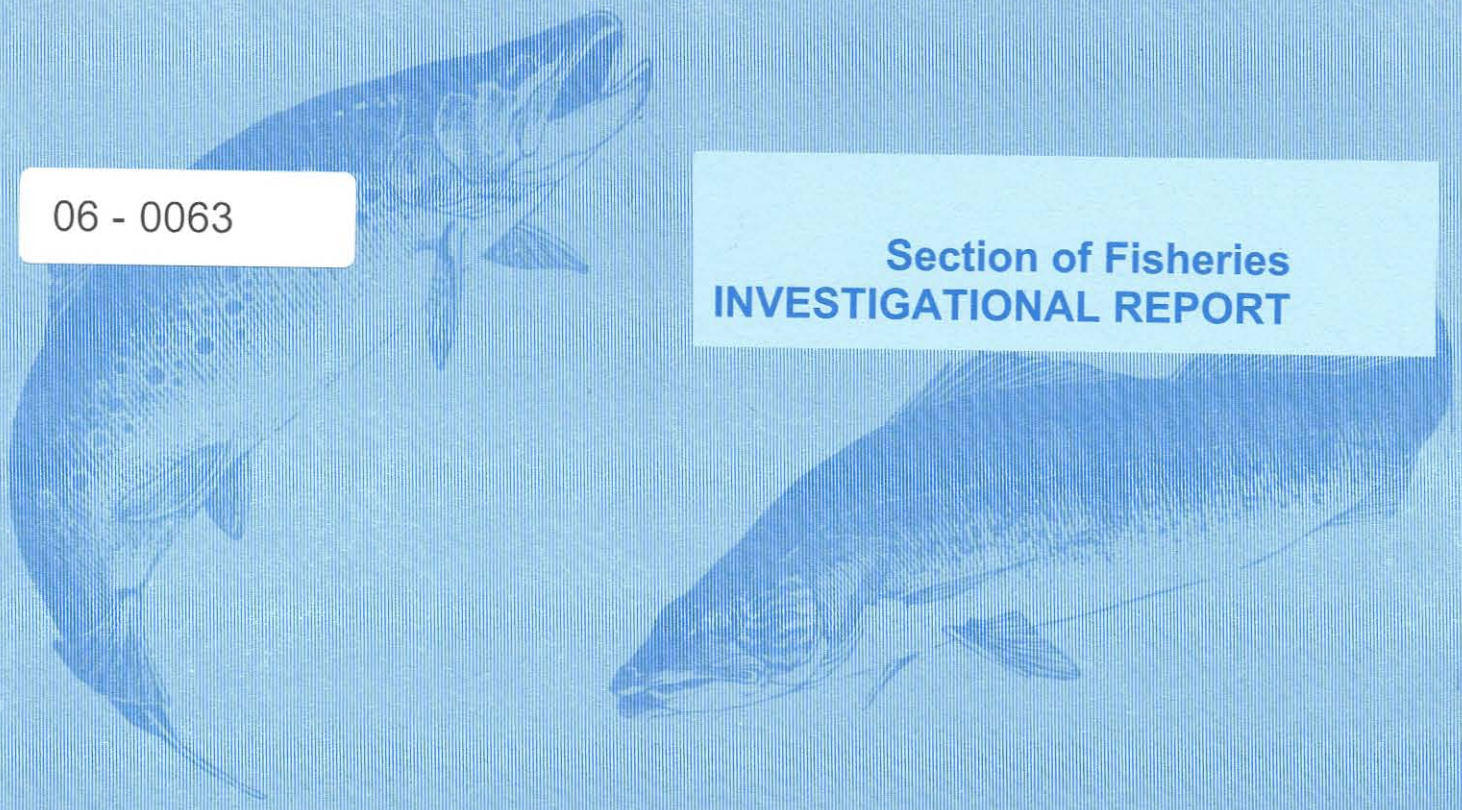
Section of Fisheries
INVESTIGATIONAL REPORT



