Radio Telemetry Attachment Techniques

Overview

Dylan Kesler

Attachment Techniques

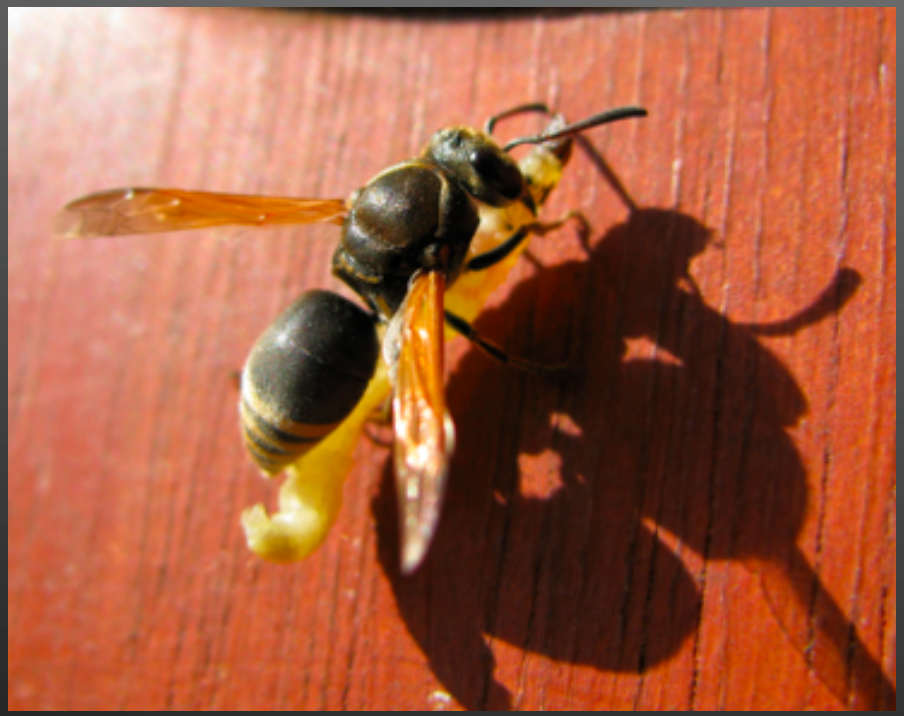
Overview

1. Study requirements
2. Attachment considerations
3. Attachment techniques
4. Review

Considerations - Study Requirements

- Aims of Study
- Bird Morphology
- Bird Behavior
- Bird Natural History
- Technology Restrictions

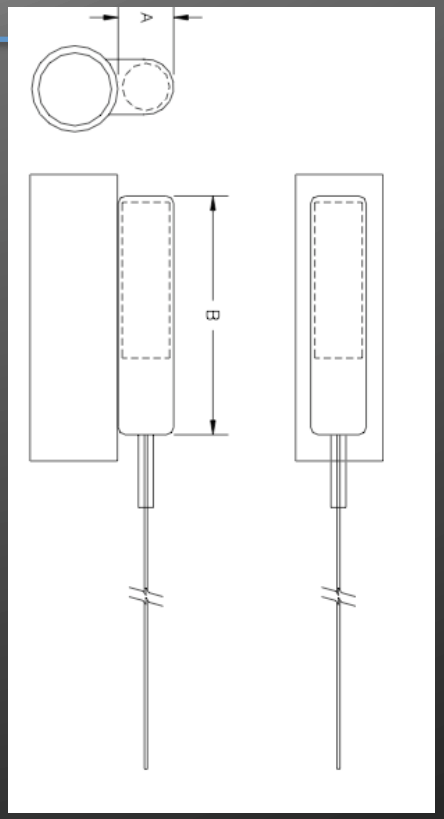
Attachment Methods



- Leg Band
- Feather Glue
- Body Glue
- Neck Loop
- Backpack
- Leg Harness
- Patagial Tag

