BUGGED BUNNIES - EASIER SAID THAN DONE

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Abstract: One important phase of the cottontail life history study in Kern County, California, involves the use of radio-telemetry equipment for determining daily, seasonal, and annual movement along with home range requirements. In purchasing, assembling, and testing biotelemetry equipment for this project, difficulties have been encountered in four main areas; available money, equipment, interference, and attachment. The aim of presenting these problems is not to discourage the use of radio-telemetry, but rather to enlighten future users to the existence and means of alleviation.

The cost of the components for assembling this system is given along with an estimate of assembled value. The types of receivers, antennas, and transmitters are discussed. Three types of interference were experienced in the initial field testing. The first relates to the use of the 27-28Mc range by citizen band operators. Secondly we discovered that the extreme heat caused the desirable pulsating signal to become a steady tone. Machinery and metal objects were responsible for further interruptions in our transmissions. Changes in frequency and adaptations in equipment should eliminate these transmission problems. Attachment of the transmitter to the rabbit is done with a collar. The transmitter is secured to the collar by using nylon reinforced tape in conjunction with electricians tape.

INTRODUCTION

Very little is known about the cottontail, *Sylvilagus auduboni*, in California. For this reason the California Department of Fish and Game initiated a cottontail life history study near Bakersfield in Kern County. The goals of this study are many.

To date we have reviewed literature and established a study area. We have applied the accepted research methods of a trapping and tagging program and road censuses; and we have made collections for reproductive, food habit, parasite, and aging studies. We are also using a modern research tool, namely, biotelemetry. In past years a research biologist had to rely on his trapping program to provide information on movement, but today, the use of radio-telemetry promises to be a far superior method for obtaining this information. We plan to use biotelemetry equipment for determining daily, seasonal, and annual movements along with home range requirements. In conjunction with this basic data, we also hope to use this equipment to test the effectiveness of our census counts, to determine the reaction of cottontails to various temperature changes within their territories, to follow the migration patterns of juveniles, and to locate nesting females.

The use of biotelemetry equipment in wildlife research has been given much publicity. However, the difficulties which must be surmounted before valid data can be obtained have received little attention. In the purchasing, assembling, and testing stages of this project we have encountered problems related to four main areas:

1. available money
2. equipment
3. interference
4. attachment

I wish to thank J. D. Hossack for his help in selecting and assembling the components for our equipment. Credit is also due Harold T. Harper, Robert D. Mallette, and John W. Speth for their aid in directing and assisting with this project.

MATERIALS AND METHODS

The first problem is more or less self-explanatory. As Wildlife Society members we have recently experienced money problems within the Society, and we have all experienced budget controls in our work and in our homes. Like most tools, the quality of biotelemetry equipment improves as the cost increases. While working with turkeys in Colorado, Gary Meyers (unpublished data) made a comparison which illustrates this fact. Using a $42 receiver with line of sight transmission, he was able to pick up a signal at a distance of only one and three-quarter miles. This same signal was received for over four miles in rolling terrain with a $1000 receiver.

We purchased components rather than assembled equipment, in order to obtain the best equipment with our available money. The components for each receiver cost $150, and parts for each transmitter cost $12. Comparable assembled receivers would have cost $250, and constructed transmitters would have sold for approximately $40.

Our receivers are based on the original design of Cochran and Nelson (1963). Each receiver is equipped to handle 10 separate frequencies, enabling us to monitor 10 cottontails at any given time. The signal is relayed through the receivers in two ways. First, a beep-beep sound is amplified by a speaker, and secondly, the signal strength is indicated on an ampmeter.

The ampmeter needle resembles that of a gieger counter; the closer you get to the source the greater the needle deflection.

Three receiving antennas are used. Large stationary, directional yagis are used for locating the position within the study area of cottontails being monitored to obtain periodic movement data. Portable, hand-held directional antennas are used to determine the exact locations of the rabbits in order to recover transmitters. Non-directional whip antennas mounted on vehicles are used to approximate the location of cottontails that have moved outside the receiving range of the yagis. By connecting the vehicle antenna to our receiver, we can pick up a signal while driving through the area not encompassed by the stationary antennas. After receiving a strong transmission we connect the portable loop antennas to the receivers, locate the cottontail, and recover the transmitter.

