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Raccoon Rabies Research Using Remote Download GPS Collars in an Urban Environment

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ABSTRACT: In 2004, raccoon variant rabies moved westward from Pennsylvania into Ohio. In an effort to prevent further spread across Ohio, USDA Wildlife Services expanded the Oral Rabies Vaccination (ORV) boundary west toward Cleveland. To assist the Wildlife Services ORV Program to better understand how rabies might move through an urban area, and to help develop the best vaccination strategy to stop its spread, researchers at the USDA National Wildlife Research Center initiated a series of studies. As part of these studies, we deployed 10 remote download GPS collars on raccoons in urban areas of Cleveland. Remote download GPS collars offer advantages and disadvantages over traditional VHF telemetry and conventional “store on board” GPS collars, particularly in urban environments. Raccoons may inhabit culverts or sewer pipes that are inaccessible to humans. As a result, collars programmed to drop off may be lost and the data never recovered. Remote download capability allows researchers to retrieve data without collecting the collar. However, remote download collars tend to be larger and bulkier than other models. Out of 10 collars deployed, 1 went missing within a day of deployment, a second stopped transmitting after 5 months, and one raccoon died (this collar was recovered and later re-deployed). Data collection of nightly locations from 8 collars is ongoing. Locations are downloaded every 5 weeks. Data collected to date suggests raccoons are restricting their space use to small green-spaces when available, but also may inhabit abandoned houses. We believe this research represents the first use of remote download GPS collars on raccoons.

KEY WORDS: behavior, disease, Ohio, *Procyon lotor*, rabies, raccoon, radiotelemetry, techniques, urban wildlife

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INTRODUCTION

Collecting location data from raccoons in urban environments can be challenging. Buildings cause signal bounce and power lines cause interference, making obtaining accurate locations using traditional VHF telemetry difficult. In such cases, use of GPS collars offers an alternative. However, typical GPS collars for raccoons (*Procyon lotor*) and other small to medium-sized mammals are ‘store on board’ and require collar retrieval to download data. Collar retrieval can be accomplished whether by pre-programmed release times or by recapturing the animal. Both scenarios can be challenging in urban environments. For example, some urban raccoons may live in small green spaces surrounded by an urban landscape; while others live in abandoned homes, sewers or drainpipes. Remote drop-off functions in such areas make collar retrieval next to impossible, resulting in lost data. Recapture can be difficult as a result of trap vandalism, disturbance or theft.

This study was performed as part of a movement study investigating raccoon movements in relation to potential westward spread of raccoon variant rabies across Ohio. We believe this research represents the first use of remote download GPS collars on raccoons, and we briefly discuss advantages and disadvantages to their use.

METHODS

This study was conducted in urban (Figure 1) and suburban (Figure 2) areas of Cleveland, Ohio. Raccoons were live captured in cage traps (Figure 3), immobilized with a 5: 1 mixture of ketamine: xylazine, and fitted with

Figure 1. Example of urban location in our study area, Cleveland, Ohio.

Figure 2. Example of suburban location in our study area, Cleveland, Ohio.

Figure 3. A raccoon captured in a cage trap, prior to fitting it with a GPS collar.

Figure 4. Lotek 7000 SLU remote-download GPS collar.

Lotek 7000 SLU remote-download GPS collars (Lotek Wireless Inc., Newmarket, Ontario, Canada) (Figure 4). The GPS is programmed to take a single nightly location at 2300 hours. Locations are downloaded every 6 weeks using a three-element UHF antenna. The VHF beacon is active during daylight hours in order to locate animals for downloading. Locations are entered into ArcGIS v 9.3.

RESULTS

Between 24 May and 26 June 2009, 10 raccoons were fitted with remote download GPS collars. One raccoon went missing shortly after release and another collar stopped transmitting 5 months after deployment. We experienced 1 confirmed raccoon mortality. This collar was redeployed on another animal. Eight collars are currently active and appear to be functioning correctly. As of January 2010, we have downloaded 1274 locations. Success rate in obtaining GPS fixes is 83%. Raccoons appear to be maintaining home ranges within habitat patches (Figure 5), even surrounding abandoned houses (Figure 6).

Figure 5. Daily raccoon locations in a habitat patch, adjacent to both residential and commercial areas, Cleveland, Ohio.

Figure 6. Raccoon locations near abandoned homes, within a residential area, Cleveland, Ohio.

DISCUSSION

Overall, the collars have been performing well. The biggest challenge was the weight of the collar (250 - 300 g) which pushes the limit on the “less than 5% of body weight” rule of thumb. Finding large enough raccoons was difficult.

Advantages

- Ability to access data regularly or on an “as needed” basis
- Collar collection not required to access data
- No need for extensive days of VHF telemetry
- Cost effective; reduces field technician time

Disadvantages

- Heavy and bulky for raccoons
- Signal interference and limited UHF range
- Batteries may need to be removed and refrigerated if collars are not deployed immediately
- Collars were a brand new model with limited field testing resulting in communication difficulties with manufacturer when troubleshooting

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