HARNESS FOR ATTACHMENT OF AN ULTRASONIC TRANSMITTER TO THE RED DRUM, *SCIAENOPS OCELLATA*

The use of small ultrasonic transmitters for studying the movement and behavior of fish in the field is becoming very popular (Stasko 1971). As a result various methods have been devised for attaching transmitters to fish either externally or internally. These methods involve hooking into the dorsal musculature or insertion into the stomach (Henderson et al. 1966), surgical implantation into the peritoneal cavity (Hart and Summerfelt 1975), and others (Ohsumi 1969). The suitability of a procedure is dependent on the species of fish and on the particular objective of the study. For studies we are initiating on movements of the red drum, *Sciaenops ocellata*, none of the existent procedures were found to be entirely satisfactory.

This note describes a simple inelastic harness we have developed for the external attachment of an ultrasonic transmitter to the caudal peduncle. This attachment method is markedly superior to other methods we have tried with the red drum. We believe this procedure will be of immediate value to many workers involved in tracking studies and therefore we are describing it now rather than awaiting the completion of our investigation of migratory movements of the red drum.

Materials and Methods

The inelastic harness for attaching an ultrasonic transmitter to the caudal peduncle is shown in Figure 1. The components of the harness are as follows:

1. An inelastic plastic pull-tie (5 × 190 mm) of sufficient length to encircle the caudal peduncle;
2. Sections of soft Tygon[1] tubing (6-mm OD) and soft rubber tubing (12-mm OD, 1.5-mm wall thickness) threaded over the pull-tie to provide a soft flat cushion that minimizes abrasions and chafing to the fish when the pull-tie is attached and tightened;
3. Small plastic pull-ties to firmly affix the transmitter to the large pull-tie and tubing described above.

When attaching the harness, the large pull-tie is tightened just enough such that it fits snugly around the caudal peduncle and cannot slip over the tail (Figure 1 inset). Care must be taken not to tighten the tie so tightly that it compresses the peduncle. If the latter occurs, the tie must be cut off with scissors and replaced. These ties can only be tightened. The final position of the transmitter itself should be on the dorsal surface of the peduncle with the axis of the transmitter situated at a right angle to the longitudinal axis of the fish. After attachment the overlapping section of the pull-tie is cut off.

Harnesses are preconstructed prior to the time of use such that in the field the only modifications required are the addition or removal of small sections of Tygon and rubber tubing to provide a cushion of the exact size for a particular fish. A preconstructed harness can be attached to a red drum in less than 5 min. Plastic pull-ties of various lengths and widths are available at most hardware stores that stock materials used by electricians.

[1]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

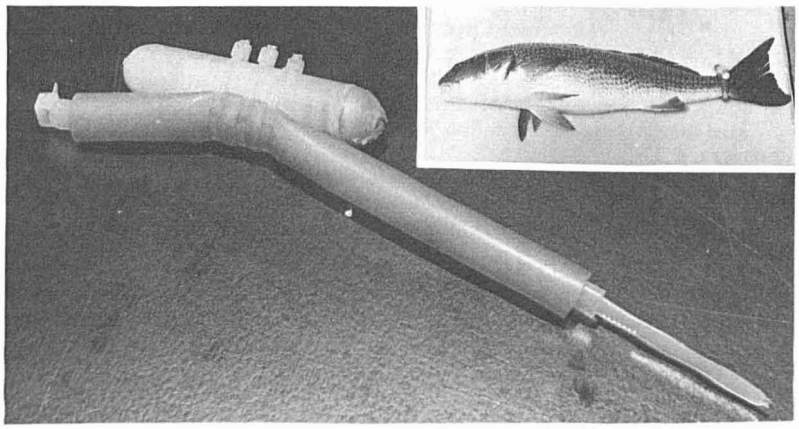

FIGURE 1.–Inelastic harness for attachment of ultrasonic transmitter to caudal peduncle of red drum. Transmitter = Smith Root SR 69. Total length of harness = 190 mm. Inset: Red drum (3.2 kg) with harness and transmitter attached.