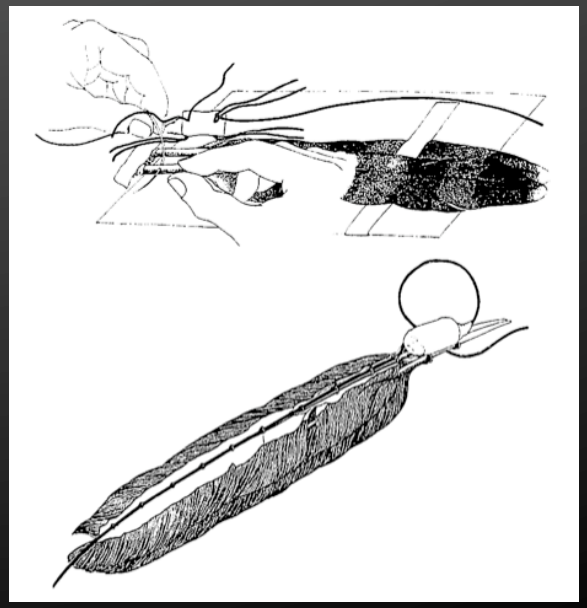
Leg Band

- Transmitter mounted to leg band
- Mount configuration
  - Upturned antenna
  - Downturned antenna
  - Horizontal antenna
- Target species
  - Wading birds
  - Seabirds
- Target situation
  - Short transmission distance
  - Geolocator
- Benefits
  - Permanent
  - Minimal abrasion risk
- Drawbacks
  - Irritation
  - Predator risk
  - Foraging interception
  - Small transmitters
  - Minimal sun exposure



Feather Glue, Tape, Tie

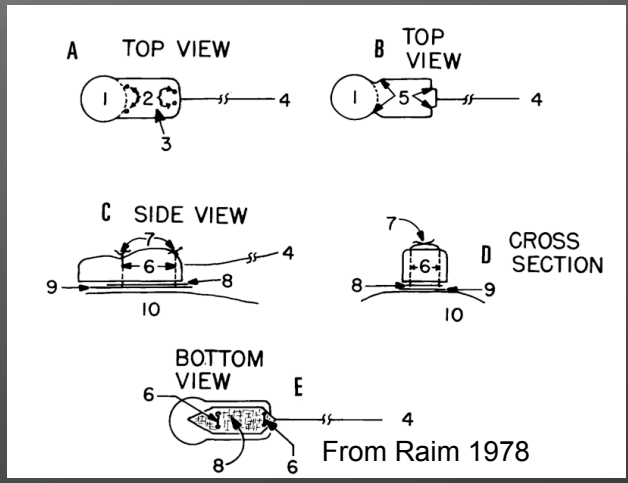
- Glued/taped/wrapped to feather
- Mount configuration
  - Retraces
  - Anterior antenna
  - Horizontal antenna
- Target species
  - Large birds
  - Woodpeckers
- Target situation
  - Short transmission distance
  - Short study period
  - Short flight distances
- Benefits
  - Drops with molt
  - Minimal abrasion risk
- Drawbacks
  - Trailing antenna
  - Premature molt
  - Small transmitters
  - Extreme tail weighting

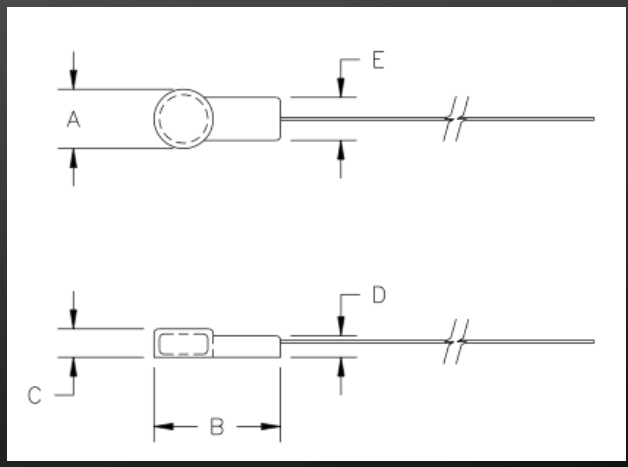


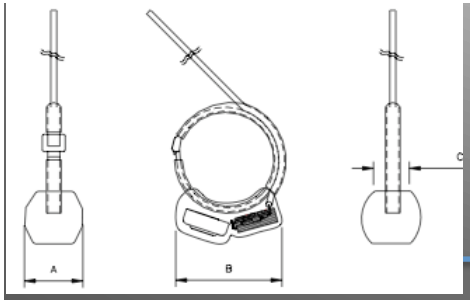
Body Glue/Epoxy

- Transmitter glued to skin
- Epoxy or surgical glue
- Mount configuration
  - Back mounted
  - Anterior antenna
  - Horizontal antenna
  - Standing antenna
- Target species
  - Small birds
  - Waterbirds
- Target situation
  - Short transmission distance
  - Short study period

