The O'Brien relationship between the spring tidal prism, P, and A_c is

$$A_c = aP^m \tag{10.2}$$

where a and m are empirical coefficients which vary somewhat with the prevailing wave climate and other local conditions. The significance of this relationship is that it implies inlet widening and/or deepening with prism. Sea level rise in most cases will increase the prism (greater repletion), to which the inlet flow area will respond likewise. Equation 10.2 is particularly applicable to sandy inlets, as described in section 6. Increasing prism means greater sand flushing ability of the channel. The sand is transported by higher currents out of the channel, both bayward and seaward, to flood and ebb shoals, respectively. With increasing prism, there is likely to be a corresponding increase in the volume of these shoals. Furthermore, as the sea level rises the deltas must grow in elevation to keep up with the rise, implying that any natural bypassing of sand would reduce and that downdrift erosion would increase.

Stabilized inlets will be affected strongly by a large sea level rise. The protective jetties, which retard the ability of the littoral drift to enter the navigational channel and reduce the wave climate in the channel, would become less effective as they are submerged. Also, the stability of the jetties may be reduced due to increased wave heights as a result of sea level rise (National Research Council, 1987b).

The sea level rise scenario imposes a much more gradual change in the inlet/bay system than, for example, channel dredging. There should be enough time for the system to keep pace with water level rise, with the attainment of quasi-equilibrium under the prevailing hydrodynamic forces and sediment movement. Equilibrium is determined jointly by hydraulic conditions characterized by the repletion coefficient (Eq. 10.1) and by sedimentary requirement as per Eq. 10.2 (O'Brien and Dean, 1972).

It is also self-evident that shoreline response as far as inlets are concerned is contingent upon the availability or lack of sediment supply. For example, the barrier islands of the Mississippi-Alabama coast have been migrating and "disappearing" due to lack of sediment supply (Otvos, 1979). See also Fig. 6.1. Over the past ~ 100 years, this factor seems to have been far more important than (absolute) sea level rise.