

# **Environmental Stewardship Award Narrative**

## **The Fort Pierce City Marina**

The 2004 back-to-back Hurricanes Frances and Jeanne destroyed 140 slips at the City Marina in Fort Pierce, causing millions in damages to the Marina alone. The twin hurricanes destroyed 150 public slips, 69 vessels and damaged 27 boats for a total of \$15.5 million in damages. An additional \$15 million was lost in public infrastructure, with an annual revenue loss of \$8.5 million for St. Lucie County and \$1.5 million lost revenue for the City of Fort Pierce.

Situated on the Indian River near the Fort Pierce Inlet on Florida's east coast, the destruction prompted the city to set about planning for marina restoration that could withstand another hurricane. The city wanted to protect the marina and vessels from future hurricane devastation, but also saw a need to protect the waterfront. The Federal Emergency Management Agency (FEMA) insisted that FEMA funds could be used only if the city developed a system for future hurricane protection. In addition, the city wanted to protect the Indian River Lagoon, Florida's most biologically diverse estuary, and because of freshwater runoff from canals and Lake Okeechobee, a fragile and compromised ecosystem.

The city designed a cutting-edge system of man-made islands to protect the marina. Once a scaled model of the system had been pretested in Canada and approved by FEMA, the city then had to convince the Army Corps of Engineers, the Department of Environmental Protection and several environmental groups that the

islands would be beneficial and not harmful to the environment. By 2010, the city had earned everyone's trust to begin the project. Fully funded by FEMA at a cost of more than \$18 million, the islands were finished in 2013.

### **Protecting the Waterfront**

FEMA's financial support was based on the plan being feasible, viable, and cost-effective. It also required hazard mitigation, environmental planning, historic preservation and statutory and regulatory compliance. A number of regulatory agencies, as well as stake holders were involved in the planning and implementation, including, but not limited to, the US Army Corps of Engineers (USACE), the Environmental Protection Agency (EPA), FEMA, the Florida Department of Environmental Protection, (FDEP), the Florida Inland Navigation District (FIND), the Florida Department of Transportation (FDOT), St. Lucie County and the City of Fort Pierce. The project's objectives included providing a 100-year storm wave and current protection, reduction of basic currents, minimizing changes in sediment transport patterns, improving access channel navigability, protecting seagrass beds, providing for manatee transit, providing ecological enhancements with structural performance and protecting the city waterfront.

The result was a network of breakwater islands comprised of about 15 acres, but covering a water habitat area of almost 22 acres, that included an oyster habitat, artificial reef, mangroves, coastal dunes, seagrass and juvenile fish and shorebird habitats. The islands consist of foundational high-strength polypropylene, sand-filled geotextile tubes. On top of the tubes is a layer of high density, flexible, UV stabilized

polypropylene specially constructed rock-filled mattresses; the top layer is armor stone that allows for plantings of mangroves and other coastal dune vegetation to stabilize the islands and attract birds. The 10.5 acre Tern Island, the largest island with cross groin features for stability and sand fill, is 1,500 feet long and 300 feet wide.

The project took six years to engineer and permit at a final construction cost of \$18 million. Established as a pilot, one-of-a-kind project, the islands include 80,000 plants, 93,518 tons of rock, 100,000 cubic yards of sand and 2,580 tons of oyster cultch. The islands include 1.26 acres of oyster habitat, 6.27 acres of artificial reef, 1.55 acres of mangrove, 4.55 acres of coastal dune habitat and 8.12 acres of seagrass.

The islands sit about 700 feet off shore, provide critical storm surge protection and serve as a sanctuary for juvenile fish. Mangroves and oyster shells attract birds, oyster larvae, fish, and other marine life.

### **Constructing the Islands**

The process of constructing the islands presented many challenges. Strong tidal currents exist, with dynamic flood shoaling. Existing seagrass needed to be protected. In addition to prior and concurrent extensive off-site mitigation, extensive monitoring was required of the islands' performance and maintenance as well as monitoring of habitats. Because of the significance of the surrounding shallow water habitat, the entire construction project followed stringent regulations. To further protect the fragile ecosystem, all construction was executed from shallow-draft barges to provide ample clearance from the bottom without damaging the local substrata. Contractors

incorporated numerous eco-friendly measures to further protect the threatened and endangered species that call the Indian River Lagoon home. In addition, the City deeded 26 acres (adjacent to the Inlet State Park) of pristine seagrass beds, tidal flats and submerged mangrove habitat to the State.

### **The Results**

Two years of monitoring was required from the date of completion in May of 2013. The islands are exceeding expectations in providing a habitat for juvenile fish and other sea life. The island vegetation has done its job in attracting a variety of birds. The islands are cleaning the waters of the Indian River Lagoon, while increasing oysters, mangroves and seagrass.

Following the waterfront protection and environmental enhancements, the City of Fort Pierce added dockage almost doubling the number of boat slips. Amenities were added, including free WI-FI and Web cameras that show real time weather conditions at the waterfront. Fueling is available 20 hours a day, 7 days a week. The Marina is 16 nautical miles to the Gulf Stream, 82 nautical miles to the Bahamas and 2.5 nautical miles to the best all weather inlet on Florida's east coast. Walkable amenities include the award-winning Saturday Farmers Market, the Sunrise Theatre for the Performing Arts, the Manatee Observation and Education Center, and a variety of restaurants in Historic Downtown Fort Pierce.

### **Conclusion**

The City of Fort Pierce has designed an innovative project that protects the marina and the waterfront, and at the same time creates natural habitats to enhance the integrity and biodiversity of the Indian River Lagoon. The islands positively impact the Indian River Lagoon by cleaning its waters, increasing sea and plant life and providing a natural attraction for bird life. The island configuration is unique in waterfront protection and protecting the Lagoon's ecosystem. With adjustments for local weather and water conditions, the island system concept can be reconfigured to protect other waterfronts throughout the world. This one-of-a-kind project has won several technical awards, and the Marina has won Florida Main Street's Honor award for outstanding public improvement. Will the protection work against the next 100 year storm event? We can wait 90 years for the test.