



Rose Bay Next Generation Restoration

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Location & History

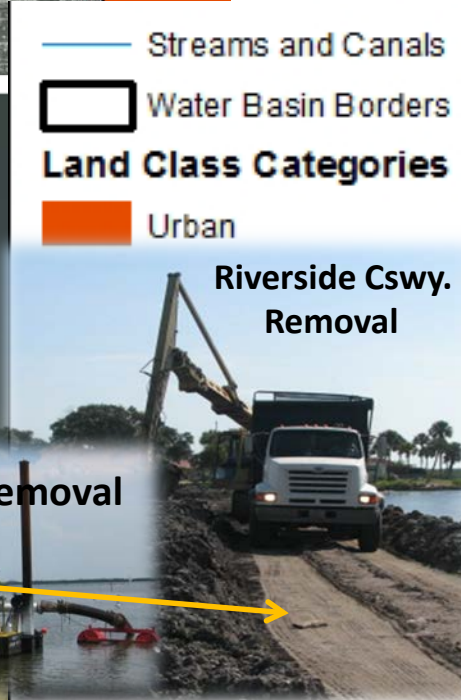
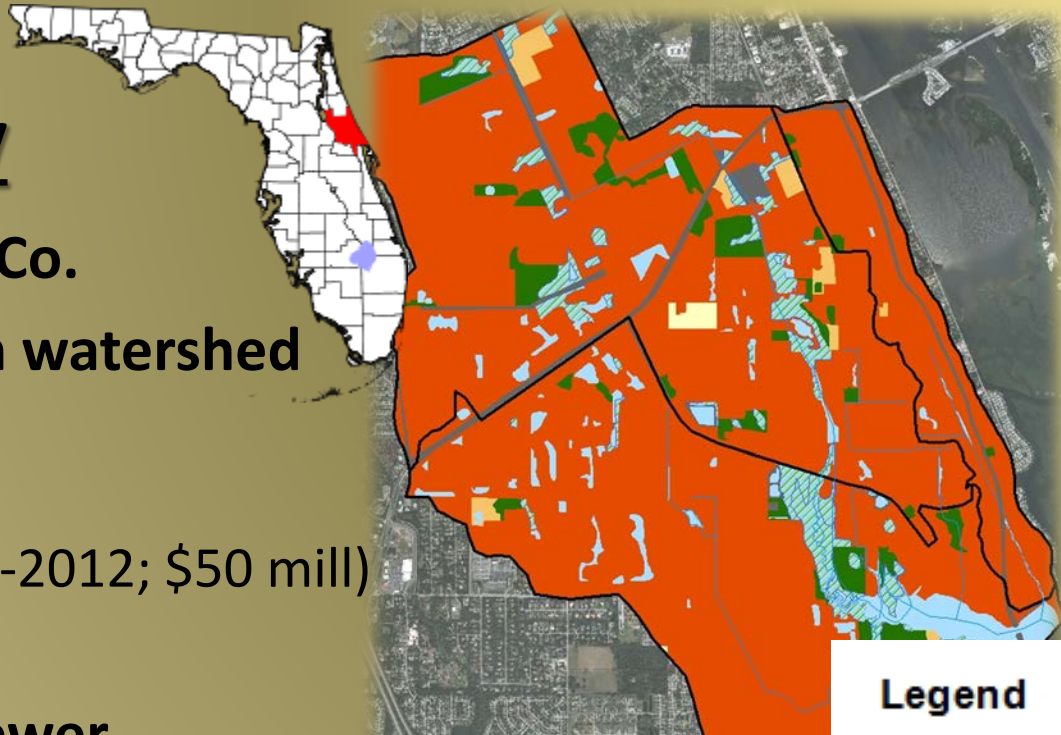
- City of Port Orange, Volusia Co.
- ½ Rose Bay 5,846 acre urban watershed developed

Prior Restoration (1989-2012; \$50 mill)

- Stormwater Retrofit
- Replace Septic w/ Central Sewer
- Remove Riverside Dr. Cswy. & Replace US1 Cswy. w/ Bridge (↑ flow)
- Remove 280,000 yds³ sediment

Previous Results

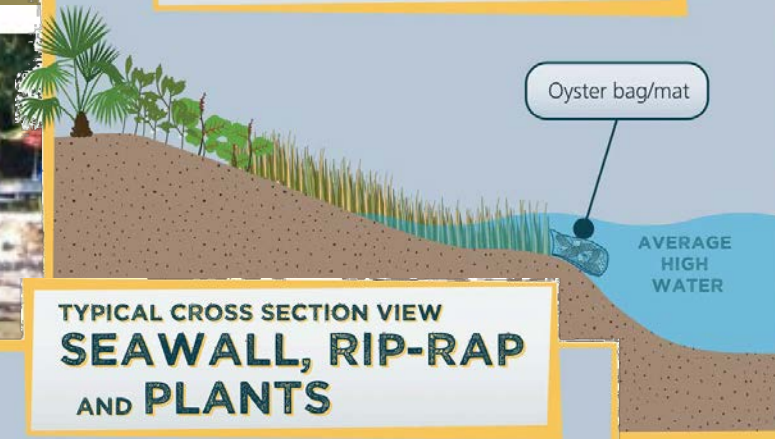
- ↑ water quality, shoreline veg., & oyster clusters/ reefs



