

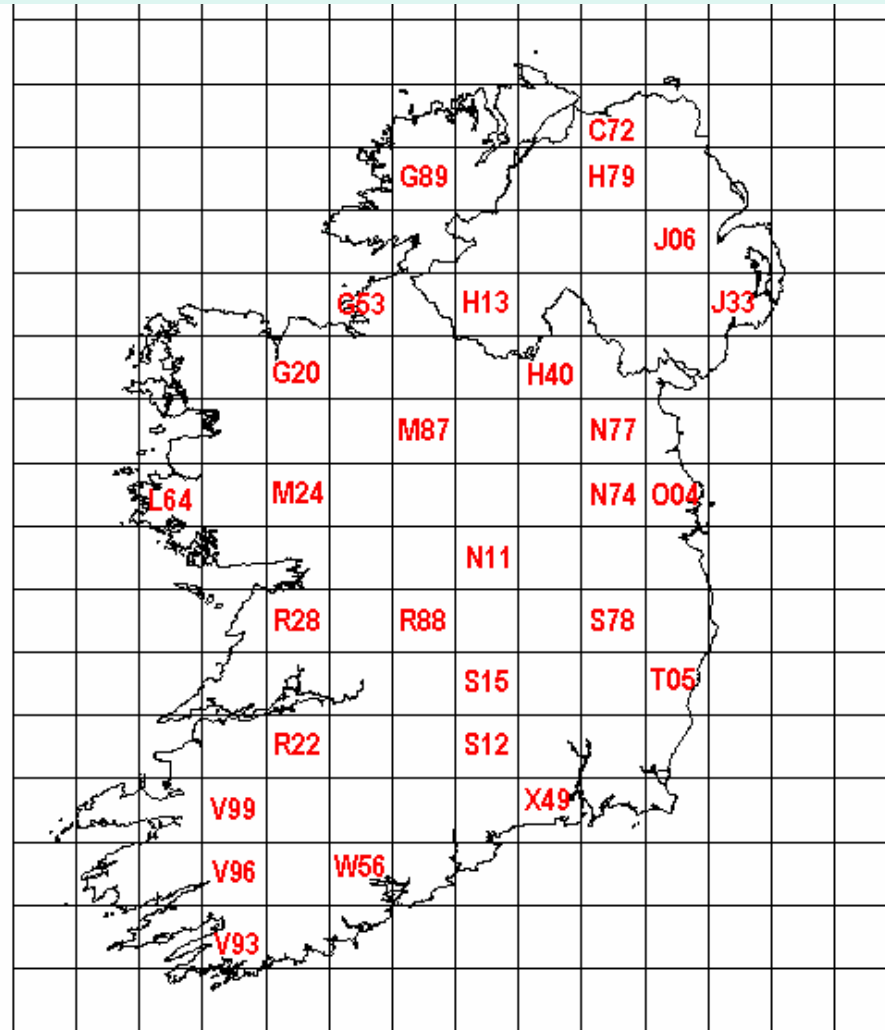
# Car-Based Bat Monitoring in Ireland: Into the Future



Comhshaol, Oidhreacht agus Rialtas Áitiúil  
**Environment, Heritage and Local Government**



