Tag Retention and Survival of Floy-tagged and Fin-clipped White Catfish and Channel Catfish in Hatchery Ponds

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Abstract: The retention of Floy FD-68B anchor tags and survival of 200 tagged and fin-clipped white catfish (*Ictalurus catus*) and channel catfish (*Ictalurus punctatus*) were determined over a 184-day period in 2 0.20-ha ponds. In 1 pond, 50 tagged fish and 50 fin-clipped fish were stocked. In the second pond, 50 tagged and fin-clipped fish and 50 fin-clipped fish were stocked. Of the 70 tagged fish recovered (all tagged fish received 2 tags), all had retained at least 1 tag. Four Floy tags were lost, yielding an overall tag retention of 97.1%. No separation of plastic sleeves was observed from the remaining 136 tags. Floy-tagged fish exhibited the highest rate of survival (86%), followed by fin-clipped fish (66%), then Floy-tagged and fin-clipped fish (54%). The results indicated that use of Floy tags was less detrimental than removing a pectoral fin and spine from catfish. It was determined that 1 tag per fish would yield sufficient tag returns for a later study due to the high tag retention rate.

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Fishery scientists have been searching for the ideal means of marking fish since 1873 when Atlantic salmon (*Salmo salar*) were first tagged in the Penobscot River, Maine (Everhart et al. 1975). Since that time, numerous

types of marking devices have been used with varying degrees of success (Bowers and Martin 1957, Eschmeyer 1959, Latapie 1967, Rawstron 1973).

Two important factors to consider when using tags are the effects tags have on fish and tag retention. Detrimental effects have included high incidence of fungal infection and death (Moyer et al. 1974), open wounds (Rawstron 1967) and growth retardation (Carline and Brynildson 1972, Eschmeyer 1959, Gunn et al. 1979). Other studies have reported no detrimental effects from tagging (Rawstron 1973, Tranquilli and Childers 1982). Tag retention time varies with the type of tag used, expertise of the tagger, species of fish tagged and habitat of the tagged fish.

Since Floy anchor tags were first described by Dell (1968), they have become increasingly popular with fishery biologists for marking fish. Rawstron (1973) preferred the Floy FD-67 tag over disk dangler and trailer tags on salmonids because it was economical, more efficient, faster, and yielded the most satisfactory results. In studies with largemouth bass (*Micropterus salmoides*), the Floy FD-68B tag was preferred over Monel strap tags inserted in the jaw (Crumpton and Smith 1975) and in the opercle (Ager et al. 1974). Three-month retention rates of 88% for largemouth bass were reported by Wilbur and Duchrow (1972) for the Floy FD-68B tag.

Although catfish are important commercial species, little work has been conducted on the effects and retention rates of various tags on them. In previous studies, channel catfish (*Ictalurus punctatus*) were marked with injected dyes, tattoos, fluorescent pigments, and hot brands to differentiate fish for selective breeding experiments (Hill et al. 1970). Brown bullheads (*Ictalurus nebulosus*) tagged with Floy FD-67 anchor tags exhibited reduced growth rates during spawning periods (Gunn et al. 1979) but tag retention rates were not reported. Tag losses of 70% by 6 weeks and 90% by 12 weeks were reported for channel catfish tagged with Floy FD-67 anchor tags (Greenland and Bryan 1974). Lack of solid attachment was blamed for these high rates of tag loss.

Little is known of movement, standing crop, or the commercial exploitation rate of catfish in the St. Johns River, Florida. From July 1981 through June 1928, commercial fishermen harvested 1,238,575 kg of catfish from the St. Johns River, making them the most important fresh water commercial species in the river (Hale et al. 1982). A tagging study was proposed to determine fishery and population parameters. Before a large-scale catfish tagging program using the Floy FD-68B anchor tag could begin, tag retention rates and survival of tagged catfish needed to be determined. Whether to single- or double-tag catfish for adequate return rates also warranted investigation.

The objectives of this study were to determine survival and Floy FD-68B anchor tag retention rates on catfish and whether to use 1 or 2 tags per fish prior to the initiation of a large-scale catfish tagging program.

Methods

On 28-29 July 1982, 200 catfish ranging from 200 mm – 472 mm total length were collected from the Wekiva River, a tributary of the St. Johns River north of Sanford, Florida. White catfish (*Ictalurus catus*) comprised 91.5% (183 fish) of the catfish collected while channel catfish comprised 8.5% (17 fish). Because channel catfish comprised such a small percentage of the fish collected, no comparisons of tag retention or survival were attempted.

An electrofishing device commonly referred to as a "monkey rig" was used to collect the fish. The alternating current electrical field was generated by a magneto from a military field telephone. The magneto was powered by a 12-V automobile fan motor. A common door spring connected to the battery provided resistence to control motor revolutions per minute. An alternating current of ±16V with a pulse rate of 16.6 Hz was produced. The device was used because of its high rate of efficiency and selectivity for catfish species (Luthey–date unknown).

