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DISCOVERY OF JUVENILE PACIFIC SALMON (COHO) IN A SMALL COASTAL STREAM OF NEW BRUNSWICK

Three juvenile Pacific salmon (Figure 1) were discovered in a small coastal stream in southern New Brunswick (Figure 2) in October 1976 while young Atlantic salmon, *Salmo salar*, were being collected for laboratory experiments. The Pacific salmon were not recognized by the electrofishing team, and their presence among the Atlantic salmon was not realized until the fish were sorted in the laboratory some days or weeks later. Identification as either coho salmon, *Oncorhynchus kisutch*, or chinook salmon, *O. tshawytscha*, was later confirmed by W. B. Scott of Huntsman Marine Laboratory, St. Andrews, N.B. Positive identification to species of these juvenile fish was not possible, but they were almost certainly coho salmon because of recent introductions of this species to the Atlantic coast.

Coho salmon are not native to the Atlantic, and no populations reproducing in natural streams of the Atlantic coast are known. Two aquaculture operations using coho salmon are under way in Maine, and coho salmon smolts have been released in streams in New Hampshire and Massachusetts since 1969 and 1971, respectively (Figure 2, inset). Presumably, the parents were from one or more of these four operations. No adults have been reported from New Brunswick streams.

When the coho salmon were recognized, further trips were made to obtain an estimate of their numbers in the stream, their size, and habitat preference in comparison with Atlantic salmon and brook trout, *Salvelinus fontinalis*, which were also present.

The stream, known locally as Frost Fish Creek, drains into the estuary of the Digdeguash River about 250 m from the Digdeguash Falls. It is a small stream approximately 3 m wide in the lower kilometer where all fishing took place. Its drainage area is approximately 570 ha. Discharge during low summer flow reaches as little as 80 l/s (Symons and Harding 1974). The lowermost 0.25 km is steep with cascades and pools. The stream here is either open to the sky or overhung with alders. Most of the Atlantic salmon yearlings occur in this portion of the stream. Through the next 0.25 km upstream the gradient decreases; occasional riffles are separated by pools and slow-flowing water. Bankside cover consists of coniferous softwoods partially clearcut. Atlantic salmon yearlings and underyearlings occur in the riffles of this section while the pools and quieter water are inhabited by brook trout. Above this section the

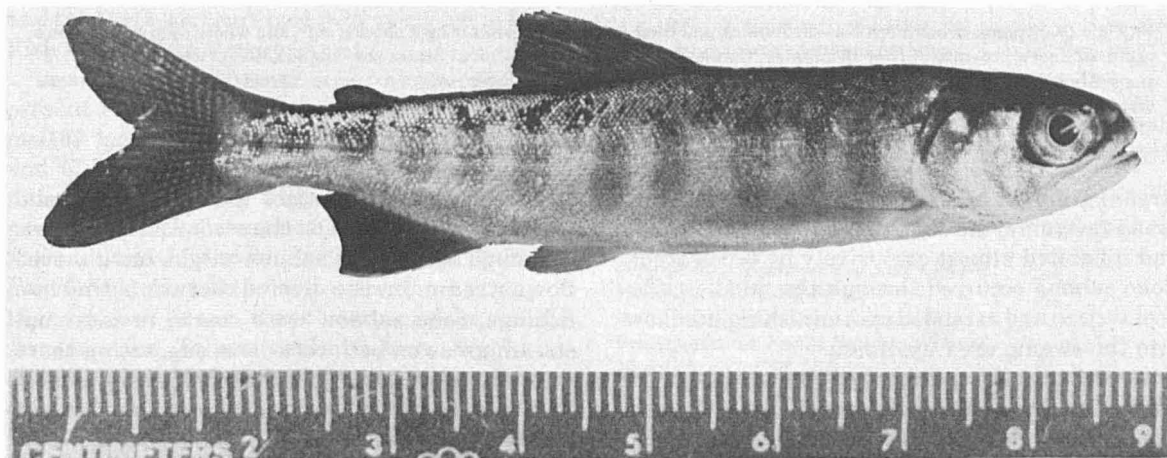


FIGURE 1.—Underyearling coho salmon captured on 28 October 1976 in Frost Fish Creek, N.B.