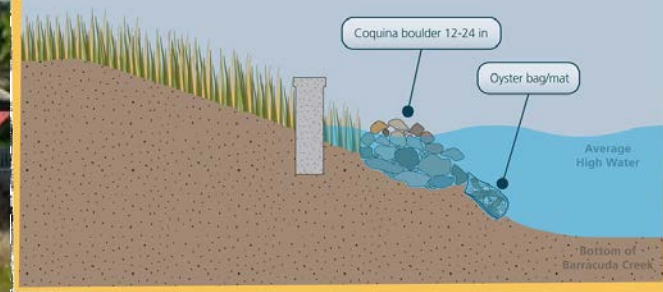
Living Shoreline Types



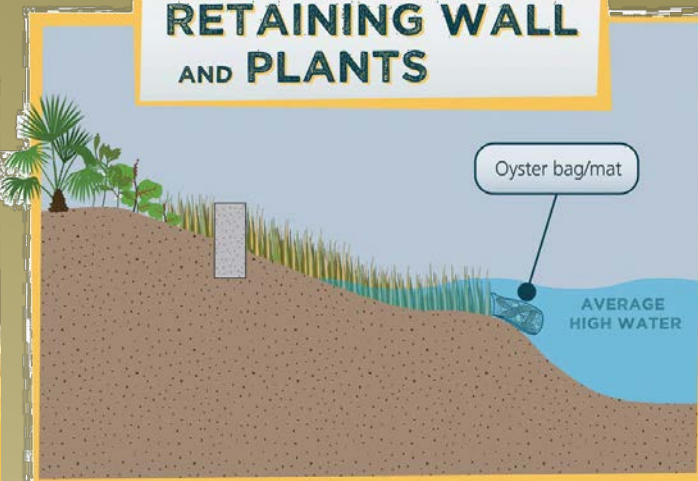
TYPICAL CROSS SECTION VIEW SLOPE AND PLANTS



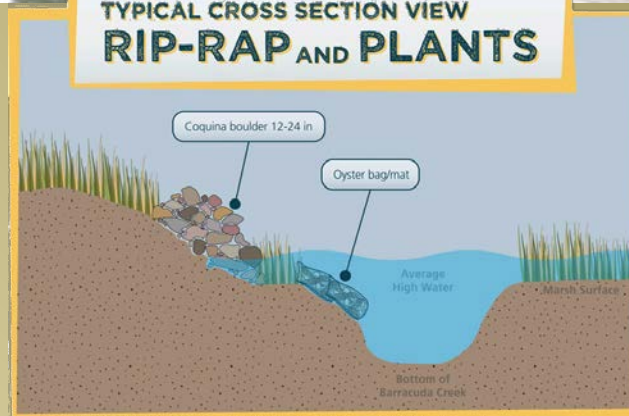
TYPICAL CROSS SECTION VIEW SEAWALL, RIP-RAP AND PLANTS



TYPICAL CROSS SECTION VIEW RETAINING WALL AND PLANTS



TYPICAL CROSS SECTION VIEW RIP-RAP AND PLANTS



Comparison of a bulkhead (top) and a living shoreline (bottom) within 500ft of each other along the coast of NC, before and after Hurricane Irene. Photo from Rachel Gittman, 2015

Living Shoreline Benefits

- Erosion Protection
- Resilient
- ↑ water & habitat quality
- ↑ property values

MANGROVES

FLORIDA'S COASTAL PROTECTORS at KENNEDY SPACE CENTER

MANGROVE HABITATS

REDUCE THE HEIGHT OF INCOMING WAVES BY 90%

provide **800%** more Coastal Protection and **470%** more Erosion Prevention than salt marshes



