

Radio Telemetry Use in Smallmouth Bass Habitat Research

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Previous studies of the recreationally important smallmouth bass in streams of the Ozark National Scenic Riverways (ONSR) indicate complex relationships between food and habitat. These relationships often are ignored by commonly used habitat evaluation procedures. A variety of habitat types apparently is essential for providing both food and cover for different life stages of the species.

Several study approaches, such as underwater observation and electrofishing, have been used to determine which habitats smallmouth bass prefer. But because of sampling limitations, the information gained was incomplete. Observations were limited to one or two seasons, and we were unable to observe the same fish through time or follow the fish's habitat selection around the clock. In order to gain a more complete understanding of the habitat utilized by smallmouth bass, research biologists at ONSR, in cooperation with biologists at the University of Missouri at Columbia, decided to use radio telemetry to determine which habitats are preferred.

Radio telemetry is a method by which the location, and consequently the movement, of a radio-tagged fish can be continuously monitored. A radio signal is emitted from a tiny transmitter that has been surgically implanted in the gut cavity of the fish. A directional antenna is used to pin-point the fish's location by determining where the signal is strongest. The transmitters are 1.5 cm long, 0.5 cm wide and weigh 4.0 grams. Their transmitting range is 150 m and they will last for three months. Each transmitter emits a different frequency so that individual fish can be identified.

Since July of 1985, 34 adult smallmouth bass have been radio-tagged. From these 34 fish over 4,000 fish locations were obtained. The last transmitters will go off the air in February of 1987, thus concluding the field work portion of this project.

Preliminary findings pertaining to cover, one of the components of habitat, showed that during the summer, the fish tend to stay within one pool, preferring open water in the early morning. During the day, log jams and boulders were preferred, while a diversity of cover types including boulders, log jams, single logs, open water and vegetation beds were used at night. Peaks in movement occurred soon after sunrise and again at sunset, with little movement between noon and sunset. During the fall, the smallmouth bass preferred cover types similar to those used in the summer, but moved less. In the winter even less movement was recorded; the fish remained around the boulders day and night. Although no distinct pattern for spring cover type selection was apparent, movement increased sharply. About half the radio-tagged fish left their "home" pool and moved from pool to pool. The maximum amount of upstream movement recorded was 7.7 km, while the maximum downstream movement monitored was 5.4 km.

As it developed, a wide array of cover types are used throughout the day and throughout the year. Conventional methods of estimating habitat selection may have underestimated the importance of one or more of these cover types. Radio telemetry also can be used to determine preferred depths, velocities and substrates.

At ONSR radio telemetry has worked well. However, river width and depth, sources of signal interference (i.e. utility lines, electrical generating stations and some engines) and other factors can influence the accuracy of the location estimate. As with any new technique, a pilot study should be undertaken to determine the feasibility of the technique. In the pilot study several types of radio transmitters, receivers, antennas and methods of radio-tagging should be evaluated. The results of this initial study will allow the researcher to adjust his project design in order to be more complete and efficient.

Radio telemetry has traditionally been used in the terrestrial environment, however, biologists now are tracking animals such as molluscs and aquatic turtles in an attempt to take a "second look." Research biologists at ONSR and the University of Missouri at Columbia feel that radio telemetry is, and will continue to be, a valuable tool in researching our aquatic resources.

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