SUMMARY

This enquiry into the geomorphological evolution of the Gippsland Lakes has led to a number of conclusions, best summarised by recapitulating stages in the development of the present configuration.

1. Late in Tertiary times, uplift of the Eastern Highlands of Victoria and continuing subsidence along the Latrobe Valley syncline, with further movements of deformation to the south, created essentially the outline of the present continental margin, a coast with a broad embayment (the East Gippsland embayment) into which flowed a number of rivers.

2. During Pleistocene times, tectonic deformation continued to influence the configuration of the coastal region, accompanied by a sequence of glacio-eustatic oscillations of sea level marked by marine transgressions which submerged the coast and regressions (Glacial phases) to low sea level stands, when extensive areas of the present sea floor were uncovered.

3. The coast of the East Gippsland embayment was generally cliffed in late Pleistocene times, but a barrier (the prior barrier) began to develop in front of the cliffs at the head of the embayment during a phase (Last Interglacial?) when the sea stood at, or up to 3 metres above, its present level. A spit then grew across the mouth of the embayment from the south-west, and was widened to form the original inner barrier, enclosing lagoons on the site of the present lakes.

4. During the Last Glacial phase, sea level fell and these lagoons drained out. The rivers extended their courses across the lagoon floors and out through gaps in the barriers, down to a low sea level. Some lagoon floors which emerged at this stage persists as areas of low plain, up to 3 metres above present lake level. On the stranded barriers, parallel dunes were partially rearranged into parabolic dunes, and it is probable that a slight transverse tilting of the coast lowered the eastern part of the inner barrier in relation to the western part.

5. The returning Holocene marine transgression flooded back into the lake basin, and brought with it the nucleus of the outer barrier. Deposition as the transgression came to an end partly overlapped the subsided eastern part of the inner barrier, so that the Boole Boole Peninsula is part of Pleistocene, part Holocene. Farther west, barrier islands were initiated offshore and subsequently linked, lengthened, and widened to form the outer barrier. Outlets from the lakes were deflected north-eastwards until only an intermittent outlet persisted, close to Red Bluff. Thus enclosed, the Gippsland Lakes were to some extent re-shaped by processes leading towards segmentation into smaller lagoons, but this was halted when, with sea water largely excluded, the lakes became fresher and reedswamp developed around their shores, initiating the process of swamp land encroachment.

6. This was the condition of the lakes when Europeans first reached then in 1839. Subsequently the cutting of an artificial entrance (1889) has led to an increase in lake salinity, die-back of much of the shoreline reedswamp, vegetation changes on bordering swamp land, and the onset of erosion around the lake shores. This erosion has been accentuated by the effects of cattle grazing and by other, less important factors. Shoreline erosion has become widespread on the shores of Lake King and Lake Victoria, and has halted the growth of the Mitchell and Tambo deltas, but in parts of Lake Wellington, less affected by salinity increase, swamp land encroachment and delta growth still continue.

7. In recent decades the Ninety Mile Beach has been receding, narrowing the outer barrier, except in sectors on either side of the artificial entrance, where progradation took place after the entrance opened in 1889, and sandy forelands have been maintained. If erosion on the Ninety Mile Beach continues it is possible that gaps will open in the narrow sector east of Ocean Grange, resulting in further influx of sea water

to the Gippsland Lakes, and inducing changes in configuration around the existing artificial entrance.

8. During the past twenty years (1958 – 78), sectors of the shoreline of the Gippsland Lakes have continued to advance as the result of deposition of beach material or encroachment of swamp land, or to retreat as a consequence of wave and current scour (Figure 36). In general, the extent of advance or retreat has been up to a metre over the two decades, but on soft swampy terrain (as on the shores of the Mitchell and Tambo deltas) there have been losses of up to 5 metres, and on the accreting parts of sand spits (as on the shores of Cunninghame and Bunga Arms) there have been gains of up to 5 metres, during this twenty year period. The shoreline of the Gippsland Lakes remains in a dynamic condition, but rates of change are generally slow in comparison with prevailing rates of shoreline change on the world's coasts (Bird 1976b).

The geomorphological processes at work in and around Gippsland Lakes have been observed in other lagoons on the coast of south-eastern Australia (Bird 1967), and in coastal lagoon systems elsewhere, variations from one system to another being related to contrasts in geological, climatic, and ecological setting. The Gippsland Lakes have become widely known as a region where ecological factors have influenced the evolution of lagoon shore, and as a classic illustration of the importance of the vegetation factor in geomorphology.