On 30 July 1982, 50 catfish were randomly selected from the Wekiva River sample, tagged with Floy FD-68B anchor tags and stocked into a 0.20-ha pond (Pond 36) at Richloam State Fish Hatchery, Webster, Florida. The right pectoral fin and spine were completely removed from another group of 50 catfish which were also randomly selected and stocked into the same pond. The procedures were repeated for a second group of 100 fish stocked in Pond 37 with the exception that the left pectoral fin and spine were completely removed from the 50 Floy-tagged fish. A concentration of 0.6 cc Quinaldine/liter of water was used as an anesthetic.

Two Floy tags were injected into each tagged fish utilizing techniques described by Tranquilli and Childers (1982), 1 tag on each side and slightly posterior to the dorsal fin. The Floy tags were 80 mm in length including 55 mm of bright yellow plastic tubing that contained a printed message and identification number. Floy FD-68B anchor tags were used because they easily could be spotted by an untrained observer and each individual fish could be identified.

Due to a shortage of available ponds, hatchery personnel stocked several species of fish in Ponds 36 and 37. Catfish in Pond 36 were co-stoked with 2,000 fingerling grass carp (*Ctenopharyngodon idella*), 50 fingerling largemouth bass, 30 adult bluegill (*Lepomis macrochirus*) and redear sunfish (*Lepomis microlophus*), and 2.3 kg of assorted shiners (*Notropis* spp.). Catfish in Pond 37 were co-stocked with 21 adult grass carp, 85 fingerling largemouth bass, 30 adult bluegill and redear sunfish, and 2.3 kg of assorted shiners (*Notropis* spp.).

On 31 January 1983, 184 days after stocking, both ponds were drained. Surviving catfish were removed and examined for tag retention. Student's *t*-test was used to analyze the data.

Results and Discussion

Six months after stocking, 136 catfish were recovered (70 tagged, 66 control). Of the 70 Floy-tagged fish examined, all had retained at least 1 of the 2 tags. Four of the 140 inserted tags were lost, yielding an overall tag retention of 97.1%. Tag retention in catfish from Ponds 36 and 37 was 96.5% and 98.1%, respectively. No significant difference ($P > 0.05$) was observed for tag retention between ponds. These retention rates were considerably higher than the 56% retention reported by Tranquilli and Childers (1982) in a 6-month study of largemouth bass tagged with FD-68B tags. They also reported a 26% separation of the plastic information sleeve from the internal anchor portion of the tag. No separation of plastic sleeves was observed from the 136 tags remaining in white and channel catfish in this study. Greenland and Bryan (1974) reported a 90% tag loss over a 12-week period using Floy FD-67 anchor tags in channel catfish. However, the maximum depth of tag insertion was 1 cm, which would not have allowed the anchor to open behind the interneurals in most cases. Because of this fault in tag insertion, it was determined that this high rate of tag loss could not be compared to the test results of this study.

Past experiments with Floy FD-67 tags (Rawstron 1967, Carline and Brynildson 1972, Stobo 1972) have shown that small shallow open wounds often occur at the point of tag insertion in experimental fish. Small, uninfected wounds were observed at the point of insertion in largemouth bass tagged with Floy FD-68B tags by Tranquilli and Childers (1982). In this study, no open wounds or infected areas near the point of insertion were observed in tagged catfish. The tag wound in experimental catfish had completely healed, leaving little or no evidence of scar tissue.

Largemouth bass, grass carp, bluegill, redear sunfish, and *Notropis* spp. were co-stocked in both ponds with the catfish. Because a variety of fish were in both ponds, it was felt that more value could be placed on these results than results from hatchery ponds where only the test species were stocked. The presence of these species helped make the hatchery environment more comparable to a natural environment.

German and LaFrance (1965) reported that rainbow trout (*Salmo gairdneri*) attacked each other's red tags, while Wilbur and Duchrow (1972) attributed most of the tag loss in largemouth bass to the pulling of tags from each other. Observations were not made in this experiment to determine if this was a factor. Because 97.1% of the tags were retained, it is doubtful that tag-pulling represents a problem for catfish, even when co-stocked with largemouth bass, bluegill, and redear sunfish.

Floy-tagged fish in Pond 36 exhibited a significantly ($P < 0.01$) higher rate of survival (86%) than fin-clipped fish (68%). In Pond 37, no significant difference ($P > 0.05$) in survival rates of fin-clipped (64%) and tagged and fin-clipped fish (54%) was evident (the left pectoral fin and spine was

removed from tagged fish stocked in Pond 37). Mortality rates of 33% in smallmouth bass (*Micropterus dolomieui*) (Coble 1971) and 80% in rainbow trout (Nicola and Cordone 1973) have been attributed to fin-clipping. This supports the highly significant difference ($P < 0.01$) found between mortality rates of fish which were both tagged and fin-clipped (46%) and tagged-only fish (14%). Because there was no significant difference ($P > 0.05$) in mortality rates between fin-clipped fish in both ponds, the higher mortality rate exhibited by fin-clipped and Floy-tagged fish over tagged-only fish was attributed to fin-clipping. These results indicated that the use of Floy tags resulted in lower mortality rates than removing a pectoral fin and spine from white and channel catfish.

