

A Simple Fish Tag Suitable for Long-Term Marking Experiments

W. J. WHITE AND R. J. BEAMISH¹

*Department of Zoology
University of Toronto, Toronto, Ont.*

WHITE, W. J., AND R. J. BEAMISH. 1972. A simple fish tag suitable for long-term marking experiments. *J. Fish. Res. Bd. Canada* 29: 339-341.

A simple, inexpensive fish tag that allows for growth of the fish is described. Growth rates of smallmouth bass were not significantly affected by tagging. The rate of retention on smallmouth bass was much higher than that for a tag described by Fraser but rates of retention of the two tags on largemouth bass were not significantly different. Estimated rates of tag loss were 15% after 1 year for smallmouth bass and 17% after 3 years for largemouth bass. Observed tag losses from white suckers over 3 years were only 0.6%.

Using this method, two or three persons can conveniently tag fish at a rate of approximately 30 per hour.

WHITE, W. J., AND R. J. BEAMISH. 1972. A simple fish tag suitable for long-term marking experiments. *J. Fish. Res. Bd. Canada* 29: 339-341.

Les auteurs décrivent une marque simple et peu dispendieuse qui tient compte de la croissance du poisson. Le marquage n'affecte pas sensiblement le rythme de croissance des achigans à petite bouche. Le pourcentage de rétention de cette marque par les achigans à petite bouche est beaucoup plus élevé que celui de la marque décrite par Fraser, mais il n'y a pas de différence significative entre les taux de rétention des deux marques par les achigans à grande bouche. Le taux de perte de marques est estimé à 15%, après 1 an, chez les achigans à petite bouche, et à 17%, après 3 ans, chez les achigans à grande bouche. Les pertes de marques observées chez les catostomes noirs communs ne sont que de 0.6% après 3 ans.

Cette méthode permet à deux ou trois personnes de marquer facilement 30 poissons à l'heure.

Received May 19, 1971

IN 1967 and 1968, studies on populations of white suckers (*Catostomus commersoni*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*) entailed considerable tagging. This note describes the preparation and application of the new type of tag used and gives data on the usefulness of the tag.

The label consisted of a piece of spaghetti tubing 25 mm long with an outside diameter of 2.0 mm (Floy Tag Co.). For smaller fish the length of the label was

reduced. The label was fastened to the fish by approximately 10 cm of polypropylene monofilament (0.3 mm diam, breaking strength 4.4 kg).

Application of tag—When applied to white suckers (Fig. 1A) the tag resembled Saunder's (1968) modification of the Swedish smolt tag (Carlin 1955). The monofilament was sewn with a needle under the dorsal fin rays between the pterygiophores, out through the skin on the opposite side, then back through the flesh to the original side about 1 cm from the insertion point. The two strands were tied in a surgeon's knot so that the monofilament was taut but did not pinch the skin. The label was threaded over the two strands of monofilament that were then knotted behind it. The label was then forced back so that the distal end covered the knot. The free ends of the monofilament were fused to the tubing in an alcohol flame.

¹Present address: Fisheries Research Board of Canada, Freshwater Institute, 501 University Crescent, Winnipeg 19, Man.

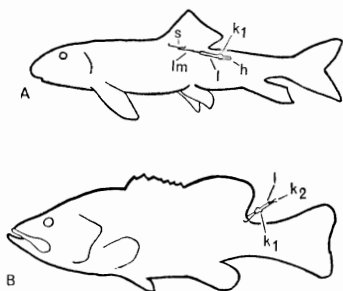


FIG. 1. Appearance and location of tag on A, white sucker and B, smallmouth bass. h, heat seal; k_1 , knot of monofilament inside label; k_2 , large knot of monofilament at distal end of label; l, label; lm, length of monofilament to allow for growth; s, surgeon's knot.

Bass were tagged by passing the monofilament only once through the muscle about 1–1.5 cm deep immediately behind the dorsal fin and then securing the two strands with an overhand knot (Fig. 1B). The tubing was threaded over the monofilament as far as the knot, and a second overhand knot was tied hard against the distal end of the tubing to retain it. Excess monofilament was cut away with scissors. A heat seal was not used when tagging bass.

The length of monofilament between the surgeon's knot and the bottom of the label allowed the fish to grow over the knot without covering any part of the label. This length should be greater for younger fish than for older ones.

Tubing that was previously soaked in a solution of malachite green reduced algal growth on the tubing and fungus growth on a fresh wound. Two persons conveniently performed all of the tagging operations. Prior to tagging, suckers were anaesthetised in M.S. 222, but bass were tagged without anaesthetic with no apparent ill effects. The tags were applied at a rate of approximately 30 per hour.

Tagging wounds of suckers healed within several months and after 1 year the loop of monofilament distal to the knot and label was partly covered with tissue. After 2 years it was frequently covered completely. Bass healed somewhat more slowly and some wounds were irritated unless the loop passing through the flesh was loose.