The transmitter, before collar attachment, weighs 22 grams. This includes the weight of the 12 gram mercury battery which has an average life span of 28 days. The transmitter components and battery are secured to a two inch fiberglass mounting board from which the 13 inch transmitting whip antenna projects. The collar which holds the transmitter on the cottontail is the subject of our fourth problem area.

In our initial field testing of the equipment we discovered that the quality of our transmissions was greatly hampered by outside interference in the area. The most obvious of these was interruptions caused by citizen band operators using the same frequencies. We selected the 27-28Mc range based on the work of Lord and Cochran (1963) who used this range in their work with cottontails in Illinois. They said, "Terrain containing very dense vegetation reduces the power received by a factor of two or three. Lower frequencies are the more penetrating." Since we were dealing with a densely vegetated habitat, we felt that this low frequency range should have been suitable for our research. Since the unanticipated citizen band broadcasting often completely overpowered our signals, we have applied for and received permission from the Federal Communications Commission to use a frequency range of 31-32Mc. This should eliminate interference from local broadcasting and still remain low enough to penetrate the dense vegetation.

A second type of outside interference was due to the effect that extreme temperatures had on our transmitters. Our transmitters were designed to emit a pulsating signal that is easy to distinguish from interference in fringe areas. However, when field testing the transmitters in hot weather, we found that exposing the transmitter to high temperatures for a brief period of time changed the signal to a steady tone. When allowed to cool in the shade, the transmitter would again emit its normal pulsating beep.

Machinery and other metal objects have been known to cause interference in radio transmissions. We concluded that the remainder of our major interference was probably due to the fact that our study area is located in an oil lease which abounds with machinery and metal pipelines.

In order to eliminate signal variation due to heat and transmission difficulties due to the abundance of metal objects, we have added components to both the receivers and transmitters in an attempt to tune them to each other and to the local area. As yet these equipment modifications have not been field tested.

Our fourth problem area was attachment of the transmitter to the cottontails. The decision to use a collar followed the findings of Cochran and Lord (1963). They found that a collar caused less abrasion than harnesses. We selected 1/2 inch flat electrical spaghetti for our collar material. It is soft and pliable and lends itself well to easy handling in the field. Holes are punched in the premeasured collar which is then fastened snugly around the cottontail's neck using a soft rivet and a pair of needle nose pliers.

At first, the transmitter was fastened to the collar with electricians tape which also served as a waterproofing material. This method of fastening proved to be unsuccessful because the tape could not withstand the wear and tear. This problem was eliminated by using nylon reinforced tape in conjunction with electricians tape.

The total weight of the transmitter with tape and coller is 27 grams. This is equivalent to three percent of the average cottontail's body weight. The same percentage of an average man's weight would be five pounds. Lord and Cochran used 35 gram transmitters with no adverse effects to the cottontails.

RESULTS

We have put transmitters on some 20 cottontails. We have not obtained any valid information on movement. Of these 20 rabbits, three were pregnant females. We had hopes of locating their nests. However, when we recovered the transmitters and cottontails, it was apparent that they had aborted or reabsorbed their litters. This was probably due to the immediate stress of handling rather than excess transmitter weight. This is based on the fact that three cottontails carried transmitters over two months, and they appeared to resume their normal activities. When they were captured both the transmitters and the cottontails were in good condition.

To date most of our work has been devoted to purchasing and assembling equipment. These field tests using transmitters on cottontails only account for about one man month of actual field time.

DISCUSSION

We have encountered problems dealing with cost, equipment, frequency, and attachment. I hope that my discussion of them will not discourage anyone from using biotelemetry as a research tool. I feel that biotelemetry does have a place in wildlife research, and the problems can be overcome. As long as the Supreme Court or other investigating body does not look into the constitutional rights of cottontails, we are free to bug bunnies and delve into their private lifes. But to date, bugging bunnies is easier said than done.

LITERATURE CITED

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