is fully exposed even at the lowest spring, when normally most of the inlet is uncovered. Such wind effects cause tidal conditions inside the inlet to become out of phase with those outside—an effect which may last for several days.

Depth Contours

Depth contours in the head of the inlet were estimated. A grid system was used, based on the New Zealand Provisional 1:25,000 Map of Otakou (sheet S 164/5) and in the basin of the inlet the intersections of the transects on the map were marked by poles carrying red flags (numbered alphabetically in Text-fig. 4). An extra set of white-flagged poles were set up to halve this first grid. Vertically and at regular intervals above the substratum both poles were marked with coloured string so that tide levels could be read at each site. The records obtained thus along with a series of photographs of the incoming tide taken at half-hourly intervals were used to build up the depth contours of the area shown in Text-fig. 3.

Fresh Water Drainage

The head of Hoopers Inlet is almost flat with very gradual slopes to the north-east and to the south-east. A wide but very shallow depression along the north-eastern side carries the bulk of the fresh water draining into the inlet, whilst another shallow depression carries the smaller amount draining in from the southern corner. The direction of flow of fresh waters is indicated by the arrows shown in Text-fig. 3. Naturally where fresh waters meet the salt tidal water, gradations from fresh water to brackish to salt occur.

Salinity

Salinity tests of the interstitial water in sand taken from selected points in the inlet (and from other localities in the Otago area) were made against standard Ag NO_3 titrations. It was found that the salinity varied from 3% near the points of inflow of fresh water to 30.52% near the sandy spit at the south-eastern end, with a general salinity of 22% to 25% in the greater part of the head of the inlet.

Biological Associations

At the northern and south-western edges of the inlet narrow bordering salt meadows converge on to the mud. In these there is a gradation from grass to *Salicornia australis* (Soland.) to *Enteromorpha clathrata* (Grev.) (Text-fig. 3). Such meadows do not occur on the north-eastern side—a man-made stone causeway three feet high having had the effect of cutting out the natural bordering plants.

Among the salt meadow plants *Amphibola crenata* is found quite commonly in the beds of *Salicornia*, especially where they border directly upon the mud flats and in some areas this plant appears to be a major factor in the distribution of the species. The animal, however, tends to avoid regions covered by *Enteromorpha*, for whereas *Salicornia* forms a sparse coverage of the sand and mud (Plate 1A) *Enteromorpha* forms an even and almost complete coverage, impeding detritus feeding (Plate 1B).

The remainder of the inlet carries two distinct biological associations. The region between high spring and mean low tidal levels is without algae, but has a dense fauna made up of *Amphibola*; the burrowing crab *Helice crassa* (Dana) (found in densest aggregations at high tide level but often extending into deeper waters); the crab *Hemiplax hirtipes* (Heller) which prefers the deeper waters where it makes use of the burrows of *Helice crassa* (Beer, 1959); brackish water