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Synopsis of 50 Years of Warmwater Fish Community Experiments at Jewett Lake

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Abstract.–Fishery and population data from one small lake spanning 50 years are reviewed in which 10 combinations of fish assemblages and angling exploitation were identified. The development of each combination was monitored and it's equilibrium state was observed or estimated. Initially, in 1945, Jewett Lake contained a diverse, lightly exploited, climax warmwater community with bluegill *Lepomis macrochirus* (51%), largemouth bass *Micropterus salmoides* (5%), and yellow perch *Perca flavscens* (6%) as major components by weight. Total standing stock biomass of all fish and the abundance of large fish were greatly reduced during the first year that public exploitation was permitted and they quickly stabilized at modest levels. Yield declined from 84 to 26 lb/acre. Next, there was a progression of experimental populations and communities comprised of combinations of bluegill, yellow perch, and walleye *Stizostedion vitreum*. Two of the experimental communities were stable and had desirable population and fishery characteristics: walleye + perch, and walleye + perch + bluegill. Predation by walleye was intensive enough to prevent over-population by bluegill and yellow perch and stimulate good individual growth. By contrast, monocultures of either prey species had higher biomass, but such slow individual growth that few fish achieved large size and their fishery potential was poor. The exploited warmwater community, composed of 7 species, had much higher fishery yield (26 lb/acre) than any of the experimental assemblages (maximum of 4 lb/acre). Total biomass of the exploited warmwater community (122 lb/acre) was matched by stunted bluegill in monoculture (peak of 126 lb/acre), but not by stunted yellow perch in monoculture (68 lb/acre), and not by the balanced 3-species community (maximum 74 lb/acre). Thus, the bluegill was able to extract virtually 100% of the potential fish productivity of the lake when released from competition and predation but the other food generalist, the yellow perch, was able to extract only 50%. Each had a somewhat unique niche, but bluegill suppressed the production of yellow perch. Bluegill are the dominant producer in Jewett Lake and most lakes in Michigan.

Fish and fishing in Jewett Lake were studied intensively from 1945 to 1995. During this 50-year span the lake supported first a typical warmwater fish community and then several types of fish assemblages of experimental origin. This data set affords a unique opportunity to (1) extract population statistics and gain insights into population dynamics which can be used for modeling; (2) determine how the characteristics of a population of one species change in the presence of other species and gain insight into how communities structure themselves; and (3) evaluate the fishery characteristics and management potential of various species assemblages. Because all studies were conducted at one lake, basic productivity and habitat type were constant. In addition, the physical environment of Jewett Lake has been constant