EFFECTS OF INTERNAL ANCHOR TAGS ON LARGEMOUTH BASS GROWTH

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Abstract: From 1977 to 1979 largemouth bass *(Micropterus salmoides)* were collected in spring from Lake Higgins in North Carolina and tagged with Floy FD-67 internal anchor tags. Tagged fish were released back into the lake and a recapture effort was made the next year. During the year following tagging, tagged bass generally achieved a smaller length increment than untagged bass of a comparable size. Weights of tagged bass tended to be less than similar size untagged bass, but only in the 326- to 350-mm size interval was the difference significant ($P < 0.05$).

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In recent years numerous studies of largemouth bass populations have been conducted which employed Floy internal anchor tags (Ager 1978, Hammond and Ager 1975, Seawell and Hevel 1978). The ease of application and high retention rates during the 1st year (Rawstron and Pelzman 1978) have enhanced the appeal of this tag. Relatively, little attention has been directed toward discerning the effects of internal anchor tags on fish growth. Gunn et al. (1979) reported that Floy FD-67 tags applied during spawning season curtailed the growth of brown bullheads *(Ictalurus nebulosus).* Several studies have demonstrated that other types of tags (ie. jaw, Petersen, and metal strap) can retard the growth of various fishes including largemouth bass (Kimsey 1956, Wegener 1965), smallmouth bass *(Micropterus dolomieui)* (Youngs 1958), lake trout *(Salvelinus namaycush)* (DeRoche 1963, Eschmeyer 1959) and walleye *(Stizostedion vitreum vitreum)* (Smith et al. 1951). The purpose of this study was to determine the effects of Floy internal anchor tags on the growth of largemouth bass.

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METHODS

Each April and May during the years 1977 through 1979, largemouth bass were collected by electrofishing from Lake Higgins, a 116 ha water supply reservoir for the City of Greensboro, North Carolina. Fish were collected for a mark-recapture study and all bass greater than 300 mm were tagged below the soft dorsal fm with Floy FD-67 internal anchor tags. All bass were measured and sufficient numbers weighed to establish a weight-length relationship for each year. Also several scales were removed from a portion of the previously untagged bass collected each year for age and growth determinations.

Length increments of tagged (recaptured) and untagged bass collected in 1978 and 1979 were compared. Of the tagged bass, only those tagged in the year preceeding recapture were utilized. Since no scales were collected from recaptured

bass, length increments could not be compared in the normal fashion. Therefore, for each year, tagged bass and untagged bass for which growth had been determined were grouped into 25-mm length intervals. The length increments attained during the preceeding year by untagged bass were determined from scale analyses. The length increments of tagged bass during the same period were obtained by subtracting length at tagging from length at recapture. Length increments of tagged and untagged bass in each length interval were compared using the Wilcoxin Rank Sum Test (Sokal and Rohlf 1969).

Weights of tagged bass in each 25-mm length interval were compared with average weights of untagged bass by the Wilcoxin Sign Rank Test (Sokal and Rohlf 1969). Also relative condition factors, Kn (LeCren 1951), were calculated as a graphical comparison of tagged and untagged bass weights. Kn values were obtained by dividing weights of tagged fish by predicted weights for equal size untagged fish generated from a weight-length regression.

RESULTS AND DISCUSSION

Sufficient numbers of largemouth bass from 301 to 400 mm long were obtained to compare length increments (Table 1). In both years tagged bass in the 301- to 325- and 326- to 350-mm size groups achieved significantly less growth than untagged bass ($P < 0.01$). The median length increment of tagged bass was approximately ⅓ that of untagged bass. For 1978, no significant differences were found between tagged and untagged bass over 350 mm ($P > 0.05$). In fact, the median length increments of tagged bass slightly exceeded that of untagged bass. However, in 1979 median length increments of tagged bass between 351 and 400 mm were significantly less than that achieved by untagged fish ($P < 0.05$).

The weight-length regression equation for untagged bass in 1979 was $\log W = -5.9387 + 3.409 \log L$ ($r = 0.995$). Weights of tagged bass tended to be less than predicted values from this regression (Fig. 1). Mean Kn values of tagged bass were <100 in all 4 size groups. However, only in the 326- to 350-mm size group was the difference in weights significant ($P < 0.05$).

Table 1. Comparison of median growth increments (mm) of tagged and untagged largemouth bass in Lake Higgins.

