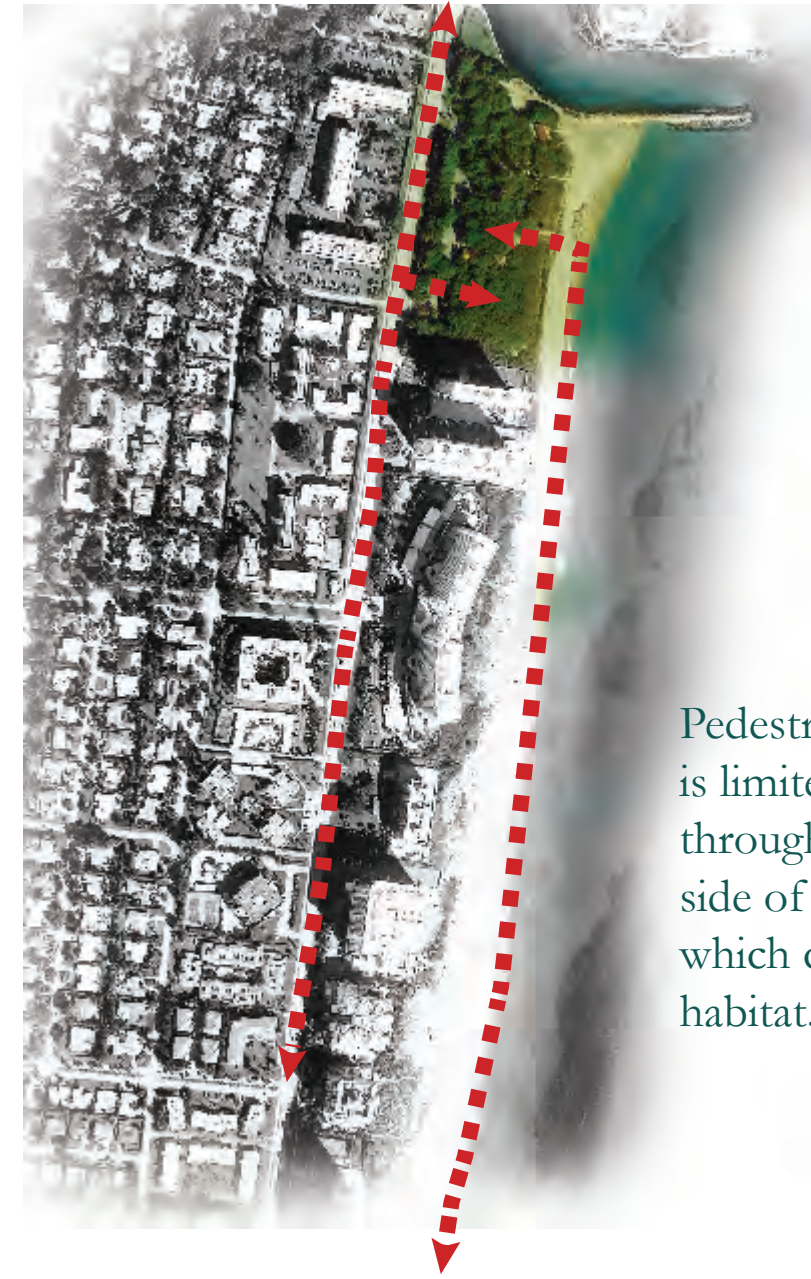


Project Area



The project area for this design is 24.6 acres with a mix of public park and high density residential fronting on the Atlantic Ocean. The beach width varies from 100- 170 feet, from water to current dune vegetation and the site has a total of .60 miles of beachfront.

South Inlet Park



Pedestrian access to the beach in this area is limited to South Inlet Park. Circulation through the project area occurs on the inland side of Ocean Boulevard and on the beach; which can be detrimental to sea turtle nesting habitat.

Dune Vegetation



The zoning of this part of the project is important because it indicates how much artificial light can be expected on the beach at night. In the map green is zoned for park use and orange is medium- high residential.

Ocean Blvd.



