9th Meeting of the Standing Committee
19th Meeting of the Advisory Committee

Heraklion, Greece, 7 – 10 April 2014

Report of the Intersessional Working Group on the Impact of Roads and other Traffic Infrastructures on Bats

Convenor: Jean Matthews

1. Progress report

The IWG was established to look into methods to minimize the impact of roads and other infrastructures (railways, airports) on bats.

- The questionnaire has been put on the Eurobats workspace. Any countries that had not submitted replies previously, or had new information were encouraged to complete it. A summary of replies and a list of countries responding area also on the workspace. There have been two additional responses since the last AC.
- The structure of the draft publication has been revised and additional authors asked to contribute. The Introduction and Scope and Chapter on EIA have been drafted. The Literature Review has been updated. The Group aims to have a final draft available for MoP7.
- A draft resolution will be discuss for proposal to MoP7.

2. Publication structure

Contents UK - Index of tables, Index of figures, Index of Case Studies

Foreword - UK

1 Introduction – UK – see draft

2 Literature Review – Slovenia - see draft

3 General information about the impact of roads on wildlife – Serbia

Leeds review (UK); HA review; Serbia, Ireland. France report due 2013.

- general information on bats & impacts of roads: which species are most affected & where - tables (Slovenia)
- why bats cross roads (migration, nightly movements, foraging around lights etc)
- roosts, including roosts in infrastructure elements such as bridges
- feeding habitats & flight routes (Link to Critical Feeding Areas IWG)

- reproduction
  - hibernation
  - conservation status
  - Distribution and occurrence on the road network
  - known impacts (speed, noise, lights – barrier effect – link to Light Pollution WG)

- Table/photograph of features important for bats (Romania ?) – Serbia

4 Bats and road construction - Serbia

Pre-construction considerations

- EIA process planning phase of roads bat inventories / surveys

– Lothar Bach/Wigbert Schorcht

5 Bats & existing roads France? (or incorporate into Ch 4?)

Reconstruction and management of existing roads

6 Avoidance, mitigation & compensation measures Serbia/Hermann

Photograph of features used by bats. Use of screens.

7 Monitoring UK edit –

Portugal – monitoring of impacts and sampling methods. Data analysis of Move project 2009-2012 - Bat mortality: road and landscape features affecting mortality; bat carcass persistence and roadkill hopspot analysis; bat activity near roads and surrounding landscape

(Also ask Ireland/ Bulgaria)

Poland monitoring gantries – results due 2013

8. Other transport infrastructure UK rail tunnel case study if available, any others?

Portugal has case study of monitoring bat casualties for 1 year over 22km stretch of railway. Suggest that patterns of mortality are different, therefore include in a separate chapter.

9 Conclusions and Recommendations (including research priorities) UK / Serbia/ Slovenia

10 Literature and further reading Slovenia

Glossary UK

Acknowledgements UK

Scientific & common names of European bats UK

Annex 1 further information Slovenia

Summary / tables of further information from questionnaire or literature

Annex 2 Summary of good practice UK

(as in Overground roosts publication)

Case Studies – within text, but also in **Annex 3** (if needed). Contributions from Portugal (MOVE - monitoring), Germany, Netherlands, Switzerland, Romania (case study on monitoring), UK (design Porthmadog)

Summary (back cover) UK

Standard format for case studies tbc

Examples for different types of case studies – survey, road design (1), monitoring (2), mitigation

Photographs - examples of different infrastructure. UK to put folder on website for people to submit (Credits within text) UK / Serbia / Slovenia to edit

Annex 1: Bats & roads booklet – Foreword & Introduction

Bats and Roads - Guidelines for minimising the impacts of roads and other traffic infrastructure on bat populations

Foreword

The Intersessional Working Group (IWG) on the Impact of roads and other traffic infrastructures on bats was established at the 12th Eurobats Advisory Committee (AC) Meeting in Budapest, Hungary, 7 – 8 May 2007.

In 2010, the 6th Eurobats Meeting of Parties (MOP6) requested the Advisory Committee (AC) to develop and publish a EUROBATS booklet highlighting the effects of roads on bats and providing guidance on minimising the impact of traffic infrastructure projects on bats. Resolution *6.14 [to be updated at MoP7 if needed]* urged Parties and non-party Range States to:

1. Take bats into account during the planning, construction and operation of roads and other infrastructure projects;
2. Promote further research into the impact of new and existing roads and other infrastructure on bats and into the effectiveness of mitigation measures
3. Develop appropriate national guidelines, drawing on the general guidance to be published by the Advisory Committee.

