COST OF PROJECT

A rough cost estimation of the entire project, to include costs of seed, seeding, rotenone, salaries, expenses, etc., would be approximately $10,000. Therefore, virtually a new lake from a sport fishing and fish population standpoint of almost 3,000 acres was produced at a cost of approximately $3.33 per acre or less than the price of one resident fishing license per acre of water. Cost (value) of fish used for restocking not included in above determination.

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EVALUATION OF VARIOUS TAGGING METHODS ON SEVERAL FRESHWATER FISHES AND ESTUARINE FISHES OF LOUISIANA[1]

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ABSTRACT

The retention rates of Atkins, dart, Petersen, spaghetti and strap tags were compared on largemouth bass, bluegill and Atlantic croaker. Antiseptics used in tagging operations were evaluated for their usefulness in promoting tag retention.

Petersen and spaghetti tags were found to be the most suitable of the tags tested for bluegills in short-term studies of three months.

Petersen, spaghetti and Atkins tags were found suitable for short-term tagging (3½ months) with largemouth bass. None of the tags were found suitable for long-term studies with the bass. Low retention rates were shown for all tags tested at the end of seven months.

Almost no retention after a five-month period was realized from Atlantic croakers.

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Sterilizing tags and tagging instruments with 70 per cent isopropyl alcohol and a post-handling dip in malachite green solution were found to have no effect on growth or retention of tags on bluegills.

INTRODUCTION

Tags to identify individual fish are useful for population estimates, age determination, migration studies and for studies of growth rate, harvest rate and mortality rate. However, if tagging is used to determine a vital statistic of a fish population, such as mortality or growth, presence of the tag should not produce any great change in that statistic. In addition, tags must be retained by experimental fish for the duration of the study period if maximum accuracy in population estimation, age determination and harvesting rate is to be obtained.

Preliminary work by members of the Game Management staff in the Louisiana State University School of Forestry and Wild Life Management indicated a very high rate of infection in tagging wounds and subsequent loss of tags. Muncy (1965) found high loss of Atkins tags, Petersen disc tags and jaw strap tags from Largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*) in small Louisiana ponds over a short period. From personal communication with Wendell Lorio (Louisiana Wild Life and Fisheries Commission biologist), high tag loss has also been indicated in tagging studies in the coastal marshes of southeastern Louisiana. Very low returns of plastic dart tags have been realized from spotted seatrout (*Cynoscion nebulosus*) tagged in areas subjected to high angling pressure.

The primary objectives of this study were to compare the retention rates of Atkins, Petersen disc, spaghetti, dart and strap tags on the largemouth bass, bluegill, and Atlantic croaker (*Micropogon undulatus*), to determine the value of antiseptic materials used in tagging operations and to determine the effect of tagging and marking on the growth of experimental fishes.

METHODS

Five types of tags were used in the study. The Atkins and spaghetti tags were placed 5-10 mm below and anterior to the posterior base of the soft dorsal fin. Dart tags were inserted midway between the lateral line and the base of the dorsal fin below the middle of the soft dorsal fin at a 30-45 degree angle from the body. The Petersen disc tags were placed at a point midway between the base of the dorsal fin and the lateral line below the middle of the spiny dorsal fin. The strap tag was clamped near the upper edge of the opercle.

The method of processing the fish used in the study was as follows. The fish were captured by angling, seines or electric shocker. They were then held in a galvanized washtub or live net. Fish were anesthetized with MS-222 SANDOZ at the rate of 1.3 grams per gallon of water. Total and standard lengths of the fish were recorded in millimeters. When fish were finclipped, it was done at this time.

The fish were tagged. Both tags and applicators used were held in 70% isopropyl alcohol prior to tagging (Butler, 1957). Fish were weighed to the nearest gram. They were then dipped for 10-15 seconds in a solution of 0.375 gram of malachite green per gallon of water (Bishop, 1957) and released.

On bluegill the average times required for processing were as follows: control, 40 seconds; strap, 60 seconds; dart, 63 seconds; Petersen disc, 66 seconds; Atkins, 71 seconds; spaghetti, 74 seconds.

Bluegill tagging was done in ten-gallon aquaria and in a quarter-acre pond on the Louisiana State University Ben Hur farm. Largemouth bass were tagged in a five-acre pond on the Ben Hur farm.

Bluegill used in the aquaria study were seined from the five-acre pond. Three fish were placed in each of 12 aquaria. They were anesthetized with MS-222 SANDOZ, weighed and measured and replaced in their original aquarium at two-week intervals for a period of ten weeks. Data obtained from this study and the other tagging studies were tested with the analysis of variance using the F-test (Snedecor, 1956).