Conclusions

Results of this study indicated that Floy FD-68B anchor tag retention rates were exceptionally good for white and channel catfish. Tagged fish exhibited higher survival rates than catfish whose pectoral spine and fin were removed. It was determined that 1 tag per fish would yield acceptable tag returns due to the high tag retention (97.1%), thus reducing the cost of the proposed tagging study. Because of these favorable results, a study using Floy FD-68B anchor tags will be initiated in 1983 to determine movement, standing crop and the commercial exploitation rate of catfish on the St. Johns River.

Literature Cited

Ager, L. A., D. E. Hammond, and K. E. Kerce. 1974. Annual progress report for Lake Okeechobee investigations development, largemouth bass fishery investigation. Fla. Game and Fresh Water Fish Comm., Tallahassee.

Bowers, C. C. and M. Martin. 1957. Results of an opening week creel census and tagging study on three state-owned lakes. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 11:244–254.

Carline, R. F. and O. M. Brynildson. 1972. Effects of the Floy anchor tag on the growth and survival of brook trout, *Salvelinus fontinalis*. J. Fish. Res. Board Can. 29:458–460.

Coble, D. W. 1971. Effects of fin clipping and other factors on survival and growth of smallmouth bass. Trans. Am. Fish. Soc. 100:460–473.

Crumpton, J. E. and S. L. Smith. 1975. Differences in growth and catchability of natural bass populations in Florida. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 29:330–336.

Dell, M. B. 1968. A new fish tag and rapid, cartridge-fed applicator. Trans. Am. Fish. Soc. 97:57–59.

Eschmeyer, P. H. 1959. Survival and retention of tags, and growth of tagged lake trout in a rearing pond. Prog. Fish-Cult. 21:17–21.

Everhart, W. H., A. W. Eipper, and W. D. Youngs. 1975. Principles of fishery science. Cornell Univ. Press Ltd., London, Engl.

German, E. R. and D. A. LaFrance. 1965. A comment on the use of red tags on fish. Calif. Fish and Game. 41:119–120.

Greenland, D. C. and J. D. Bryan. 1974. Anchor tag loss in channel catfish. Prog. Fish-Cult. 36:181–182.

Gunn, J. M., J. M. Ridgeway, P. J. Rubec, and S. U. Qadri. 1979. Growth curtailment of brown bullheads tagged during the spring spawning period. Prog. Fish-Cult. 41:216–217.

Hale, M. M., J. E. Crumpton, and D. J. Renfro. 1982. Annual progress report for commercial fisheries investigations project, commercial fisheries statistics. Fla. Game and Fresh Water Fish Comm., Tallahassee.

Hill, T. K., G. B. Pardue, and B. W. Smith. 1970. An evaluation of several marking methods for channel catfish *Ictaluris punctatus* (Rafinesque). Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 24:304–307.

Latapie, W. R. 1967. Evaluation of various tagging methods on several freshwater fishes and estuarine fishes of Louisiana. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 21:505–509.

Luthey, D. R. Date unknown. Survey findings on the Lake George and St. Johns River fisheries investigations. Fla. Game and Fresh Water Fish Comm., Tallahassee.

Moyer, E. J., S. L. Smith, and J. E. Crumpton. 1974. Comparison of Floy fingerling tags and latex injection for marking sub-adult largemouth bass. Fla. Game and Fresh Water Fish Comm., Fish. Res. Lab., Eustis.

Nicola, S. J. and A. J. Cordone. 1973. Effects of fin removal on survival and growth of rainbow trout (*Salmo gairdneri*) in a natural environment. Trans. Am. Fish. Soc. 102:753–758.

Rawstron, R. R. 1967. Harvest, mortality, and movement of selected warmwater fishes in Folsom Lake, California. Calif. Fish and Game. 53:40–48.

———. 1973. Comparisons of disk dangler, trailer, and internal anchor tags on three species of salmonids. Calif. Fish and Game. 59:266–280.

Stobo, W. T. 1972. The effects of dart tags on yellow perch. Trans. Am. Fish. Soc. 101:365–366.

Tranquilli, J. A. and W. F. Childers. 1982. Growth and survival of largemouth bass tagged with Floy anchor tags. North Am. J. Fish. Manage. 2:184–187.

Wilbur, R. L. and R. M. Duchrow. 1972. Differential retention of five Floy tags on largemouth bass (*Micropterus salmoides*), in hatchery ponds. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 26:407–413.