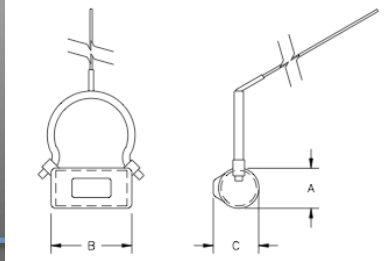
- Benefits
  - Drops with molt
  - Minimal abrasion risk
- Drawbacks
  - Trailing antenna
  - Small transmitters





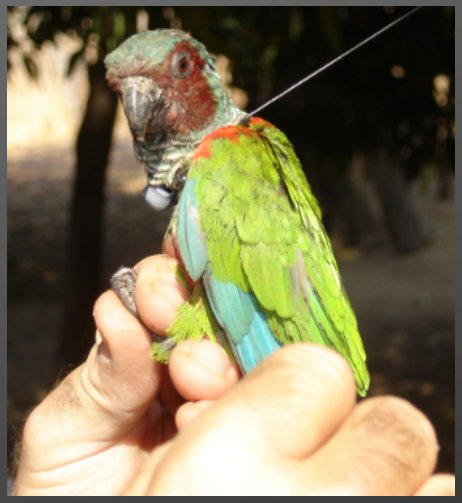


Pennant



- Transmitter harnessed around neck
- Individual sizing
- Mount configuration
  - On breast
  - Standing antenna
  - Horizontal antenna
- Target species
  - Large birds
  - Parrots
  - Gallinaceous birds
  - Ground feeders
- Target situation
  - Long study period
  - Short flight distances

- Benefits
  - –Permanent marking
  - –Minimal abrasion risk
- Drawbacks
  - Permanent marking
  - Extreme front-weighting



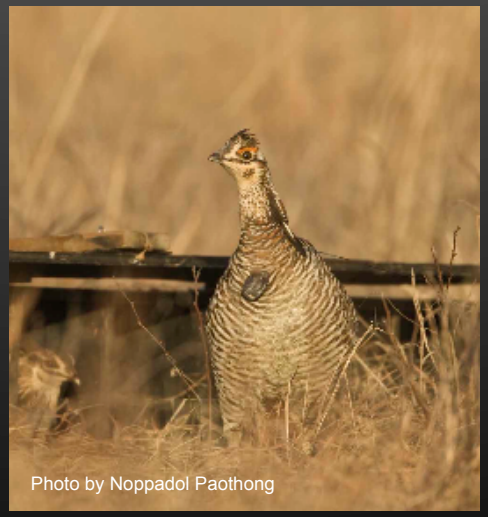
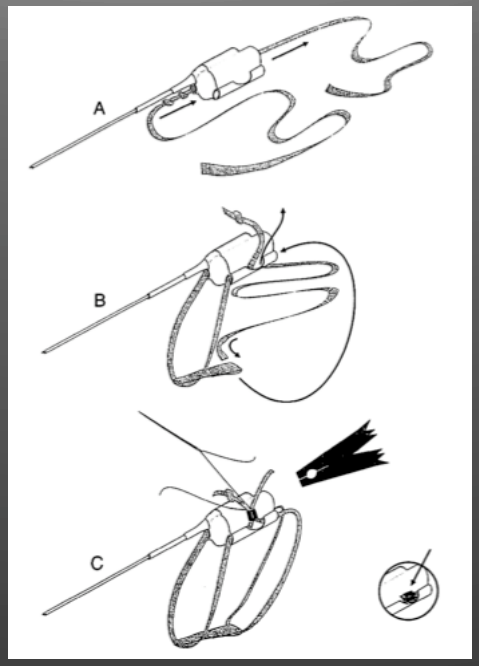
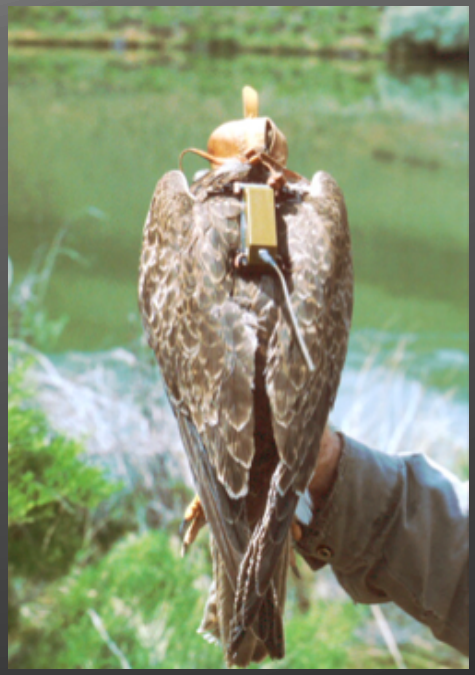


