RECOMMENDATIONS FOR THE ATTACHMENT OF SATELLITE TRANSMITTERS TO CRANES

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Abstract: Recent advances in miniaturization of satellite transmitters have resulted in thumb-sized packages weighing less than 30 g. These are smaller than VHF radios routinely mounted on crane leg bands. With this development and with favorable signal reception results, there is no need for, and much to recommend against, the continued use of back-pack mounts. We provide details for leg-mount attachments.

Key words: crane, migration, radiotelemetry, satellite telemetry.

In the mid 1980s, advances in electronics technology allowed for miniaturization of satellite transmitters (PTTs, platform transmitter terminals) to the degree that they were small enough (ca 300 g) to be attached to large, flighted birds. They were nonetheless heavy enough to, of necessity, be attached as back packs. In most cases, harnesses were used to hold the packages to the birds.

The first bird released with a back-pack PTT was a bald eagle (Haliaeetus leucocephalus) in 1984 (Strikwerda et al. 1986). There followed, in rapid succession, a series of experiments involving many species (e.g., Strikwerda et al. 1986, Jouventin and Weimerskirch 1990). To date, birds as small as peregrine falcons (Falco peregrinus), Swainson’s hawks (Buteo swainsoni), and spectacled eiders (Somateria fischeri) have been tracked (Petersen et al. 1995, Fuller et al. 1998).

The first crane to be satellite tracked was a greater sandhill crane (Grus canadensis tabida) instrumented by S. Nesbitt in Florida (Nagendran 1992). From 1990–95, a team at Patuxent Wildlife Research Center experimented with many harness designs and attachment methods (Ellis et al. 1992, Olsen et al. 1992). Several cranes were even trained to fly alongside a motor vehicle so attachments could be inspected while the birds flew. During this era, PTTs were deployed on cranes in eastern and western Siberia, Canada, and in various states of the USA. Our hope was to design a harness that could be deployed on developing colts so that, after growth or drastic changes in body mass, the birds would not suffer restricted flight, impaired incubation or copulation (or other behavioral impairment), or reduced survival. This effort was based on the assumption that PTTs were about as light as they could ever become. However, in the 1990s, electronics advances led to smaller PTTs until, by 1995, it was possible to deploy PTTs as small as 30 g with a transmission life (programming features allow for periodic transmission to extend life) of a year or more. This miniaturization allowed us to deploy satellite transmitters with the same or less mass as that of conventional (VHF) transmitters being routinely deployed on crane leg bands (Melvin et al. 1983).

With these advances, and aware of the abrasion to skin and feathers resulting from back-pack harnesses even on captive cranes (with limited flight opportunities), we abandoned harnessing and commenced immediately on experiments to see if we could achieve acceptable levels of signal reception with our PTTs mounted on leg bands. Initial experiments proved promising, so we switched exclusively to leg-band-mounted PTTs.

Although no one has made a side-by-side experimental test comparing reception capabilities of back-pack- and leg-band-mounted PTTs, our reception results with leg attachments have been comparable to or better than previously experienced with back-pack mounts. For example, 5 sandhill cranes were instrumented by biologists from Northern Prairie Wildlife Research Center in Nebraska and followed through their spring migration, through the summer, and to their wintering areas. Location data was obtained from 202 of 213 (95%) transmissions. These results and continuing studies indicate that leg-band PTTs are effective in gathering data on cranes migrating long distances. PTT-marked cranes migrated on the same schedule as other cranes and flew up to 1660 km between relocations, suggesting that the leg-band packages cause little harm. Two of 5 instrumented cranes nested in northeastern Siberia, a distance of over 6,400 km from their wintering grounds. The PTTs used in this study.

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weighed 30 g, and the total weight of the package, including the epoxy protective covering and plastic leg band, was about 55 g. The PTT package accounted for 1–2% of the crane’s body mass (depending on the subspecies), well within the guidelines recommended by the Ornithological Council (Gaunt et al. 1997). In general, the total mass of all bands, transmitters, and other markers should not exceed 5% of the body mass of the bird (Caccamise and Hedin 1985).

Because some research teams have recommended backpack harnesses (e.g., Nagendran et al. 1994) which, no matter the design, we believe pose much greater risk to the bird (see Melvin and Temple 1987, Burke et al. 1999), we are publishing this notice. In short, we encourage all crane research teams to use leg-band attachments exclusively, when working with large colts and older birds. As discussed elsewhere in these proceedings, rapidly growing, small chicks probably require body attachments.

An example of a PTT-size radio attached to a band is illustrated by Ellis et al. (1996:239) and in Fig. 1. The specifications of the lightest PTTs and bands are: mass, PTT alone, 20–40 g; mass, PTT with band and fasteners, 40–50 g (if plastic band is 2-mm thick, 7.5-cm tall and consists of 2 “half bands” with inside diameter 2.1 cm [for greater sandhill cranes] and flanges 1 cm wide). The PTT can be attached to the plastic half-band by a brass band (10 mm wide and 0.5 mm thick) and/or the floor of the PTT can be epoxy bonded to the band. We also make 3–5 beveled holes through the band beneath the PTT and fill these with epoxy resin. The PTT is attached to the leg just above the hock (ankle). When preparing packages for attachment, be certain to remove burrs and bevel the edges of band, especially where the package rests on the hock joint.

LITERATURE CITED


