University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Bird Control Seminars Proceedings | Wildlife Damage Management, Internet Center for

10-31-1973

RADIOTELEMETRY FOR STUDYING PROBLEM BIRDS

Olin E. Bray
U.S. Bureau of Sport Fisheries and Wildlife, Denver

Follow this and additional works at: http://digitalcommons.unl.edu/icwdmbirdcontrol

Part of the Environmental Sciences Commons

Bray, Olin E., "RADIOTELEMETRY FOR STUDYING PROBLEM BIRDS" (1973). *Bird Control Seminars Proceedings*. Paper 122.
http://digitalcommons.unl.edu/icwdmbirdcontrol/122

This Article is brought to you for free and open access by the Wildlife Damage Management, Internet Center for at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Bird Control Seminars Proceedings by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

RADIOTELEMETRY FOR STUDYING PROBLEM BIRDS

0lin E. Bray
U.S. Bureau of Sport Fisheries and Wildlife
Wildlife Research Center, Denver, Colorado 80225

Bird problems are much easier to solve if information is available on the behavior of the birds involved. Banding, color-marking, and visual observations have provided only general information on the behavior of problem birds. In order to continuously monitor the activities of birds causing problems, personnel in our Bioelectronics Unit and I developed a radiotelemetry system. A. Lawrence Kolz, George W. Corner, Erwin W. Pearson, and Richard E. Johnson of the Bioelectronics Unit provided the knowledge of electronics and many days of tedious work necessary to develop this system.

Equipment

Attachment. One necessity was a method of attaching transmitters that permitted behavior as nearly natural as possible. Tests with Starlings (*Sturnus vulgaris*) and Red-winged Blackbirds (*Agelaius phoeniceus*) showed that adhasives were not reliable for attaching transmitters to birds. Suturing and various harness arrangements caused atypical behavior. Therefore, a plastic tail clip was developed to attach transmitters to the base of the tail (Bray and Corner, 1972). The clip weighs 0.3 gram and is attached to the six middle tail feathers of Starlings and to the four middle tail feathers of Redwings and Common Grackles (*Quiscalus quiscula*).

Transmitter. The higher the frequency the greater the absorption, refraction, and reflection of the signal by obstacles (Adams and Smith, 1964). Because of these characteristics and the equipment available when we initiated our work in 1967, we decided to start with a low frequency and were assigned 30 MHz. After 4 years of experimentation, the maximum reception range of 30-MHz transmitters was about 1 mile, but the average tracking range was less than 0.5 mile. Field studies with these transmitters were a failure because contact could not be maintained with instrumented birds.

In 1971 we changed to 164 MHz frequency. Because of the great increase in reception range that resulted, all studies involving 164-MHz transmitters have been successful. In agricultural areas where we have worked, absorption, refraction, and reflection have had a negligible effect on signals.

Our transmitters, which are built by personnel of the Bioelectronics Unit, emit a pulsing signal, which is easier to detect and permits a longer operating life than a continuous signal. The transmitting antenna is an 11-inch vertical whip; whip antennas are omnidirectional, and a vertical whip has a greater transmission range than a horizontal whip when the bird is on the ground. The antenna is bent forward (towards the bird's head) at an angle of about 30° so that it is upright when the

bird is standing or perching. Transmitters weigh about 3 grams with a tail clip and $RM312T_2$ battery attached.

The $RM312T_2$ battery (0.7 gram) is the smallest 1.4-volt mecury oxide battery that can be used with the transmitter. Larger 1.4-volt batteries are used if the weight of the transmitter package (transmitter, battery, and tail clip) is less than 5 percent (preferably less than 4 percent) of the bird's weight. The $RM312T_2$ cell powers the transmitter for about 5 days. Batteries do not always operate for their calculated life expectancy, particularly if they have been stored long, but this problem is partially overcome by ordering them directly from the manufacturer (Mallory Battery Co., Tarrytown, New York[1]). Since soldering directly to the battery often ruins a small cell, the batteries are ordered with tabs attached.