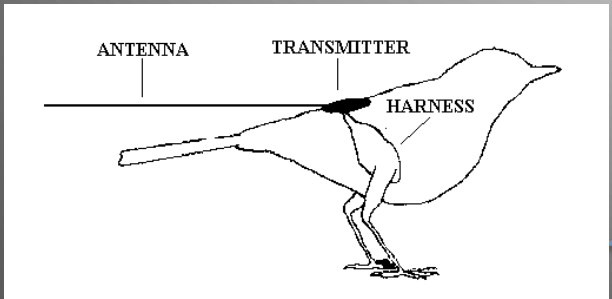
Photo by Noppadol Paothong

Backpack

- Transmitter harnessed around wings
- Individual sizing
- Mount configuration
  - Back
  - Standing antenna
  - Teflon tape
- Target species
  - Large birds
- Target situation
  - Satellite transmitters
  - Long study period
- Benefits
  - Permanent marking
  - Center of gravity
  - Sunlight exposure
- Drawbacks
  - Abrasion risks





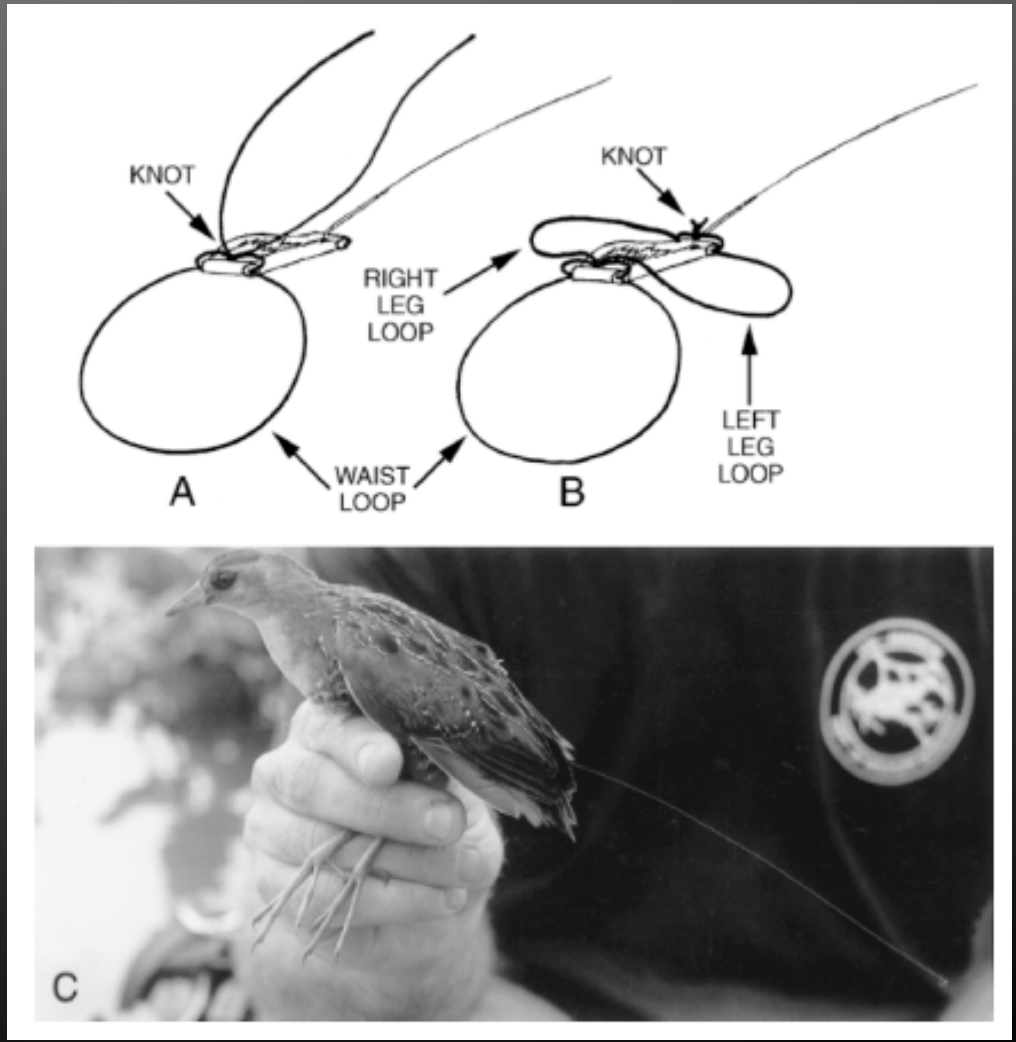


Leg Harness

- Standardized sizing
- Configuration
  - Standing, trailing, or horizontal antenna
  - On back
  - Transmitter harnessed around legs
- Target species
  - Small birds
  - Large birds
- Target situation
  - Long flight distances
  - Tree-perching birds
- Benefits
  - Permanent or temporary
  - Minimal abrasion risk
  - Use with small birds
  - Very light
- Drawbacks
  - Not so good for gallinaceous birds
  - Trailing antenna

Modified Leg Harnesses

- Harness design modified for birds with slender body and legs.