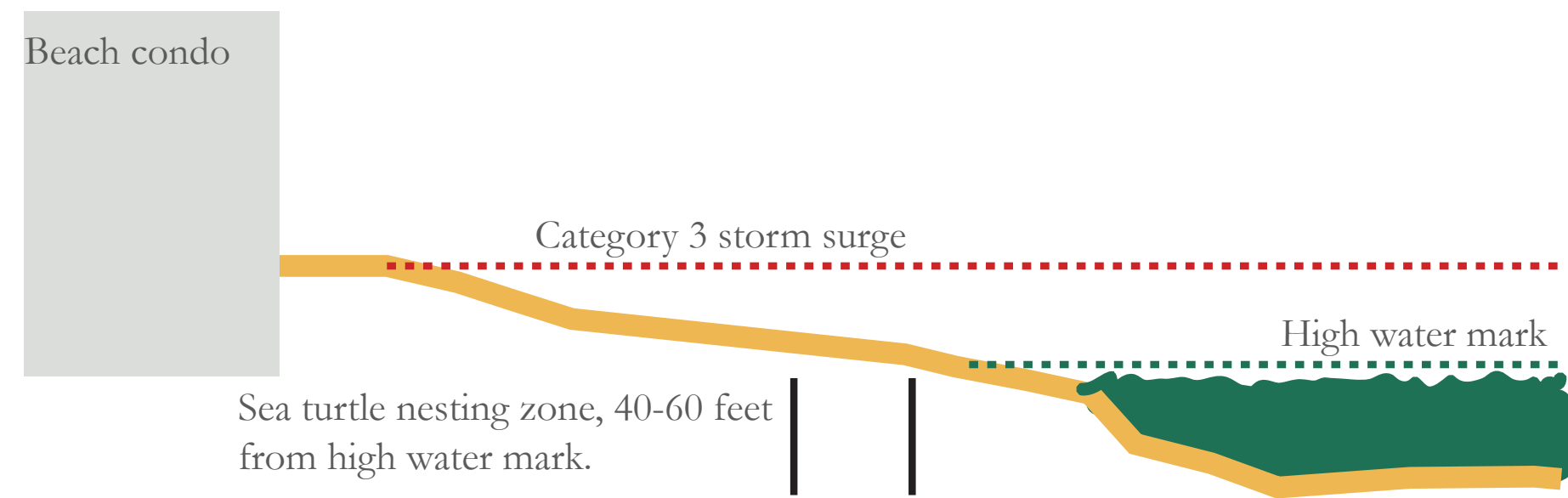
Ocean boulevard is a collector street within the city of Boca Raton, it provides access to the private condos and public parking at South Inlet Park.

