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Overwinter Consumption of Bluegill by Walleye and Yellow Perch

James C. Schneider and James E. Breck

Michigan Department of Natural Resources
Institute for Fisheries Research
212 Museums Annex Building
Ann Arbor, Michigan 48109-1084

Abstract.–The potential for predation by walleye or yellow perch to improve stunted bluegill populations was evaluated by lake observations combined with pond and laboratory experiments. There was substantial predation on age-0 bluegill by adult yellow perch during winter and fall in Michigan lakes. The highest calculated consumption rate, as percent of predator weight per day (%BW/d), was 0.43 for Cedar Lake. For two lakes, Blueberry Pond and Cassidy Lake, total December-March consumption of bluegill was estimated at 3,500/hectare and 8,600/hectare, respectively. Walleye also ate appreciable numbers of bluegill during fall in some lakes. Overwinter studies in experimental ponds measured the predatory effect of adult yellow perch and juvenile walleye on bluegill. Survival of age-0 bluegill in ponds without predators (controls) averaged 90±6% (N = 7, ±SD) over four winters; survival was reduced to 61±16% (N = 9) in ponds with predators. In a fifth winter experiment, bluegill survival averaged 19±6% (N = 3) in control ponds and 3.1±2.4% (N = 4) in walleye ponds. Predation on age-0 bluegill in the ponds was estimated to be 0.38±0.10 %BW/d for walleye and 0.27±0.08 %BW/d for yellow perch. In parallel laboratory experiments at 4.4°C, consumption rates were 0.11 %BW/d for adult yellow perch and 0.34 %BW/d for small walleye, and maintenance rations were 0.075 %BW/d and 0.32 %BW/d, respectively. Complete gastric evacuation of a 1% bluegill meal was estimated to take 41 h for yellow perch and 77 h for walleye. Most, but not all, predators lost weight in ponds or tanks at approximately 4°C. Laboratory experiments at higher temperatures, typical of fall and spring, indicated higher consumption and metabolic rates. Measurements of predator gape and bluegill body depth and length were also taken to determine predatory capabilities of walleye and yellow perch.

In Michigan lakes, young-of-the-year bluegill, which are usually less than 50 mm TL during fall and winter, may be ingested by walleye of any size likely to be present and by yellow perch larger than 158 mm TL. We conclude that fingerling walleye and adult yellow perch consume many age-0 bluegill during winter when they co-occur. When appropriate-sized predators are present at a sufficient biomass, their predation can help control bluegill stunting.

Populations of small-sized, slow-growing (stunted) bluegill *Lepomis macrochirus* that provide little or no sportfishing occur in many southern Michigan lakes, and throughout the midwest, and are a major concern to fisheries managers. Studies on the population biology of bluegill have demonstrated that the species has high reproductive potential, density-dependent growth, and density-independent mortality after about age 2 (Schneider 1971; Beyerle 1977; Latta and Merna 1977). Consequently, bluegill often produce a large year class, and unless