

Society turned a proposed shag destruction campaign into a shag investigation and thereby afforded useful data. The Southland Society, which desired to reduce the eel fauna of the Makarewa River system, agreed to keep careful records of eels captured and costs of operations, to provide material for examination, and generally to assist the research organization to ascertain the effect of operations on the trout population.

Reference was made in last year's report to the circumstances under which this Department took over the responsibility for the prosecution of fresh-water fishery investigations in continuation of the work previously carried on from Canterbury College, Christchurch, as headquarters, under the Fresh-water Research Committee of the New Zealand Acclimatization Societies Association. The transference to Wellington took place in June, 1937, when two rooms equipped as a laboratory were provided in the Public Works District Office building in Sydney Street. Mr. D. F. Hobbs, who had been Honorary Research Secretary and later Field Biologist to the Fresh-water Research Committee, and Mr. D. Cairns, M.Sc., were appointed as Biologists, with Miss V. K. Lawrey, of the former Christchurch staff, as Laboratory Assistant. During the year the Whangarei, Hobson, Auckland, Waimarino, East Coast, Hawke's Bay, Wellington, Waitaki, and Southland Acclimatization Districts were visited by one or other of the biologists in connection with special investigations or at the request of the local society.

The examination of samples of trout-scales from numerous fishing-waters throughout the Dominion has shown that there is no profound difference in the general rate of growth and no indication of a lack of food-supplies for the trout-stocks of any waters. The superfluity of food organisms that apparently existed in the early days of trout acclimatization, and that doubtless served to nourish the monster fish that could be taken not infrequently in those times, has presumably long since been reduced to more or less a stable state of affairs in which there is a fair balance maintained between the predators and prey. Without losing sight of the general fact that the relatively large-sized food organisms—e.g., koura (crayfish), "silveries," whitebait, and the adult *inanga* or other members of the *Galaxias* family, bullies, and the larger insects—are less abundant in trout waters than formerly, and that such food-supply is favourable if not altogether necessary to the production of big trout, and without disregarding the future possibilities of artificially helping to maintain the supply of such trout-food, it would appear that the most immediate problem in present trout-fishery management is the maintenance of a head of fish. Given a sufficiency of well-filled trout nurseries, enough of the young fish will survive and grow to a size that will give the angler satisfactory sport, though he may rarely land an individual fish that will make him hesitate to tell the truth about it for fear of not being believed. The study of the factors that make for successful reproduction and survival of trout is thus of primary and fundamental importance, and this is the direction which the investigations carried out by Mr. Hobbs have taken and in which they are being at present pursued.

A female trout produces anything from six hundred to one thousand eggs per pound of its weight, yet such a production of eggs is little more than enough to maintain the population. Obviously, somewhere between the time when eggs are produced and that when the survivors of them attain maturity, tremendous losses occur. Possibly no phase of the investigational work is more important than that which aims at finding out at what stage the heaviest loss occurs and, generally, the extent and causes of losses at different stages of the fish's development. Stock-maintenance work generally aims at three things: (1) The prevention of poaching; (2) the protection of fish from anglers until they approach maturity; and (3) the collection of ova from wild fish to be safeguarded in hatcheries until they pass the embryo stage, which has been assumed to be their most vulnerable point. The results of the investigational work of Mr. Hobbs during the last six years have raised doubts as to the soundness of this third phase of maintenance-work, at least in some of its customary applications. An account of his first three years' investigations is given in Fisheries Bulletin No. 6 issued by this Department recently. These investigations aimed at showing the extent and causes of losses occurring in natural spawning-beds from the time when ova are deposited until the resulting fish emerge from the gravel as fry. Contrary to what had been very generally believed, it was found that losses during this stage of development very frequently assumed only moderate proportions, and were often, indeed, so slight as to call into question the soundness of the basic assumption of fish-hatchery practice. Generally the evidence obtained was such as to show that natural reproduction was a very much more efficient process than had hitherto been supposed, and to suggest it as not unlikely that the fish hatcheries of New Zealand unnecessarily safeguarded the young over a period through which they are much less in need of safeguarding than in an equal period of time immediately following their liberation. Over the last three years this study, which was commenced in Canterbury and Westland, has been greatly extended, and, during the last year, approximately a quarter of a million more specimens of eggs and larval fish were obtained from natural spawning-areas in the Southland and Auckland districts. The further data will be made the basis of another bulletin this coming year, and, in addition, some comment will be made on the relation of the investigational work to present fish-cultural practice. Other studies, arising from Mr. Hobbs's work over the last six years, include one on the food and habits of young trout and salmon and their inter-relationships with other fish, and one on the productivity of trout and on certain causes of differences in their growth-rates. Data under these heads accumulated over the period when the earlier research organization had no funds to publish results. The preparation of papers embodying these data will occupy Mr. Hobbs's time for many months. When these papers are completed they should constitute an important addition to existing knowledge of the spawning requirements of adult fish, the reactions of ova and larval fish to the main types of environment New Zealand offers, and the ecology of early post-larval fish. The study of the factors affecting the growth-rate of young fish will be linked with the study of later growth as determined by scale-reading.