Turtle Nesting Habitat

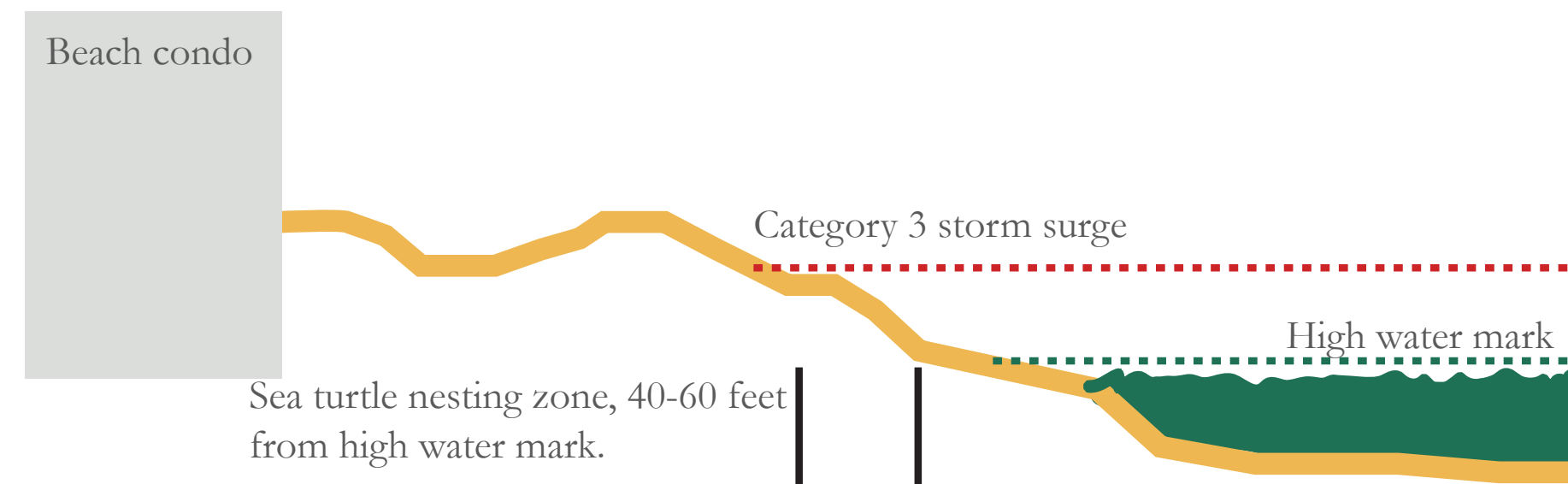


The turtles do not use all of the beach in fact they will crawl 40-60 feet from the high water mark for nesting and then return to the Atlantic to mate and feed.

Groomed Beach Profile



High Energy Beach Profile



Due to human use, the groomed beach profile is much flatter. This is because of loss of dune vegetation which traps sand that blows toward the shore, as well as beach grooming which keeps the sand flat causing it to erode faster. Boca Raton is naturally a high energy beach which defines it as a narrow beach with dune vegetation beginning 50 feet from the shore, right in the sea turtle nesting zone. Not only would a natural beach be aesthetically pleasing, it would provide for lower maintenance and storm protection.

Artificial lighting



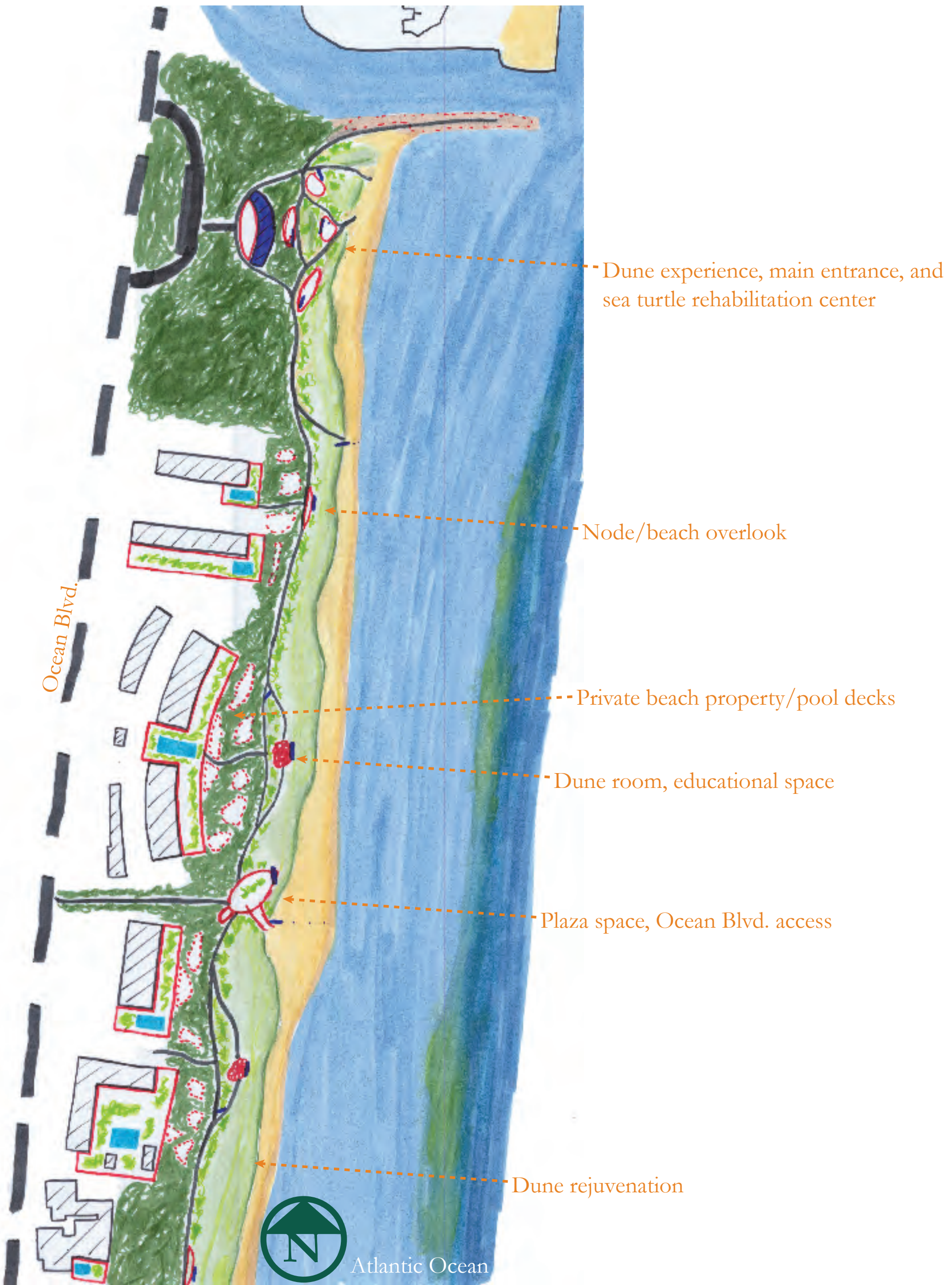
Artificial lighting is very detrimental for sea turtles, because they instinctually nest at night. Not only does it deter females from nesting successfully, hatchlings will crawl toward the brightest horizon, which naturally would be the ocean, however because of human development the hatchlings crawl in the opposite direction often never reaching the ocean at all.