Usefulness of tag—Bass were fin-clipped for ready identification of recovered fish that lost their tags, and all suckers taken in the recovery program were examined for evidence of tagging wounds. Of 650 recoveries of tagged suckers in the 3 years after tagging, three fish had lost the spaghetti tubing label and one had lost the entire tag. Of 633 recaptures made before August 14 in the year of tagging smallmouth bass, five had lost their tags. In the next year, 16 of 108 bass recaptured (15%) had lost their tags. These rates of tag loss are low for this species. Fraser (1955) estimated

that 80% of smallmouth bass tagged in various ways had lost their tags by the following year.

The suitability of the spaghetti tag for marking largemouth bass was compared directly with that of the tag used in 1949 by Fraser (1955) on smallmouth bass. Fraser's tag consisted of an oval celluloid disc 0.5 × 0.3 inches. A 9-inch length of nylon monofilament (6-lb test) was inserted through a hole in the label and tied with a clinch knot. The monofilament was passed through the flesh immediately behind the dorsal fin with a needle, brought around as tightly as possible, returned through the hole in the label, and secured to the label by two half-hitches. Excess monofilament was cut off with scissors.

From August 2 to 8, 1967, 98 largemouth bass were marked with spaghetti tags and 103 with Fraser's tag at Nogies Creek, Ontario. The percentages of fish marked by these methods, which were recaptured at least once from 1967 through 1970, did not differ significantly ($P > 0.05$) in any of these years. The numbers recaptured at least once in the various years, and (in parentheses) the expected numbers along with the chi-square values, were:

Year	1967	1968	1969–70
Spaghetti tag	9(10.7)	23(23.8)	7(5.8)
Fraser's tag	13(11.2)	26(25.0)	5(6.1)
Chi-square	0.54	0.066	0.45

Therefore, there is no evidence of a difference in either tag losses or tagging mortality between the two groups of fish tagged by these methods.

Losses of tags of each type from largemouth bass appeared to be few. The total losses of the two tags from 1967 through 1969 were:

Years after tagging	0	1	2	Total
No. of recaptures	268	264	64	596
Tags lost (%)	0	9.0	17.2	5.9

Bass are commonly tagged by means of a strap encircling the mandible (Forney 1961). However, Youngs (1958) found that a strap tag around the mandible significantly reduced the growth rate of smallmouth bass.

The growth rate of smallmouth bass marked with the spaghetti tag was compared with that of unmarked bass using the method of comparison employed by Youngs. The regression of length at recapture on length at tagging of 38, age VII, smallmouth bass gave a curve described by the equation:

$$L_8 = 0.78L_7 + 3.69$$

where: L_8 is the length at recapture; L_7 is the length

at age VII. This curve represents the growth rate of tagged bass at age VII.

The mean length at age VIII of 123 unmarked bass was 13.8 inches. The mean length at age VII of 249 unmarked bass was 13.0 inches. These lengths, substituted for L_8 and L_7 , respectively, satisfy the above equation almost exactly. Therefore, the spaghetti tag appears not to have affected the growth rate of tagged smallmouth bass.

The tag has also been used successfully on northern pike *Esox lucius* with few tag losses (J. Casselman personal communication).

Tagging did not appear to interfere with spawning of suckers. Of 296 tagged on the spawning grounds in 1967, 95 were recaptured within 3 weeks at least once and many were recaptured several times.

This tag appears suitable for long-term studies of suckers, bass, and probably a number of other fishes.

Acknowledgments—The authors appreciate the assistance of Dr F. E. J. Fry in the design and application

of the tag, and for providing data on the tagging of largemouth bass at Nogies Creek, Ontario. Mr R. S. Dursley was responsible for operations at Nogies Creek. Financial support was provided by grants from the National Research Council of Canada, the Fisheries Research Board of Canada, and the Canadian National Sportsmen's Show.

- CARLIN, B. 1955. Tagging of salmon smolts in the River Lagon. *In* Annual Report for 1954, Inst. Freshwater Res., Drottningholm, Sweden, p. 57-74.
- FORNEY, J. L. 1961. Growth, movements and survival of smallmouth bass (*Micropterus dolomieu*) in Oneida Lake, New York. N.Y. Fish Game J. 8: 88-105.
- FRASER, J. M. 1955. The smallmouth bass fishery of South Bay, Lake Huron. J. Fish. Res. Bd. Canada 12: 147-177.
- SAUNDERS, R. L. 1968. An evaluation of two methods of attaching tags to Atlantic salmon smolts. Progr. Fish-Cult. 30: 104-109.
- YOUNGS, W. D. 1958. Effect of the mandible ring tag on the growth and condition of fish. N.Y. Fish Game J. 5: 184-204.