# Advanced Animal Tagging

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- 3 major tag/system types:
  - Automatic Location System
  - Data Telemetry System
  - Data Logging Tag

Why develop tags at the Lab: Weight

- Commercial tracking tags with similar functionality are too heavy
- Improve on existing systems: lower mass, longer life, added functionality

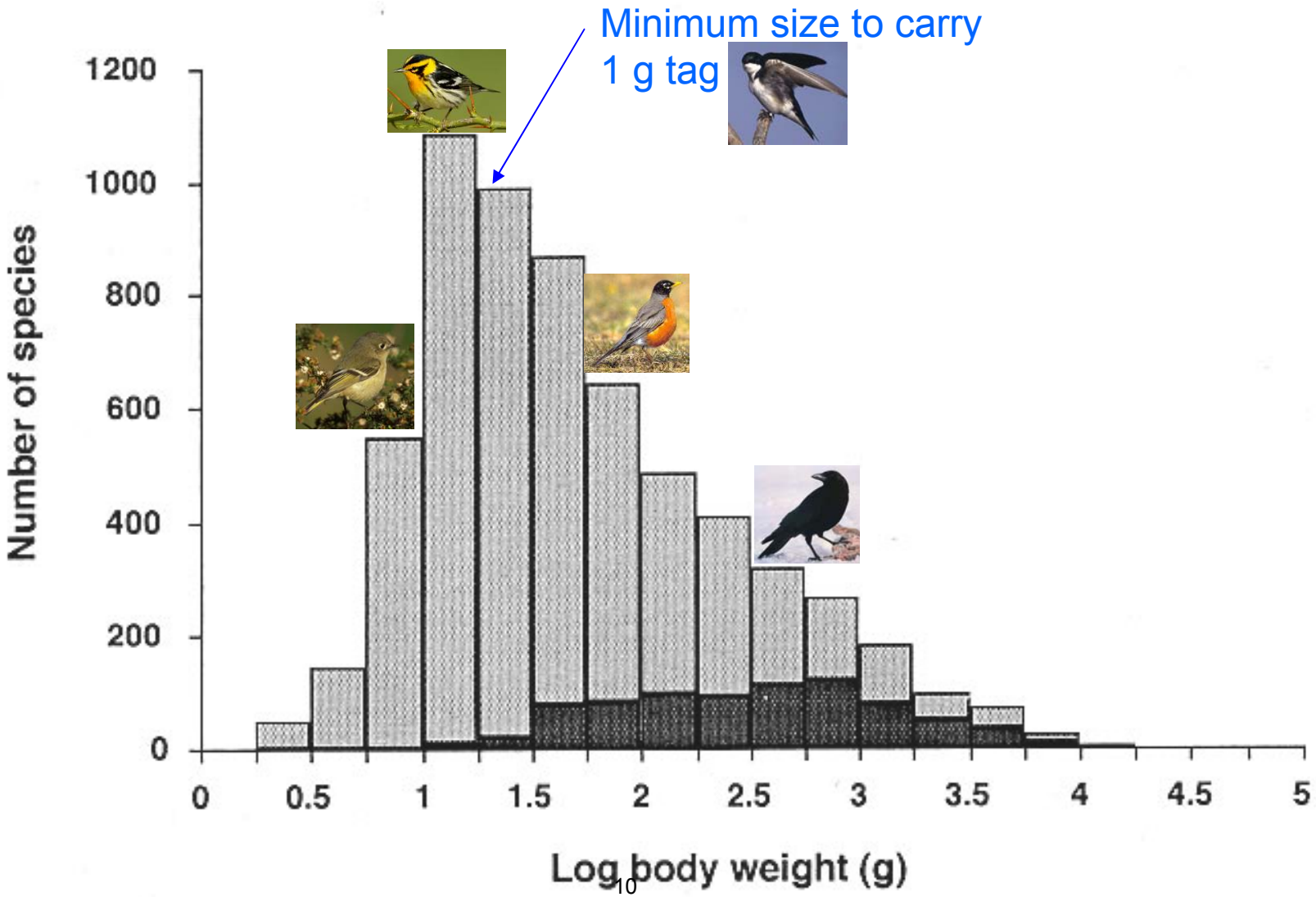
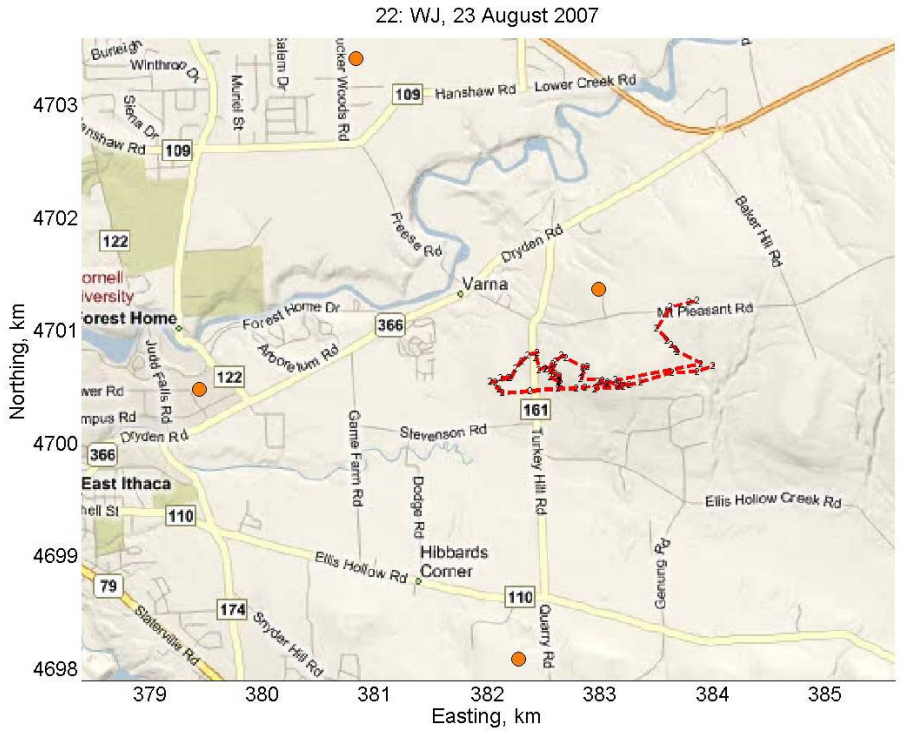


