# COMPARATIVE GROWTH RATES OF LARGEMOUTH BASS *(MICROPTERUS SALMOIDES LACEPEDE)* IN NORTH CAROLINA WATERS

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One important index to the quality and productivity of any fishery is the growth rate of the fish found in that particular habitat. Often times the age and accompanying growth rates are the most important pieces of information the fishery worker has at his disposal when diagnosing fishery problems. Knowing two vital facts about a fish, i.e., the total length at capture and the age at capture, we can interpret several useful items: First, the relative density of the population of the species under study; second, availability and utilization of the food supply in the habitat; third, maturity of the spècimens studied; and fourth, suitability of the habitat for the species being studied. Hence it is apparent that the age and growth rates of fish are certainly important to the fishery worker and often indispendable in dealing intelligently with problems in fish management.

## METHODS

The method of determining the age of fish that is the most widely used and probably the most practical is the scale method. This method and its applications are discussed at length by Bennett (1937), Hile (1941), and van Oosten 1928).

During the summer of 1950, in connection with lake survey work, scale samples were taken from over 600 fish, including 142 largemouth bass. These bass ranged in length from less than 5 inches to a maximum of 27 inches. Fifteen lakes representing all sections of the state, except the east coastal area, were sampled. This paper is concerned only with the growth rates of the bass from these lakes.

## RESULTS

Although a very limited number of lakes and impoundments were sampled in the state, at least some indications and comparisons are evident and seem valid. Taken together, the lakes presented quite a wide range of bass growth rates, as indicated in Fig. 1 and Table 1. The best growth of bass was found in the Roxboro City Reservoir. However, this does not mean that this is the best in the state — only the best of the 15 lakes checked. This growth rate was better than that reported by Stroud in 1948 for Norris Reservoir in Tennessee, and considerably better than those reported from Michigan and Indiana by Lagler and Ricker in 1943. Even the average for the 15 lakes was quite high and above that for the north central states. This is to be expected when we consider the primary factors upon which growth depends. These would include availability (and quality) of food, water temperature, and length of growing season. Secondary and important

