further increase in salinity and, in 1962-63, when the deepening project was completed, the salinity rose to 2,200 ppm. A physical model of the estuary was subsequently constructed to examine the problem in further detail (Brezina, 1975). The ultimate outcome of the channel deepening projects was to turn Lake Maracaibo from a relatively fresh water lake into a brackish water lagoon, with a complete change in life forms[3].

The effect of dredging is commonly evaluated for Environmental Impact Statements. Such a study was carried out as prerequisite to the construction of the Trident submarine base at King's Bay, Georgia. The ocean entrance to this bay is through St. Mary's Entrance, Florida. Fig. 9.5 shows the application of Eq. 9.1 for predicting the high and low water (tidal range 2.2 m) salinity profiles in this prototype case, prior to dredging (Parchure, 1982). Although agreement between theoretical curves and measured data is obviously very rough, the theory, although approximate, does simulate the overall trends suggested by the measurement. Dredging plans called for a deepening of the channel between the entrance (end of jetties) and King's Bay ranging from 0 to 4 m. A 4% rise in the salinity was predicted 20 km up the entrance as a result of dredging (Environmental Science and Engineering, Inc., 1980).

The aforementioned examples are merely illustrative of the basic phenomenon of interest, and are not meant to demonstrate the power of available technology with respect to physical or numerical models and their application. The subject matter has been covered extensively in literature on fluid mechanics and hydraulic engineering. For a fuller treatment, the work of Fischer et al. (1979) may be cited. Here, it will suffice to make reference to a recent study conducted to examine the potential effects of deepening the lower Mississippi river on salinity intrusion (Johnson et al., 1987). In Fig. 9.6, the duration of the saline wedge intrusion (days per year) is plotted against distance above the head of a number of passes (distributaries) in the vicinity of New Orleans. Two curves are shown, one for a 12 m deep channel (present depth is 9 m) and another for a 17 m deep channel. These curves were generated numerically. The model was calibrated

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[3]Jindrich Brezina, University of Zulia, Maracaibo, Venezuela, personal communication.