

At the second to top station, where the Maungakotukutuku Stream joins the Waikanae River, about six miles from the sea at an altitude of 200 feet, no species of *Galaxias* were found and *Gobiomorphus huttoni* shared the stream with *Anguilla*, a few trout and occasional *Geotria australis* ammocoetes in muddy backwaters. These fish all occupied habitat types distinct from that of *G. huttoni*. About 1½ miles from the sea and at an altitude of less than 100 feet (where the third sample was obtained), the fish fauna showed a further marked change. *Gobiomorphus huttoni* was still the numerically dominant species. In quieter water, *G. basalis* was found, but in small numbers and in the torrential water, which is characteristic of this section of the river, *Cheimarrichthys forsteri* and *Philypnodon hubbsi* were found. These two species show some habitat overlap with *G. huttoni* but usually occur in more rapidly flowing water.

The fourth station was in the upper tidal estuary of the Waikanae River. *G. huttoni* was found to be present here, but dominated numerically by *G. basalis* which was probably the most abundant species in the estuary. Other species present included *Rhombosolea retiaria*, *Galaxias attenuatus*, *Retropinna* spp. and the *Anguilla* spp. The upper estuary of the Waikanae River has a compact gravel bed with little cover for bullies and both *Gobiomorphus huttoni* and *G. basalis* were found to live there freely amongst the stones and beneath stream debris. *G. huttoni* and *G. basalis* appeared to occupy much the same habitat type.

From the studies in the Makara Stream and the Waikanae River, and from extensive general observations it appears that *Gobiomorphus huttoni* occupies a distinctive niche in the rocky habitat of New Zealand streams, and that where this habitat type occurs *G. huttoni* is usually abundant and often the numerically dominant fish species.

#### PREDATION ON *G. huttoni*

Data from the feeding habits of trout in New Zealand are available from a number of papers. When data from these sources (Allen, 1955, 91 *S. trutta*; Phillipps, 1924, 38 trout; Stokell, 1928, 225 trout; analyses by the author, 200 trout) were combined, it was found that a total of 554 trout had consumed 465 bullies. Allen (1955, p. 130) found three bullies (species unnamed) in 91 *S. trutta* from the Horokiwi Stream, and there is a possibility that the species was *G. huttoni* as this is the most frequent bully species in the Horokiwi Stream. Analyses, by the author, of the stomach contents of eight *S. trutta* from the Makara Stream, produced three *G. huttoni*. Hobbs (1940, p. 62) stated that bullies are "eaten extensively, especially by trout of large size", and the above data confirm this. Published records of predation by trout on *G. huttoni* are not known, but this may result from the fact that most analyses of trout stomachs have been carried out on trout from regions where *G. huttoni* is rare or absent (e.g., the Canterbury Plains rivers, Canterbury lakes and the thermal lakes). In these places the dominant species of bully are *Gobiomorphus basalis* and *Philypnodon breviceps* and these are probably the species on which the trout preyed. Results from the Makara Stream show that predation by trout on *G. huttoni* does occur, but the small size of the trout population in relation to the bully population in the Makara Stream, indicates that inter-action between the two species on a predator-prey basis is probably small. The small size of most of the trout in the stream and the marked habitat divergence between the few large trout present and *G. huttoni* supports this suggestion. The secretive habits of *G. huttoni* make concerted predation by trout unlikely, although the more open-living juveniles may be taken by trout in greater numbers.