TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE WYOMING SOIL CONSERVATION SERVICE

Biology No. 307 January 1986

Subject: LARGEMOUTH BASS*

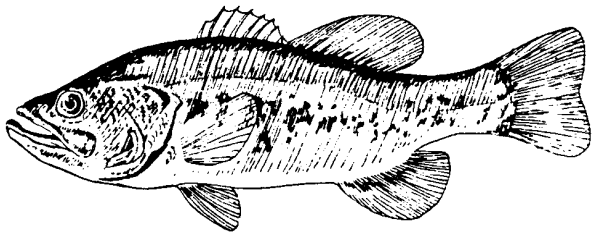
General

The largemouth bass (Micropterus salmoides) is native to the eastern United States, excluding the Northeastern States, and has been introduced throughout the United States. Two subspecies are recognized, the northern subspecies, M. salmoides salmoides, and the Florida subspecies, M. salmoides floridanus.

Age, Growth, and Food

The maximum known age of largemouth bass is 15 years, and the normal rate of growth for adult largemouth is approximately 454 g per year. Largemouth bass mature and spawn as early as age I near the southern limit of their range. Maturity is delayed among more northern populations. In Canada, maturity is reached in 3 to 4 years for males and 4 to 5 years for females.

Largemouth bass fry feed mainly on microcrustaceans and small insects, juveniles consume mostly insects and small fish, and adults feed primarily on fish and crayfish. Adults often feed near vegetation within shallow areas. Largemouth bass feeding intensity is bimodal with peaks in the early morning and late evening.



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*Information taken from Ecoregion M3113 Handbook and Habitat Suitability Index Models, Wildlife Species Narratives (literature searches), U.S. Fish and Wildlife Service, various dates between 1978-1984.

Reproduction

Spawning typically begins in the spring when the water temperature reaches 12.0° to 15.5°C. Spawning has been recorded between 11.5° and 29.0°C, but most occurs between 16° and 22°C. Incubation time ranges from 2 to 7 days, depending on water temperature. The Florida subspecies nests and spawns earlier than northern subspecies and at a 1° to 3°C lower temperature.

A gravel substrate is preferred for spawning, but largemouth bass will nest on a wide variety of other substrates, including vegetation, roots, sand, mud, and cobble. Nests are constructed by the male at water depths averaging 0.3 to 0.9 m with depths ranging from about 0.15 m to 7.5 m. Nests have been found as deep as 8.23 m in a reservoir where depth increased during the spawning period.

Specific Habitat Requirements

Lacustrine environments are the preferred habitat of largemouth bass. Optimal conditions are lakes with extensive (≥25 percent of surface area) shallow (≤6 m depth) areas to support submergent vegetation, yet deep enough (3 to 15 m mean depth) to successfully overwinter bass. Thus, it is assumed that 40 to 60 percent of the lake area should be >6 m depth to provide optimal overwintering habitat in northern latitudes.

Optimal riverine habitat for largemouth bass is characterized by large, slow moving rivers or pools of streams with soft bottoms, some aquatic vegetation, and relatively clear water. First and second order streams are generally poor habitat. One study reported that largemouth bass abundance increased in rivers during dry years when the flow was reduced and the water pooled. Thus, it is assumed that a river with a high percent (≥60 percent) of pool and backwater area is optimal. Also, largemouth bass prefer low gradient (≤1 m/km) streams; abundance declines as gradient increases toward headwater areas. It is assumed that gradients> 4 m/km would be unsuitable.

Growth of largemouth bass is reduced at dissolved oxygen levels 8 mg/l, and a substantial reduction occurs below 4 mg/l. Distress may be evident at 5 mg/l. Levels below 1.0 mg/l are considered lethal.

Standing crops of black basses (Micropterus spp.) are positively correlated with total dissolved solid levels of 100 to 350 ppm.

Largemouth bass are considered intolerant of suspended solids (turbidity) and sediment. High levels of suspended solids may interfere with reproductive processes and reduce growth. One researcher felt that high levels of suspended solids reduced the available food for largemouth bass to the extent that growth of maturing fish was reduced enough that they were physically incapable of reproduction. One study found that the greatest survival and growth of largemouth bass occurred in ponds with turbidities (suspended solids) < 25 ppm. Growth was intermediate in ponds with 25 to 100 ppm turbidity levels and lowest in ponds with turbidities >100 ppm. Also, no young-of-the-year bass were found in the ponds with high turbidities, while they were recovered from the ponds with low and intermediate turbidities. Thus, the optimum suspended solid levels are assumed to be 5 to 25 ppm, and levels <5 ppm

indicate low productivity.

Largemouth bass require a pH between 5 and 10 for successful reproduction. Using one researcher's criteria for freshwater fish, optimal pH range is 6.5 to 8.5. Largemouth bass can tolerate short-term exposures to pH levels of 3.9 and 10.5.

Adult. Adult largemouth bass are most abundant in areas with vegetation and other forms of cover (e.g., logs, brush, and debris). Optimal cover corresponds to 40 to 60 percent of the pool or littoral area; too much cover may reduce prey availability. Optimal current velocities are ≤6 cm/sec, and velocities> 20 cm/sec are unsuitable. Increased water levels in reservoirs may reduce prey availability due to increased cover for prey species. Stable to decreased water levels concentrated prey, which increased feeding and growth rates of adult bass. Thus, stable to slightly negative midsummer fluctuations (0 to 3 m) are considered optimal for adult largemouth bass.

Optimal temperatures for growth of adult bass range from 24° to 30°C. Very little growth occurs below 15°C or above 36°C. Salinity levels above 4 ppt cause sharp declines in abundance.

Embryo. Optimal spawning substrate is gravel, but other substrates, such as vegetation, roots, sand, and mud, are suitable. Silty, mucky bottoms are unsuitable. Exposed, shallow water (<1.5 m) nests are vulnerable to destruction by wave action. Boulders, irregular bottoms, and other forms of shelter may protect these nests. Water velocities as low as 40 cm/sec may result in mortality of embryos. Several researchers reported that velocities >10 cm/sec were avoided by the species. Stable water levels during spawning are optimal; drawdowns often result in poor survival. Since largemouth bass spawn at depths ranging from 0.15 m to 7.5 m, it is assumed that drawdowns >7.5 m are unsuitable for successful embryonic development during spawning.

Optimal temperatures for successful spawning and incubation are 20° to 21°C with a range of 13° to 26°C. Survival is very low at temperatures> 30°C and < 10°C. Survival of embryos is impaired at salinities> 1.5 ppt and zero at levels> 10.5 ppt.

Fry. Optimal current velocities for fry are <4 cm/sec, and fry cannot tolerate current velocities >27 cm/sec. Cover, in the form of flooded terrestrial vegetation, is an important requirement for fry habitat suitability because the amount of cover has been positively correlated to number of fry. However, too much cover constitutes poor spawning habitat. Thus, it is assumed that optimal pools or littoral areas contain 40 to 80 percent cover. Also, stable to increased summer water level is optimal because it increases cover availability. It is assumed that decreasing (>1 m) water levels would he suboptimal because fry would be more susceptible to predation with the decrease in available cover.

Optimal temperatures for fry growth are 27° to 30°C. Little growth occurs below 15°C or above 32°C. The growth rate of fry declined at

salinities 1.66 ppt and was zero at 6 ppt.

Juvenile. Specific habitat requirements of juveniles are presumed to be similar to those of adult largemouth bass.