1. Introduction

1.1 Scope and structure of the document

These guidelines have been produced by the Intersessional Working Group on Bats, Roads & other Infrastructure, part of the Eurobats Advisory Committee to meet the request under Resolution 6.1.4 at MoP6. They provide a basis for Eurobats Range States to produce their own national guidance taking into account such factors as the composition and ecology of bat species, the topography, climate and construction, legislation and planning regimes in their locality.

Little research has been undertaken on the impacts on bats of transport infrastructure other than roads, but the decision making processes for major infrastructure projects have much in common with those for roads. Where issues have been identified that are particular to other transport infrastructure types, these are noted within the relevant section or considered in a specific section of the document. Some examples are given within the text but there is also a section on Case Studies in Annex ? Technical terms and abbreviations are explained in the Glossary (Annex ?).
The document is aimed particularly at those involved in taking decisions about traffic infrastructure that may impact on bats, including infrastructure planning and design, bat surveys, impact assessment, designing and monitoring mitigation, compensation and enhancement. It is relevant to all road projects, be they new construction, improvement or maintenance projects. The guidance will need to be interpreted through other relevant protocols for activities such as tree surveys, structural inspections and management of highways estate.

Guidelines are only guidelines and no particular method or solution will be proportionate or appropriate in every instance. Advice should be sought from qualified specialists and agreed with the relevant advisors on a site-specific basis.
In recent years our understanding of the effects of roads and other developments on bats and the effectiveness of mitigation techniques have increased significantly, although are still subject to uncertainty. Current research projects and changes in technology mean that these continue to change. The information in this document is considered to be accurate at the time of publication, but will need to be reviewed and updated as new information comes to light.

1.2 Legislative background

Most EUROBATS range states have some form of national legislation protecting bats from killing, injury and disturbance and from damage or destruction of roosts, although a small number do not.

[add protection of habitat].

1.2.1 The EU Habitats Directive (92/43/EEC)[1].

Specific legislation applies to Member States of the European Union as all microchiroptera species are listed on Annex IV of the Directive. In addition the rarest species are also listed on Annex II (see Appendix [] – species list) and Article of the Directive requires designation of Special Areas of Conservation (SACs) for these species. Additional considerations are required for schemes that may affect Annex II species, including a greater level of survey intensity and a higher level of confidence in the effectiveness of any proposed mitigation [insert reference to EU Guidance on Plans & projects affecting SACs]

[Additional information on fcs if needed]

Under Article [insert ref], there is a requirement to monitor the impact of incidental killing in order that measures can be taken if necessary to reduce this to avoid impacts on bat populations.

1.2.2 The Convention on the Conservation of Migratory Species of Wild Animals 1979 (CMS, or the Bonn Convention)[2] requires Member States to strictly protect these animals, conserve or restore the places where they live, mitigate obstacles to migration and control other factors that might endanger them. It was instigated in recognition of the fact that migratory animals can only be properly protected if conservation activities are carried out over the entire migratory range of the species. All bat species are listed in Appendix II of the Bonn Convention and the Eurobats Agreement was set up under this Convention in 1994.

1.2.3 The Convention on the Conservation of European Wildlife and Habitats 1979 (Bern Convention)[3] requires Members to take appropriate and necessary legislative and administrative measures to ensure the special protection of the wild fauna species specified. All bat species are listed in Appendix II (Strictly protected fauna species) with the exception of *Pipistrellus pipistrellus* which is listed in Appendix III (Protected fauna species).

[Additional references to be added]

[Additional clauses to tie in with other chapters]

[1] http://ec.europa.eu.environment/nature/legislation/habitatsdirective/index_en.htm

[2] Ref for CMS

[3] Ref for Bern Convention

2 Literature Review

It has long been known that bats are included in the list of animal species affected as casualties of traffic (e.g. Hodson 1960), however articles reporting such findings remained rare for the next three decades (Figure 1). It was only in 1990s that the first review papers (e.g. Kiefer et al. 1995) collating older published records, personal notes and records from wildlife hospitals brought the attention of this bat conservation issue to scientists and nature conservation officers. From that time onwards, and especially since 2000, the number of publications reporting bats as traffic casualties has steadily increased (Figure 1). In the framework of EUROBATS IWG on *Impacts on bats of roads and other traffic infrastructures* we have gathered approximately 180 publications and responses to our questionnaire (see Chapter [] Literature and further reading), but we are certain that there is additional data on the subject still hidden in the grey literature and in various environmental impact assessments.

