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ABSTRACT

Radio transmitters have been used in ecological studies on a wide array of species. Over the past decades many different types of attachment techniques have been employed. Many of these techniques have altered behavior and other life history aspects of the study species. Here we describe a modified version of the leg harness that allows prefabrication before entering the field and results in a precise fit for the individual bird. This harness technique uses materials that degrade shortly after the life of the transmitter to ensure that the individual does not migrate with the burden of the transmitter. This technique has been applied to a variety of species from warblers (7-9.5 g) to moderately sized honeyeaters (40 g).

INTRODUCTION

Radio telemetry has been a tool in ecological research for several decades (e.g., Rothstein et al. 1984). Resolution of spatial and temporal habitat use using telemetry is often unmatched by any other technique. Telemetry technology has evolved to the present state in which transmitters are now manufactured for use on birds weighing as little as 9.5 g (transmitter weight = 0.38 g).

Mounting transmitters has been accomplished through a variety of techniques with varying degrees of success depending upon the application. Wing and neck harnesses are still used for a range of species from passerines to raptors (Sykes et al. 1990, Gervais et al. 2006). Subcutaneous mounting is required for some species, such as diving ducks (Peterson et al. 1995) and other waterfowl (Dzus and Clark 1996). Tail mounts have been used in falconry with success. Some researchers have mounted transmitters directly to the backs of birds using an adhesive (Raim 1978). While successful in many applications, the above techniques have obvious disadvantages from the perspective of the bird or are not applicable to small passerines. More recently, leg harnesses have been used with success (Rappole and Tipton 1991, Neudorf and Pitcher 1997, Hill et al. 1999, Doerr and Doerr 2002).

We describe a simple technique for using a leg harnesses that has several advantages: 1) no prefabrication is necessary other than the initial simple knot, 2) each harness results in a precise fit for each individual bird, 3) the transmitter may be applied without assistance once the technique is practiced, and 4) materials are used that ensure the transmitter will drop off the bird before too long. In this respect, the simple design described below represents an innovation that reduces risk to the bird and increases the likelihood of obtaining the intended data.

METHODS

Tying the knot - A single piece of cotton string is tied in the middle using a standard simple knot. Do not tighten. The length of the string depends on the size of the study species, although longer is better than too short (excess is removed after transmitter is attached). Insert the ends of the string back through the knot on the opposite side of the knot that they exited (see Fig. 1), then tighten.

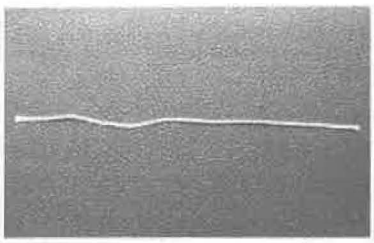


Figure 1a.

The initial piece of cotton string.

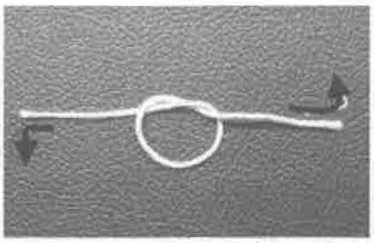


Figure 1b.

Tie a simple knot in the string but do not tighten.

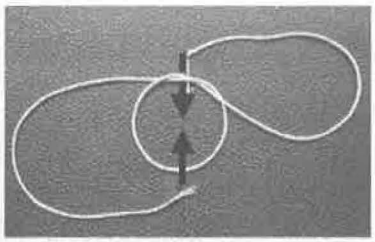


Figure 1c.
Insert ends of the string through the opposite side of where they exit the knot.

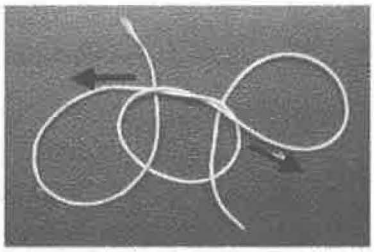


Figure 1d.
Tighten the knot by pulling at the beginning of the new loops created.

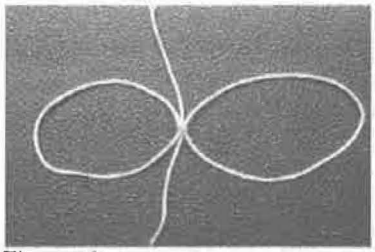
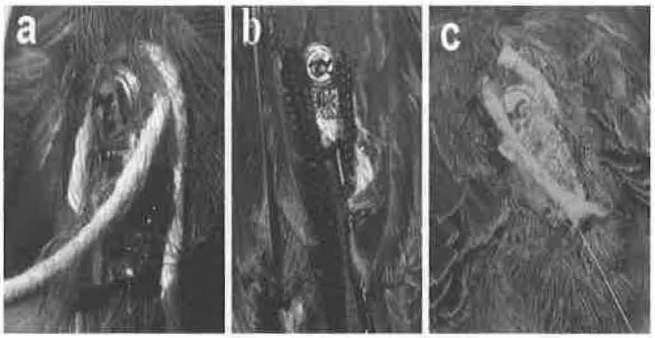


Figure 1e.
Complete harness ready for application.

Application - Once the knot is tied, insert one of the bird's legs into one loop. Pull the harness over the bird's back and insert the bird's other leg through the remaining loop. Do not twist the harness. If the harness is twisted it will not tighten correctly. Once the bird's legs are both inserted through the loops, place the loops high on the leg where it meets the body. If the harness is not placed high enough, there will be too much slack and the bird might remove the harness. Once the loops are located properly, tighten the loops by pulling on the strings. Tighten evenly to ensure the knot is placed at the middle of the sacrum. When pulling on the harness, if there is no slip and the loops are placed high on the leg, the harness is at the desired tension.