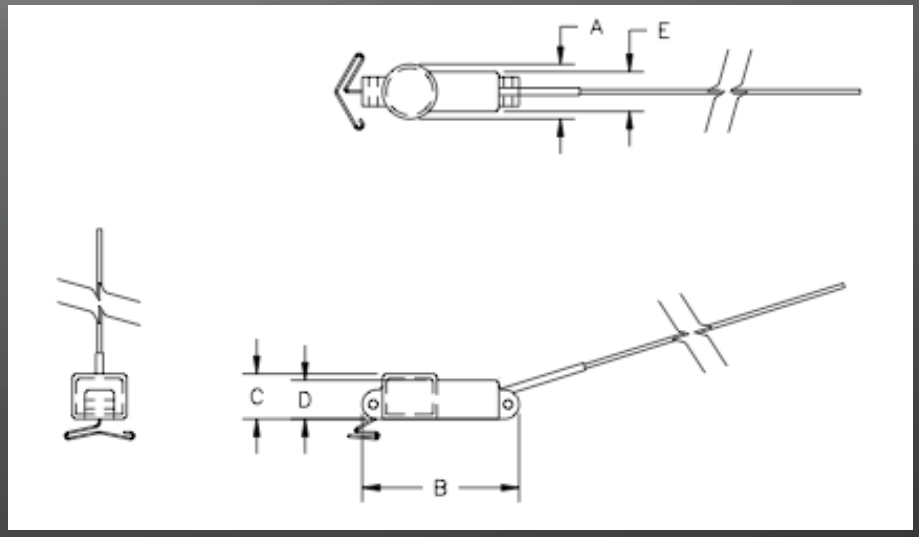


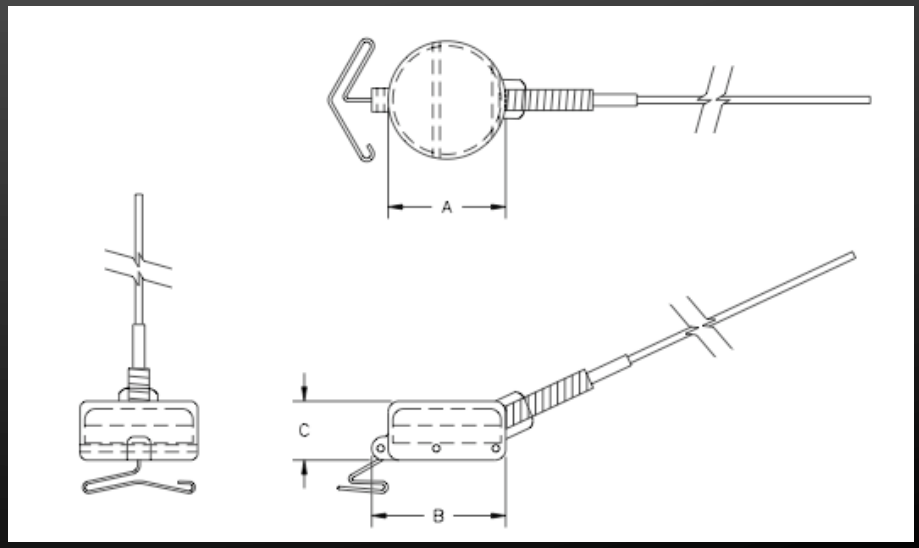
Patagial Tag

- Configuration
  - Transmitter mounted to patagial tag
  - Standard sizing
  - Standing antenna
- Target species
  - Large birds
- Target situation
  - Long transmission distance
  - Satellite
  - Long study period
  - Short flight distances
- Benefits
  - Permanent marking
  - Mid-body weighting
  - Minimal abrasion risk
- Drawbacks
  - Permanent marking
  - Flight impedance
  - Need large bird

Subcutaneous Anchor

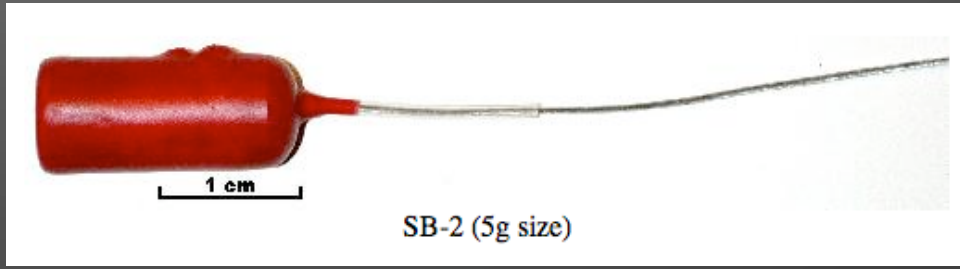
- Transmitter inserted into skin
- Mount configuration
  - On back