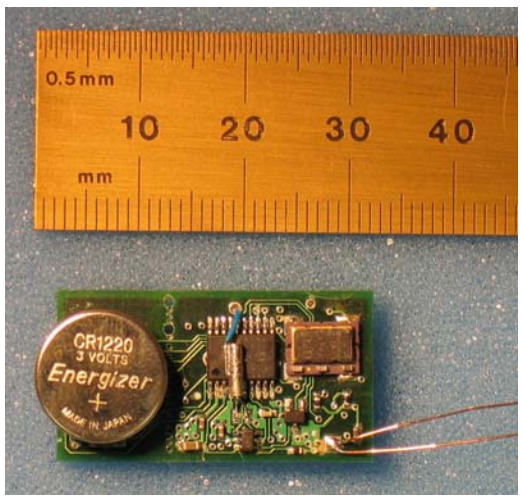



Figure from: Gaston, K.J. and Blackburn, T.M., 1995, "The Frequency Distribution of Bird Body Weights: Aquatic and Terrestrial Species," *Ibis*, **137**, pp. 237-240

# Automatic Location System

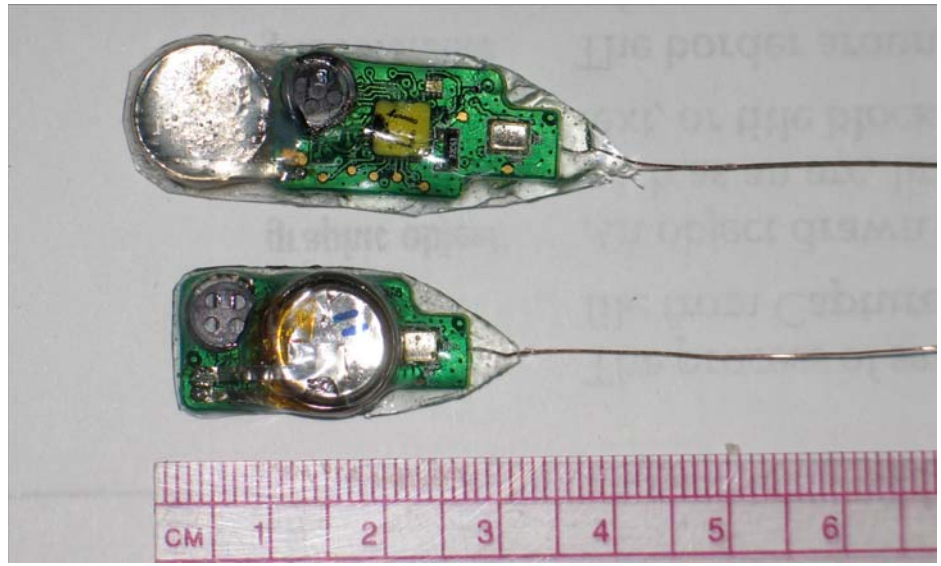
- Automatic, remote tracking, very low mass, long life tag
- Bird wears tiny tag (1.5g) with multi-year lifetime
- Like GPS in reverse
- Positions computed from Differential Time of Arrival
- 4 receivers cover 25 km$^2$




# Data Telemetry System

- Automatic, remote data offload
- Tag samples onboard sensors, stores data, downloads to base when in range
- Broad range of sensors and applications:
  - Light level for geolocation
  - Pressure (altitude and weather)
  - Temperature (body & ambient)
  - Acceleration
  - On-bird blood assay?




# Data Logging Tag

- Minimum weight, complexity, cost
- No RF; tag must be recovered
- On-board data storage
- Variety of sensors available: light level, pressure, temperature, acceleration, acoustic
- First generation of ultra-low mass (980 mg) geolocation loggers now in field testing
- Geolocation uses sunrise/set time and day length to estimate position