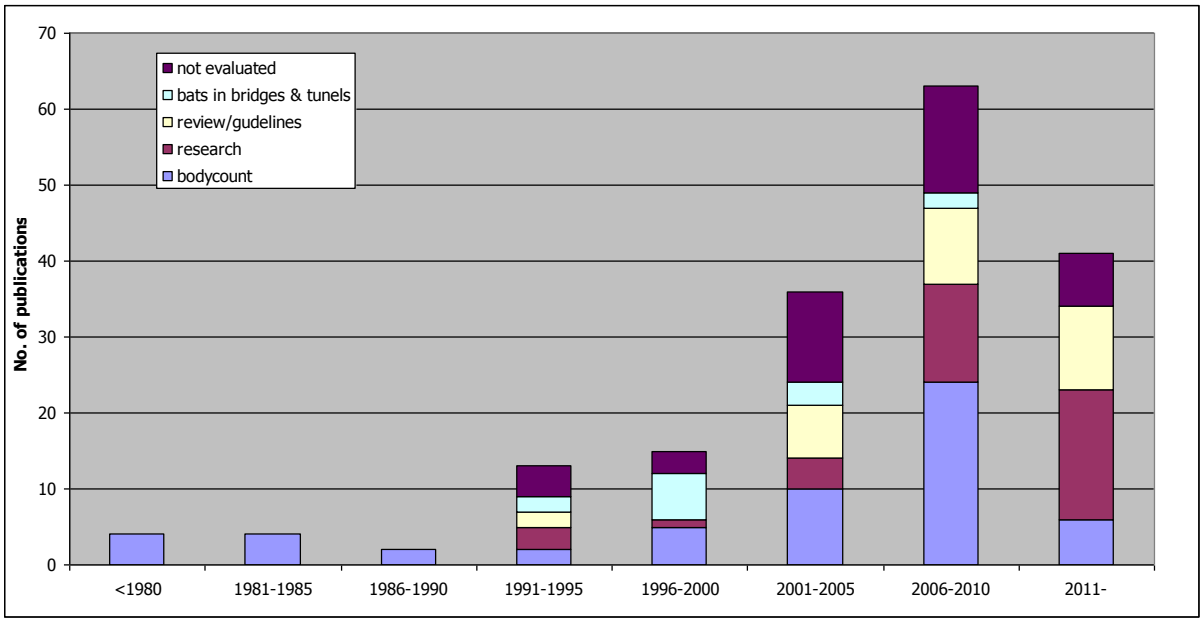

Figure 1. Number, type and period of publication which consider bats as traffic casualties.

Although the conservation problem of bats and transportation is recognized world-wide (e.g. Russell et al. 2008), the IWG has concentrated on gathering information only for EUROBATS range states. Most of records refer to bats being hit by cars, lorries and similar road motor vehicles (Table 1), although there are very rare accounts of bats being killed by trains (e.g. Kiefer at al. 1995) and even anecdotal observations of bats being casualties of collision with bicycles. It has also been known from 1960 onwards that planes present a hazard to bats, with the information coming primarily from the USA (e.g. Peurach et. al. 2009). However the authors also reported planes colliding with some bat species that are listed under the EUROBATS Agreement and it can be assumed the collisions occurred in the EUROBATS range states area (Table 1).

The majority of published accounts come from mainland Europe, where 19 countries (Figure 2) have published or unpublished accounts relating to as many as 30 bat species (Table 1). It is evident that not only low-flying bat species such as *Rhinolophus* species, but bats flying in middle or higher airspace, like *Pipistrellus* and *Nyctalus spp.,* are victims of traffic (Figure 3). In general that means that practically every bat species should be treated as a potential traffic casualty. Studies also show

that in different environments there is there is a marked difference in the composition of bat species falling victim to traffic (Figure 4). Whether this is a consequence of abundance of bat species in the locality, or of particular local environmental factors in the study areas is not clear at the moment.

Most papers reporting bat traffic casualties originate from regions where the transportation system is well developed, bat conservation and research has a long tradition and there also exist long standing strict nature conservation legislation. It is no wonder that publications from Germany, France and United Kingdom form approximately 70% of collated papers, and another 20% were composed from contributions from Poland, Portugal, Ukraine, Ireland and The Nederlands. These publications give a better insight into which species are more vulnerable to traffic impacts and in what habitat, or in what period.