No. 528

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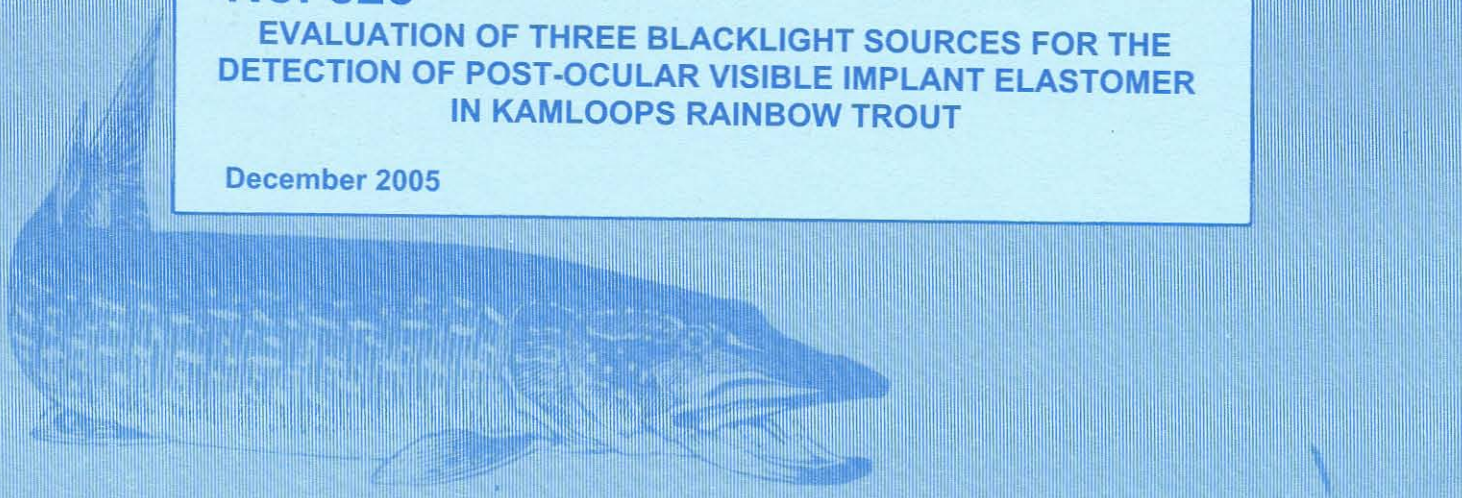

Minnesota
DEPARTMENT OF NATURAL RESOURCES

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EVALUATION OF THREE BLACKLIGHT SOURCES FOR THE DETECTION OF POST-OCULAR VISIBLE IMPLANT ELASTOMER IN KAMLOOPS RAINBOW TROUT

Tracy L. Close
Minnesota Department of Natural Resources
Policy Section, Division of Fish and Wildlife
5351 North Shore Drive
Duluth, MN 55804

Abstract - Age-0 kamloops strain rainbow trout were injected in the post-ocular adipose tissue with green and yellow visible implant elastomer (VIE) to evaluate the effectiveness of the new Deep Blue 7 LED (Northwest Marine Technology brand name) flashlight at improving mark detection over the blue filtered halogen dive light previously sold by the company. Detection was monitored for 626 d using both lights. Detection did not differ between lights and declined to unacceptable levels over time. On day 626, 11% of the yellow and 6% of the green elastomer were detected. A calcein detector, tested near the end of the study, improved detection rates for a short time but not long enough to be of value in long-term experiments. The poor detection may not be unique to the kamloops strain; therefore, long-term detection should be tested before large-scale marking programs are initiated.

Introduction

Visible implant elastomer (VIE) is a two-component, surgical grade silicone polymer used to batch mark fish. The material comes in various colors and is injected as a viscous liquid, curing into a rubber-like material that fluoresces under ultraviolet (UV) light. Satisfactory retention and detection rates have been reported when injected in various sites in several fish species (Dewey and Ziegler 1996; Bailey et al. 1998; Hale and Gray 1998). However, long-term detection rates have been shown to be unacceptably low in the post-ocular tissue of kamloops rainbow trout when detection was assisted using the blue filtered halogen dive light and amber glasses provided by the manufacturer (Close 2000). In response to the findings of Close's study, the manufacturer recalled the dive lights and replaced them with a Deep Blue 7-LED flashlight (Northwest Marine Technology brand name), correcting a limitation of the older light. Our original objective was to determine if the declining detection observed in Close (2000) study was caused by limitations of the older detection light or was a function of the strain of fish in which the elastomer was tested. Late in the study we modified our objective by evaluating a third black light source, a calcein detector.

Methods

On 10 December 2001, 87 age-0 kamloops rainbow trout were marked in the post-ocular adipose tissue. Fish were anesthetized with tricaine methanesulfonate (MS 222). The left side of the fish was marked with yellow elastomer and the right side with green elastomer following the instructions outlined in the instructional video provided by Northwest Marine Technology. Each mark was about 2-3 mm in length. The fish averaged 128 mm (s = 12 mm) in total length (TL) when marked. The fish were reared at the French River Coldwater Hatchery for 75 d after marking and then transferred to a holding tank at Duluth Area Fisheries Headquarters where they were reared in Lake Superior water at ambient temperatures and observed for another 551 d. The fish were examined on an irregular basis using both the halogen bulb dive light and the Deep Blue 7-LED flashlight. The amber glasses provided by Northwest Marine Technology were worn to aid detection. New batteries were installed in both devices and the battery output was monitored with a voltmeter to insure that the lights were adequately powered. On day 512 we began to examine the fish with a prototype of a calcein detector described in Mohler et al. (2002) and Negus and Tureson (2004).