  - Standing antenna
- Target species
  - Large birds
  - Ground feeders
  - Ducks
- Target situation
  - Long study period
- Benefits
  - Permanent marking
  - Minimal abrasion risk
- Drawbacks
  - Permanent marking
  - Surgery required



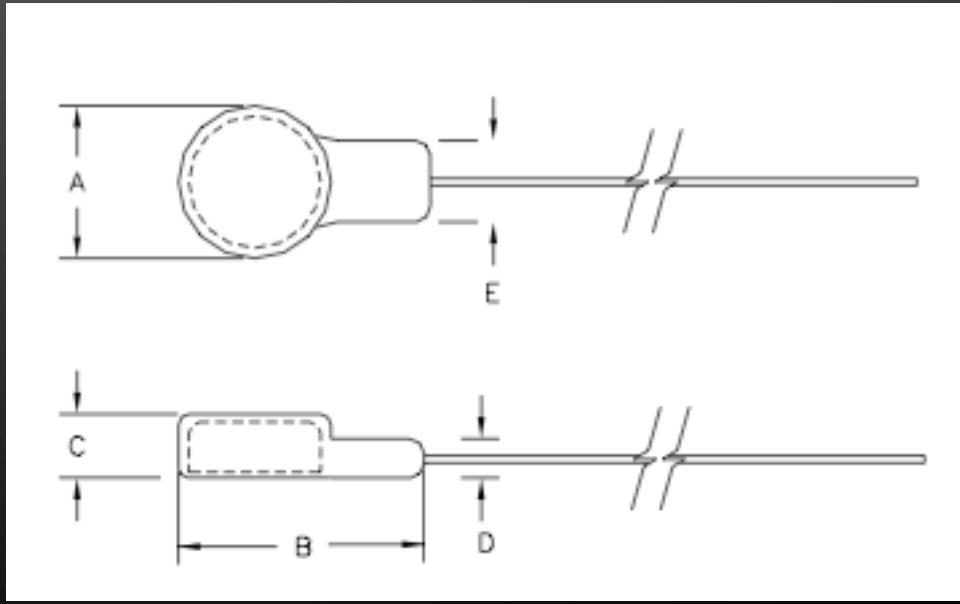


Internal

- Configuration
  - Transmitter implanted in body cavity
  - Hidden antenna
  - Exposed antenna
- Target species
  - Large birds
- Target situation
  - Short transmission distance
  - Satellite transmitters
- Benefits
  - Permanent marking
  - Minimal abrasion risk
- Drawbacks
  - Permanent marking
  - Surgery required
  - Hidden