Procedures

We aften use mist-nets to capture birds to be instrumented, but occasionally we have released a bird and then discovered that a wing was injured during the netting operation. A decoy trap is probably one of the best devices for capturing birds, unless the researcher believes that it may bias the study. Birds should be removed from the trap immediately, or the energy they expend fighting the trap may restrict their movements for several days after release. After birds are removed from the trap, they are banded, weighed, instrumented, and released as quickly as possible.

Model LA 11-S receivers (AVM Instrument Co., Champaign, Illinois) are used for all monitoring. Each instrumented bird is followed by one person throughout the day. The bird's location is determined by triangulating with a three-element, hand-held yagi antenna (American Radio Relay League, 1964), which receives the strongest signal when pointed at the transmitter. The flock containing the bird is usually sighted at the triangulation fix. Fluctuation in signal strength indicates that the bird is moving. When the bird flies, the auditory strength of the signal increases greatly.

Reception range, which is influenced by vegetation and topography, is greatest when monitoring is done from elevated points or when the bird is flying. With a hand yagi, reception range is usually 1-3 miles if the bird is on the ground, 1-7 miles if it is in a tree, and as far as 15 miles if it is flying.

When a bird's signal has been lost, a whip antenna attached on a vehicle with an automobile gutter clamp (Model ASP-157, Antenna Specialists Co., Cleveland, Ohio) and a hand yagi are used to locate it. The whip antenna is used during driving, and periodic stops are made to search with the yagi, which has a greater reception range than the whip. The signal is often received while driving when the bird flies; then the vehicle is stopped and the bird's direction is determined with the yagi.

We have also used a Cessna 150 airplane to locate migrating Common Grackles. A hand yagi and an H Adcock antenna (Richardson, 1961) are clamped to opposite wing struts. The antenna leads are connected to a coaxial switch inside the plane, which is connected to the receiver. The Adcock antenna produces a null (weak signal) when it is perpendicular to the transmitter. By switching between two directional antennas, the plane

can easily be directed toward the bird. However, our experience is limited and the Adcock antenna may not be necessary. Earphones are needed because of engine noise. Reception range from an elevation of 1,500 feet is usually at least 20 miles.

Field Studies

We have conducted field studies with Redwings, Starlings, and Common Grackles. Starlings and Grackles usually adapt to transmitters more readily than Redwings, which often require at least a 1-day adjustment period. The psychological effect of the presence of the transmitter may be a bigger factor during the adjustment period than the weight of the transmitter.

In the winter of 1972, a study to obtain information on the behavior of Starlings using a large winter roost was conducted at Wilsonville, Oregon, where 800,000 Starlings were roosting in a holly (*Ilex, sp.)* orchard. Instrumented Starlings moved up to 20 miles from the roost to feeding areas.

To obtain data on Common Grackles damaging peanuts (*Arachis hypogaea*), Grackles were instrumented in November 1971 and 1972 near Tishomingo, Oklahoma. Instrumented Grackles moved up to 30 miles from roosts to feeding areas, and three birds migrated approximately 40 miles to northern

In September 1972 and 1973, male Redwings were instrumented near Hope, North Dakota, to obtain information on the damage they cause to sunflowers (*Helianthus annuus*). Instrumented birds moved more than 8 miles from roosts to feeding areas, and one bird migrated south approximately 38 miles.

Information collected in these studies on movement patterns, activities, habitat use, size of feeding areas, flock size, roosting behavior, and migration will be published elsewhere in detail.

[1] Use of trade names does not imply endorsement of commercial products by the United States Government.

Literature Cited

Adams, L., and W.C. Smith. 1964. Wildlife telemetry. Proc. Nat. Telemetry Conf. Sec. 2-3:1-4.

American Radio Relay League, Inc. 1964. The A.R.R.L. antenna book. Newington, Conn. 330pp.

Bray, O.E., and G.W. Corner. 1972. A tail clip for attaching transmitters to birds. J. Wild. Manage. 36(2):640-642.

Richardson, A.G. 1961. Direction-finding antennas. Pages 28-1 to 28-28 in Jasik, H. (Editor), Antenna engineering handbook. McGraw-Hill Book Co., New York.