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Fluorescent Elastomer for Marking Small Fish

Few traditional techniques for marking fish can be readily applied to small fish in experimental studies where individual identification is required. Ideally, marks should be inexpensive and easily applied, and marking should not alter the survival, growth, or behavior of fish. Moreover, marks must be retained for the duration of the study and should be easily detected. We evaluated the subdermal injection of fluorescent elastomer (a multi-component, silicone polymer) for marking bluegills (*Lepomis macrochirus*).

Laboratory and Pond Studies Conducted

The retention of elastomer marks on bluegills was first examined in a laboratory study. Sixty adults (73–133 mm long) and 10 juveniles (34–47 mm long) were each marked at four locations: (1) on the dorsal surface of the skull, (2) at the point of insertion of the dorsal fin, (3) below the dorsal fin, and (4) on the caudal peduncle. Fish were anesthetized with tricaine methanesulfonate and subsequently marked by injecting small amounts of fluorescent elastomer under the skin with a small syringe. Control fish were anesthetized but not marked. Fish were held in three laboratory raceways with water temperatures of 21°–25°C during the study. We examined fish under an ultra-violet lamp to assess the retention of marks after 1, 2, and 6 months.

In a second study, we marked 300 juvenile bluegills (43–66 mm) that were subsequently transferred to 12 enclosures (mesocosms) in an experimental pond. Within each enclosure, each fish was distinctively marked with a unique combination of two colors of elastomer and marks placed at five body locations (insertion of the dorsal fin, left and right sides below the dorsal fin, and left and right sides on the caudal peduncle). Fish were captured after 70 days in the enclosures and examined under ultraviolet light to assess the retention of marks.

Survival, Growth, and Retention of Marks on Fish

In the laboratory study, marking did not affect the growth and survival of bluegills. Only one marked fish and two controls died. The mean total length of adult bluegills increased by 28 mm, whereas unmarked controls increased an average of 25 mm. The mean total length of marked juvenile bluegills increased by 43 mm, whereas unmarked juveniles grew an average of 36 mm. Adult bluegills retained more than 99% of their marks during the 6-month study. Juvenile bluegills shed all of the marks applied to the dorsal surface of the skull, but retained all marks at all other body locations during the study. In the pond study, we were able to identify 98% of the marked juvenile fish recovered after the 70-day experiment.

An Effective Method for the Marking of Experimental Fish

The injection of fluorescent elastomer is reliable for marking juvenile and adult bluegills for 6 months or less. The fluorescent elastomer mark was easy to apply, requiring less than 1 min per fish, and marks were readily visible when viewed under an ultraviolet lamp. A starter kit that includes elastomer, syringes, and an ultraviolet lamp costs less than $400. This marking technique provides researchers with an inexpensive method for identification of individual fish, thereby increasing the efficiency of experiments involving repeated measurements on individual fish.

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