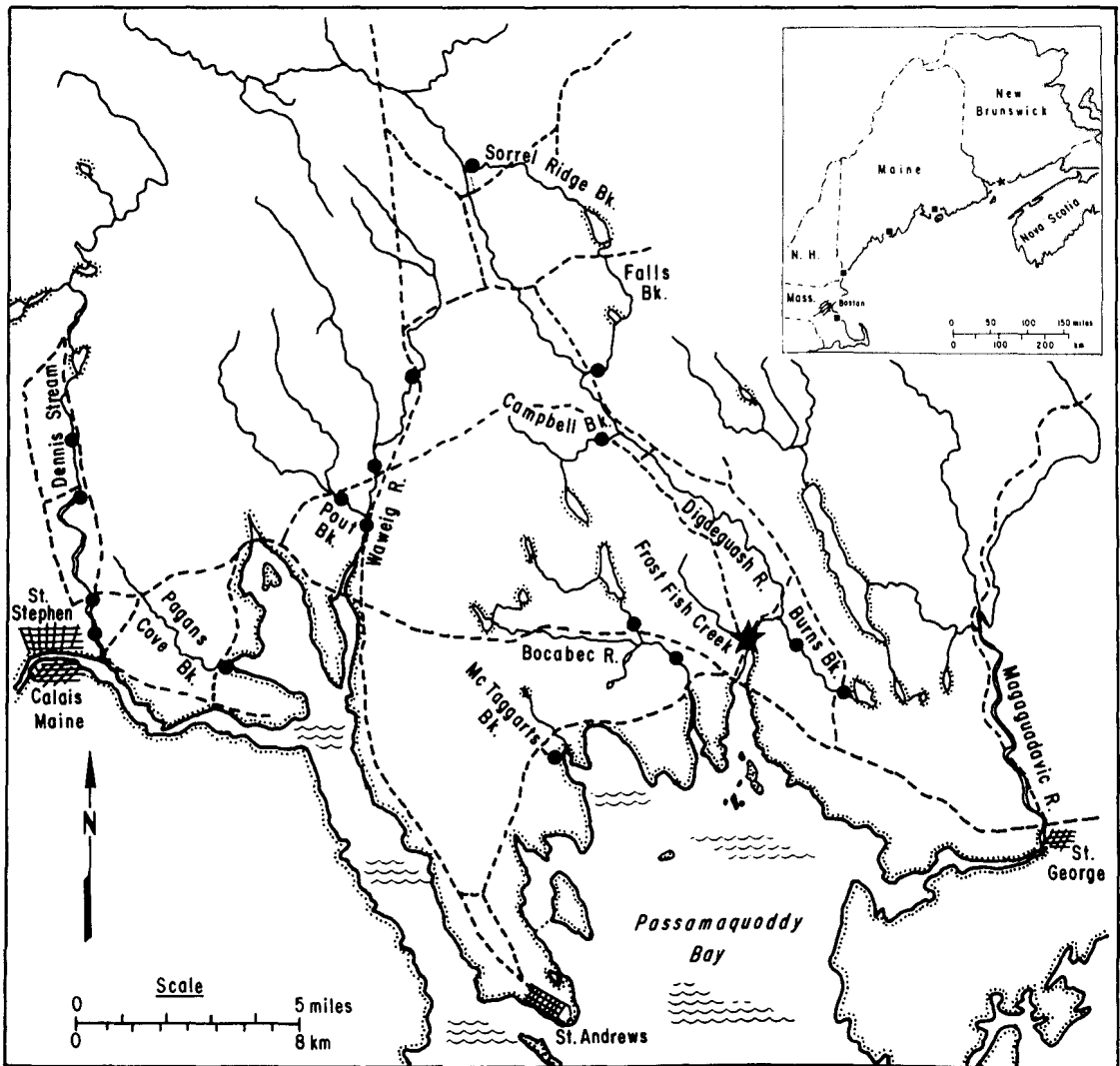


FIGURE 2.—Streams of southern New Brunswick and their access. Dots, sites of spot checks; star, site where coho salmon were captured. Inset, province of New Brunswick, Canada, and northeastern United States showing location of aquaculture operations (Maine) or release sites (N. H. and Mass.) of coho salmon (squares) with respect to location of underyearling coho salmon discovered in New Brunswick (star).

