Retention of Coded Wire Tags by Juvenile Striped Bass

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Abstract: We evaluated microtag retention in fingerling striped bass (mean total length: 58.5 mm) that were tagged during routine hatchery operations. Striped bass were tagged vertically in the cheek muscle using a Northwest Marine Technology Mark IV tagging machine. Tags were implanted dorsal to ventral, approximately 2 mm deep. During each of 10 days of tagging, 24 tagged fish were randomly selected and placed into each of 4 865-liter circular tanks. At 11–13 weeks after tagging, retention averaged 92.4%. Most tag loss occurred in the first 2 weeks after tagging, and all occurred within 34 days.

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Striped bass stocking programs have been initiated in many Atlantic and gulf coast states in response to declining striped bass populations (Street 1987). Many of these programs utilize coded wire tags (microtags) to distinguish stocked fish from wild populations. Tagging enables fisheries managers to utilize later catch records to estimate population size, formulate harvest restrictions, and evaluate success of stocking programs (Street 1987, Dorazio 1991). However, the rate of tag retention must be known to properly apply this information to resource management decisions.

Microtag retention can vary among species and sizes of fishes, primarily because of morphological differences (Fletcher et al. 1987, Heidinger and Cook 1988). Klar and Parker (1986) evaluated retention of microtags placed in the cheek musculature of striped bass (mean weight = 10.5 g, approximately 95

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mm TL) and reported 100% retention after 180 days. However, they evaluated retention under laboratory conditions, using a relatively small number of fish (N = 500) that were tagged at a much slower rate than is customary in routine hatchery operations. During normal stocking procedures thousands of fish are tagged daily by numerous personnel and this might produce lower tag retention rates (Dunning et al. 1990). Furthermore, many striped bass stocking programs use fish that are smaller than those tagged by Klar and Parker (1986), and it is possible that problems associated with handling smaller fish could result in less reliable tag placement and poorer long-term retention.

Our study was conducted to evaluate microtag retention in fingerling striped bass (33–87 mm TL) that were tagged during routine hatchery operations and stocked into the Savannah River, Georgia. These fish were smaller than those studied by Klar and Parker (1986) and Dunning et al. (1990). Our study provides an estimate of tag retention in large-scale stocking programs using this smaller size class of striped bass.

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Methods

In June 1990, 100,000 striped bass were tagged with micromagnetic coded wire tags (1-mm long, 0.25-mm diameter) at the Georgia Department of Natural Resources' Richmond Hill Fish Hatchery prior to being stocked in the Savannah River, Georgia. Fish total length ranged from 33 to 87 mm (mean 58.5 mm), and weight ranged from 0.5 to 6.2 g (mean 2.7 g). Fish were anesthetized in a 0.02% solution of MS-222 just prior to tagging. Tagging was conducted by hatchery personnel using 2 Northwest Marine Technology Mark IV tagging machines equipped with 24-gauge needles. The tagging machine was modified so that the tagging needle remained in a fixed position, and the fish were manually impaled on the needle. Microtags were injected vertically into the left adductor mandibularis (cheek) muscle, posterior to the eye (Dunning et al. 1990). The target area was aligned visually. The tags were injected dorsal to ventral and implanted approximately 2 mm deep. After tagging, the fish were passed through a quality control device to check for tag presence; untagged fish were re-processed. The average rate of tagging was 379 fish per hour per machine (range: 215–586). At this rate, it took 15 days to tag all 100,000 fish stocked in the Savannah River.

We monitored tag retention rates by holding fish in tanks for 13 weeks. To include variation in tag retention among different groups of fish and tag operators, fish for the retention study were selected on 10 different days during the tagging period. This assured inclusion of fish handled by all personnel involved in tagging operations. Although this variation is not quantified, it is reflected in the overall rates of tag retention. On each of the 10 days during the tagging period, 24 fish were randomly selected after tagging and recovery from the anesthesia and placed in each of 4 865-liter circular tanks.

Tanks were aerated and received a continuous flow of hatchery well water. To reduce handling stress, water flow was stopped after every addition of new fish, aeration was increased, and NaCl was added to create a 1% salt solution. Tanks were then treated with 10 ppm nitrofurazone (active ingredient) for 3–4 hours. Water temperature was 19–21 C throughout the study; dissolved oxygen was 7.1–9.4 ppm, and pH was 7.2–8.3. Fish were fed commercially prepared trout chow 6 times per day; the total daily amount was approximately 5% of their body weight.

During the experiment, we removed dead fish and checked them for tag presence using a field sampling detector (Northwest Marine Technology). We also checked the bottom of the tanks daily using a 200-mm disk magnet to collect 'lost' tags. This enabled us to determine when tags were lost in relation to the tagging date. Tags from each tagging date could be distinguished by different tag codes. At the end of the experiment, all striped bass were removed from the tanks and checked for tag presence or absence.