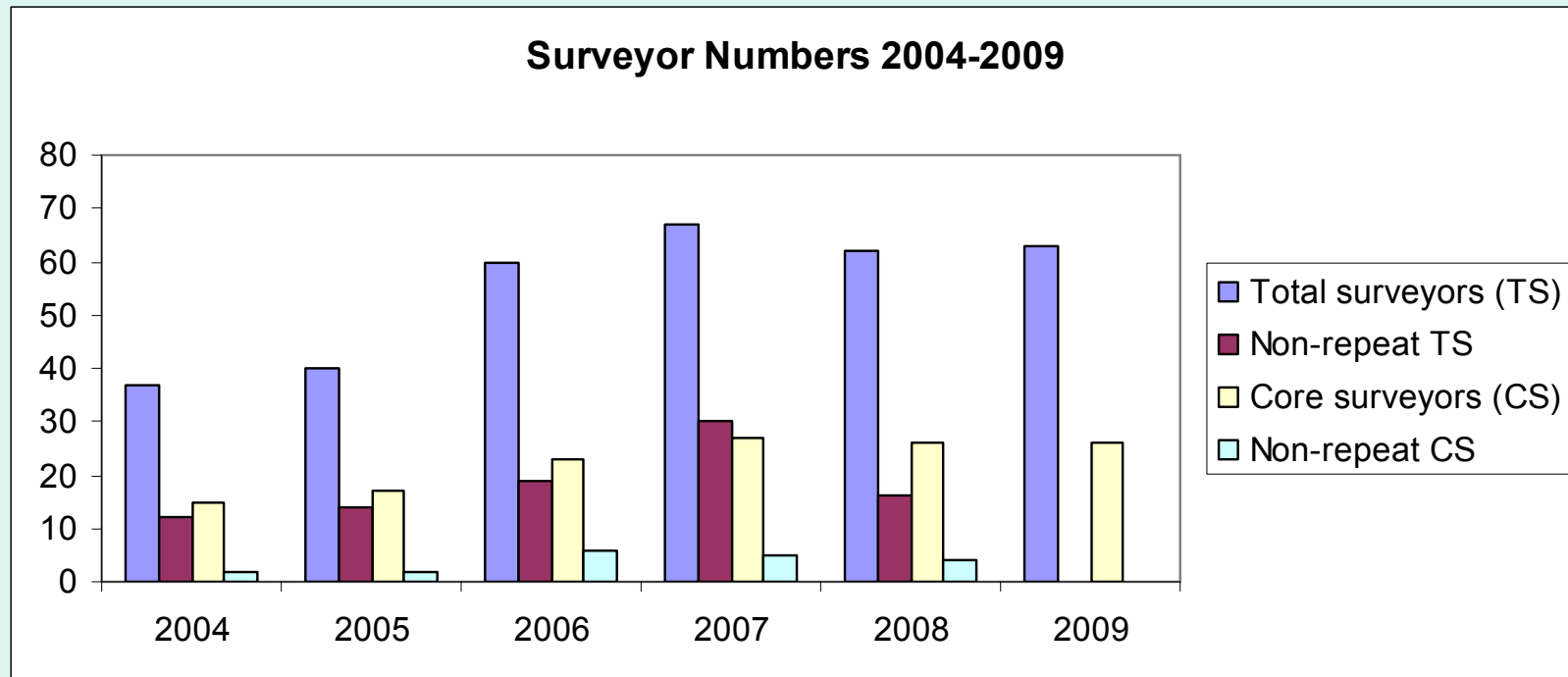
# The Survey Squares



# The Surveyors



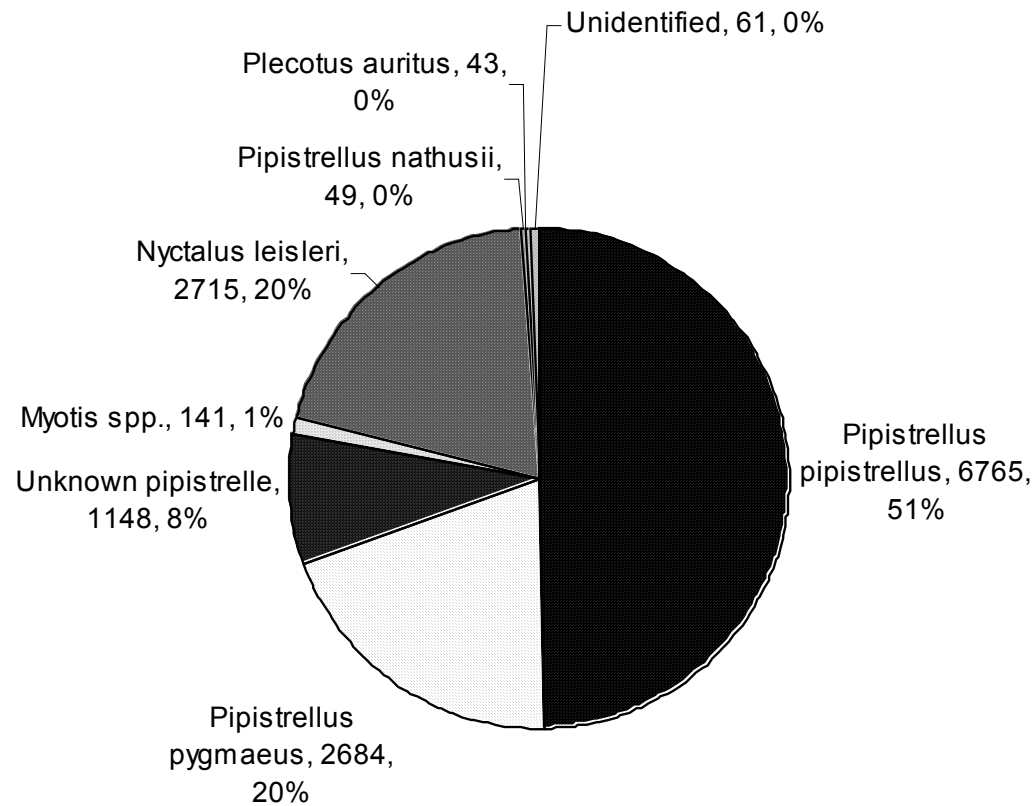
# Numbers of Surveyors from 2004-2009



- Core surveyors (team leaders) very consistent in surveying year on year. 83% of core surveyors complete the survey from one year to the next (compared to 67% of total surveyors).
- In 2009, 63 surveyors. Staff members of NPWS/NIEA = 38, BCIreland/NIBG members with family & friends = 25

# RESULTS (n=13,606)

## Proportion of species encountered 2003-2008



**Raw bat encounter data, per 1.609km/1 mile transect. Note: 2009 best overall coverage of any year to-date. Data not yet fully analysed.**

