Living Shoreline Techniques and Successes

**OBJECTIVES**
1. Restoration and protection of shoreline
2. Increased shoreline resilience
3. Accretion of sand
4. Reduction of wave action
5. Protection of native shoreline vegetation
6. Providing Essential Fish Habitat
7. Long term benefit associated with rising sea level
8. Ability to withstand storm impacts

**METHODS & MATERIALS**
1. Evaluation of the proposed site
   a. Site survey (above and below the surface)
   b. Assessment of environmental factors and impact
2. Site design and selection of modules
3. Permitting
4. Secure funding
5. Construction of Reef Ball modules
6. Deployment
7. Monitoring

**Success with Reef Balls**
- Government land protection projects:
- Homeowner USACE mitigation:
- NGO – projects:
- EFH – Essential Fish Habitat
- Beach Nourishment Projects
- Oyster, Mangrove and Shoreline Restoration

**Living Shoreline Restoration & Stabilization**
Using Reef Balls as a breakwater around a site of plant placement proves to be the best choice, due to their permeability vs. solid rock or bagged shells. The design of the Reef Ball with a low center of balance keeps them in place when other materials may be scattered.

**Breakwater**
The size of Reef Balls selected were determined by the depth they were placed. In general for erosion control, we like to place the Reef Balls at a crest height just below the calcifying biological tide line (highest point where corals and calcifying marine life lays down material) sometimes higher when it is desired for the Reef Balls to be exposed at low tides such as for oyster projects. Because Reef Balls are available in 11 sizes, the crest can be built to a uniform level.

**Oyster Restoration**
The marine grade concrete with special additives for proper pH balance, has proved great for growth of oysters. The growth over a couple months is amazing, and by 2 years, the oyster reef is often fully covered.

**Mangrove Restoration**
In challenging environments, or in areas where the normal tidal hydrology is disrupted, natural mangrove restoration is compromised. This unique mangrove planting system was used for direct planting of propagules in areas of high energy. Oyster balls, and Mangrove pots are ideal for setting up a nursery, and later locating on the restoration site.

**Habitats - EFH, and other Marine Habitats**
The variety of sizes of Reef Balls, with different hole sizes, makes it possible to create the right habitat for a specific species. Adding model balls over the openings can further protect the habitat from predatory fish.

**Stratford, Connecticut**