LIFE CYCLE OF QUINNAT SALMON IN NEW ZEALAND

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From work carried out at the Glenariffe Salmon Trap (Rakaia), and from material obtained from various other rivers and lakes, the broad outlines of the life history of the Quinnat Salmon has been established in New Zealand.

A convenient point to start at is when the adults return to the river of origin. The majority do return to their parent stream; however, a small proportion of stragglers also occur. The fish usually congregate at the mouth in late January and February; however, some early fish occur and occasionally some early runs also. The timing of the run is subject to marked fluctuations. The majority have stopped feeding completely at this state, and whilst the sexual organs are developing, the gut is degenerating. In a normal run, most of these fish will be in their third year of life whilst the next most abundant will be in their fourth year. Very few will be in their fith, whilst no six year fish have yet been examined in New Zealand runs.

Occasionally the four year class will be the dominant year class; also large numbers of two year males (Grilse) sometimes occur. A very small number of mature females in their second year also occur in the New Zealand runs. The result of these differing age proportions for the angler creates the impression of variability in growth of runs from year to year. In fact the growth rates are quite constant for the year classes of fish.

How do our New Zealand runs relate to those in America? The simple answer is they show a very similar growth rate but they are younger at maturity; consequently we do not get the big fish that occur in America with its older runs in which the majority are four and five year fish, whilst six year fish are not uncommon, and fish up to eight years old are encountered. Two year mature females which occur in New Zealand, do not occur in North American stocks.

The adults' progress up river to the spawning stream at varying rates, if early they may hold up in suitable pools and even occasionally fall back down river to re-ascend a little later, whilst if they are late they may come up in a rush. The time that the majority move onto the spawning beds appears much more constant and for Glenariffe is one week either side of mid April. At this stage the majority are showing physical signs of their journey upstream and of their fast; but occasionally a bright fresh fish is obvious. By now most are sexually mature, but the occasional fish has been observed well up river with undeveloped sexual organs. These presumably are late developers.

Pairing commences, the early arrivals occupying the lower areas of the spawning stream whilst the late arrivals are pushed further up, by the aggressive resident males. The females may dig trial redds (nests) until a suitable area is found. The female does all the digging, whilst the male waits in attendance. The redd is a large hollow excavated in the shingle by flexions of the female's body which lifts the gravel, which is then carried a little downstream by the current. The female lays several pockets of eggs throughout the redd. As the eggs are laid the attendant male fertilises them.

A curious feature is the occurrence of fertile one year parr. These are progeny from the previous year's spawning which have remained in the stream and may take part in the spawning act; however, unlike the adult fish these appear to survive after spawning. The female may dig several redds but finally all adults of both sexes exhausted, and subject to irreversible physiological changes, die.

Dependent on water temperature the young emerge approximately two to three months later. It appears large numbers are forced out of the parent stream very early in life, and it is considered that high mortalities occur at this stage. Those that remain may stay up to one year in the headwaters and at maximum a further six months in the river or estuarine areas before finally going to sea. Work by Mr. A. Parrott indicates the greater part of the adult run comes from these fish that grow into a more robust size by remaining in freshwater before going to sea.

Once in the sea, little is known of the New Zealand salmon's biology. Most specimens taken have been immature juveniles out of harbours such as Lyttelton, Timaru and Oamaru. Recently older specimens have been taken off-shore, one 30 miles off Timaru.

The age structure of runs in different rivers in the same year are distinct, indicating a definite homing characteristic and underlining the need for such stocks to be individually examined. New Zealand is unusual in having self propogating stocks of land-locked Quinnat, the more important ones being in Lake Coleridge and Lake Wakatipu. The basic life cycle is identical to that of sea run Quinnat and differs only in growth rates, the land-locked stocks being smaller. For sea run Quinnat in New Zealand, the average lengths and weights of year classes of spawning fish are:

Age	*Mean Fork Length*	*Mean Wt.*
2 years	23 inches	5lb
3 years	30 inches	11lb
4 years	35 inches	15lb
5 years	40 inches	22lb

whilst for land-locked stocks caught in Coleridge on the opening of the season are:

Age	*Mean Fork Length*	*Mean Wt.*
2 years	14 inches	1½lb
3 years	18 inches	2½lb
4 years	20 inches	3¼lb
5 years	Insufficient data, very seldom occur.	

The largest fish caught in North America was caught in a trap and weighed 126½lb, whilst the heaviest rod caught fish was taken by a 14-year-old boy and weighed 92lb.

In New Zealand the Annual Report of the Marine Department, 1931, records a 52lb fish taken in the Waitaki River, whilst a report on New Zealand Fish and Fisheries 1924 by L. F. Ayson records a 45lb, 52lb and 64lb fish from the Dobson River, a tributary of the Waitaki. However, these are unusual fish.

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