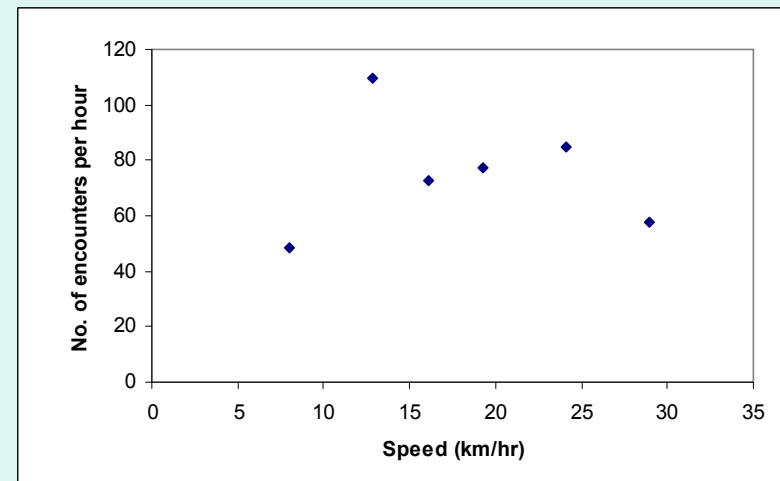
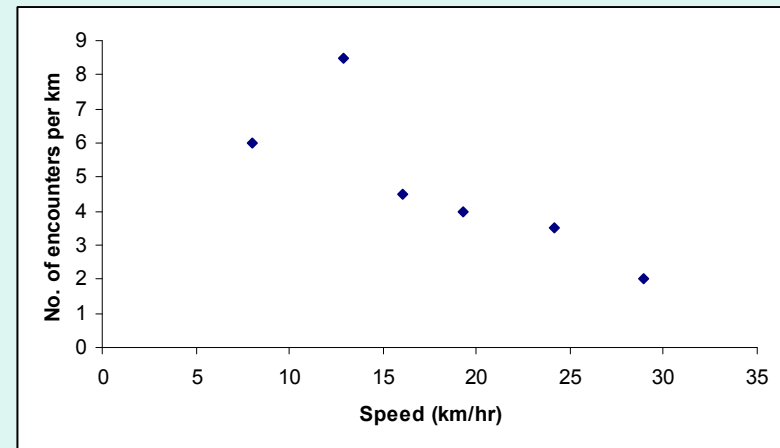
Average encounters per 1.6km transect	45kHz pip	55kHz pip	Unid pip	Myotis sp.	Leis	Nath pip	Total Bats
2003	1.294	0.478	N/a	0.039	0.289	0.000	2.100
2004	1.905	0.695	0.443	0.050	0.511	0.000	3.621
2005	1.344	0.574	0.266	0.035	0.544	0.001	2.781
2006	1.701	0.652	0.271	0.029	0.892	0.033	3.620
2007	1.77	0.639	0.253	0.036	0.631	0.015	3.390
2008	1.686	0.768	0.294	0.029	0.739	0.006	3.537
2009	Down?	Same	Down?	Same	Down?	Up?	Down

# Bat passes per hour or per km?

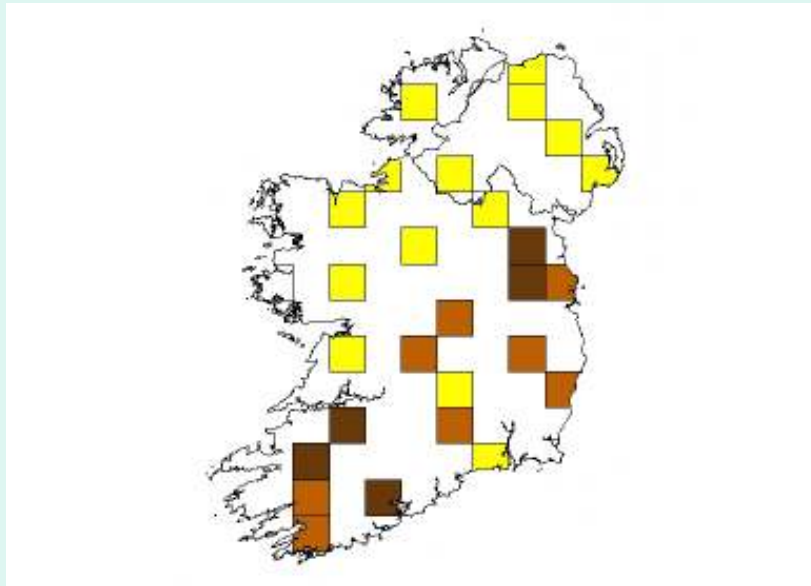
- Surveys are carried out at different speeds – most slightly slower than the prescribed speed (15mph).
- A fast survey would be conducted at about 17mph (27kmph) but it is not unusual for some to take as long as 5.7minutes, indicating that the car travels at just over 10mph (16.6kmph).
- Are bats over-detected in slowly driven squares, relative to faster squares?
- In 2006, we carried out a 'speed experiment'.
  - 5 drivers and their cars.
  - 3 roads in Co. Meath.
  - Same equipment as for the normal survey.
  - Each route driven 5 times by each of the 5 cars in sequence at consecutively slower speeds.





# Results of the Speed Experiment

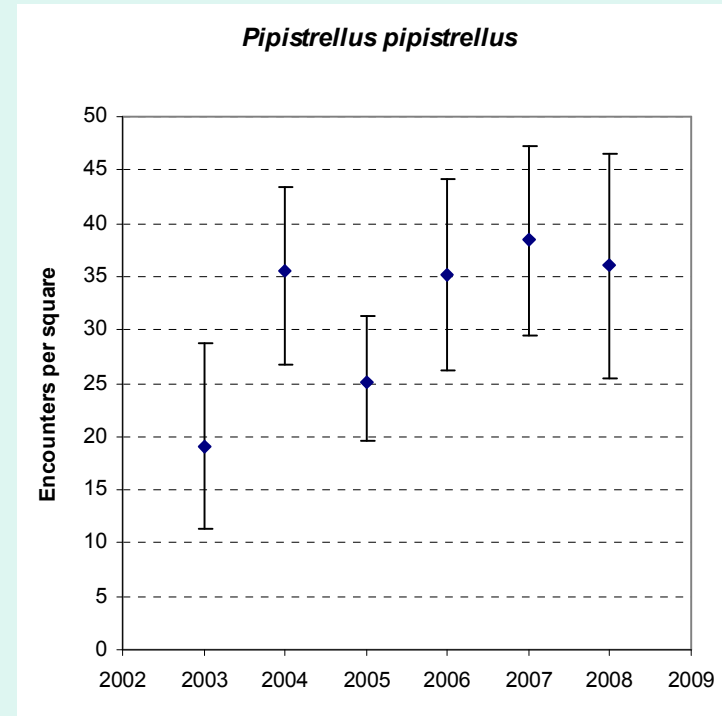
- Results for two of the transects were inconclusive due to the low number of bats recorded there.
- But at one site there was good bat activity.
- Here, bat encounter rate was negatively correlated with speed.
- Therefore, presenting results as bat passes  $\text{hr}^{-1}$  is likely to be more accurate than passes per unit distance.



