

SHORT COMMUNICATIONS

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PREENING BEHAVIOR AND SURVIVAL OF TERRITORIAL ADULT GOLDEN EAGLES WITH BACKPACK SATELLITE TRANSMITTERS

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Knowledge of avian ecology has advanced substantially through the use of telemetry techniques, but not without consequences. Two meta-analyses encompassing a broad range of avian taxa yielded evidence of multiple negative effects, including increased energy expenditure likely caused by aerodynamic differences and decreased nesting effort (Godfrey and Bryant 2003, Barron et al. 2010). Among raptors, effects include decreased survival rates for Northern Goshawks (*Accipiter gentilis*; Reynolds et al. 2004), Prairie Falcons (*Falco mexicanus*; Steenhof et al. 2006), and Spotted Owls (*Strix occidentalis*; Paton et al. 1991). However, survivability was unaffected for a number of other raptor species (Kenward 2001). Female Gyrfalcons (*Falco rusticolus*) wearing platform transmitter terminals (PTTs, i.e., satellite transmitters) attached as “backpacks” via body harnesses, preened more than their untagged mates, suggesting discomfort and/or efforts to remove them (Booms et al. 2011). Gregory et al. (2003) showed that territories where Golden Eagles were trapped on nests for telemetry fledged fewer young post-trapping than control territories. Marzluff et al. (1997) noted decreased reproduction among Golden Eagles (*Aquila chrysaetos*) wearing backpack-mounted radio transmitters, but small sample size and other factors obscured conclusions. Use of PTTs on Golden Eagles seems justified given the inadequacies of ground-based telemetry for tracking this wide-ranging bird and a critical need for ecological data to inform its management. We assessed possible effects of PTT backpacks on territorial adults while studying the ecology of Golden Eagles from the Colorado Plateau region of southwestern North America by documenting (1) percentage of time spent preening during 1–6 wk after PTT attachment and

(2) removal of PTT packages or mortality during 1–2 yr post-attachment.

METHODS

Eagles were captured on coyote (*Canis latrans*) or mule deer (*Odocoileus hemionus*) carcasses with a remotely detonated net launcher (Coda Enterprises, Mesa, Arizona, U.S.A.; Harmata 2011) and were released at respective capture sites within 1–2 hr. We recorded hallux and head measurements to determine sex of each eagle (Harmata and Montopoli 2013) and attached a U.S. Geological Survey aluminum leg band to each prior to marking.

Preening Behavior. During 7–13 January 2011, we captured and tagged four territorial adult Golden Eagles (two male, two female) in northwestern New Mexico with ca. 100-g PTT packages (PTT-100-70 Argos-GPS with 10-g backup battery; Microwave Telemetry, Inc., Columbia, Maryland, U.S.A.), including harness. We used “Y” backpack style harnesses (Buehler et al. 1995) constructed of 6.4-mm wide Teflon ribbon (Bally Ribbon Mills, Bally, Pennsylvania, U.S.A.) to attach PTTs. Each PTT had a glossy, gold-colored finish and measured $9.8 \times 3.8 \times 2.5$ cm, including a 0.5-cm thick neoprene base. A stiff, 18-cm long antenna made of coated stranded steel extended from the back of the unit at a 45-degree angle above the eagle’s dorsum. We also attached a 20-g VHF transmitter (150–151 MHz; Wildlife Materials, Inc., Murphysboro, Illinois, U.S.A.) to central rectrices of each eagle (Kenward 1978) to aid real-time relocation for directly observing behavior. Together, the PTT and VHF transmitter packages weighed <3% of each bird’s mass, a standard apparently established by consensus among biologists of the U.S. Geological Survey-Bird Banding Lab in the 1980s, when transmitters became important as auxiliary markers (B. Peterjohn pers. comm.). We realized we risked a synergistic effect of double marking, but had no other means of real-time relocation of eagles with backpacks.

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