Year	Size group	Untagged bass median increment	Range	N	Tagged bass median increment	Range	N	Significance level ($P \leq$)
1978	301 – 325	41	18 – 99	13	10	6 – 20	4	0.01
	326 – 350	41	16 – 73	15	21	4 – 33	17	0.01
	351 – 375	26	13 – 37	14	33	13 – 47	11	NSD[a]
	376 – 400	35	23 – 42	5	30	6 – 42	16	NSD
1979	301 – 325	58	29 – 132	11	9	0 – 20	6	0.01
	326 – 350	40	13 – 58	13	6	0 – 28	19	0.01
	351 – 375	28	21 – 43	10	14	0 – 51	10	0.05
	376 – 400	31	11 – 49	9	9	8 – 13	5	0.01

[a] NSD = $P > 0.05$

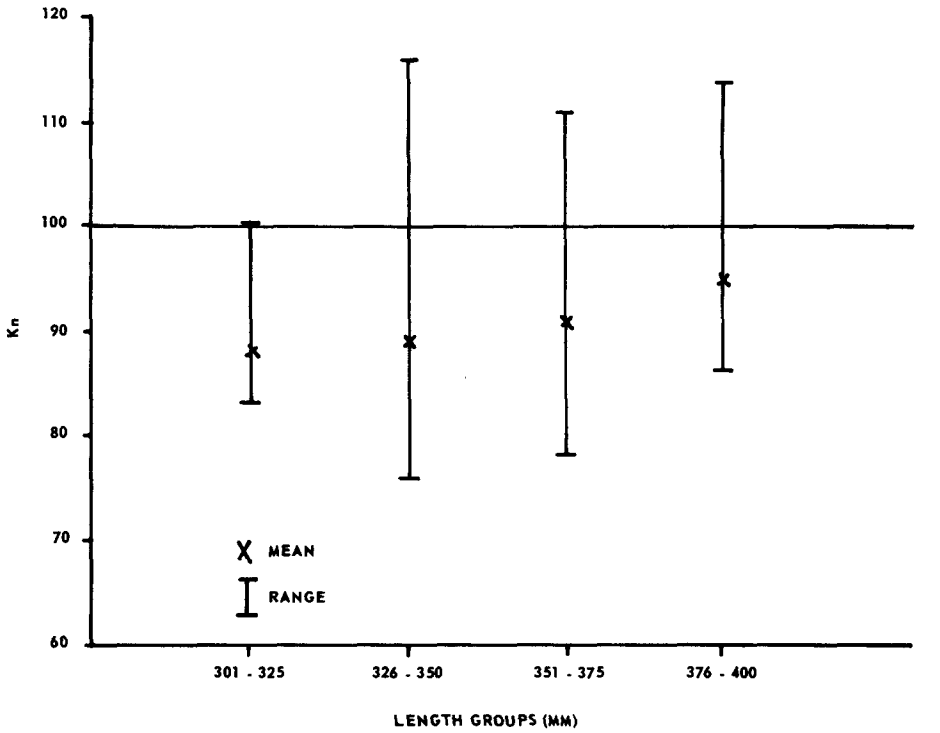

Fig. 1. Relative condition factors (Kn) of tagged bass as compared to untagged bass in 1979. A Kn value of 100 represents no difference in weights.

Eschmeyer (1959) found that Petersen, cheek, and jaw tags did not adversely affect the condition of lake trout. Smith et al. (1952) reported similar results with walleye. Weight reductions in largemouth bass tagged with monel, Petersen, and spaghetti tags were found by Wegener (1965) 3 months after tagging. However, these fish were frozen prior to weighing and some dehydration probably occurred. The reduced Kn values in the present study indicated that tagging with Floy anchor tags did lower the condition of bass in Lake Higgins.

DeRoche (1963) reported that the longer tagged lake trout lived, the more retarded their growth. We obtained too few recaptures of bass tagged longer than 1 year to test long term suppression of growth. However, from the few fish available, it did appear that growth continued to be retarded after 2 years.

The mechanism(s) whereby tags reduce fish growth is unclear. Latapie (1967) and Wegener (1965) noted a high incidence of infection associated with tag wounds. Tag wounds in Lake Higgins bass appeared to heal quickly and no visible infection was evident. If the effects of internal anchor tags upon growth are associated with stress, then the effects may be magnified in populations of bass which are in poor condition. Van Horn et al. (1981) reported that bass in Lake Higgins did have relatively low condition values.

Since many bass tagging studies are conducted in spring with internal anchor tags, investigators should be aware of the potential for reducing growth of tagged fish. Tagged bass in Lake Higgins achieved smaller annual length increments and were in poorer condition than untagged bass. In studies where large numbers of bass are tagged, either in 1 year or over several consecutive years, significant portions of the populations could be affected.

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