

temperature of Lake Coleridge water averages 48° F. and the summer temperature 52° F. There is thus very little seasonal variation, and apparently rapid growth continues throughout the year. The structure of the scales of the specimens examined corroborates this. Except that a "parr" nucleus is shown, after which there are indications of a sudden change to conditions making for augmented growth which persists steadily throughout life, the scales present no obvious "zoning" features.

Two checks are indicated early in life—one at a length of 2 in. to 2½ in. and another at a length of 4 in. to 4½ in., which probably represents the winter of 1929 immediately prior to migration from the stream to the lake. There is a slight indication of narrowing at a length of 15 in. to 17½ in., which probably represents the winter of 1930. In the absence of a considerable amount of previous study of the same class of scales, with corroborating circumstantial evidence, it would be very difficult to give a confident "reading" of the age of these fish from their scale characters such as is possible in the case of European salmon. The same remark applies to those of Lake Te Anau, and it seems possible that these fish similarly make more rapid growth than has hitherto been suspected.

With regard to sexual condition, I can only report on two of my specimens, as the reproductive organs of the third had been entirely removed in cleaning the fish. The first of the other two was a male with "milts" 80 mm. (3¼ in.) long and 8 mm. (about ⅞ in.) in width at the widest part. This would certainly have reached sexual maturity in time to take part in the spawning activity of the 1931 winter season—i.e., just before attaining the age of three years. The second specimen was a female with ovaries about 55 mm. (2¼ in.) long by 10 mm. (⅓½ in.) wide and ova of about 0.75 mm. diameter. It seems probable that this would also have been ready to spawn in its second winter of life. These Lake Coleridge Atlantic salmon thus demonstrate not only an extraordinary growth-rate, but also a precocity in reaching maturity, compared with their European ancestors.

At least a dozen of these Atlantic salmon were caught in Lake Coleridge in November–December, 1930. Scales of a specimen recorded as 24½ in. long and 3¾ lb. weight, caught on the 26th December, 1930, have been forwarded to me by Mr. H. G. Kemp, of Ashburton, and there was a report of the capture of a 5 lb. specimen in the January, 1931, number of the *New Zealand Fishing and Shooting Gazette*. I do not know how much dependence is to be placed on the accuracy of the reported weight in this latter case.

A further question arises: Can this rapid growth be maintained for the third and subsequent years in this lake environment and on a fresh-water diet? I think not. The Te Anau salmon first become mature when they have attained a weight of from 3 lb. to 5 lb. and while they present the grilse-like appearance (forked tail and slender contour lines); and the evidence from scale-examinations and from marking experiments shows that after this they put on very little additional growth, most of the nourishment they ingest apparently being necessary for the development of the reproductive organs.

FRESH-WATER RESEARCH.

The new committee set up by the Acclimatization Societies' Association, as mentioned in my last report, has now completed its first year's work. It had been proposed to employ two biologists, one with headquarters at Wellington and one at Christchurch. However, owing to uncertainty as regards future finance, one biologist only has been appointed—namely, Mr. A. W. Parrott—who has been working at Canterbury College, Christchurch, under the direction of Professor Percival. In connection with trout investigations Mr. Parrott has concentrated on the study of scale-samples from various rivers and lakes in connection with the problems of age and growth. He has completed reports on this subject in connection with the trout of Lake Sumner, the Lake Ellesmere system, the Aparima River, and the Hutt River. He has also completed a report on an investigation on the growth of the scales in relation to the growth of the fish in *Gobiomorphus gobioides* (bully), and he has made a preliminary investigation of the scales of some Atlantic salmon from Lake Te Anau. Professor Percival has organized a scheme for the recording of temperatures of fishing-waters in different parts of the Dominion. He is also collecting evidence with a view to a general report on the question of the deterioration of fishing in certain rivers. He has also accumulated considerable information regarding the life-histories and biology of several aquatic organisms which figure in the food of trout, including the bully (*Gobiomorphus gobioides*), silvery or smelt (*Retropinna retropinna*), and various members of the family Galaxiidae, and a number of invertebrate animals, such as fresh-water shrimp "water-flea," may-flies, caddis-flies, snails, &c. Preliminary investigations on the dissolved gases and mineral salts found in Lake Te Anau have been carried out by Professor Percival, who has also given lectures at seven of the larger centres for the purpose of instructing and interesting anglers in the study of fresh-water life.

In my report for the year 1928–29 reference was made to the investigations on trout problems carried out by Captain J. S. Phillips under the Wellington Acclimatization Society's Fishery Fellowship scheme at Victoria University College, Wellington. At the expiration of the term of this fellowship, and before leaving for England in July, 1930, Captain Phillips submitted another report, which was published by the Marine Department early in 1931 as Fisheries Bulletin No. 3—"A Further Report on Conditions affecting the Well-being of Trout in New Zealand." In addition to these two reports, a paper on "A Revision of the New Zealand Ephemeroptera" was published in the "Transactions of the New Zealand Institute," Vol. 61, Part 2 (1930), as a result of the same author's researches.

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