

**Project Title: Can Waters around Durney Key, Pasco County, Florida, Support Coral Recruitment to Artificial Substrates?**

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**Executive Summary Prepared for the City of Port Richey - 3 December 2008**

### ***Introduction***

To determine whether an artificial reef installation is feasible, there must be a thorough characterization of the habitat. An understanding of both small-scale and large-scale environmental processes is needed to determine factors that potentially will influence the reef. Large-scale processes include coastal circulation, wave climate, and sediment dynamics that take place over spatial scales of tens to hundreds of kilometers in the region of the reef. Small-scale processes include the physical characteristics in the immediate vicinity of the reef – the local current, wave and tide characteristics, temperature, salinity, and suspended and bottom sediments at a proposed reef site.

The City of Port Richey, Florida, was considering installing an artificial reef of porcelain modules near Durney Key, a dredge spoil island just offshore. To assist in determining the feasibility of this proposal, three objectives were pursued: a) to characterize the oceanographic setting of Durney Key, including hydrodynamics, water quality and invertebrate biota; b) to investigate the potential for successful coral recruitment and growth in Durney Key waters; and c) to determine if porcelain is a suitable substrate for settlement of the larvae of coral species present in the waters off west central Florida.

### ***Methods***

A map of Durney Key, with sampling sites, is presented in Figure 1. The parameters evaluated are listed in Table 1.

### ***Results***

Data from Acoustic Doppler Current Profilers revealed that currents around Durney Key are tidally dominated with velocities increasing in winter due to frontal passages. Seasonal stage variation ranges from 0.29 m (11.4 in) to 0.64 m (2.1 ft) and seasonal temperature ranged from 10°C and 35°C for winter and summer, respectively. Atmospheric data from the Port Richey COMPS site showed average wind speeds were higher in winter (3.7 m/s or 12.4 ft/s) than summer (3.1 m/s or 10.2 ft/s), corresponding to increased average water velocities. Compared to Florida Keys patch reef waters, waters around Durney Key averaged 12 parts per thousand (ppt) lower in salinity, pH was more variable with a lower minimum, and total phosphorus was much higher. Ceramic

and porcelain recruitment tiles deployed to investigate larval recruitment were colonized by turf, coralline and macroalgae, with barnacles recruiting secondarily. Sediment cores revealed shelly assemblages characteristic of productive estuarine conditions. No stony or soft coral recruitment was observed.

### *Conclusions*

The Durney Key area was deemed not suitable for coral recruitment and growth on an inshore artificial substratum because of temperature extremes, potential for minimal water movement during summer, and frequent occurrences of low salinity and pH, and high total organic phosphorus concentrations in nearshore waters. Faunal studies demonstrated that the dominant recruitment reflects the common coastal/estuarine biota, which does not include reef-building corals.

This study clearly demonstrated that cooperative projects between local municipalities and universities can be mutually beneficial. The project provided a graduate student the opportunity to work with local officials at the early stages of determining the feasibility of a project, out of which she earned a master's degree. In this case, because the graduate student had a support stipend from the USF College of Marine Science, the costs to the City were primarily for logistical support, equipment underwrite, and sample analyses. With this relatively modest investment, her assessment potentially saved the City of Port Richey at least tens of thousands of dollars in feasibility studies. More importantly, had the artificial reef project been undertaken without a feasibility study, the monetary costs could have been much higher and the results could have been unsatisfactory, and potentially even disastrous.

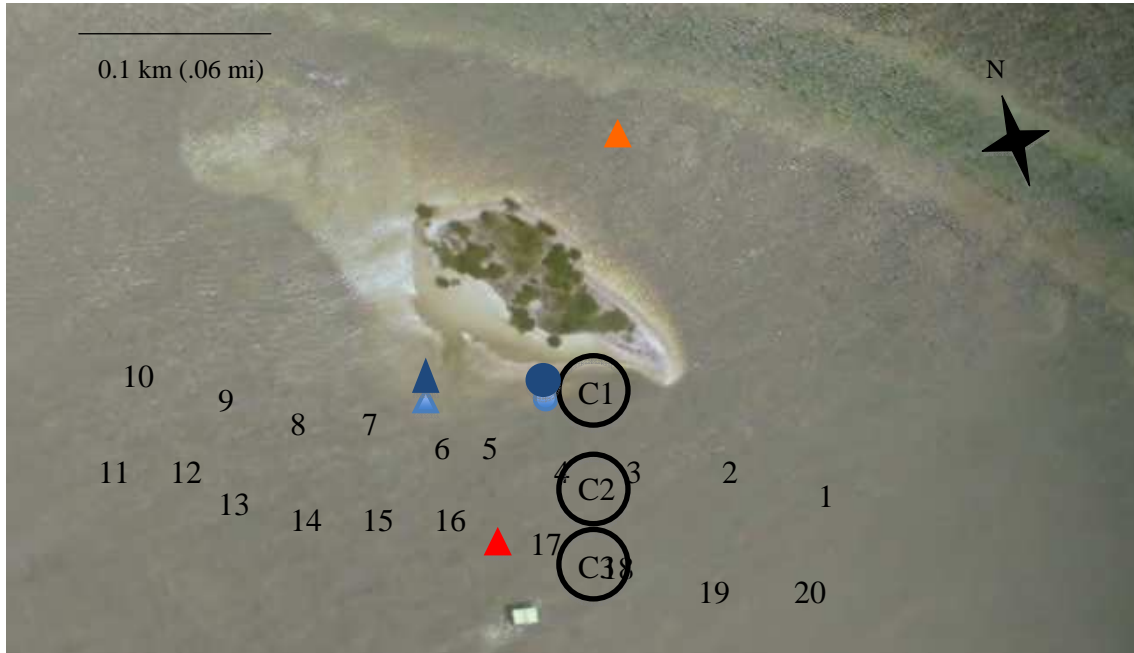


Figure 1. Durney Key with locations of various samples, where triangles represent ADCP locations with blue being ADCP A, red ADCP B and orange ADCP C; blue solid circle representing location of surficial sediment collection, open black circles representing sediment cores with C1 = core 1, C2 = core 2, C3 = core 3 and numbers representing stakes of recruitment tiles.

Table 1. Parameters evaluated with corresponding investigation techniques.

Parameter Category	Method Employed	Specific Parameter
Physical	Acoustic Doppler Current Profiler (ADCP)	Water temperature, pressure (indicating depth), current velocity, current direction
	Data from COMPS station	Air temperature, wind speed, wind direction, relative humidity, rainfall
Chemical	Water samples	Inorganic nutrients (NO <sub>3</sub> <sup>-</sup> + NO <sub>2</sub> <sup>-</sup> , NO <sub>2</sub> <sup>-</sup> , NH <sub>4</sub> <sup>+</sup> , Si(OH) <sub>4</sub> , TP) salinity, temperature, pH, total dissolved solids
	Sediment samples	Organic pollutants suite and heavy metals suite
Sedimentological	Sediment push-cores	Grain-size analysis
		Percent carbonate
Biological	Recruitment tiles	Recruitment rates of benthic biota
	Sediment push cores	Invertebrate and foraminiferal assemblages
	Lime rock	Foraminiferal density and assemblage