In the 1990s special attention was given to bat usage of transport structures such as bridges and tunnels as important bat roosting sites (e.g. Lustrat & Julien 1993, Walther B. 2002, Ceľuch & Ševčik 2008). Some research important for understanding threats to foraging or migrating bats, for example use of the linear landscape features (e.g. Limpens & Kapteyn 1991, Blake et al. 1994), were investigated, in also the early 1990s and more focused field researched started in the beginning of second millennium (Figure 1). First and still quite numerous are studies on mitigation measures that could minimize at least direct collisions of bats and vehicles (e.g. Bach et al. 2004, Bontadina et al. 2005, Boonman 2011, Georgii et al. 2011, Berthinussen & Altringham 2012b).

Only approximately 10 years later came studies directed into understanding other effects of roads on bat: fragmentation of habitat and bat responses to it (e.g. Melber & Kerth 2010, Berthinussen & Altringham 2011, Stephan 2012, Barataud et al. 2012). Also under investigation were the effect of traffic lighting (e.g. Stone et al. 2009) and noise pollution (e.g. Schaub et al. 2008, Siemers & Schaub 2010). A few more recent studies focused on effects of railways on bats (e.g. Lüttmann 2012). Together with these studies came other reviews of this conservation problem and expert guidelines to mitigate its effects (e.g. Bickmore 2003, Limpen et al. 2005, Altringham 2008, Brinkmann et al. 2008). Very early also were the first legislative provisions made, in the form of national or regional guidelines or official nature conservation advice in relation to bats and roads (across EUROBATS range states (e.g. Highways Agency 1999, National Roads Authority 2006). Such guidelines have become progressively more precise (e. g. SETRA, CETE, 2009, Bundesministerium 2011) in relation to the information that has to be gathered on bats in order to adequately undertake environment impact assessment (very specific methods are suggested) and what mitigation methods are available. Some years later the first compilations of bat mitigation measures stared to appear (e.g. O'Connor & Green 2011, Berthinussen & Altringham 2012b), which are extremely valuable for evaluation of investigation methods used, adequacy of the EIA and the success of mitigation methods.