Sea turtle friendly lighting



DESIGN STATEMENT

Nearly every species of marine turtles can be found on the ever increasing endangered species list. This urban beachfront design project focuses in on the rapidly growing Southeast Florida coast in Boca Raton. By implementing beach dune rejuvenation and interaction, a symbiotic habitat will grow on the Boca beachfront that creates awareness about sea turtles and a better chance for their essential revival.



MASTER PLAN



TURTLE REHABILITATION



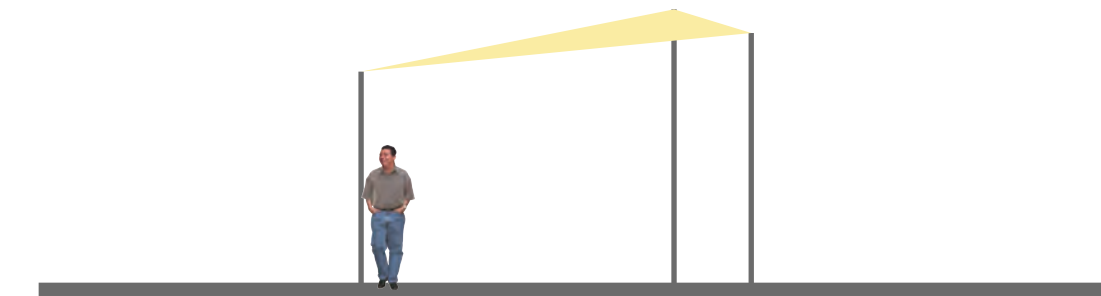
DUNE EXPERIENCE



Aquatic turtle exhibit for face to face turtle interaction.



Large copper structure for patina and scale.