stream gradient becomes lower, the surrounding area is swampy, the stream is choked with alders and inhabited almost exclusively by brook trout. Coho salmon occurred through the middle riffle-pool section and extended in diminishing numbers into the swamp area upstream.

To estimate the numbers of young coho in the creek, two equal-effort electrofishings were performed through the riffle-pool section and approximately 50 m into the swampy section. The lower fast section was fished separately during the first

trip (28 October), but since it contained no coho salmon it was omitted on the second 20 days later. Although some coho salmon might have moved downstream in the period between the two fishings, coho salmon were scarce in most upstream areas on both occasions, suggesting there were few above the point where fishing ceased. Twelve coho salmon were caught on the first trip and five on the second. The total population estimated by the depletion method (Seber and Le Cren 1967) was 21. Three coho salmon had been cap-

tured during the collection trip on 9 October, so that the total estimated population of coho salmon in the stream was 24.

During electrofishing, particular note was taken of the kind of habitat in which coho, Atlantic salmon, and brook trout were captured. Coho salmon were found where there was immediate or nearby overhead cover in the form of overhanging banks, tree roots, or fallen trees or brush, and where the water current was slow (<30 cm/s). This kind of habitat was also frequently occupied by brook trout. On at least one occasion, a brook trout and coho salmon were captured together. Atlantic salmon were scarce above the lowermost steep section of the stream. However, in October and November three or four Atlantic salmon were captured in slow water where they had never been seen in summer (Symons and Harding 1974). These observations suggested that summer habitat requirements of coho salmon were more similar to those of brook trout than of Atlantic salmon, although the latter may utilize brook trout-coho salmon habitat in winter.

All captured coho salmon were retained and taken to the laboratory for measuring and weighing. The average fork length of all coho salmon captured was 89 mm, ranging from 75 to 100 mm. There was no statistical difference between average lengths in October (89 mm) and in November (91 mm). Examination of scales revealed that these coho salmon were underyearlings. They were considerably larger than underyearling Atlantic salmon (60-70 mm fork length) and underyearling brook trout (40-60 mm) captured at the same time. The coho salmon were retained for use in laboratory experiments through the winter, and the 10-15 that survived were returned to Frost Fish Creek the following April.

To investigate whether coho salmon might be present elsewhere, spot checks were made in 17 nearby locations (Figure 2) between 28 October and 17 November. Spot checks consisted of 10-35 min of electrofishing with most effort being expended in parts of streams having habitat similar to that in which coho salmon were caught in Frost Fish Creek. No coho salmon were found at any of these sites. Brook trout were caught in all streams, and Atlantic salmon were caught in streams where they were known to occur. Brown trout, *Salmo trutta*, were caught in Frost Fish Creek (2 individuals), Burns Brook (1), and Sorrel Ridge Brook (1), all tributaries to the Digdeguash River. Brown trout were introduced to the Dig-

deguash as early as 1921 (MacCrimmon and Marshall 1968), and they continue to exist there in small numbers.

In sum, an estimated population of 24 under-yearling coho salmon was found in Frost Fish Creek in fall 1976. No coho were discovered in neighboring streams during a cursory search. Although adult coho salmon are known to spawn in small, gravelly coastal streams (Scott and Crossman 1973), spawning may not have occurred in the creek. Atlantic salmon apparently do not spawn there despite the presence of young which are thought to arrive from the main Digdeguash River, having descended the falls into the estuary and then reentering the nearest available freshwater. The young coho salmon may have arrived by the same route. Regardless of the exact location in which coho salmon spawned, should they establish a run in the river system, it would probably be revealed by continued sampling of fish in the creek.

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