against data obtained during the 1953-54 low-flow period. The results essentially are illustrative of the effect of channel deepening from 12 m to 17 m. Thus, for example, this effect would increase the duration of the wedge at 180 km from about 40 days to about 60 days per year.

9.5 RESEARCH NEEDS

Scientific work in understanding the basic processes of mixing between salt and fresh waters is likely to continue well into the future, in order to steadily improve predictive methodologies, which have at present attained a reasonable degree of sophistication. However, further improvements are highly desirable.

An area which deserves further consideration is mixing under wave action, or combined wave and tide action. At present the effect of waves in this respect is only weakly understood. Much of analysis carried out so far appears to have been directed towards situations dominated by tides alone. It is noteworthy as well that with deeper water associated with sea level rise, waves would be admitted more freely, thereby decreasing fluid stratification by virtue of greater mixing in the vertical direction, particularly in estuary mouths.

Another important research area is related to the development and motion of fronts due to salinity, temperature and sediment density gradients. Understanding the behavior of these fronts is vitally important to a range of water quality and ecological issues.

It must be mentioned that most of the work done to-date appears to have dealt with such effects as those related to channel deepening or changes in upstream river hydrology, rather than sea level rise. As noted, sea level rise can also increase the coastal tide and wave action, particularly if the coastline is rocky, and does not recede, while water depth increases. A similar situation can also arise if the shoreline were erodible, but sea level rise was so rapid as to prevent depths at the mouth from achieving quasi-equilibrium with the hydrodynamic forcing. This would lead to a situation wherein the estuarine mouth would be in deeper water, and where the tide (and waves) would arrive with lesser hinderance due to reduced bottom friction and lesser chance of wave breaking in the offshore waters. In most work carried out so far, the coastal tide (and waves) is typically assumed to practically remain unchanged.