



## Living Shorelines Tour Site #3 - Breakwaters

### SHORE PROTECTION FUNCTION

Breakwaters are built in near-shore waters, usually parallel to the shoreline, to reduce wave energy leeward of the structure. Depending upon their function, they can be deployed as detached freestanding structures or connected to the shoreline. They reduce wave action through a combination of wave refraction and dissipating incoming wave energy. Breakwaters are used to protect pocket beaches, or upland.



*Aerial view of breakwaters at Kings Reach.*



*Kings Reach breakwaters.*

### DESIGN & CONSTRUCTION ELEMENTS

The breakwaters at the Kings Reach portion of JPPM are typical of Chesapeake Bay breakwater systems. In this particular area, highly valuable archaeological remains required protection, so the bank could not be graded. Therefore, fill material was placed in front of the bank to provide protection and then clean

sand fill was brought in to create the breakwater system. After the material was graded to the design specifications, it was planted with both smooth cordgrass (*Spartina alterniflora*) in the “low marsh” zone and saltmeadow hay in the “high” marsh, above mean high tide.

## **ECOLOGICAL ELEMENTS**

It is easy to notice that the sand bars (tombolos) that join the shoreline to each breakwater vary from strongly connected to just barely attached - at low tide.

Exposure to greater wave energy has eroded the material behind one breakwater in particular, yet the beach remains stable.

When first constructed, these bars were all similarly joined with a substantial amount of fill material. Observe how the

plant communities behind the breakwaters are different. The shoreline behind the marginally connected breakwater supports less vegetation and looks more like a beach. In contrast, behind the northernmost breakwater, the tombolo is high in elevation and completely intact.

Notice how the northern tombolo supports sapling trees and shrubs – looking more like an abandoned agricultural field than a beach.

Also, nearby you will see a stand of mature deciduous trees that are a convenient source of seed material for future trees to root and develop.

In ecological terms, the sequence of stages and changes occurring on the northern breakwater is called succession. Succession involves the continuous replacement over time of one plant community by another. If untouched by humans or the effects

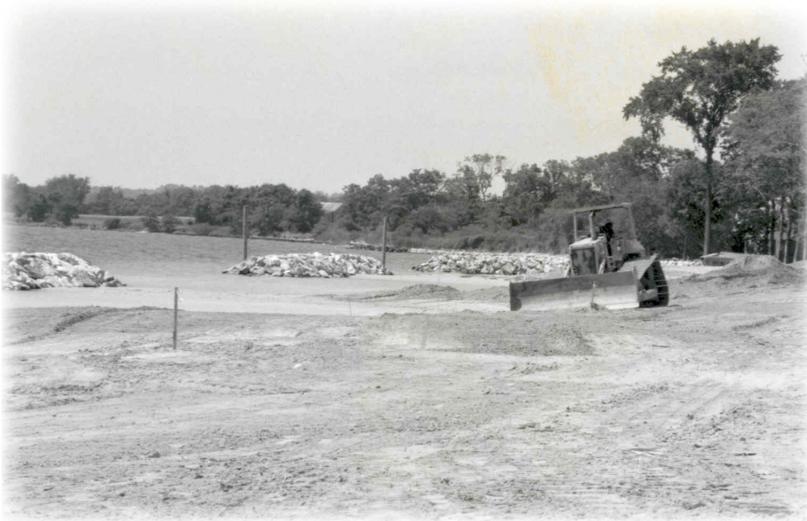
of erosion, replacement populations of both plants and animals would ultimately lead to a climax or mature ecosystem that is relatively stable. Most often, along unprotected coastal shorelines, plant and animal communities are in a continuous state of change - disrupted by constant storms, sea level rise and erosion.

## **PERFORMANCE**

Although, due to Hurricane Isabel, the breakwaters are no longer uniformly attached to upland, the system has succeeded in protecting the bank and valuable buried archaeological remains.



*Pre-construction shoreline at Kings Reach.*



*Kings Reach breakwaters during construction.*