# Common pipistrelle

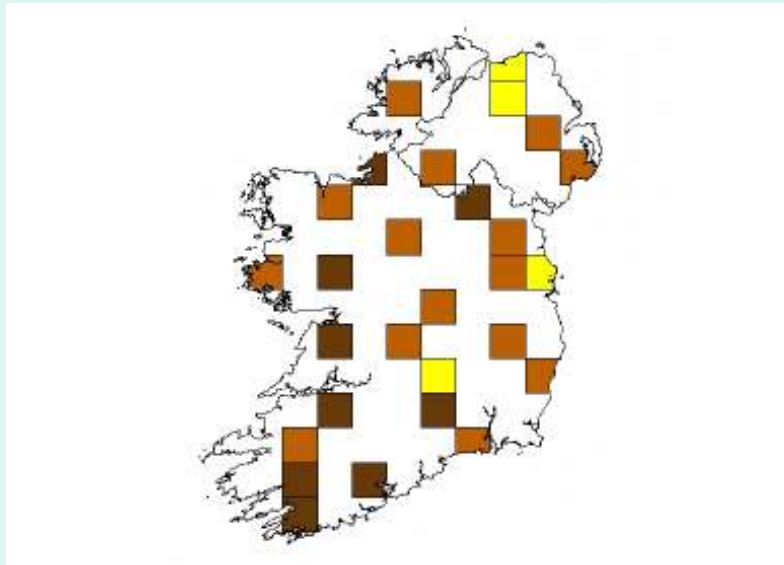






-  Absent.
-  Encounter rate  $>0 \leq 20 \text{hr}^{-1}$
-  Encounter rate  $>20 \leq 40 \text{hr}^{-1}$
-  Encounter rate  $>40 \text{hr}^{-1}$

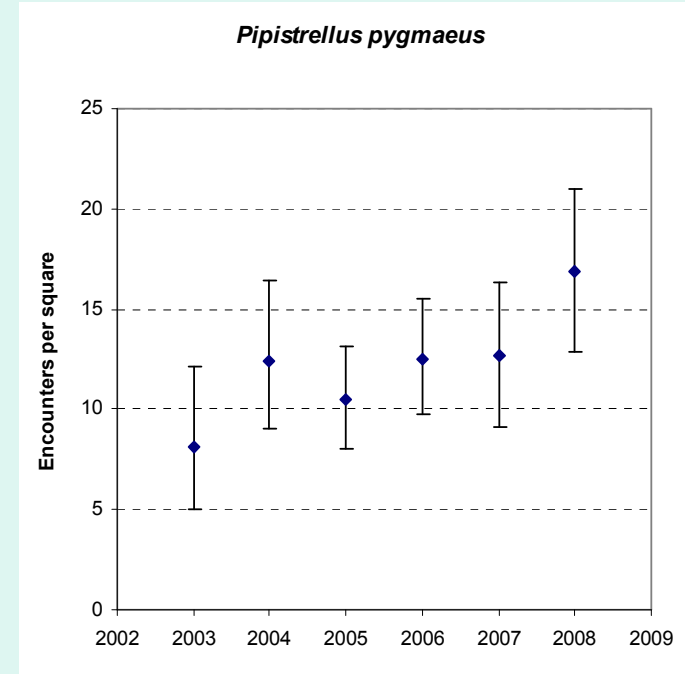


Results of GLM model for encounters per survey. Bars are 95% confidence limits

# Soprano pipistrelle

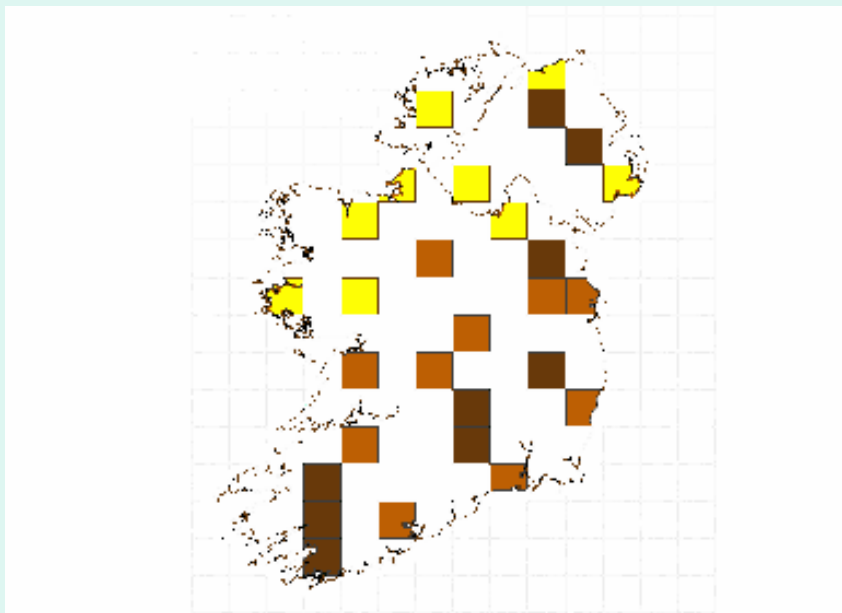






-  Absent.
-  Encounter rate  $>0 \leq 6 \text{hr}^{-1}$
-  Encounter rate  $>6 \leq 12 \text{hr}^{-1}$
-  Encounter rate  $>12 \text{hr}^{-1}$