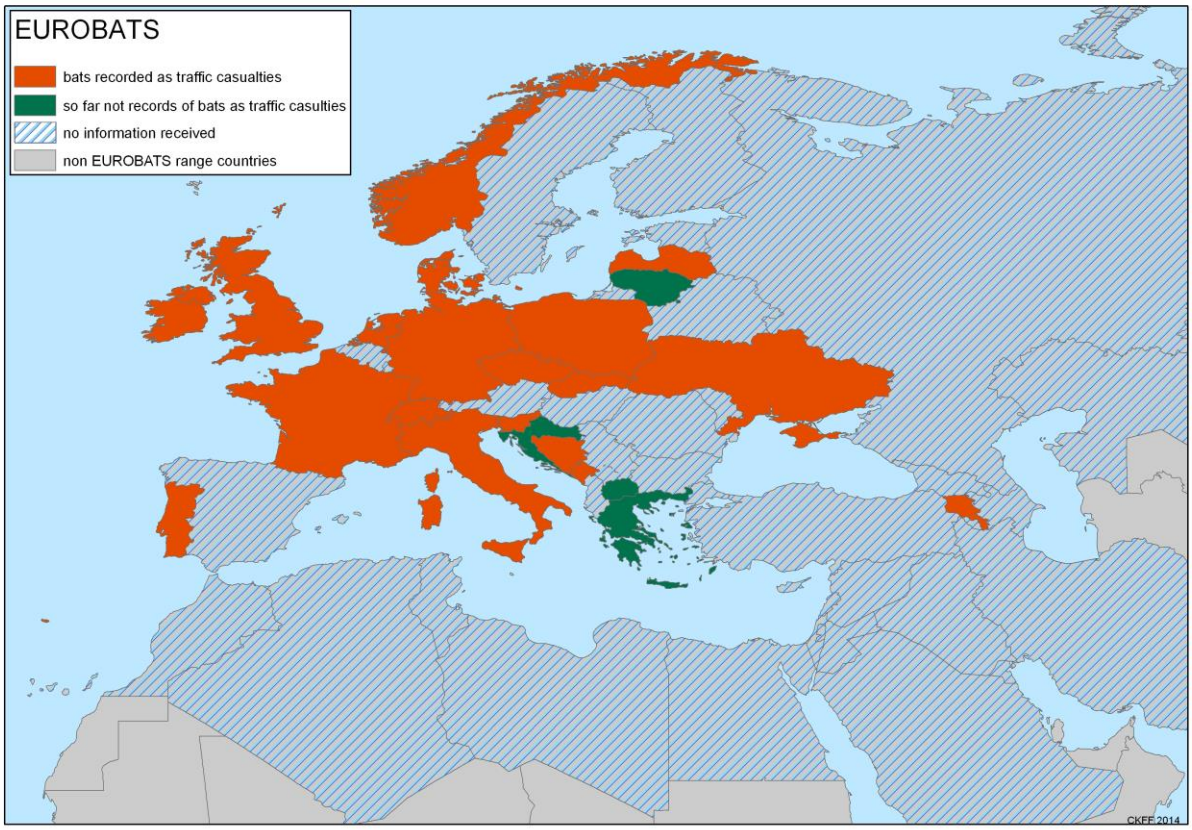

Figure 2. Bats reported as traffic casualties in EUROBATS range states.

(The boundaries and names used on this map do not imply official endorsement or acceptance by the United Nations.)

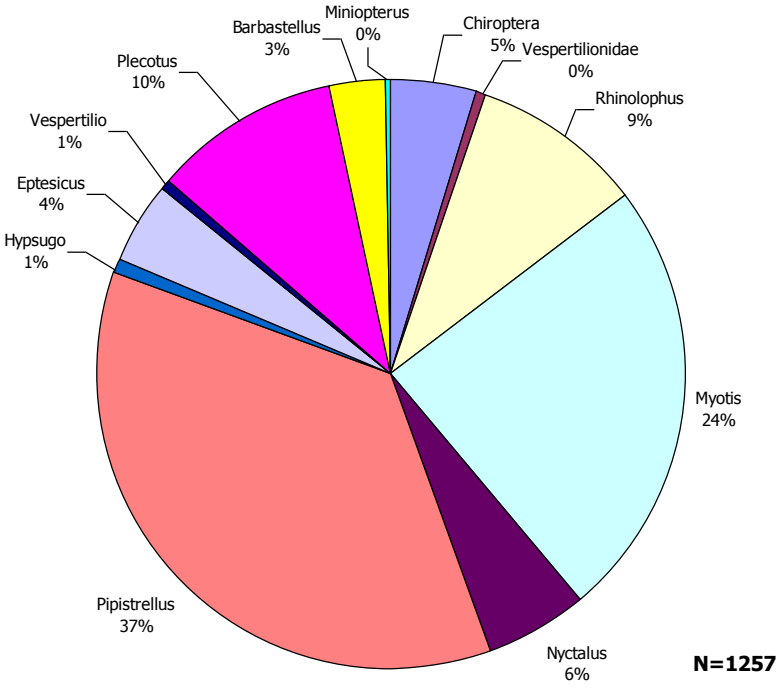

Figure 3. Percentage of bat genus found as traffic casualties, compiled from different studies in EUROBATS range states.