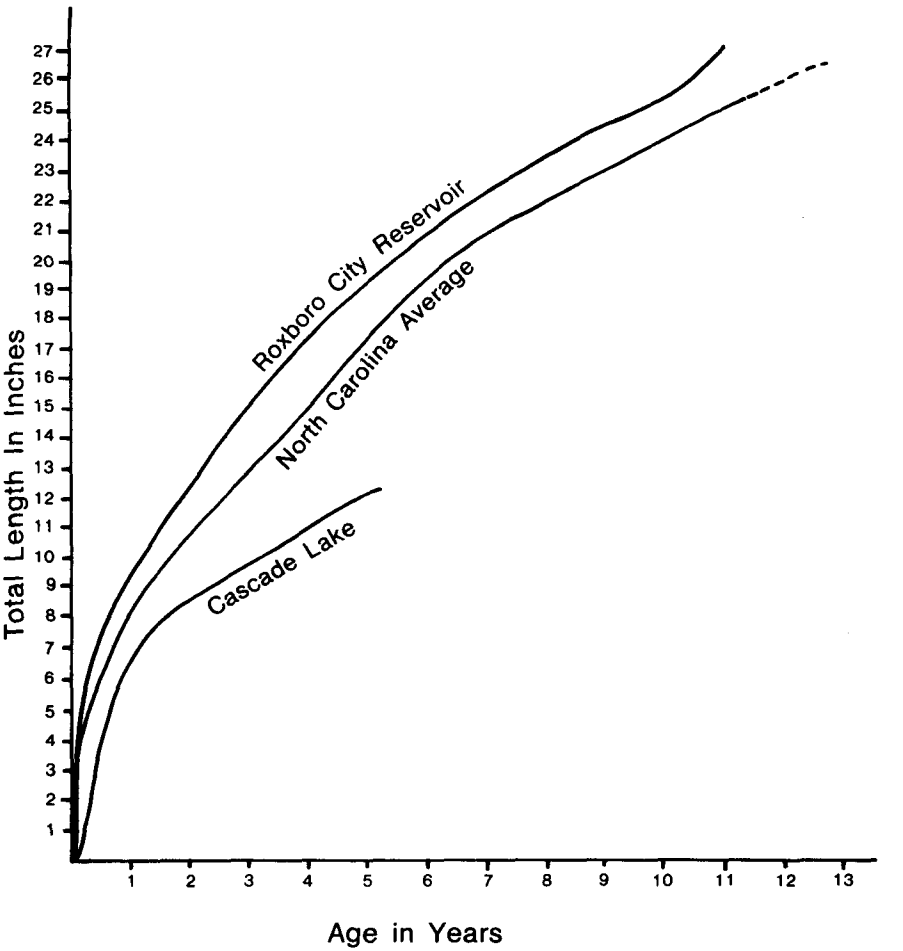


Fig. 1. Largemouth bass growth in North Carolina — 1950.

influencing factors would include clarity of water and population densities. It is obvious that in the latitude of North Carolina, higher average water temperature and longer growing seasons exist than in the north central states, for example.

In comparing growth rates within the state, we found the lakes and impoundments in the following general order, although in many cases the growth rates were very similar:

1. Roxboro City Lake
2. High Rock Lake
3. Lake Hickory
4. Badin Lake
5. Lake Catawba
6. University Lake, Chapel Hill
7. Mt. Island Lake

Table 1. Length-Age relationship in the largemouth bass in North Carolina.

| | Length in inches at the end of each complete growing season | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year of Life | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Age-Group | 0 | I | II | III | IV | V | VI | VII | VIII | IX | XI | |
| Lake No. of Annuli | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Roxboro City Lake | | 9.0 | 12.0 | 14.7 | 17.1 | 19.2 | 20.8 | 22.3 | 23.4 | 24.1 | 25.1 | 27.0 |
| High Rock Lake | | 8.3 | 13.1 | 16.0 | 17.9 | 18.3 | 19.1 | | | | | |
| Lake Hickory | | 7.0 | 12.0 | 14.6 | 15.5 | 16.2 | 17.4 | 19.0 | 21.5 | | | |
| Badin Lake | | 6.9 | 12.0 | 15.0 | 17.0 | | | | | | | |
| Lake Catawba | | 8.5 | 12.2 | 13.7 | 14.9 | | | | | | | |
| University Lake | | 8.4 | 10.1 | 13.2 | 15.1 | 18.0 | 19.3 | 22.0 | | | | |
| Mountain Island Lake | | 8.3 | 11.1 | 13.9 | 15.6 | | | | | | | |
| Lake Ellis | | 6.8 | 11.1 | 14.5 | 15.5 | 17.1 | 18.0 | | | | | |
| Ledbetter's Lake | | 7.1 | 10.0 | 12.0 | 14.7 | 19.0 | 22.0 | 24.0 | | | | |
| Creedmoor City Lake | | 7.8 | 10.3 | 11.5 | 13.7 | 16.8 | 17.2 | | | | | |
| Lake Tillery | | 8.4 | 9.0 | 13.0 | 14.6 | | | | | | | |
| Blewett Falls Lake | | 5.7 | 8.7 | 10.0 | 12.6 | | | | | | | |
| Lake Glenville | | 5.6 | 7.9 | 10.0 | 12.5 | 13.7 | | | | | | |
| Lake Tahoma | | 7.3 | 8.9 | 10.6 | 12.0 | 13.0 | | | | | | |
| Cascade Lake | | 6.7 | 8.3 | 9.5 | 10.7 | 12.0 | | | | | | |
| North Carolina Average | | 8.0 | 10.8 | 12.7 | 15.0 | 16.9 | 19.0 | 20.7 | 22.1 | 23.0 | 24.0 | 25.0 |
| Norris, Reservoir, TN | | 6.9 | 12.2 | 14.7 | 16.1 | 17.5 | 19.3 | 20.8 | | | | |
| North Central Average | | 3.3 | 7.4 | 10.5 | 12.5 | 14.0 | 15.1 | 16.3 | 17.4 | 18.1 | | |