SB-2 (5g size)



Potential Problems

- Bill caught in harness
- Abrasion
  - Especially backpack mounts
- Irritation
  - Leg band transmitter with antenna
- Weight
  - Limited mobility
    - Migration
    - Predator escape
- Conspecific aggression
- Antenna curling
- Cavity entry restriction

Mong and Sandercock

(JWM 2007)

- Upland Sandpipers
- Body glue vs. harness vs. feather glue
- Retention
  - 1.8 years leg-loop harness
  - 40 Days body glue
  - 27 days feather glue
- Return rates
  - Reduced with leg-loop harness
  - Unaffected with body glue or feather glue

Take Home Points

1. Best attachment techniques differ among bird groups based on research need, behavior, morphology, and natural history.
2. Pilot studies are important.
3. Care in capture handling techniques, harness sizing, radio weight, and bird consideration is always warranted.
4. Backpack harnesses have consistently been found to be detrimental to survival and behavior.
5. Leg-loop harnesses, subcutaneous, and abdominal implants have long retention time.
6. Feather-mounted radios seem to have least impact on survival.
7. Debate about subcutaneous and abdominal implant effects on bird health.

Useful Literature

- Berdeen, J. B. and D. L. Otis (2006). "Effects of Subcutaneous Transmitter Implants on Mourning Doves." Wildlife Society Bulletin **34**(1): 93-103.
- Chipman, E. D., N. E. McIntyre, et al. (2007). "Effects of Radiotransmitter Necklaces on Behaviors of Adult Male Western Burrowing Owls." Journal of Wildlife Management **71**(5): 1662-1668.
- Folk, T. H., J. B. Grand, et al. (2007). "Estimates of Survival from Radiotelemetry: a Response to Guthery and Lusk." Journal of Wildlife Management **71**(4): 1027-1033.
- Gervais, J. A., D. H. Catlin, et al. (2006). "Radiotransmitter Mount Type Affects Burrowing Owl Survival." Journal of Wildlife Management **70**(3): 872-876.
- Guthery, F. S. and J. J. Lusk (2004). "Radiotelemetry studies: are we radio-handicapping northern bobwhites?" Wildlife Society Bulletin **32**(1): 194-201.
- Hagen, C. A., B. K. Sandercock, et al. (2006). "Radiotelemetry Survival Estimates of Lesser Prairie-Chickens in Kansas: Are There Transmitter Biases?" Wildlife Society Bulletin **34**(4): 1064-1069.
- Hupp, J. W., J. M. Pearce, et al. (2006). "Effects of Abdominally Implanted Radiotransmitters with Percutaneous Antennas on Migration, Reproduction, and Survival of Canada Geese." Journal of Wildlife Management **70**(3): 812-822.
- Mulcahy, D. M. (2006). "Are Subcutaneous Transmitters Better Than Intracoelomic? The Relevance of Reporting Methodology to Interpreting Results." Wildlife Society Bulletin **34**(3): 884-889.
- Palmer, W. E. and S. D. Wellendorf (2007). "Effect of Radiotransmitters on Northern Bobwhite Annual Survival." Journal of Wildlife Management **71**(4): 1281-1287.
- Phillips, R. A., J. C. Xavier, et al. (2003). "EFFECTS OF SATELLITE TRANSMITTERS ON ALBATROSSES AND PETRELS." Auk (American Ornithologists Union) **120**(4): 1082-1090.
- Pitman, J. C., C. A. Hagen, et al. (2006). "Survival of Juvenile Lesser Prairie-Chickens in Kansas." Wildlife Society Bulletin **34**(3): 675-681.
- Small, M. F., J. T. Baccus, et al. (2006). "Are Subcutaneous Transmitters Better Than Intracoelomic? A Response." Wildlife Society Bulletin **34**(3): 890-893.
- Steenhof, K., K. K. Bates, et al. (2006). "Effects of Radiomarking on Prairie Falcons: Attachment Failures Provide Insights About Survival." Wildlife Society Bulletin **34**(1): 116-126.
- Sunde, P. (2006). "Effects of Backpack Radio Tags on Tawny Owls." Journal of Wildlife Management **70**(2): 594-599.