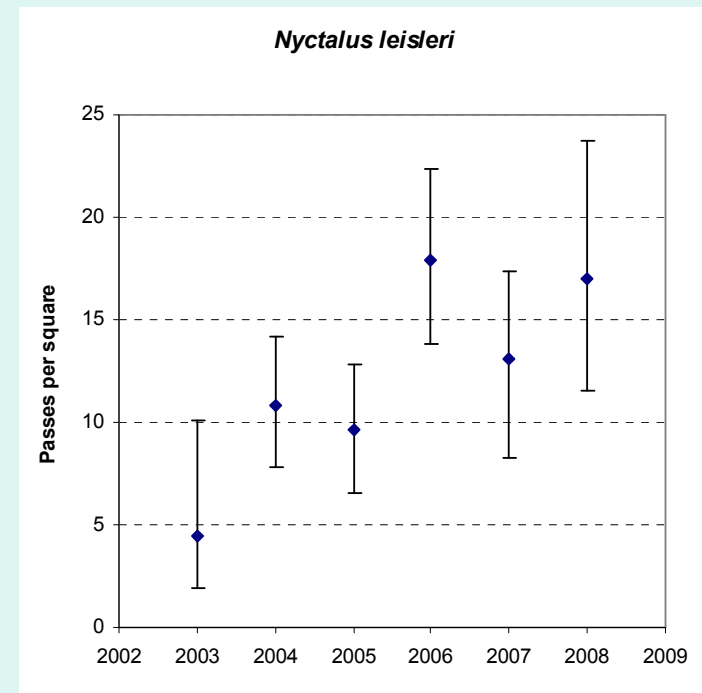


Results of GLM model for encounters per survey. Bars are 95% confidence limits

# Leisler's Bat



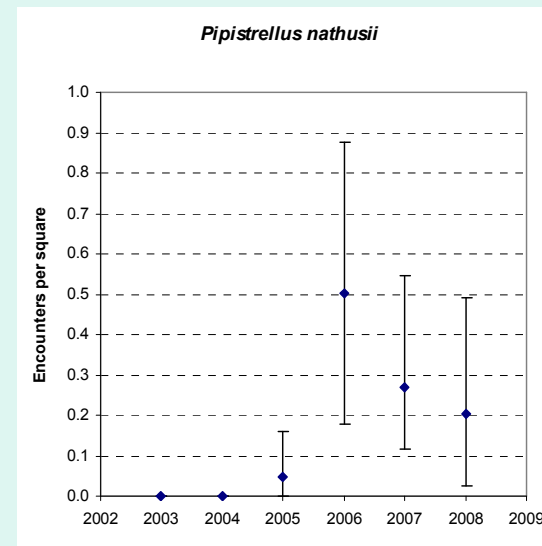
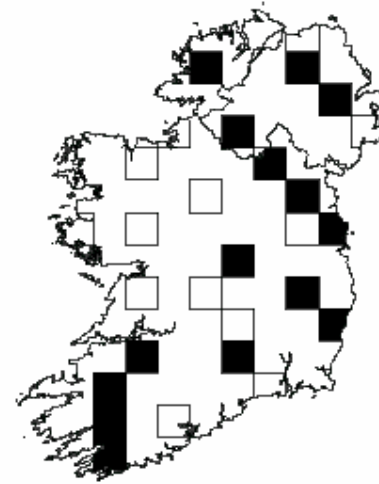
-  Absent.
-  Encounter rate  $>0 \leq 6 \text{hr}^{-1}$
-  Encounter rate  $>6 \leq 12 \text{hr}^{-1}$
-  Encounter rate  $>12 \text{hr}^{-1}$



Results of GLM model for encounters per square. Bars are 95% confidence limits

# Nathusius' pipistrelle

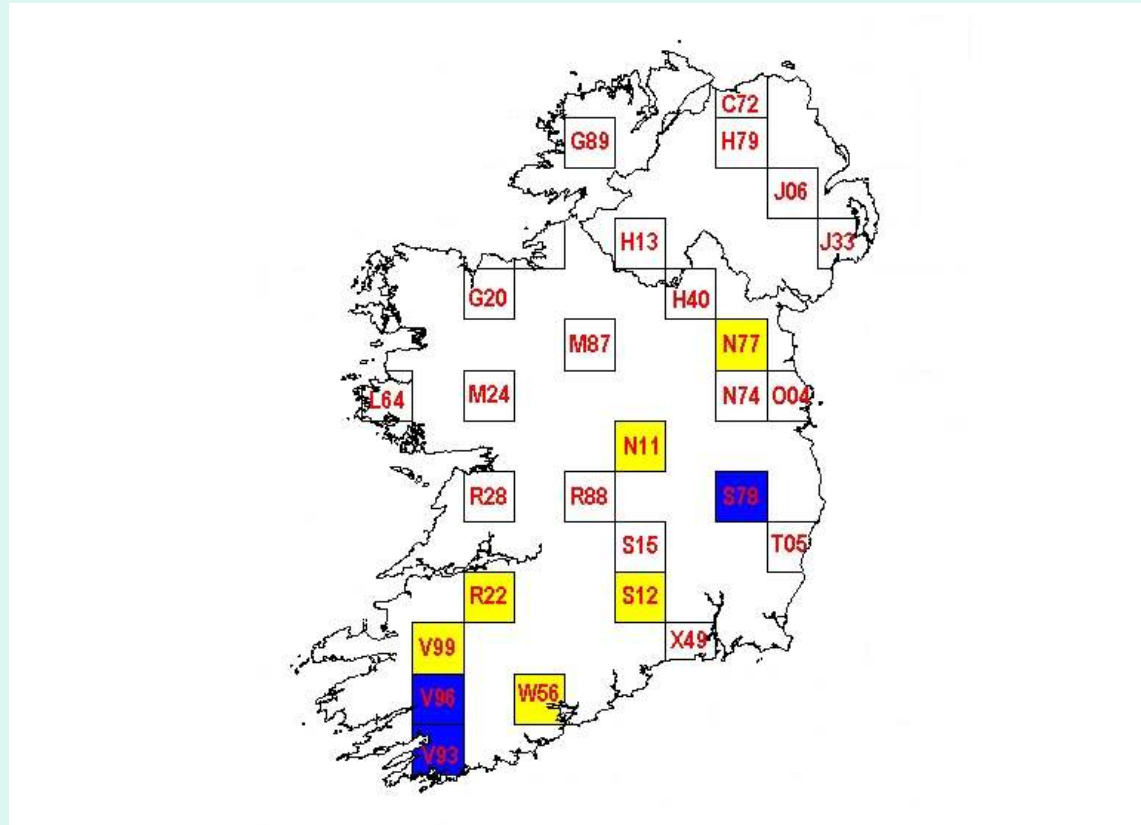
- Occasional records.
- Has turned up in many squares, but consistently in one, J06 Northern Ireland.
- Map shows all squares with Nathusius' records (black) from car-based monitoring from 2005 to 2009 (2009 data incomplete).
- Trends inconclusive due to lack of data, wide confidence intervals. Possible quadratic trend.