The red drum used for testing the harness were caught in the Matanzas Inlet, Fla., by hook and line and maintained in captivity for approximately 2 mo prior to testing.

Results and Discussion

Observations of the suitability of the inelastic harness were conducted in a 3.3-m diameter fiber glass tank, in an enclosed half-acre pond (max depth 2.5 m), and in the Intracoastal Waterway near the Whitney Marine Laboratory. In the fiber glass tank, two red drum (2.5, 3.5 kg) with harnesses and "dummy" transmitters attached swam normally as soon as released and accepted food of shrimp and mullet within 30 min. A third red drum (ca. 3 kg) with harness and active transmitter (Smith Root SR 69) attached was released in the half-acre pond. During the 3-wk lifetime of the batteries in the transmitter, the movements of the fish were monitored almost daily with a receiver and hydrophone. The red drum moved actively about the pond, ate readily, and schooled with other fish. Mangrove roots, pilings, and other obstacles in the pond were not snagged by either the harness or the transmitter. More than 2 mo after the fish was initially released, the harness and inactive transmitter remained in place, and the fish continued to feed and behave normally.

A fourth red drum (3.2 kg) with harness and active transmitter attached was released into the Intracoastal Waterway on 12 January 1976 and tracked continuously for 7 h from a boat with a 74-kHz receiver and hydrophone. The position of the fish with respect to charted channel markers was recorded frequently to provide the summary described below. During the first 1.5 h after release, the fish moved approximately 1.6 km to the south of the release point. This movement was against the direction of the tidal flow. During the remaining time the fish moved 1.2 km to the north, again against the direction of the tidal flow. During this excursion, the fish entered the mouth of almost every creek encountered. At nightfall the fish had moved into a deep hole approximately 140 m up a small creek situated 400 m from the original release point. The fish was not located on the second day but on the third day was located at the edge of the main channel of the Intracoastal Waterway approximately 2 km to the south of the release point. Tracking of the fish had to be discontinued due to a malfunction in the receiver.

For the studies we are initiating on migratory movements of the red drum, the method selected for the attachment of the transmitter was extremely important, and we spent considerable time trying alternative methods. These methods included the hooking of saddles into either the dorsal or ventral musculature, surgical attachment to the pectoral girdle or to the lower jaw bone, surgical implantation into the peritoneal cavity, and insertion into the stomach. Utilization of the inelastic harness provided the following advantages over the other methods we tried.

1. The attachment procedure is simple and quick enough such that only a few minutes elapse between the time the fish is caught, tagged, and released.
2. The procedure results in no bleeding and causes minimal trauma, damage, or weakening of the fish.
3. The attachment is secure and assures that the transmitter remains attached to the red drum for the lifetime of the transmitters we are using (Smith Root SR 69 and SR 69A, lifetimes of 20 and 45 days).

Ichihara (1971) described a "saddle type" method for affixing a transmitter to a fish. This method employed an elastic strap of neoprene rubber that encircled the fish anterior to the dorsal fin. The author noted that fish with elastic harnesses of the saddle type died within 9 to 30 days. Regarding the above observations, we have also found that rubber elastic harnesses encircling the caudal peduncle are unsatisfactory because they constantly compress the peduncle and result in a progressive deterioration of the entire tail region. However, our inelastic harness causes no such deleterious effects. Although we have experimented with the inelastic harness on the red drum only, we are certain that it can be used with any large fish having a fairly rigid tail that is markedly broader than the caudal peduncle.

Acknowledgments

We are grateful to Jack R. Smith, Department of Electrical Engineering, University of Florida, for providing the hydrophone and 74-kHz receiver used in the current study. We also thank Marineland, Inc., for permitting us to use their saltwater pond and other facilities.

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