A total of 60 bluegills (10 fish with each of the five tag types and control fish) were processed on March 21-22, 1966, in the quarter-acre pond. Their weights ranged from 44 to 110 grams with an average of 70.4 grams. The left pelvic fins were clipped from tagged fish and the right pelvic fins were clipped from control fish so the control fish could be separated from tagged fish which had lost their tags at the time of recapture.

On March 25, 1966, 40 bluegills were processed to test the value of the isopropyl alcohol used to sterilize the tags and tagging instruments and the value of the malachite green dip used at the end of the tagging procedure. Twenty fish were tagged with the spaghetti tag and 20 with the Petersen disc. The spaghetti tag and the Petersen disc tag were used because the aquaria study indicated that they were more desirable than the others.

Largemouth bass were tagged in the five-acre pond in two groups. The first group, caught by electric shocking and angling and processed on August 3-6, 1965, consisted of 28 individuals. The second group, caught by electric shocking, was processed on November 18-December 1, 1965, and consisted of 34 individuals. Fish from both groups were recaptured on March 12 and 15, 1966, using seines and rotenone.

Atlantic croakers were tagged in a quarter-acre pond at the Marine Research Laboratory on Grand Terre Island, Louisiana. Forty-two fish were tagged on October 29-30, 1965. They were caught on hook and line from the turn basin near the pond.

Water temperature and salinity in the turn basin are recorded daily by laboratory personnel. Average monthly water temperatures in the turn basin were as follows: October, 17.9C; November, 20.6C; December, 14.6C; January, 11.8C; February, 13.3C; March, 16.6C. Salinities in the turn basin averaged 22.6 ppt with a range of 5.8 ppt to 35.2 ppt. The lowest recorded salinity in the quarter-acre pond was 8.0 ppt on March 29, 1966, following a period of heavy rains.

RESULTS

Days of retention of the various tags on the 36 bluegill in the aquaria study were tested with the analysis of variance. There was no significant difference at the five per cent level. Per cent of weight lost at two weeks was analyzed in the same manner and a significant difference was indicated. Average percentages of original weight loss were as follows: Control, 7.7; Atkins, 8.3; Petersen, 8.6; spaghetti, 9.8; dart, 10.4; strap, 16.6.

The wounds caused by the tags seemed to be worse on the strap and dart tags. The strap tags caused considerable mechanical damage to the gills where they came in contact with them. Some of the strap tags had eroded from the opercles in as little as four weeks. Two of the dart tags were lost from the fish in four weeks and seven weeks.

A total of 100 bluegill were tagged in the quarter-acre Ben Hur pond. This included 60 fish in a study to evaluate the five tag types and 40 fish to evaluate the antiseptics used in the tagging procedure. Ninety-three of the original 100 bluegill were recaptured. The total weight of these 93 bluegill was 25.3 pounds. This was an increase of 10.2 pounds in the pond or 40.8 pounds per acre in the 9½-week period.

The greatest per cent of recoveries were realized from control fish and those with Petersen and spaghetti tags. Ninety per cent of the controls were recovered. All of the fish with the Petersen discs had retained their tags. Eighty per cent had retained their spaghetti tags. These retention rates were greater than the dart (50 per cent), Atkins (30 per cent) and strap tags (30 per cent).

Statistical analysis of the percent of their original weight gained by fish tagged with the fibe tag types indicated that among those fish retaining their tags there was no significant difference at the five per cent level.

The *average* per cent of weight gained by those bluegills with the Petersen disc was 67.2 and that of those with spaghetti tags was 63.9.

The percentage of *total* original weight gained was 53.5 for the Petersen disc and 62.3 for the spaghetti tag. The percentage of *total* original weight gained by the control fish was 91.7. Although there was little difference between the per cent of original weight gained by fish with the Petersen disc and spaghetti tags these tags did have a substantial effect on the growth of the fish.

There was considerable staining and/or algae growth on all of the tags. These growths or stains were not as serious in the strap, Atkins and Petersen disc tags as they were on the plastic tubing of the dart and spaghetti tags. There was a rust-colored stain on the straps which could be rubbed off easily to read the identification numbers. The covering of filamentous algae could be easily removed from the Atkins and Petersen disc tags by rubbing with the fingers. The yellow plastic tubing on the dart and spaghetti tags was usually stained dark brown where it was in contact with the water and was usually covered with filamentous algae. Parts of this tubing which were inside the fish were usually clean and easily readable.

