season progressed; late in November, few or no females were found in the breeding areas of the Makara Stream. The number of females in the upstream breeding waters decreased simultaneously with an increase in the lowland stream (where few adults were present during the winter period). This change in abundance, in conjunction with the failure to find dead spent females after breeding, implies that the reduction of female numbers in the breeding stream was due to migration and not spawning mortality. Since no downstream migration of single individuals or mass movement of fish was seen, it is not known whether this movement was purposive or due to the inability of the spent fish to resist the stream current.

The downstream movement of the females appeared to be followed, but to a much lesser extent, by similar movement of the males. During the summer of 1961-62, the North Makara tributary of the Makara Stream and the mid reaches of the main stream, where the population of *G. huttoni* had been dense during the winter and spring, were almost devoid of females. Despite some reduction, a good population of males was maintained during the summer period. Both sexes appeared to return to the upstream habitat in late summer and early autumn (February-April).

Seasonal Spawning Frequency

In order to determine the number of spawnings per season, per female, size (diameter) frequency studies of oocytes in ovaries at different stages of maturity were made. Ovaries were removed from the female and the oocytes within the ovary were displaced from the ovarian membrane and separated out in a watch-glass of water. Diameters of the rather irregularly shaped oocytes were measured with a micrometer eyepiece, using a low-power binocular microscope. Oocytes of the small translucent type described above were not measured, but the abundance of this group was estimated visually and was subjectively compared in different ovaries. All opaque oocytes and translucent ripe oocytes were measured. As the oocytes were found to be irregular in shape, to avoid selection of any particular diameter of the oocytes, the oocyte diameter along the fixed axis of the micrometer was measured. Clarke (1925, p. 14) found such random measurement to be the most reliable method.

The presence of multi-modal frequency curves was used by Clarke to indicate several spawnings. To determine the number of oocyte groups present prior to the first spawning of the season, 1,000 oocytes were measured from a gravid female taken in September, 1961. Two clear modes were found (Fig. 3D). The presence of two modes was confirmed by later studies and suggests that there are two spawnings each season. However, the conclusion that there are two spawnings cannot be accepted unless it can be shown that the secondary mode does not represent eggs which will be spawned in later years or that will degenerate and be resorbed at the close of the breeding season. It is quite clear from the study of ovaries from January and February samples (e.g., Fig. 3A), in which the whole egg complement comprised tiny translucent oocytes measuring about 0.1mm, that all the eggs involved in the two major oocyte groups present in the gravid female are lost prior to the end of the breeding season. Because maturing eggs were present in the ovaries at certain times of the year only, the secondary groups of maturing oocytes present during the spawning period cannot constitute oocytes which will mature in later years. These oocytes must in some way be involved in the current breeding season. Since no ovary was found in which there was any suggestion of oocyte resorption there is no evidence to support the conclusion that maturing