Raccoon ecology database: A resource for population dynamics modelling and meta-analysis


Rabies in the Americas Conference XX, Québec City October 2009
Our purpose

• What is the Raccoon Ecology Database?
  – design
  – content

• Why is it useful?
  – parameter estimation for modelling
  – meta-analysis
The Design

• A Microsoft Access relational database containing:
  – Citations
  – Study areas
  – Trait values
  – Readers
  – Lookup tables
The Design

Raccoon Ecology Authorship Data

Study ID: 2


Is this Grey Literature? ☐

Reader ID:

Additional Comments:

Instructions:
Enter primary literature data using this form. When complete, click the “Enter Study Area Details (step 2)” button, which will take you to the next form, where you can enter one or more study areas discussed within this paper. Subsequent forms will provide space to enter specific trait and disease information.

Record: 1 of 873
The Design

[Image of a computer screen displaying a form for entering study area details, including fields for Study Area ID, Study Area Name, Study Area Size, Country, Province/State, Longitude and Latitude, Start and End dates, Captivity Status, and additional landscape and study area comments.]

Instructions:
Enter any pertinent study area information, adding multiple entries using the add new record button for multiple study areas within a single paper. Click the "Enter Trait Values (Step 3)" button to enter specific parameters of a population within the currently viewed study area. There must be a study area record added prior to entering Trait Values.
The Design
The Content: Coverage

Literature:

– scientific journals and reports 1926 - June 2009
– search engines:
  • ISI Web of Science® and
  • Google Scholar™
– Search strings e.g.
  \[(raccoon* \text{ or } raccoon* \text{ or } P. \text{ lotor or } Procyon \text{ lotor}) \text{ and } (not("raccoon dog") \text{ and } \text{density})\]
– 870 documents accessed
– 150 provided quantitative traits
– 1272 trait records
The Content: Traits

**Morphology:**
- body condition
- body neck circumference, tail length, total length
- body weight

**Population Dynamics**
- life span
- mortality causes
- population size
- density, density dependence
- reproduction birth period, breeding period, chance of giving birth, consortship duration, consortship partners, consortship success, fecundity, gestation, litter size, mating system, oestrus duration, oestrus period, parous, placental scars
- roadkill index
- sex ratio
- survival

Photo credit: Roch Therdux
The Content: Traits

Movement and space use
• dispersal distance, period
• habitat and den habitat selection
• home range, core, core overlapping, overlapping
• movement rate
• species range
• site fidelity
• age of first movement with mother
• age of independence from mother
• age of weaning

Disease
• contact rate
• disease cycling period, enzootic duration, epizootic period, first epizootic duration
• disease incubation period, infectious period, natural immunity, positive cases time to peak, prevalence
The Content: Measures

Trait parameters
• Mean
• Median
• Minimum and maximum
• Range
• Sample size
• Variance
• Standard deviation
• Coefficient of variation
• Standard error
• Confidence interval
• Distributions

Co-variates
• Sex
• Age class
• Dates
• Season
• Location
• Habitat
The Content: Coverage

Geographically:

- 212 different study areas
- 204 in Canada and USA
- Geo-referencing:
  - 191 study areas with state or province name
  - 119 with county names
  - 75 with latitude and longitude
Modelling applications

- Models can require large amounts of data about vector and disease ecology
Modelling applications

• Querying data out; the query:
Modelling applications

- Querying data out; the result:

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Home range size

![Home range size graph showing the distribution of home range sizes for males and females.](image)
Mean litter size

Frequency of observations

Number of kits
Modelling applications

- Traits will vary with location
- Model parameters can be estimated for specific regions or landscape types
Mean litter size

- Number of kits: 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5
- Frequency of observations: 0, 2, 4, 6, 8, 10, 12
Mean litter size = f (Latitude)

\[
y = 0.007x^2 - 0.45x + 10.32
\]

95% confidence
The Raccoon Ecology Database


Download: [http://redb.nrdpfc.ca/REDB.htm](http://redb.nrdpfc.ca/REDB.htm)

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• Ontario Ministry of Natural Resources
• Natural Sciences and Engineering Research Council, Canada
The Raccoon Ecology Database


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Questions?