

Case Study: Biscayne Bay Spoil Island Shoreline Stabilization

In 1992, Hurricane Andrew, a Category 5 storm crossed the south Florida coast and caused unprecedented damage. The storm destroyed mangroves on the spoil island of Chicken Key leaving a barren and eroding shoreline.

This island is located in the Biscayne Bay Aquatic Preserve off the Deering Estate in Coral Gables, Florida. In 1997, five years after the storm, mangroves had not been able to naturally recruit along the eastern side of the island due to the high-energy exposure to Biscayne Bay.

Miami-Dade County, DERM, saw Chicken Key as an opportunity for the implementation of Riley Encased Methodology™ (REM 2010), Patents Pending, in restoration and shoreline stabilization of the island.



The photo to the left shows installation of the encasements along the barren eastern shoreline in 1997.

The planting included both Red (*Rhizophora mangle*) and Black (*Avicenna germinas*) mangroves to ensure protection of the spoil island from influence of the open waters of Biscayne Bay. Planting the two species at the proper elevation provided some diversity to more accurately restore the natural ecosystem.

Wrack line was a major destructive influence and inhibiting factor preventing natural recruitment and reestablishment of mangroves along this shoreline. The following photo shows the collection of grasses, wood planks and

consumer products that are routinely driven against the island during inclement weather events, such as tropical storms, hurricanes and cold fronts.



Following the planting, periodic site surveys were performed to document the establishment of mangroves and the resulting shoreline stabilization.



At the site review in June 2001, the trees had begun the adaptation process, which is a key principle of Riley Encased Methodology™.

The photo to the left as taken during this site survey of the mangroves undergoing the self-regulated adaptation process. The following photo shows splitting of the encasement as the cross sectional area of the developing tree expands against the interior encasement wall. The multi-position opening of the encasement at engineered stress points facilitates the adaptation process and is one of the patents pending features of our proprietary encasement design and manufacture.



In the previous photo a black mangrove is in the foreground with the root system pneumatophores extending outside the encasement and above the surrounding sediment. A red mangrove is shown in the background with its prop root structure also extending outside the encasement. In 2001, as evidenced by the photos, the plantings were undergoing the adaptation process that would ultimately result in mature trees independent of the encasements.

When the tree completes the self-regulated adaptation process the encasement has automatically been split into three longitudinal sections enabling the removal of the encasement from the environment. This is another

exclusive feature of our patent pending encasement design that assures optimized growth and establishment of self-sustaining mangroves.

Numerous tropical storms and hurricanes, which included Floyd, Dennis, Irene, Emily, Frances, Jeanne, Chris and Katrina, caused high wind and wave activity at the site from 1997 to 2007.

The inherent ability of the encasement device to protect plantings from inclement events is a benefit of the REM



Principle of Isolation. Isolation of the seedling inside the tubular encasement device ensures that juvenile plants are protected from wind, waves, wrack and debris during the early stages of development when most vulnerable to environmental influence and damage.



The adjacent photos are from the tenth year site survey conducted in 2007. The trees have well developed foliage, aerial or pneumatophore root systems, and have reached reproductive maturity. The shoreline of this spoil island has been successfully stabilized and new habitat has been created for a variety of birds, fish and crustaceans.



Chicken Key is a quintessential example of employing REM technology as a viable habitat creation, restoration and shoreline stabilization tool.


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Patents Pending

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