# Which squares are best for bat diversity?

- Car monitoring is limited in number of species it picks up (*Myotis* spp., in particular, which account for nearly half of our bat fauna), so its usefulness for picking out important areas is restricted.
- Overall abundance: Skewed towards squares with high common pipistrelle levels, in the south and south west.
- Overall diversity index: Highlights squares where overall bat abundance is low (north and north west).
- Combination of these two elements i.e. high abundance and high diversity. Several squares of interest.

## Squares with high overall bat abundance (average total bat encounter rate) AND high Simpson's Index of Diversity (1-D)



■ Bat encounter rate  $>60\text{hr}^{-1}$  and  $1-D \geq 0.6$

■ Bat encounter rate  $>55\text{hr}^{-1}$  and  $1-D \geq 0.5$

Average derived from 4 to 10 surveys, depending on the square.

With more years surveying this may give us a good indication of squares that are important for bats.

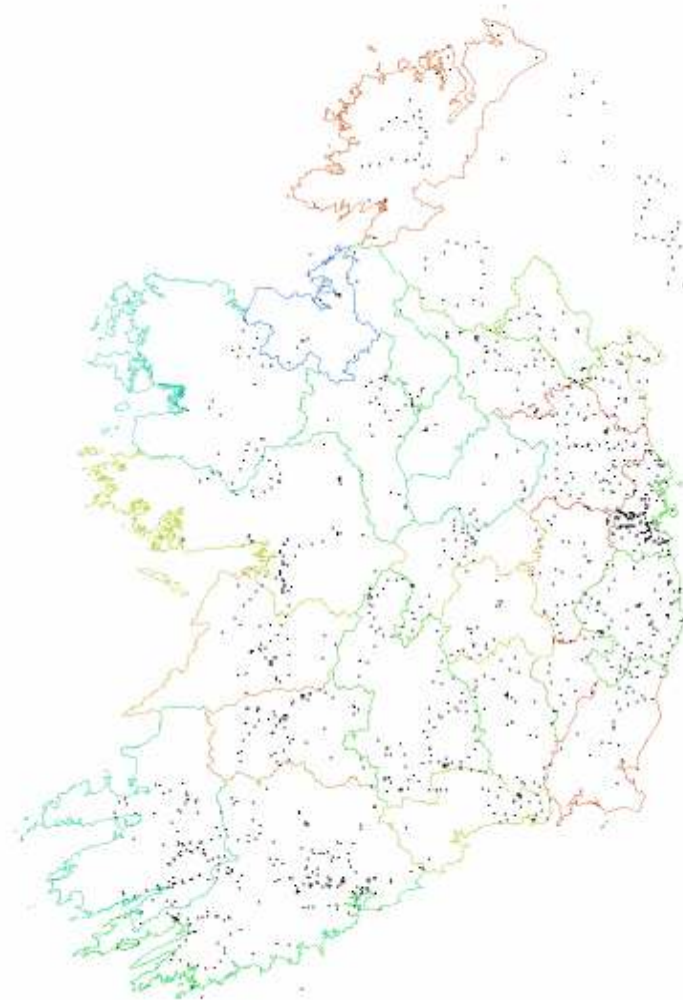
# Why do some squares support a more abundant and diverse bat fauna than others?

- Temperature.
- Rainfall.
- **Habitats:** On the 'to do' list...
- Other factors.

# Bat records from the survey

- Data entered into the BC Ireland database. Northern Ireland data forwarded to CEDaR and BCT. Data feeds to NPWS/NBDC.
- **Note circles of dots.**
- Bat records cannot be georeferenced exactly, instead entered as start point for each transect.
- **3 lesser horseshoe bat passes W56 in 2008.**
- Would be good to be able to pinpoint records.

