ABSTRACT

Two lightly exploited stocks of lake whitefish (Coregonus clupeaformis) near Isle Royale, Lake Superior, were compared in terms of growth, mortality rates, and yield per recruit. The stocks are separated geographically to the north and south of the island.

The ages of 501 lake whitefish from both stocks were determined. Length at age was estimated by conventional back calculation methods. The whitefish from the northern and southern areas were judged to be of different stocks. The southern stock averaged 50 mm longer at a given age than the northern stock. Total mortality rates were calculated for both stocks but they appeared to be high due to gear selectivity.

The Beverton and Holt dynamic pool model was applied to the stocks. Maximum yield per recruit for both stocks was attained at a fishing rate of 2.0 and a size limit of 482 mm (19 inches). The implications of this increase in fishing pressure were viewed in terms of remaining reproductive potential. Potential egg numbers were compared for the stocks at the fishing rate of 2.0 and a fishing rate of 0.7, which approximates that found in northern Lake Michigan. At the 0.7 fishing rate, there were 108% more potential eggs for the southern stock and 46% more for the northern stock than at the higher fishing rate of 2.0. The increase in yield per recruit at the 2.0 fishing rate, however, was only 9% and 7% for the northern and southern stocks, respectively.

The present size limit (432 mm or 17 inches) of the Isle Royale whitefish was hypothetically increased to 482 mm (19 inches) along with the instantaneous fishing mortality to 0.7. With a raised size limit of 482 mm, the decrease in yield per recruit was only 0.001% for the southern stock and 0.04% for the northern stock. The increase in residual egg potential was substantial, however, with 58% more potential eggs for the northern region and 59% for the southern region.