Results

A significant amount of mortality occurred immediately after the fish were transferred to Duluth Area Headquarters due to transfer stresses. Some additional mortality occurred thereafter, and only 36 fish remained on the last day of the study (day 626). On day 626 the fish averaged 429 mm (s = 32 mm) in length (TL).

The Deep Blue 7-LED flashlight did not improve detection or extend the detection interval of the elastomer when compared to the halogen bulb dive light. There was no difference in performance between the two lights and mark detection declined with time (Figure 1) as in the previous study (Close 2000). On day 512, 16% of the left side marks and 14% of the right side marks were detected using each of the Northwest Marine Technology lights, thus the fish were examined using the calcein detector to determine if the marks had been lost or masked by pigment. Detection was considerably enhanced with this device with 62% of the marks on the

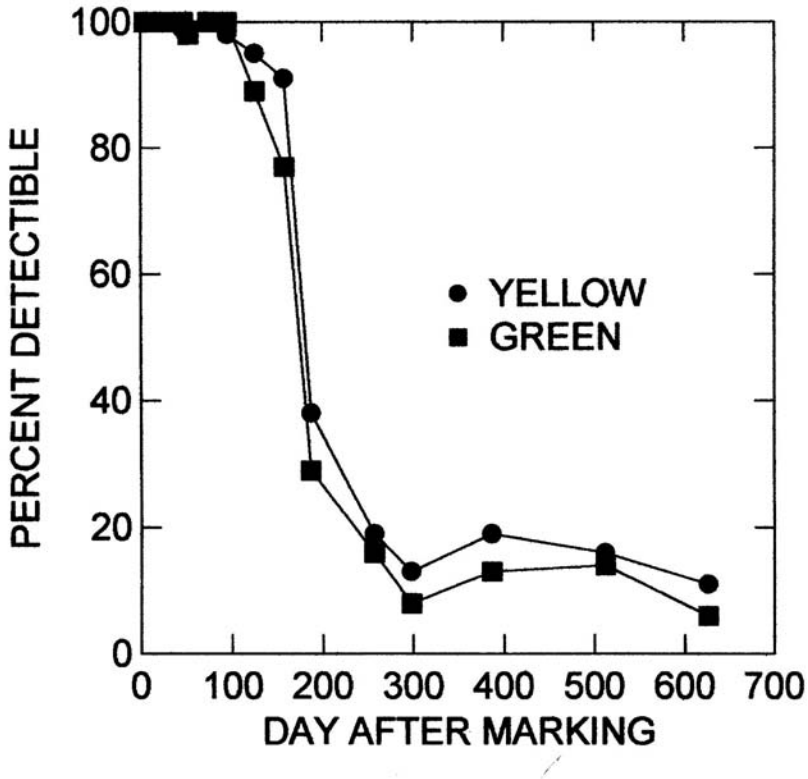

Figure 1. Detection of post-ocular visible implant elastomer in Kamloops rainbow trout as a function of time when viewed using either of the Northwest Marine Technology lights.

left side (yellow) and 86% of the marks on the right side (green) easily detectable, suggesting that the elastomer had not been lost in any of the fish. On day 626, 11% of the yellow and 6% of the green elastomer were detected with the Northwest Marine Technology lights. Mark detectability had also dropped with the calcein detector, with 25% of the left side (yellow) marks and 72% of the right side (green) marks detected. Even with the calcein detector, it was clear on day 626 that the marks would soon be undetectable because 11% and 73% of the detected left and right marks respectively were only about the size of the period at the end of this sentence and could easily have been missed.

Discussion

Successful use of post-ocular VIE marks in other species suggests that kamloops rainbow trout accumulate sufficient pigment in the post-ocular tissue to mask the marks, precluding successful use of VIE at this marking site in long-term experiments. None of three black-light sources tested could overcome this problem. The calcein detector was superior to the other two lights for a short time but not long enough to warrant its use in long-term experiments. Poor long-term detection may not be unique to the strain, therefore, unless long-term detection has been demonstrated, it should not be assumed for any strain or species of fish.

References

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