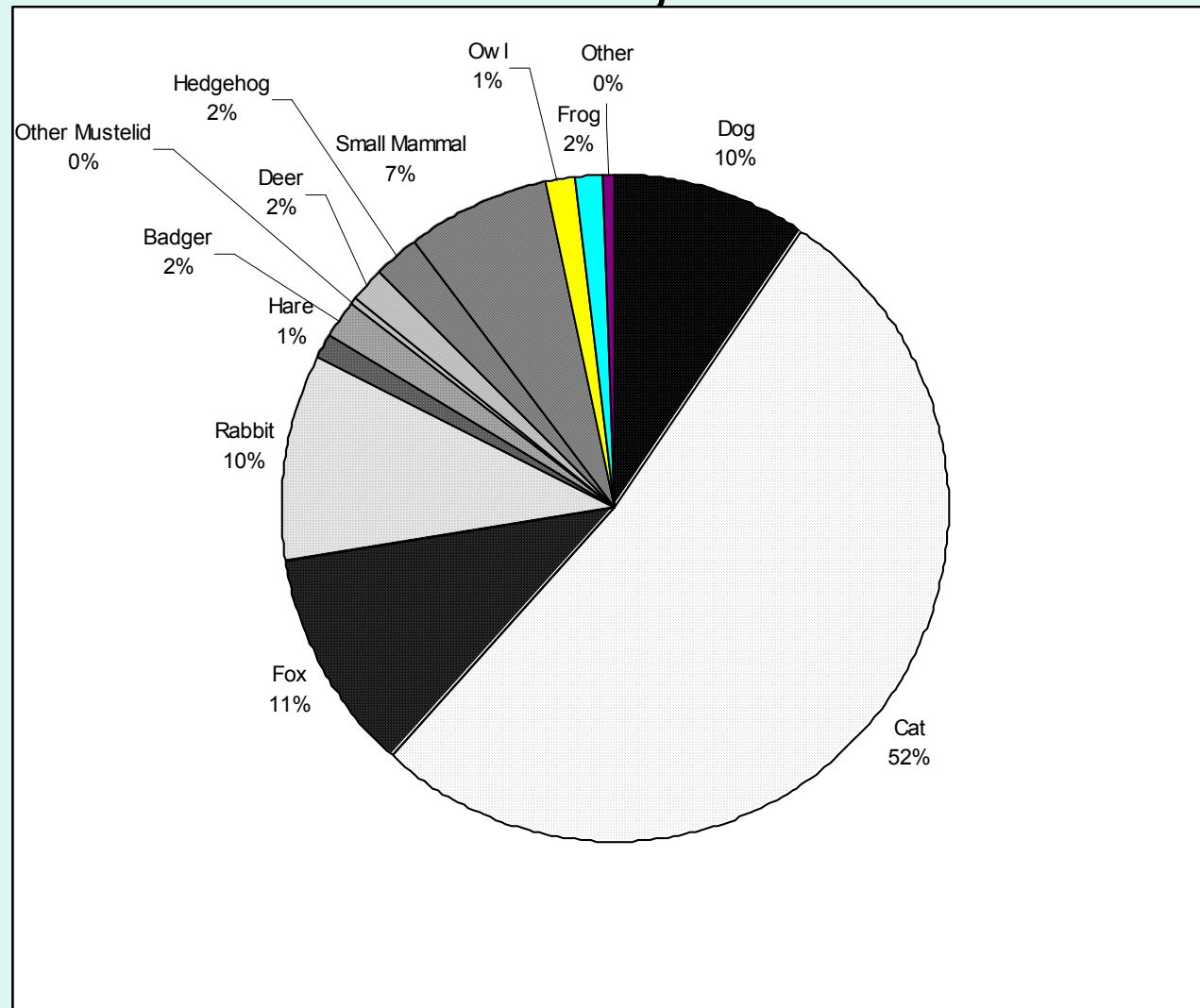
County:  Species:



