Dynamics of Good Bluegill Populations in Two Lakes with Dense Vegetation

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Abstract.—Characteristics of bluegill *Lepomis macrochirus* populations and fish communities were studied intensively at Dead Lake and Blueberry Pond. The lakes were small, shallow, and weedy, with macrophytes covering 41-83% of the surface. Both contained unusually high proportions and densities of bluegills over 8 in long due to unusually low fishing mortality, a favorable growth pattern, and low recruitment to age 2 or 3. Growth was rapid from 3 to 8 in, it then slowed and condition deteriorated among older fish. Mortality of adults was observed in early spring, when about 10% of the adults died. Rapid growth was stimulated by consistently low recruitment and utilization of limnetic *Daphnia* and littoral benthos as food. Low recruitment was partially due to predation; a diet study at Blueberry Pond estimated 303,300 juvenile bluegills per year were consumed by fish predators. Most juveniles were eaten by largemouth bass *Micropterus salmoides*, very few by cannibal bluegills. Each lake contained dense, slow-growing piscivores, but surprisingly they comprised less than 20% of the total fish biomass. It appeared that few adult bluegills attempted to spawn in Blueberry Pond, and this lack of spawning was likely more important than predation in controlling bluegill abundance. A supplemental pond study demonstrated that young and old adults of varying condition had normal reproductive potential. The triggering of spawning behavior may be linked to adult density, and perhaps adult growth, by behavioral or bioenergetic mechanisms. The implication for fisheries management is that weedy lakes need not be dominated by small, stunted bluegills but are capable of producing large bluegills if fishing harvest is restricted and a favorable food chain is present.

Fish communities in many southern Michigan lakes are dominated by small, slow-growing bluegills *Lepomis macrochirus*. These lakes lack bluegills as large as 8 in, a size which serves as an indicator of both good bluegill populations and good overall angling (Schneider 1981, 1990). Fishery managers have been unable to improve the size structure of bluegills in these communities for extended periods of time.

Lake characteristics, especially submerged macrophyte vegetation, play an important role in shaping bluegill populations and fishing quality. Size structure and growth of bluegill populations were correlated with abundance of macrophytes, predator-prey ratios, lake depth, and overall fishing quality for a large sample of Michigan lakes (Schneider 1981). In general, shallow and weedy lakes were the type most likely to have an overabundance of small, slow-growing bluegills, poor fishing, and low proportions of largemouth bass *Micropterus salmoides*. Conversely, populations of large, fast-growing