Migration Interest Group: Research Applied Toward Education

MIGRATE

National Science Foundation Research Coordination Network in Biological Sciences

Remote Tracking Technologies

LOTEK WIRELESS
FISH & WILDLIFE MONITORING

NORTH STAR
Science and Technology

HSL
Holohil Systems Ltd.

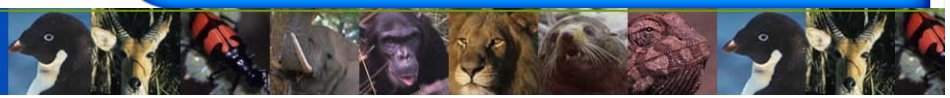
ATS
Helping You Keep Our World On Track...

Wildlife Computers
Innovative Tags for Innovative Research

TELONICS
Quality Electronics for Wildlife,
Environmental Research,
and Special Applications

Microwave
Telemetry, Inc.

SIRTRACK
WILDLIFE TRACKING SOLUTIONS



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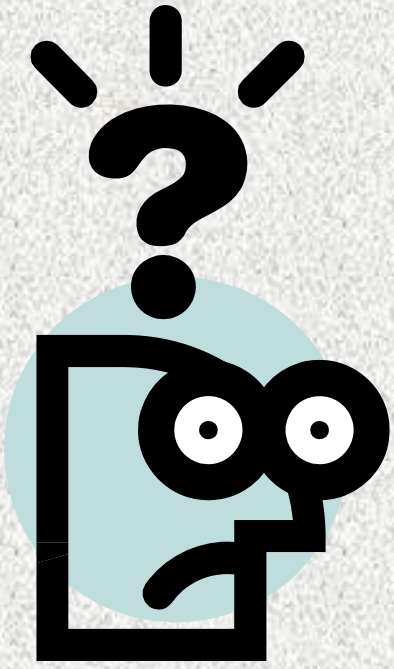
- What type of tags should I use?
- What attachment method should I use?
- How do I collect/extract the data?
- How do I plot and manipulate the data?
- How do I analyze the data?
- What type of software is needed?
- How do I integrate tracking with environmental data?



!!!Scale!!!

(Time and Space)

Research Objective: What is your question?

Too Consider…

- Size of bird and tracking duration?
- Studying local movements or long-distance migration?
- Can you recover the instrument?
- Collecting physiological data?
- Terrain (canopy cover)?
- Resolution (time/space) of the environmental data?
- Budget?

Minimum Size Per Instrument Category

(commercially available)

VHF transmitters - 0.35 g (Holohil Systems Ltd.)

Geolocation archival tags – 0.5 to 1.5 g (British Antarctic Survey, Lotek)

Satellite transmitters (PTT) – 9.5 g (Microwave Telemetry Inc.)

Global Positioning System loggers – 20 g (New Behavior)

Global Positioning System PTTs – 22 g (Microwave Telemetry Inc.)

Instrument Size Recommendations

- < 5% of animals mass

  (but also consider aerodynamics, attachment location, stage of annual cycle, age class, etc.)

- Smaller is not always better

  (at least from a data perspective)

Costs

VHF transmitters - $150

Geolocation archival tags – $150 to $1,000

Satellite transmitters (PTT) – $1,700 to 3,000 (plus Argos fees)

Global Positioning System loggers – $800 to $1,600

Global Positioning System PTTs – $4,000 (plus Argos fees)

Analyses / Statistics

- Make cool maps and animations!
- Single points or movement paths
  - chi square to fractal analysis…and every in between!
  - spatial and temporal autocorrelation
- Habitat Use – Environmental influences on movement
  - pressure, wind systems, and migration stopover
  - use vs. availability…or…resource use vs. fitness
- Tracking data are extremely versatile…and complex
  - pure excitement to utter frustration

Computer Programs

Spreedsheets: e.g, Excel

Databases: e.g., Access

Triangulation: e.g., LOAS, Pythagoras

GIS: e.g., ArcGIS 9, ArcView 3.3, Matlab, SAS, and many more!

Environmental data: e.g, ERDAS Imagine, ENVI, GIS prog. above

Statistics: e.g., SPlus, SAS, R, and many more!

Selected Literature – Helpful Books

Millspaugh, J.J. and J.M. Marzluff. 2001. Radio Tracking and Animal Populations. Academic Press.

Manly, B.F., L.L. McDonald, D.L. Thomas, T.L. McDonald, and W.P. Erickson. 2002. Resource Selection by Animals - Statistical Design and Analysis for Field Studies. Second edition. Kluwer Academic Publishers, Dordrecht, The Netherlands.

!!!and MANY MANY more!!!!

Outline of This Section

- **Overview of Technologies**
  - Matthew Johnson
- **VHF Telemetry, Attachment Methods, Triangulation**
  - Dylan Kesler
- **Argos, GPS, GLS Tracking and Data Filtering**
  - Rob Suryan
- **GIS Applications**
  - Patti Haggerty