

part. The whitebait-fishing in the Grey River and in South Westland also showed a marked improvement this season, and this was ascribed to the favourable conditions of weather, and consequently of water in the rivers, which did not interfere as much as usual with the fishing operations. Subnormal catches in the Manawatu, Marlborough, Hokitika, and Southland districts are said to have been influenced by the prevalence of floods during the fishing-season; but the unprecedentedly poor results obtained from the North Canterbury rivers were due, it is suggested, to the long period of drought which afflicted that district between January and May, 1935, in which period practically all the spawning takes place. The herbage on the banks of the rivers was nibbled short to the water's edge by hungry stock, which would thus wipe out possible spawning-places, and the drying-up of drains and side-streams would check or prevent the usual migration of adults. The injurious effects of heavy floods while the spawn is on the banks, by which the eggs are killed through the deposit on them of silt, have been observed at the time of the great flood in the Hokitika River in February, 1935. The systematic study of all the factors that have a bearing on the propagation of this still important but progressively diminishing species is a special branch of fishery investigation for which provision needs to be made; and it is still more urgently necessary to put to practical use the information already made available by the discoveries of Captain L. Hayes in 1930 and 1931, which have been described in previous reports. The riparian areas used by the spawning inanga have been located in several localities. The protection of known spawning-areas and the location of those still unknown are tasks which have a very obvious and direct bearing on the maintenance of these fisheries.

#### QUINNAT SALMON.

The 1935 run of salmon into the Waitaki River was the first to encounter the obstruction imposed by the completed dam at Awakino. The occurrence of this obstacle, and the failure of the fish to make use of the fish-pass which had been provided, held back the fish that would otherwise have continued their migration to spawn in the upper tributaries of this river system as in earlier years. The result, so far as the Hakataramea was concerned, was that a succession of runs of unprecedented numbers entered this river, and there was no difficulty in securing in a short time all the parent fish required to yield the ova needed for the hatchery. The construction of the usual rack was commenced on the 8th April under favourable conditions, the Waitaki being in flood and the Hakataramea  $3\frac{1}{2}$  in. above its normal level, with a good deep channel at its mouth. Prior to the completion of the rack on the 15th April a few pairs of fish had been seen spawning in the Hakataramea about two miles above its mouth. The first fish came up to the rack on the 18th April, and from then onwards there was a steady run which reached its maximum on the 29th of the month. The numbers of fish and eggs taken each month were as follows:—

—	Males.	Females.	Ova.
April (20th to 31st) .. .. .	156	115	392,000
May (1st to 15th) .. .. .	85	72	308,000
	241	187	700,000

During the period (20th April to 15th May) 100 males and 127 unripe females, besides approximately 300 other fish were lifted over the rack to spawn naturally in the Hakataramea River. On 17th May the rack was pulled out, and on this date about 400 salmon were seen to move up. By this time the river-bed below the rack had been very extensively "dug" by spawning salmon, and subsequently every yard of suitable shingle in the lower course of the Hakataramea was used, the earlier "redds" in some cases being disturbed by later spawners. Salmon continued to run into the Hakataramea much later this season than normally, appreciable numbers of newcomers being noticed early in July.

With the exception of 100,000 ova sent to the Westland Acclimatization Society and 10,000 retained for the ponds, all the quinnat fry incubated in the hatchery were planted in the upper waters of the Hakataramea River. It will be interesting to see what will be the outcome of this concentration into one relatively small tributary (about 40 miles long) and the lowest part of the main river's course (about 46 miles) of the spawning runs of salmon which formerly spread themselves over many scores of miles in the headwaters of the Waitaki river system. Past records show that owing to the difficult fishing-conditions in the lower part of the Waitaki, there has never been a very appreciable harvest of fresh-run salmon to the angler, and the possibilities of commercial fishing have never attracted any one to seek to make a trial of them. The principal economic value of the Waitaki salmon has been as a source of supply of ova for the hatchery. That being the case, it is not difficult to be philosophical about the effects of the dam at Awakino in cutting off access to the headwaters. There is, moreover, a growing tendency on the part of Waitaki anglers to consider that the prospects for better trout-fishing will be much improved by the absence of quinnat salmon in the waters above the dam. To what extent the trout-stock of the Hakataramea may be affected by the probable increase of salmon in that river in the future is another question that presents itself. It is desirable that provision should be made for definite biological observations on these points.

With regard to the extent of the spawning runs in other salmon rivers there is little information to record. It is reported that Deep Creek, which is regarded as the best spawning tributary of the Rangitata, received a good run of early fish but very few afterwards. There was a notable lack of small males this season.

Pond-reared quinnat salmon parr to the number of 4,720 were marked by fin-clipping before being liberated in the Hakataramea River between 25th June and 4th July, 1935. These fish at the age