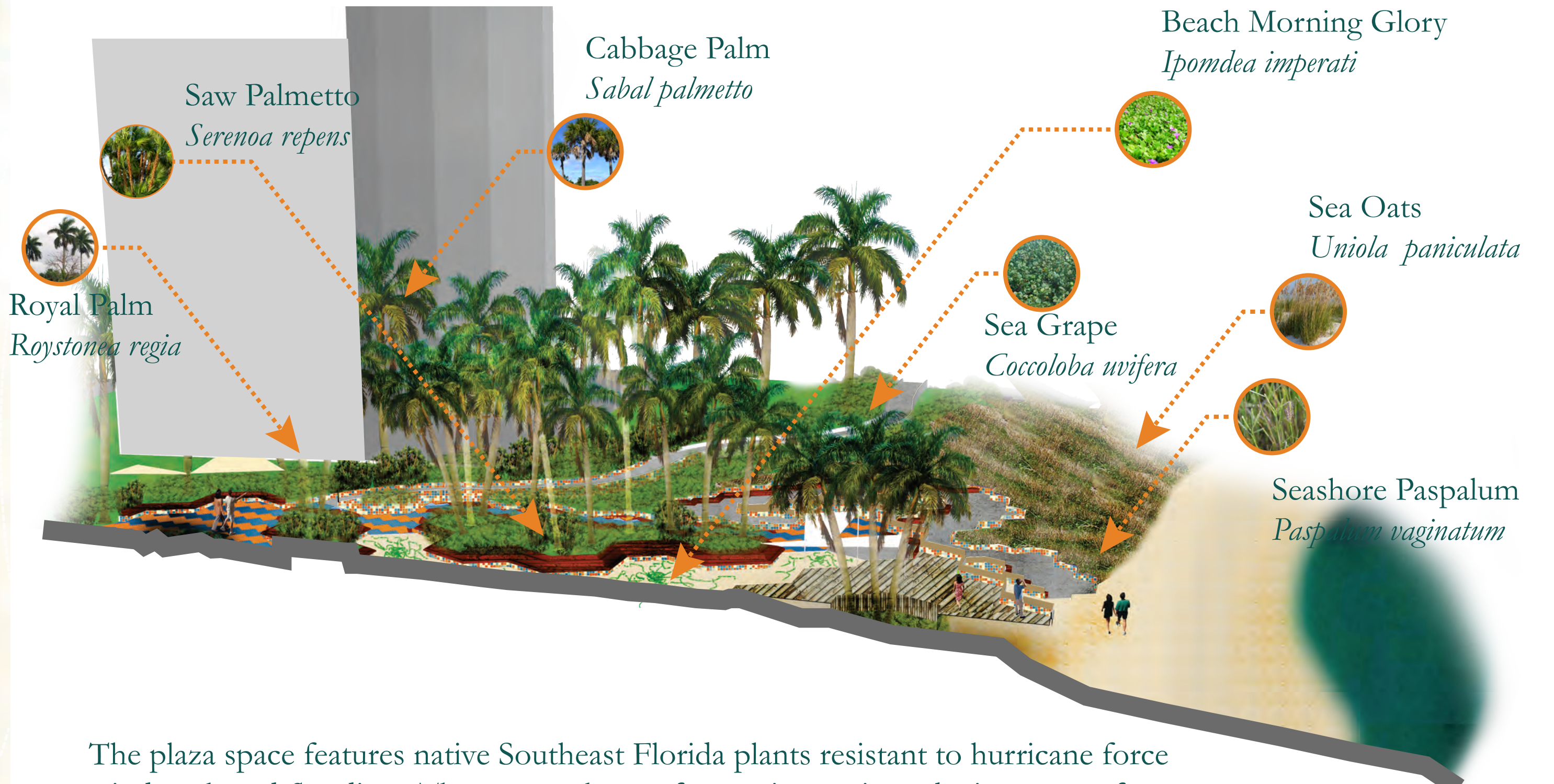


Shade structures made of durable fabric and aluminum supports.



The dune experience and turtle rehabilitation center is the main access for the public onto the beach in this area and will inspire sea turtle awareness and conservation. It will also give people the opportunity to become involved, whether it's a night nesting tour or live hatchling exhibit.

PLAZA



The plaza space features native Southeast Florida plants resistant to hurricane force winds, salt and flooding. The center plaza softscape is a native substitute to turf grass, and even provides a flowering aesthetic. These plant materials will help decrease maintenance costs, especially during a tropical storm event. The Plaza is a major node along the site, providing access to the street and the beach.



The plaza space has sea turtle friendly lighting such as indirect light as seen under the benches, and on the shore side of the palm trees. The blue lighting is solar activated, inlayed when the paving pattern was layed.



DUNE ROOM

This intimate space is intended to be a place of observation, awareness, and education. The space is nestled within the dunes; inspired by the egg chambers that female turtles lay each year, becoming a quiet zone of self reflection and thought



