

IMMATURE SPLAKE TROUT IN A COLORADO LAKE

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We, as fishery biologists, are interested in faster growing, more vigorous, disease resistant, game fish. Hybrid crosses present a possible answer to this quest. One of the most highly publicized hybrid fish of recent years has been the splake trout which is the cross between the male brook trout (Salvelinus fontinalis, Mitchell) and female lake trout (Salvelinus namaycush, Walbaum).

This study of the splake trout was concerned with their development during the first two years of life. The study was initiated at the hatchery where observations on eggs and small splake trout were made. The splake trout were released at the age of six months in Parvin Lake, where their development in a lentic environment could be observed. Parvin Lake is a productive 60-acre, 30-foot deep, montane zone lake located in the Rocky Mountains of north central Colorado.

No major difficulties were encountered in hatching splake trout eggs and raising splake trout. The principal known cause of mortality appeared to be the thick corion of the lake trout egg which the small perhaps weaker splake trout embryos sometimes failed to break. As a result, probably only the stronger splake trout survived hatching. The hatching mortality was about 12 percent and could probably be reduced, according to a bio-chemist, with the application of certain enzymes to help dissolve the corion. The splake trout was a hardy, disease resistant fish. They were extremely wary but fed and grew well on standard hatchery diets.

The physical characteristics of splake trout resemble closely those of the brook trout parent. The most obvious deviation from this resemblance is that of the body shape which is slender and the caudal fin which is forked. The coloration of the splake trout resembles the coloration of the brook trout with black

dorsal vermiculations, spotted sides, and white margins on the paired fins. There are usually no red spots on the sides of splake trout as there are on the brook trout. The splake trout has large teeth like those of lake trout.

When six months old and two to four inches long the splake trout were stocked in Parvin Lake. Following their introduction into the lake, their distribution and movement was determined by horizontal gill nets, vertical gill nets, lake electrofishing, hook and line and a downstream trap.

The horizontal gill nets had either $\frac{1}{4}$ - or $\frac{3}{8}$ -inch bar mesh. The vertical gill nets were used to determine the depth distribution of the fish. A vertical gill net may be described as similar to a window shade. Each net was wound around a floating roller made of sealed sections of five-inch diameter irrigation pipe. The net was unrolled from the surface to the lake bottom. A gang of five nets was attached side by side and set at one time. Each net was a different size mesh and the effect was an experimental gill net extending from the surface of the lake to the bottom. The depth of any fish caught was easily determined by color codes on the net sides.

Temperature changes in the lake caused the splake trout to change its habitat seasonally which in turn affected food habits, growth, harvest and survival.

In general, the splake trout inhabited the shallow areas during the fall, winter and spring when the water temperature there was cool. As the water temperature warmed to more than 60° F., they moved into the cooler thermocline and upper hypolimnion. The splake trout remained there until the water temperature in the shoal areas cooled and then moved back into the shallow water. They stayed in the shallow inlet bay throughout the summer months because there the inlet stream kept the water cool. This was the only shallow area of the lake where the splake trout could be found during the summer months.

When the water was cool, the distribution of the rainbow trout was similar to that of the splake trout. Throughout the months when the lake was warmer, however, the rainbow trout of comparable age and size stayed in the epilimnion and upper thermocline while the splake trout occupied an area substantially deeper in the lake.

This general distribution pattern of the splake trout undoubtedly had a serious detrimental effect on the growth rate. When the first group of fingerling splake trout were initially stocked in Parvin Lake in June they grew as well as rainbow trout of comparable size. When confined to the lower thermocline and upper hypolimnion, the splake trout grew slower than the rainbow trout of comparable age and size. The splake trout moved back into the shallow productive areas later in the year and their growth rate again approached that of comparable rainbow trout. However, this reduction in midsummer growth caused the splake trout to remain smaller than the rainbow trout throughout the rest of the study.

In the shallow areas of the lake, the splake trout fed primarily on Isopoda (sow-bugs) and Odonata (dragonflies and damselflies). While confined to the deeper areas, they utilized Isopoda, Odonata, and Diptera (midges). While the quality of the diet was similar in both the shallow and deep areas, the splake trout probably found a reduced quantity of food in the deeper areas.

When splake trout were in the deeper portions of the lake, they did not compete with the rainbow trout since the rainbow trout were not present. This may be important from the standpoint of managing a lake with both rainbow and splake trout populations. It is probable that under temperature conditions as found in Parvin Lake, the splake trout do not compete with rainbow trout for food during the months when the growth rate of the rainbow trout is at a maximum.

The harvest and consequently the survival of the splake trout was also a function of the changing temperatures of the lake. Few splake trout entered the

fishermen's creel during the first summer since they were too small to be acceptable to fishermen. The following spring, the splake trout began to appear in the fishermen's creels, however, many were still returned to the water as too small. By the time the splake trout were large enough to be accepted, the water had warmed and they had moved into the deeper waters. Here they were mostly unavailable since boats were not allowed on Parvin Lake. Some fishermen continued to catch splake trout by weighting their lines and casting into the deeper, cooler lake areas.

For these reasons the splake trout did not provide quality fishing and the harvest rate was lower than that of rainbow trout. Had the general public been permitted to fish from boats, it is possible that the harvest would have been increased. It is also possible that the splake trout will provide quality fishing during the spring of their third year in the lake. At this time, they will be large enough to be acceptable and will be in the shallow water, available to fishermen.

Statistical comparisons of harvest data showed that splake trout were more readily caught on natural bait and less readily caught on flies than rainbow trout. It was also shown that splake trout were caught more or less uniformly throughout the day but were not as readily caught in the evening as rainbow trout.

Throughout the season, there was a greater daily fluctuation in the catch success on splake trout than there was on rainbow trout. The fluctuation in the catch of splake trout was caused by their movement between shallow water where they were available to fishermen and deep water where they were not available.

Migration of the splake trout downstream was negligible. This was determined by a permanent trap in the outlet stream which captured all migrants. It appeared that each time splake trout were introduced they distributed themselves throughout the lake. In the process, about one percent of them encountered and moved down the outlet stream.

One additional observation that deserves mention was made on the oxygen requirements of splake trout compared to those of rainbow trout. It appeared that splake trout from the lake or hatchery could be kept out of the water longer or hauled in more crowded planting trucks with no adverse effects. Similar treatment frequently killed comparable rainbow trout. These observations plus the distribution of splake trout in the deeper levels of the lake where there is less dissolved oxygen suggest that splake trout may be suitable for lakes with marginal oxygen supplies.

The significance of the effect of temperatures on splake trout harvest, survival, growth, and food habits during the first two years of life has been pointed out. It is possible that splake trout should be stocked in waters that never exceed 60° F. if it is desirable to avoid the responses described.