Using minnow traps to estimate fish population size: the importance of spatial distribution and relative species abundance

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Abstract

Relative abundance and within-lake distributions of three fishes, northern redbelly dace (*Phoxinus eos*), finescale dace (*Phoxinus neogaeus*), and central mudminnow (*Umbra limi*), were examined using minnow traps in Tuesday Lake, a small bog lake in the Upper Peninsula, Michigan. For these species, catches in minnow traps placed at the perimeter of the lake were 21 to 52 times higher than catches in midlake traps. Variance : mean ratios of perimeter trap catches indicated that both dace species were highly aggregated while the distribution of mudminnows was less aggregated or random. Over an 11 day period during which all fish caught were removed from the lake, catch per unit effort (CPUE) of both dace species declined in response to fish removal. In contrast, CPUE for mudminnows was low initially, increased to an asymptote and then declined only in the last 5 days of the fish removal. The patterns of CPUE for mudminnows indicated that mudminnow trapability and/or activity was reduced in the presence of high densities of dace. The low abundance of dace in traps with many mudminnows suggested mudminnows avoided traps already containing dace. Throughout the removal period, CPUE provided an accurate index of dace abundance, whereas this was true for midminnows only after dace populations had been reduced drastically. Therefore, in any use of minnow traps to estimate populations, both spatial distributions and relative species abundance of small fishes must be taken into account.