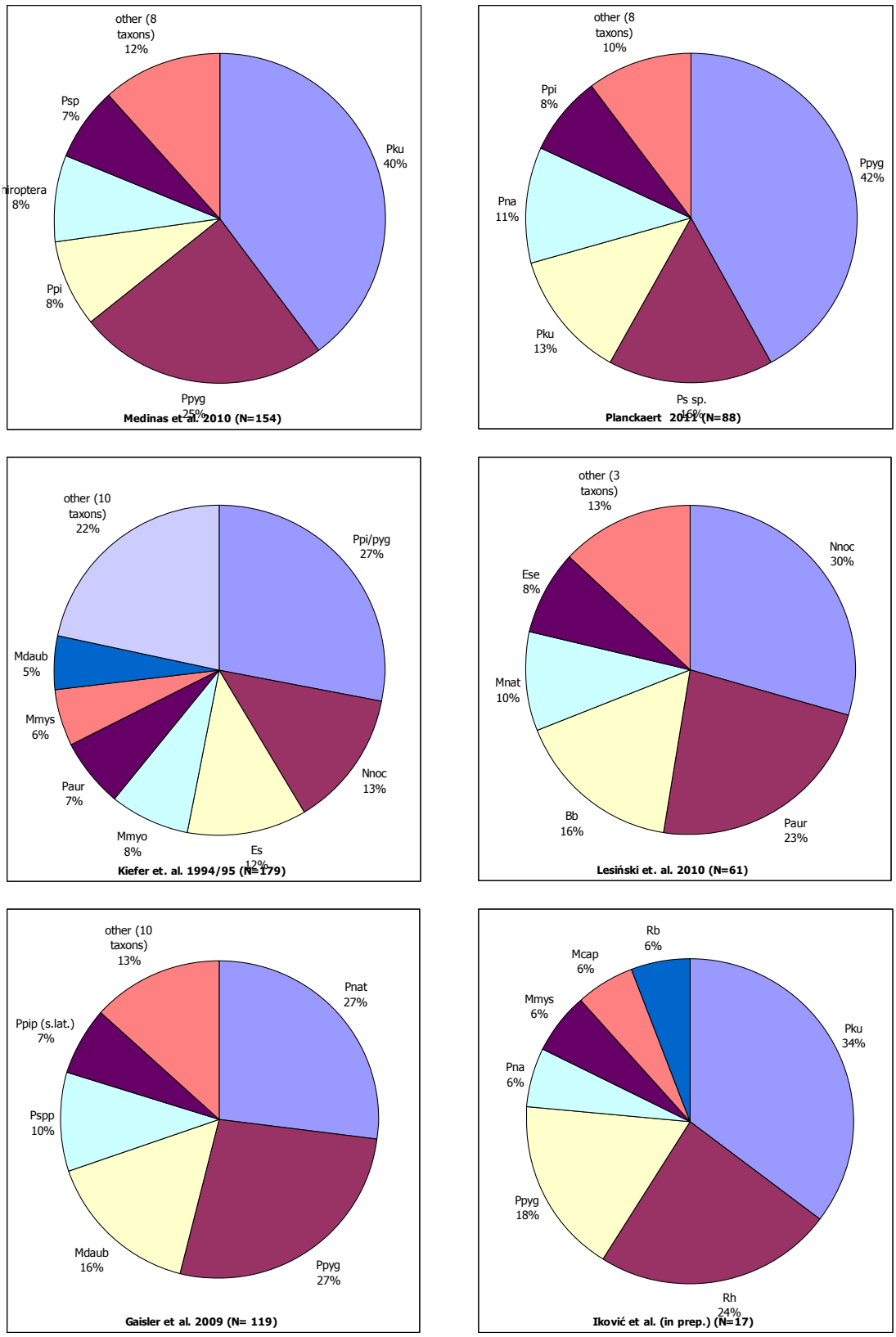

Figure 4. Examples of different compositions of bat traffic casualties in different studies.

Table 1. List of bat species recorded as casualties of traffic in different states of EUROBATS region.

Species	State	Transportation		
		road	railway	plane
Rhinolophus ferrumequinum	AM, D, F, PO,	+		
Rhinolophus hipposideros	D, F, ME, PL, PO, SK, SV, UKR, UK,	+		
Rhinolophus euryale	F,	+		
Rhinolophus blasii	ME,	+		
Myotis myotis	D, F, PL, SK	+		
Myotis blythii	AM, F,	+		
Myotis bechsteinii	D, F, SK, UK	+		+
Myotis nattereri	CZ, D, F, PL, PO, IR, UKR, UK	+		
Myotis emarginatus	CZ, F,	+		
Myotis mystacinus	D, F, IR, ME, PL, PO, SV, UKR, UK	+		
Myotis alcathoe	CZ,	+		
Myotis brandtii	CZ, D, PL, PL,	+		
Myotis daubentonii	CZ, D, F, PL, PO, SV, UK	+		
Myotis dasycneme	PL,	+		
Myotis capaccinii	ME,	+		
Nyctalus lasiopterus	D, F,	+		
Nyctalus leisleri	CZ, D, F, PL, PO, SV,	+		
Nyctalus noctula	CZ, D, F, PL, SK, UKR,	+		+
Pipistrellus pipistrellus	AM, CZ, D, F, I, IR, PO, SK, UKR, UK	+	+	+
Pipistrellus pygmaeus	CZ, F, IR, ME, PO, SV, UK	+		
Pipistrellus kuhlii	F, I, ME, PO, SV, UKR,	+		+
Pipistrellus nathusii	CZ, D, F, ME, PL, UKR,	+		+
Hypsugo savii	F, I	+		+
Eptesicus nilssonii	D,	+		
Eptesicus serotinus	CZ, D, F, PL, PO,	+	+	
Vespertilio murinus	D,	+		+
Plecotus auritus	D, F, IR, PL, UKR, UK	+		
Plecotus austriacus	D, F, PL, SK,	+		
Barbastella barbastellus	D, F, PL, PO, SK, SV, UKR, UK	+		
Miniopterus schreibersii	AM, D, F, PO,	+		