Applying the transmitter- Once the harness is in location, epoxy is applied to the flat side of the transmitter and placed on the knot. Be sure to remove flight feathers from excess epoxy. When the transmitter is situated, pull the excess strings into the epoxy to secure the harness and prevent the loops from expanding (see Fig. 2). Allow the epoxy to harden. Once hard, cut the excess string with scissors.

Fig. 2. Once the harness and transmitter are in position, pull both strings into excess epoxy either on top (see a) or the side (b & c) of the transmitter to secure the harness and prevent the harness from expanding.



A simple leg harness can be made using a single length of cotton string by tying it into a double slip knot and tightening a loop around each leg, and then adhering the transmitter to the single knot on the back of the bird using epoxy. The mounting of the transmitter may be done by one individual. Preparing the string prior to entering the field reduces the handling time of the bird in the field. From time of capture to time of release is < 15 min. The pre-mounting stage is illustrated in Figure 1. The size of the knot will depend upon the size of the bird, as will the thickness of the cotton. A major

consideration is to select the thinnest cotton possible so that the harness will degrade soon after the battery life, thereby ridding the bird of the harness and the transmitter. For larger studies, species, or longer battery life, different materials may also be used to prolong data collection.

RESULTS

This harness has been used successfully in four very different habitat types on four different species, all passerines ranging in size from 7-40 g with two different sized transmitters (0.36 g and 0.78 g) from Holohil Systems Ltd. (Ontario). The technique was first used successfully with Louisiana Waterthrushes *(Seiurus motacilla,* n = 17) in riparian habitat in the Caribbean National Forest, Puerto Rico. This harness technique has also been used with both adult (n = 11) and fledgling (n = 6) Canada Warblers (*Wilsonia canadensis)* during the breeding season in north temperate red maple *(Acer rubrum)* swamps in central New Hampshire. One harness broke after 11 days of data collection (battery life = 12 days). In addition, two harnesses came off without being broken, but did so after at least 10 days of data collection. During a migration study in Arizona this technique was used on Wilson's Warblers (*Wilsonia pusilla*, n = 11). In *Acacia* roadside woodlands in central New South Wales, Australia, this technique was used on Spiney-cheeked Honeyeaters *(Acanthagenys rufogularis* n = 8). One harness was removed successfully by the bird within six hours and the harness was still intact. The same bird was recaptured and the harness stayed on this second time for the duration of data collection (> two weeks). All other honeyeater applications were successful.

Observation of bird behavior during telemetry indicated that all birds adjusted well to the harness and presence of the transmitter. Birds spent some time pecking at the harness and transmitter in the first 24-48 hr, but such behavior disappeared or became very infrequent thereafter. During the duration of the data collection for all four species, individuals were observed preening the antenna.

Birds that were recaptured to remove transmitters were inspected for abrasions or any other sign of bodily stress. In all cases, no detectable signs were found anywhere on the body (Louisiana Waterthrushes: n = 13, Canada Warbler adult: n = 7 fledglings: n = 3, Wilson's Warbler: n = 2, Spiney-cheeked Honeyeater: n = 1).

DISCUSSION

This harness technique has been used successfully on species that weigh as little as 7 g without causing physical irritation to the individual or affecting its behavior. The materials used in creating the harness have negligible effects on the overall transmitter weight, which allows attachment to small passerines. The use of thin diameter cotton as a harness material ensures that harnesses will fall off individuals that are not recaptured. Our evidence is from returning waterthrushes from 2004 to 2005 that were not recaptured and returned without transmitters. One harness successfully degraded before fall migration of one Canada Warbler fledgling, and after three months three Spiney-cheeked Honeyeaters that were color banded and used during the study, two appeared to no longer have transmitters attached. We suspect that harnesses degrade within four to six weeks or become frayed enough for the birds to remove. This, of course, depends on the diameter of the cotton thread used and the weather conditions. Other materials, such as nylon, may be utilized for studies in which a longer duration is required.

A primary concern is to implement a technique that precludes birds migrating long distances with the extra burden of transmitters. As such, timing and life history of study species should be considered when using telemetry, especially in cases where return rates of marked individuals are an essential component to the study.

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Wing Length and Sex of Hatch-Year Orchard Orioles Determined from Recaptures

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ABSTRACT

I recorded 2250 captures of Orchard Orioles (Icterus spurius) *representing 1679 individuals at two locations along the Platte River, Nebraska, during 13 spring-summer seasons from 1992 - 2006. Hatch-year (HY) birds were captured 680 times with 22 of these birds recaptured in subsequent years. Thirteen recaptures were males and nine were females. Comparing wing lengths recorded at first banding as HYs to their later sexually dichromatic plumage showed male HYs with longer wings, but the 74 mm break point between sexes as defined by Pyle (1997) was unsupported by my recaptures. There is a wide overlap of wing lengths between the sexes. In discussion, I postulate that Pyle's measurements from museum specimens may be influenced by shrinkage and, therefore, may be unreliable for field sex determination of HY Orchard Orioles.*

INTRODUCTION

Orchard Orioles (*Icterus spurius*) are usually single-brooded (Scharf and Kren 1996), but Ligi and Omland (2007) found birds at 33% of nests double brooded in Maryland. They appear to be semi-colonial nesters in prime habitat (Scharf and Kren 1996), where they are classic Neotropical migrants spending only about three months on their temperate nesting grounds. The remainder of the year is spent in passage or on Central and South American wintering grounds (Clawson 1980; Scharf and Kren 1996). Nesting habitat is usually deciduous woody trees and shrubs with primary distribution east of the Rocky Mountains. *Partners*