

Growth, Survival, and Vulnerability to Angling of Three Wild Brook Trout Strains Exposed to Different Levels of Angler Exploitation Over Time

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Abstract.—It has been suggested that the genetic growth potential of trout may be degraded, over time, by differential angler harvest of the faster-growing fish of each cohort. To test this hypothesis young-of-the-year wild brook trout from two branches of the Au Sable River and from the East Branch of the Fox River were stocked in three experimental lakes to determine their relative growth and survival after 2 years of residence. Brook trout populations from the Au Sable River were believed to have been historically exploited more intensively than that from the East Branch of the Fox River. The relative vulnerability to angling for the three strains was estimated in two of the lakes. Further, mean sizes of angler-caught trout were compared to mean sizes of trout captured by intensive gill netting to determine if anglers caught the larger trout in the population, and to ascertain possible correlations between growth rate and vulnerability to angling. Some differences in growth were found, suggesting that strains differed genetically. Brook trout from the East Branch Fox River exhibited significantly greater increases in length and weight than fish from either the North Branch Au Sable or the Mainstream Au Sable. Growth was similar for both Au Sable River strains. A habitat or lake effect on brook trout growth was evident. Highest growth for all strains occurred in Hemlock Lake and lowest in South Twin Lake. The superior growth performance of East Branch Fox River brook trout was most evident in Hemlock Lake, where all strains grew best. Mature males were significantly longer and heavier than mature females when data were pooled across strains for each lake. East Branch Fox River mature females allocated relatively less energy to gonadal weight than mature females of the Au Sable River strains. East Branch Fox River and Mainstream Au Sable brook trout had the highest and lowest survival, respectively, in all three lakes. The difference in survival between East Branch Fox River and Mainstream Au Sable strain trout was greatest in Hemlock Lake, where all strains exhibited relatively low survival; the difference was least in North Twin Lake, where all strains demonstrated relatively high survival. A significantly higher percentage of the population of East Branch Fox strain brook trout were caught, during 3 days of experimental angling, than either of the Au Sable River strains indicating greater vulnerability to angling for this strain. The mean lengths and weights of brook trout caught by angling from North Twin Lake were significantly higher than the means for trout caught with nets. In South Twin Lake, where all strains were more similar in size, no significant differences were detected between lengths or weights of angler and net-caught trout. The results of this study suggest that the intensity of angler exploitation, over time, may have altered the genetic potential for growth and catchability of these wild brook trout strains.