Results and Discussion

Tag retention of live fish in 4 tanks at the end of the experiment ranged from 91.7% to 92.7% and averaged 92.4% (standard deviation 0.4%). Survival ranged from 60% to 69%. Most (92%) of the dead fish were removed from tanks within 5 days of tagging (Fig. 1); tags were present in 98.8% of these fish. All of the tags retrieved from the bottom of the tanks with the magnet were found within 34 days of tagging and most (90%) were found within 15 days (Fig. 2). This period may correspond with the time required for the puncture wound from tagging procedures to heal. Dunning et al. (1990) also reported that the highest rates of tag loss occurred in the first 2 weeks after tagging.

Our results show poorer tag retention of coded wire tags in the cheek musculature of striped bass than in experiments using larger fingerlings. Klar and Parker (1986) reported 100% retention in the cheek muscles of striped bass with mean total length of approximately 95 mm, and Heidinger and Cook (1988) reported 95%–99% retention in the cheek muscles of bluegill, largemouth bass, and walleye with mean total lengths of 107, 95, and 75 mm, respectively. The lower tag retention rate in our study may be due in part to the smaller size of the striped bass used in this study (mean total length 59 mm). Heidinger and Cook (1988) suggested that lower tag retention in smaller sizes of fishes may be attributed to smaller size of the target tissue.

The rates of tag retention reported here are probably representative of typical hatchery tagging operations using fingerling striped bass of this size class. Our results are consistent with Dunning et al.'s (1990) study, which was conducted with striped bass that were slightly larger (65–100 mm TL) than those

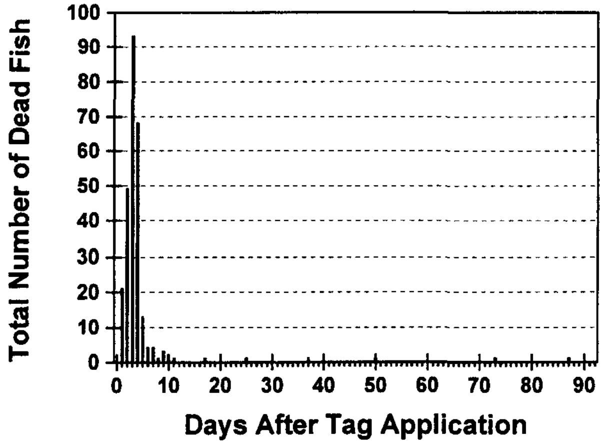

Figure 1. Total number of dead fish retrieved from all 4 tanks on each day after tag application.

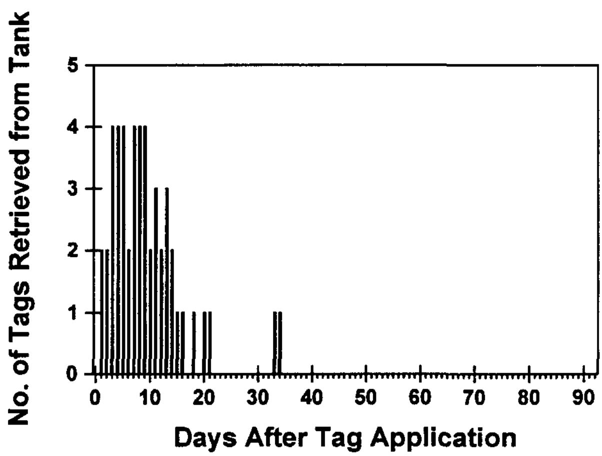

Figure 2. Number of tags retrieved from fish holding tanks on each day after the fish were placed in the tank.

used in our study but were tagged using similar hatchery procedures and rates of tagging. Lower rates of tag retention during routine hatchery procedures compared with laboratory studies may be due to increased tagging rates, improper tag placement, operator inexperience, and operator fatigue or boredom resulting from the large numbers of fish being processed (Dunning et al. 1990).

Information on tag retention rates, such as the estimates we determined, can be used to adjust data on the relative recapture rates of tagged and untagged fish in later sampling and thus provide more accurate estimates of stocking program success or year-class strength. Our results suggest that a tag retention rate of about 92% should be used to adjust recapture data for striped bass tagged at lengths of 40–80 mm.

Literature Cited

Dorazio, R. M., B. M. Florence, and C. M. Wooley. 1991. Stocking of hatchery-reared striped bass in the Patuxent River, Maryland: survival, relative abundance, and cost-effectiveness. North Am. J. Fish. Manage. 11:435–422.

Dunning, D. J., Q. E. Ross, B. R. Friedman, and K. L. Marcellus. 1990. Coded wire tag retention by, and tagging mortality of, striped bass reared at the Hudson River hatchery. Am. Fish. Soc. Symp. 7:262–266.

Fletcher, D. H., F. Haw, and P. K. Bergman. 1987. Retention of coded wire tags implanted into cheek musculature of largemouth bass. North Am. J. Fish. Manage. 7:436–439.

Heidinger, R. C. and S. B. Cook. 1988. Use of coded wire tags for marking fingerling fishes. North Am. J. Fish. Manage. 8:268–272.

Klar, G. T. and N. C. Parker. 1986. Marking fingerling striped bass and blue tilapia with coded wire tags and microtaggants. North Am. J. Fish. Manage. 6:439–444.

Street, M. W. 1987. Atlantic and Gulf states' management of coastal striped bass. Fisheries (Bethesda) 12:4–5.