

The net-fishing catch is the poorest on record. This is ascribable not only to the check upon netting operations caused by the continuous floods, but also to the fact that recent changes in the contour of the river-bed in its lower part had caused a shoaling of the river where there was formerly deep water, in which the salmon found their first halting-place after entering fresh water, and which therefore afforded a favourable draught for netting. Only one net was operated this season.

Atlantic Salmon

The trapping season on the Upukororo River opened well with a slight rise of water which encouraged 65 salmon to enter the trap on 29th April. After that the river remained at a low level throughout May and continued low except for two slight freshes on the 11th and 22nd June and again on 5th and 27th July. Consequently no good runs took place and the majority of the fish spawned in the lower reaches of the river between the lake and the trap. This natural spawning could be expected to have fruitful results, provided that the bottom remained undisturbed by floods until the young fish had reached their free-swimming stage. Such occurrences, however, are not infrequent with this wayward river; and that is why the hatchery is worth while as an insurance against loss of the rising generation. The lake and the River Waiau also remained abnormally low, which, as is usual, induced more fish to spawn in the main river, where redds were observed to be fairly numerous.

The total number of salmon taken in the trap was 114, of which 72 were males and 42 females, yielding 101,000 ova. These were hatched out with very little loss, and the fry were fed in the hatchery boxes for six to eight weeks before being liberated. Nearly half the fry were planted in the lake margin to economize transport, instead of being taken to the river, the rest, about 8,000, being kept for pond-rearing. During the year 7,000 yearlings were raised in the ponds and marked before liberation.

The 1943-44 salmon-angling season was reported as fair; relatively few anglers visited the lake.

Trout

Information regarding trout-fishing conditions in the rivers and lakes of their several districts is given in the annual reports of acclimatization societies, and it is sufficient here to make a brief reference to certain points of general interest.

A good deal of comment has recently been made by experienced and observant anglers regarding the decreased population of the younger age-groups of trout in certain waters. It is said, for instance, that some of the rivers of Southland, Otago, and South Canterbury which formerly carried good stocks of trout of mixed age and size, with the smaller fish predominating in number, as is the normal and natural condition, have recently changed their character and become "big-fish" waters, holding some good fish but too few medium- and small-sized trout. One cause to which this dearth has been attributed is the increase of black shags, which are undoubtedly serious enemies of trout when they haunt nursery waters in appreciable numbers. Naturally, the lack of ammunition and the absence of many active men who before the war made a regular practice of shag-shooting has allowed these predators to seek their prey with impunity and to attain an augmented rate of reproduction in places where their presence is patently harmful. All reasonable measures for preventing them from becoming overabundant in the vicinity of trout and salmon waters should therefore be encouraged and facilitated. Under conditions of ideal fishery management there would be an organized system for investigating the habits of all trout-predators—in the case of the black shag I consider its harmfulness has now been thoroughly proved—and for keeping down their numbers and discouraging them from haunting waters where trout or young salmon provide, at least in the case of the black shags, almost the whole of the prey that their very vigorous appetites demand. Another important item in the list of trout-predators is the eel, about which something will be said later.

Rarely or never in Nature does one adverse factor operate to the exclusion of all others, and it must not be inferred that the killing off of shags would solve the problem of keeping trout waters well stocked. There is much investigational work to be done to ascertain the degree to which natural reproduction can be expected to maintain, or can be helped by cultural measures to maintain, an optimum trout population. There are also, besides the predatory birds and fishes, the inimical factors of water pollution and water abstraction, which play an increasing part in reducing the extent of natural and healthy feeding and spawning ground which the trout in earlier times enjoyed. Reduction in the volume and rate of flow of the water in a river involves reduction in trout-food supply and in the availability of suitable bottom for spawning. The development of irrigation has not only brought about such changes, but has also been the direct cause of substantial losses of trout, which find their way into the water-races and are unable to get back again to the river. These facts are mentioned not with any intention of criticizing the measures that have brought them into being, for we must all recognize that production on the land has to be developed; and there are, indeed, prospects of the creation of many valuable additional miles of fishing water in the Rangitata-Rakaia channel and an improvement in the character of the Lower Waitaki as angling water by reducing its flow in connection with hydro-electric works. What fishery interests have to recognize is that the changed conditions have to be understood in their full biological bearings and the practical management of fisheries adjusted accordingly. They must not run away with the idea that with the shooting of shags or the building of a fish-hatchery the job is done.

From the fisheries point of view there is also a prospect of beneficial results arising out of the newly-authorized—I don't know whether one can yet add *organized*—measures for dealing with erosion problems. Erosion of the hill country, with the consequent deposit of shingle and silt in the river-beds, the shifting of bottom material by heavy floods, and the low volume of water in times of drought—these are conditions in the environment of many of our trout which mean menace to their well-being and checks to their propagation to which their ancestors were certainly not subjected to the same extent. That is the position in general terms. A more precise analysis of biological relationships is necessary for the full understanding of the problem necessary as the basis of suitable fish cultural developments to meet the angling needs of the future.