would provide **4.9 mill. USD** of coastal protection more than manmade barriers

HOW THEY DO IT

MANGROVES

WETLAND PLANT COMMUNITIES THAT GROW ALONG FLORIDA'S COAST

COMPLEX, WOODY STRUCTURE DISSIPATES INCOMING WAVES

ROOTS BUILD SOIL TO ELEVATE THE COASTLINE



SEA LEVELS AT KENNEDY SPACE CENTER ARE PROJECTED TO RISE 20-30 cm BY 2050

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Cost Guide to Coastal Erosion Control Measures			
Erosion Control Measure	Unit	Unit Cost Range	Comments
LIVING SHORELINE MEASURES			
Marsh and Dune Plants	Sq. Yard	\$2.50 to \$5.50/sq yard	Calculated at \$.50 - \$1 per plant at 18" centers (Delivery may cost \$50 - \$75)
Clean Sand Fill	Cubic Yard	\$15 to \$20/cubic yard	Delivered - to coastal area
#3 Riprap	Ton	Less than \$75/ton	Delivered. One cubic yard = 1.7 tons ≤ \$127.50
Geofabric	Sq. Yard	Less than \$12.40/sq yard	Determine needs and shop for better price.
Wooden Sills	Linear Foot	\$65 to \$100/linear foot	Installed
Oyster Shell	Bag	\$2 to \$5 per bag	Material cost only (not including labor)
Oyster Shell	Cubic Yard	\$45 to \$60/cubic yard	Material cost only (not including labor)
Concrete Reef Balls	Linear Foot	\$100 to \$200 per linear ft	Installed
ReefBLK™	Linear Foot	\$175 to \$250 per linear ft	Installed
Rock Breakwater	Linear Foot	\$150 to \$200 per linear ft	Installed
WADs®	Linear Foot	\$350 to \$450 per linear ft	Installed
BULKHEADS			
Vinyl Bulkhead	Linear Foot	\$125 to \$200 per linear ft	Based on four- to eight-foot height, including labor, materials, earthwork, and backfill. Toe protection is used to avoid scouring. Additional fill may be required over time.
Vinyl Bulkhead w/toe protection	Linear Foot	\$225 to \$300 per linear ft	
Wooden Bulkhead	Linear Foot	\$115 to \$180 per linear ft	
Wooden Bulkhead w/ toe protection	Linear Foot	\$200 to \$280 per linear ft	
Concrete Bulkhead	Linear Foot	\$500 to \$1,000 per linear ft	
Sheetpile Bulkhead	Linear Foot	\$500 to \$1,000 per linear ft	

Challenges



Exotics
(Brazilian Pepper)



Sea Walls &
Bare Shorelines



Stormwater
Discharges



Landscape,
fertilizer, &
irrigation mgmt.



Climate Change &
Debris Removal

Harbor Oaks residents remain hopeful despite Hurricane Irma's destruction

While Hurricane Matthew caused major wind damage in October, Irma quickly became a flooding nightmare along the Intracoastal Waterway. The water has

Goals

- Restore degraded inter-tidal areas waterward of existing hard armor
- Model Healthy Estuary Community w/ locally driven habitat mgmt. that can be adopted in other coastal communities
 - Pvt. property is key to large-scale restoration & the benefits it can yield





Shoreline Profiles & Existing Habitat



Early Efforts

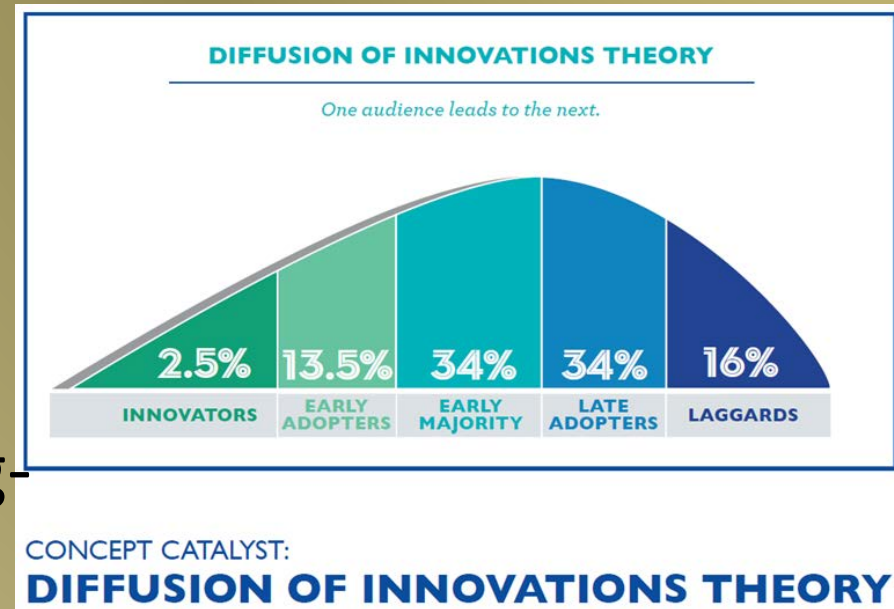
- Worked w/ City to install native plants in road medians closest to Bay
- Completed outreach to 52 parcel owners
 - 14 opted in; state & federal permit apps under review
- Applied for project funding
- Removed hurricane debris (docks) from waters behind participants' homes
- Growing mangroves from fallen seed
- Removal/treatment of Brazilian Pepper
- Community presentations incl. wildlife-friendly yards



Upcoming



- Brazilian Pepper eradication, citizen monitoring & control
- Complete shoreline designs, begin work once permitted
 - Plan yard rain barrel/gardens
 - Work with City re canals
- Complete w/i 5 yrs; expand
- Implement resident-led, long-term monitoring & mgmt. of shorelines & buffers
 - Keeping citizens engaged over time could be challenging
- “How To” manual
- Continue pursuing student research opportunities



Questions?



With thanks to our collaborators: City of Port Orange, Harbor Oaks Neighborhood Assn., East Coast Greenway Alliance, Florida Fish and Wildlife Conservation Commission, Florida Native Plant Society- Paw Paw Chapter, Marine Discovery Center, St. Johns River Water Management District, & Volusia Soil and Water Conservation District