None of the wounds caused by tagging seemed to be infected at the time of recovery. Wounds on fish which had lost their tags were evident on close examination but were well healed. The strap tags which had not already fallen out were loose and had started to erode the area where the tag was attached to the opercle. The barbs on three of the five remaining dart tags had worked their way back from where they had been originally placed and were protruding from the skin. Pelvic fins clipped at tagging were beginning to regenerate, but the marks were easily recognizable.

On March 25, 1966, 40 bluegill were processed in a study to test the value of the isopropyl alcohol used to sterilize the tags and tagging instruments and the value of the malachite green dip used at the end of the tagging procedure. Thirty-five tagged fish were recovered. The percentages of their original weight gained averaged slightly higher in the spaghetti-tagged fish (91.1) than in the Petersen-tagged fish (81.5) but there was no statistically significant difference among the four treatments.

The bluegill in this study were not finclipped. Those in the tag evaluation study had one pelvic fin removed. The average per cent of original weight gained with the bluegills used in the tag evaluation study was 67.2 for the Petersen disc and 63.9 for the spaghetti tags while those in this study were 81.5 for the Petersen disc and 81.1 for the spaghetti tags. Analysis of variance indicated that there was a significant difference at the five per cent level of the percentage of original weight gained by the two groups of bluegill. Evidently removal of one pelvic fin adversely effected weight gain by the tagged fish.

Two groups of largemouth bass were processed in the five-acre pond. Nineteen of the original 28 fish were recaptured from the seven-month study. These included all five of the controls, two fish retaining Atkins tags, one with a dart tag and one with a spaghetti tag. The rest had lost their tags. Of those fish retaining their tags, those with Atkins tags had the greatest weight gains. The number of retentions was insufficient to analyze statistically.

Thirty-two of the original 34 fish were recaptured from the four-month study. Twenty-four fish had retained their tags. Analysis of variance indicated that there was no significant difference at the five per cent level for the percentage of original weight gained or lost by the bass in this study.

Strap tags had the highest loss (67 per cent) of all the tags in this study. The dart tags were beginning to work their way out of the fish. The Petersen disc tags had a tendency to catch in the net material. The wounds caused by spaghetti and Atkins tags were healing or healed.

A total of 42 Atlantic croakers were tagged at Grand Terre Island on October 29-30, 1965. They were collected on March 29-30, five months after tagging. Only one of the 22 recovered fish had retained part of a tag. This fish had retained the hard plastic barb of a dart tag which had lost the yellow spaghetti tubing with identifying numbers on it. Representatives of all tag types were identified by fin clips accompanied by scars in the areas of tag attachment.

SUMMARY

Short-term tagging in aquaria and in a quarter-acre pond indicated that the Petersen disc and spaghetti tags were more suitable for bluegill than the other tags tested. Bluegill tagged with these two tag types had a comparable growth rate, but this growth rate was lower than that of the control fish. Finclipped bluegills tagged with Petersen disc and spaghetti tags had a significantly lower weight gain than bluegills which were tagged with the same tag types but not finclipped by the removal of one pelvic fin.

A seven-month study indicated that none of the tags tested are suitable for any long-term tagging with the largemouth bass in Louisiana ponds. A four-month study with largemouth bass indicated that spaghetti, Petersen disc and Atkins tags are suitable for short-term studies with these fish.

None of the tag types, with the exception of part of a dart tag, was retained by Atlantic croakers in a five-month period from November, 1965, through March, 1966.

A tagging study with 40 bluegills tagged with the Petersen disc and spaghetti tags indicated that there was no significant difference in tag retention or growth of bluegills among fish which had been processed with a post-handling dip in malachite green solution, with the tags and tagging instruments sterilized with isopropyl alcohol before tagging, with both, or with neither.

There was a considerable amount of staining and/or algae growth on the tags tested. This was easily removed with the fingers from the strap, Atkins, and Petersen disc tags. The combination of staining and algae growth made reading of the identification numbers difficult on the yellow plastic tubing of the spaghetti and dart tags.

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LAKE MANAGEMENT ON MILITARY INSTALLATIONS

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The management of lakes on military installations is receiving more emphasis in providing opportunities for participation in enjoyable and healthy off-duty recreation activities for all personnel assigned.

Our own personal appreciation of this, as well as practical requirements have been clearly affirmed by recent pronouncement by the President of the United States, and by Congressional enactment of administration sponsored legislation to require positive action in the direction.

The policies of our Commander-in-Chief not only serve as a reaffirmation of moral responsibilities but serve for us who are under his command as a clear mandate for reemphasis of these endeavors. The policies demonstrate added attention on the part of activity personnel; a search for new, better and more efficient ways of managing the real estate entrusted to them; and reviewed efforts to improve our lakes and streams.