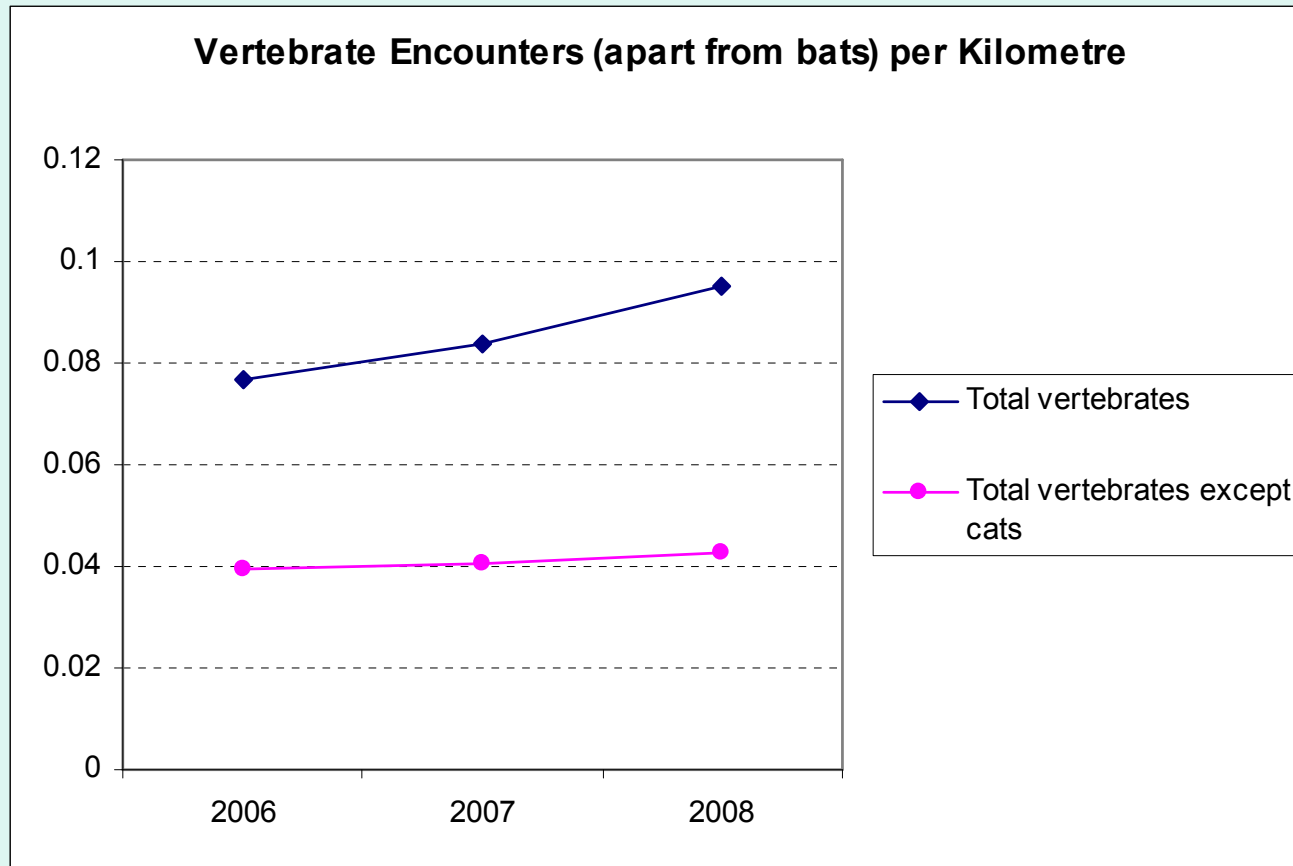
# Other vertebrates

- Other vertebrates, alive and dead recorded since the start of the survey. Since 2006 recorded within and between transects.
- A number of species of conservation interest have been recorded including pine marten and barn owl. Lack of geo-references limits usefulness.
- UCC will be studying these data in 2009/2010.

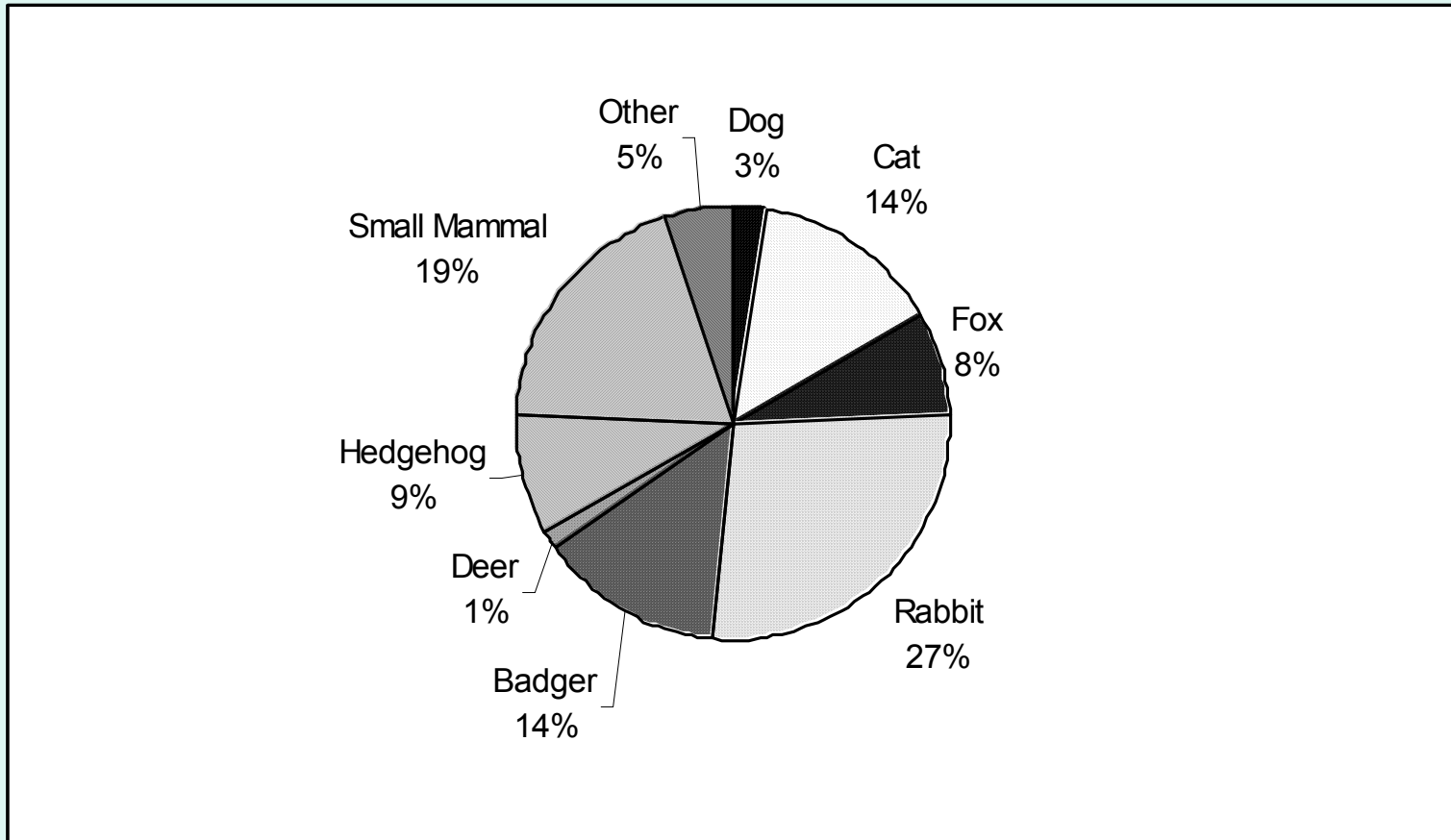
# Living vertebrates recorded from 2006-2008, n=1109



# Cats comprise 50% of all roadside vertebrates recorded alive



# Dead vertebrates recorded 2006-2008, n=78



# And into the future...?

- Habitats – why bats are occurring where. Models/predictors for the wider countryside.
- Extrapolating from bat passes to overall population numbers. Is this possible?
- Going high-tech – GPS units would allow geo-referencing of all records – bats and other vertebrates.
- Edirol recorders as minidisks go out of use.
- Looking to iBATS...
- iPhones

# Acknowledgements

- Our volunteers for providing excellent data every year
- Staff at NPWS, NIEA and BCT
- Jon Russ
- Jasja Dekker
- Steve Langton