8. Lake Ellis
9. Ledbetter's Lake
10. Creedmoor City Reservoir
11. Tillery Lake
12. Blewet Falls Lake
13. Glenville Lake
14. Lake Tahoma
15. Cascade Lake

The entire growth curve was used in the comparison, rather than segments of the curve. In some cases individual lakes that are listed from 5 on down displayed better growth during the first 2 years than those of the top 5.

It is interesting to note that in considering all the lakes in the respective chains, the Catawba System displays a better over-all bass growth rate than that of the Yadkin System. The general average growth rate of the smaller lakes in the Piedmont section falls between these two systems. The bass in the mountain section grow much more slowly than in the other areas because of the shorter annual growing seasons.

Looking at the river systems individually, we find that as we go down stream from lake to lake, the bass growth rates become progressively poorer. This is particularly apparent in the Yadkin System where High Rock Lake is rated 2nd, Badin 4th, Tillery 10th, and Blewett Falls, far down the system, 11th.

The trend is the same in Catawba, with Lake James (Hueske 1947) high, Lake Hickory medium, and Mt. Island and Catawba relatively low.

Two obvious factors are contributing to these differences, and it is interesting to note that both factors increase in intensity from the headwater lakes to the lower lakes in the chains — turbidity of water and densities of non-game fish populations.

Food supplies for bass over 4 inches are adequate in all lakes concerned, so this is not a critical factor in causing material differences in the growth rates. However, to say that the food supply is adequate and to say it is available to the bass are certainly not one and the same. Here is where the factor of water turbidity enters in. Large numbers of gizzard shad and young bluegills and other sunfishes may be present, but if the water is turbid much of the time, the bass, which feed by sight, will be handicapped greatly in their feeding and, consequently, will not grow as rapidly as would be possible in clearer waters with the same amount of food present.

Any rough fish in game fish habitats are too many; however, it appears that excessive numbers must be present before they do any noticeable damage to the bottom food supplies. This bottom food is important to the young of almost all species of fish, including the bass. Bass and other species depend upon these bottom organisms during the early curcial stages of their lives. Future growth depends on the start these fish get in life.

A comparative correlation of these two factors, turbidity and rough fish populations, and the growth rate of bass was seen both on the Yadkin and Catawba systems. With the down-stream increase of both turbidity, including lengthened periods of severe turbidity, and greater rough fish population densities, the growth of bass declined.

The alleviation of the turbidity and decrease of rough fish populations will undoubtedly result in better growth rates in all species, including the bass. This does not say the fishing will materially improve; but on the basis of past records of other habitats, it should improve.

Turning briefly to the mountain lakes checked, we find a very different situation than that seen in the Piedmont reservoirs. Here turbidity is not a serious problem, and evidently does not influence the feeding of the fish. Food supplies are, for the most part, adequate for the largemouth. The growth limiting factor here is the water temperature. Cold water lowers metabolism of all species, including the largemouth bass. As a rule, the lower the average water temperature from the optimum, the slower is the growth in warm water species. This is very apparent in the mountain lakes, many of which are not suitable habitat for optimum largemouth bass growth.

In summation we can say that the bass are growing quite well in most lakes of the Piedmont section, and also in the upper impoundments of both the Yadkin and Catawba systems. In the mountain lakes, largemouth bass are growing relatively poorly due to low average water temperatures. The over-all state-wide bass growth rates are satisfactory, and exceed those reported by investigators in many other sections of the country. The bass growth rate was also found to be inversely correlated with increasing turbidity and increasing populations of non-game species.

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