Using Reef Balls for Living Shorelines

Best Practices:

Jim McFarlane

Objective

By surveying comparative living shoreline applications since 1996 we will develop best practices for living shorelines. Shoreline comparisons will include: Reef Balls concrete block, wood, WADS, Castle Blocks oyster shell bags, granite riprap and other materials and designs use on the project sites.

Methodology

To start with we will research the original project goals. Then review historic data on surrounding area. Analyze data from navigational charts, NOAA wind and wave action. Next is an analysis of watershed data, including salinity searching from plankton studies, and macro-algae studies for the site? Next we turn to NASA satellite image data reviewing site data from the 1994 forward looking at indications of shoreline changes as well as indicators of high or low energy. The images can also provide indicators of water movement and shifting of sands. An onsite survey with 360 4K studies of the breakwater / reef to document and review for verification purposes. The site surveys will identify flora and fauna that were specific objectives in the original site plan. Any unexpected positive or negative results will also be recorded. Using a cubic meter a comparison of the various test modules collecting quantitative data biased on surface area. This is a new approach as often studies are limited to a single square, or a line transit. A line transit from perpendicular to the shoreline across the site provides a quantitative value for the accretion of sand, or erosion. Data reviews will indicate the best designs, and best materials specific to a breakwater / reef for maximizing the overall health of a shoreline habitat. At that point sharing the data will help planning teams make justifiable decisions as they design living shoreline projects.

Background

Openings are complex curves creating eddy currents id eal for filter feeders. Tremendous surface area in a stro ng module designed to stay in place.

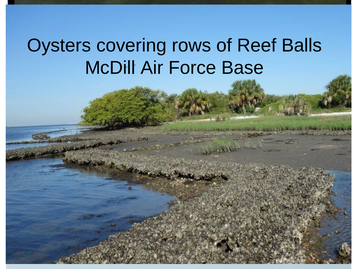
Today's technology has changed how we look at and analyze data. 4K video is now available at reasonable price. And when you add the 360 degree capabilities you now have a better way to look at a cubic meter for collecting data, particularly when submerged inside the module.

Observations

Bird Island Phase I (year 4) 2016

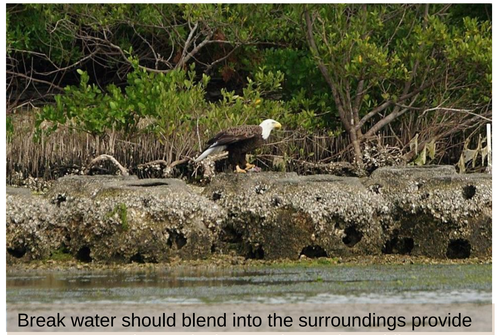
360 degree survey inside and outside of the modules, VR video and still photos.

Tampa Baywatch Fantasy Island 2016



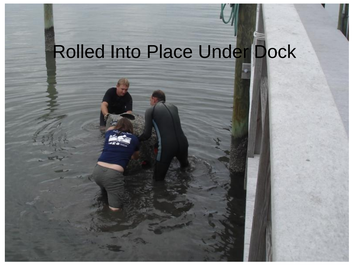
Water is clear, prior to ICW boat traffic. Add Breakwater closer to the source of waves.

Natural Looking Shoreline

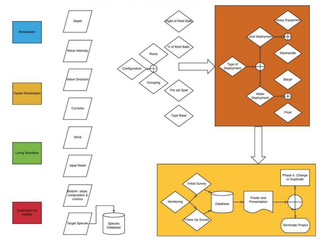


Break water should blend into the surroundings provide wave attenuating, reducing erosion and providing a surface for filter feeders as well as fish coruscations and moleskins. Reef Balls showed a much greater diversity of species per cubic meter than other materials.

Oyster success, is better with relief from the bottom, that will also provide additional Essential Fish Habitat.

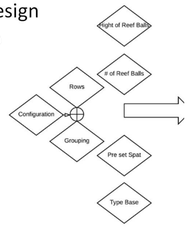


Stick with the Flow



Design

- Concave = ends further from shoreline
- Convex = center further from shoreline
- Straight
- Groupings arcs, ovals, staggered
- Micro habitat 1 Reef Ball to multiples
- Depth 1 – 5 rows
- Sizes vary, highest in center or toward shore.



Conclusion

With 10 sites surveys we were able to develop the flow chart and solutions for best oyster growth, best wave attenuation, and best placement for Essential Fish Habitat. The Reef Balls out performed other materials by over 98%.