

The Bulgarian Odonata database – current status, organisation and a case study new entries

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Abstract. Bulgarian Odonata database is analysed for the period of the last 10 years. All new entries are summarised in individual species graphs representing the trends in data compilations. Special attention is paid on the role of communities in this process with a single study case which is evident of how a small contribution could elucidate important new information on some underexplored areas.

It is concluded that for the past 10 years mountain areas and large Bulgarian rivers have been understudied. These should be the priority target areas in the investigations undertaken in near future.

Key words: Odonata, database, Bulgaria, Balkan OdoBase (BOB), Balkan Peninsula

Introduction

During the last decade the development of the European odonatology has been boosted by number of conservation projects happening at national and international scale. They all resulted in styled distribution atlases prepared for most of the continent even on regional level for some countries like Germany (Sternberg & Buchwald 1999, 2000; Kuhn & Burbach 1998). More recently the cooperation between experts on regional level successfully conveyed to the world dragonfly admirers the atlas of the Mediterranean and North Africa (Boudot *et al.* 2009) followed by the appraisal of the conservation status of those species (Riservato *et al.* 2009) and the European Red List (Kalkman *et al.* 2010). The members of various odonatological societies went further from the usual annual conferences and meetings. The contemporary specialists and dragonfly-lovers have already witnessed the first European Congresses of Odonatology (Vairão-Vila do Conde, Portugal in 2010 and Beograd, Serbia in 2012). They are complementary to the regular bi-annual International

Symposiums of Odonatology held by the Worldwide Dragonfly Association and the International Odonatological Foundation S.I.O. These meetings play a vital role in identifying current white spots in research areas, establishing potential threats in dragonfly habitats health and planning important conservation actions. Therefore it is not a surprise that the first ever global assessment of an insect group was prepared for Odonata (Clausnitzer *et al.* 2009).

These achievements would not be possible with the sole performances of the research teams working professionally in this field. Specialists have the immense importance providing the imperative scientific information and guidance for the conservation projects, but they alone could not achieve the incredible figures for the national databases available today. A massive support from communities and individual volunteers in the United Kingdom resulted in a database having more than one million data entries! Experienced collaborators have launched a dragonfly monitoring scheme that is operating and constantly improving for The Netherlands (Ketelaar & Plate 2001). Specially designed data-sheets for most of the European countries have been prepared and introduced in various occasions (Cham 2007; http://www.libellules.org/fra/fra_index.php; <http://www.sglibellen.de/pdf/sgl-erhebungsbogen.pdf>).

Such a bright picture, however, is typical of countries from Western and Central Europe while the rest of the continent remains largely underexplored in terms of its Odonata fauna. Various reasons could be pointed out with the most important been: 1) insufficient funding opportunities, 2) shortage of Odonata experts working or living in Eastern Europe, and 3) volunteer networks are still missing. In order to overcome these problems a large project was initiated for the countries on the Balkan Peninsula at the beginning of 2010. It was sparked by the idea of the Odonatological Congress in Portugal. A network of experts called BOB (Jović *et al.* 2010) was established prior to the Congress. BOB stands for Balkan OdoBase. That is a joint initiative of entomologists working with Balkan dragonflies and living within the area. A team of experts agreed to compile the databases developed for their countries with the idea to share the information that may help in increasing popularity of Balkan dragonflies, giving opportunity to other researchers to approach the available data and keeping up-to-date information of all what is going on with the Balkan dragonflies.

BOB was put in action immediately with an important contribution towards Bulgarian Odonata. Kulijer & Marinov (2010) reported on the earliest ever data on local fauna collected by Viktor Apfelbek in 1892 and kept unpublished at the National Museum of Bosnia and Herzegovina. They remained unknown to the public and so far ignored from the main publications on this insect order for Bulgaria. However, the collection has a very high historical importance which is commented upon in the paper. Another initiative of the Balkan dragonfly enthusiasts was launched in the same year – a new internet site is up and running. It gives an ideal opportunity for communication between people willing to share memories from their encounters with the favourite insects. The site has an on-line identification key and possibility for entering data from the field observations. A special form is prepared, which is compatible with the database format used for Bulgarian dragonflies. That is how everyone could become a member of the growing in Bulgaria family of dragonfly lovers. The site is available at: <http://www.odonata.org/>. Also during the same period a Bulgarian Odonata Specialist Group named *Insignis* was established. It is not a juridical body and for the moment acts at the national level within Bulgaria. The Group already prepared a species conservation list (based on the IUCN criteria) and launched it with the Bulgarian Ministry of Environment and Waters for future consideration. So far no response from the Ministry was received.

The present paper is the fourth initiative that appeals for greater attention to the Balkan Peninsula Odonata. It summarises the data compilation for Bulgaria for the last ten

years, evaluates the new entries for each species individually and reports on the community involvement into data collection. This study is indicative about the importance of the cooperation even under small-scaled activities performed within regions that belong to previously studied areas with published information.

Material and Methods

Bulgarian Odonata database has been analysed following the contributions over the last 10 years. This period was selected as it includes all data compiled after the last thorough revision that summarised all information available about Bulgarian Odonata fauna (Marinov 2003). The focus of the study was on the total area coverage as UTM-grids (10x10 km) with any data about Odonata species. Individual graphs displaying the advances/steps backs in knowledge of the Bulgarian fauna were prepared for each species.

A special discussion point in the research was made on the importance of the community support for the data compilation. It was demonstrated by a short case study from Bulgaria where few pictures only added 4 new UTM-grids with 7 localities distributed as follows:

1. Grass and scrub vegetation near Belashtitsa Village, S of Plovdiv, LG15; 300 m a.s.l.: 22 June 2009.
2. Stream flowing through a deciduous forest south of Markovo Village, S of Plovdiv, LG15; 400 m a.s.l.: 03 August 2005.
3. Swamp south of Kuklen Village, S of Plovdiv, LG15; 580 m a.s.l.: 16 June 2008, 26 June 2009, 06 July 2009, 26 May 2010.
4. *Quercus* forest near Akademik Hut, S of Plovdiv, LG05; 600 m a.s.l.: 15 July 2009.
5. *Quercus* forest with *Juniperus oxycedrus* L. above Markovo Village, S of Plovdiv, LG05; 500 m a.s.l.: 31 July 2005, 01 August 2009.
6. Yundola, West Rhodope Mts., GM36, 1200 m a.s.l.: 05 July 2003.
7. River with stony banks north of Lilyache Village near the town of Vratsa, GP00, 380 m a.s.l.: 20 June 2008.

Results

Bulgarian Odonata database

At present the database contains total of 515 UTM-grids with entries of any data. It has been largely enhanced since Marinov (2003) thanks to the data collections by local and foreign volunteers. Figures 1 and 2 display the total area coverage achieved so far and a breakdown of the results before and after 2001 which was the critical year for data collection published in Marinov (2003).

The Appendix contains graphs summarising the results for all species so far reported for Bulgaria. They all are compatible with the scheme chosen for Fig. 2 with a little modification. Total UTM-coverage for the whole country was deliberately deleted as its inclusion obscured the pattern of data compilation for the two periods before and after 2001. It was especially true for species which were found in single locations and therefore did not add any significant number of new UTM-grids.

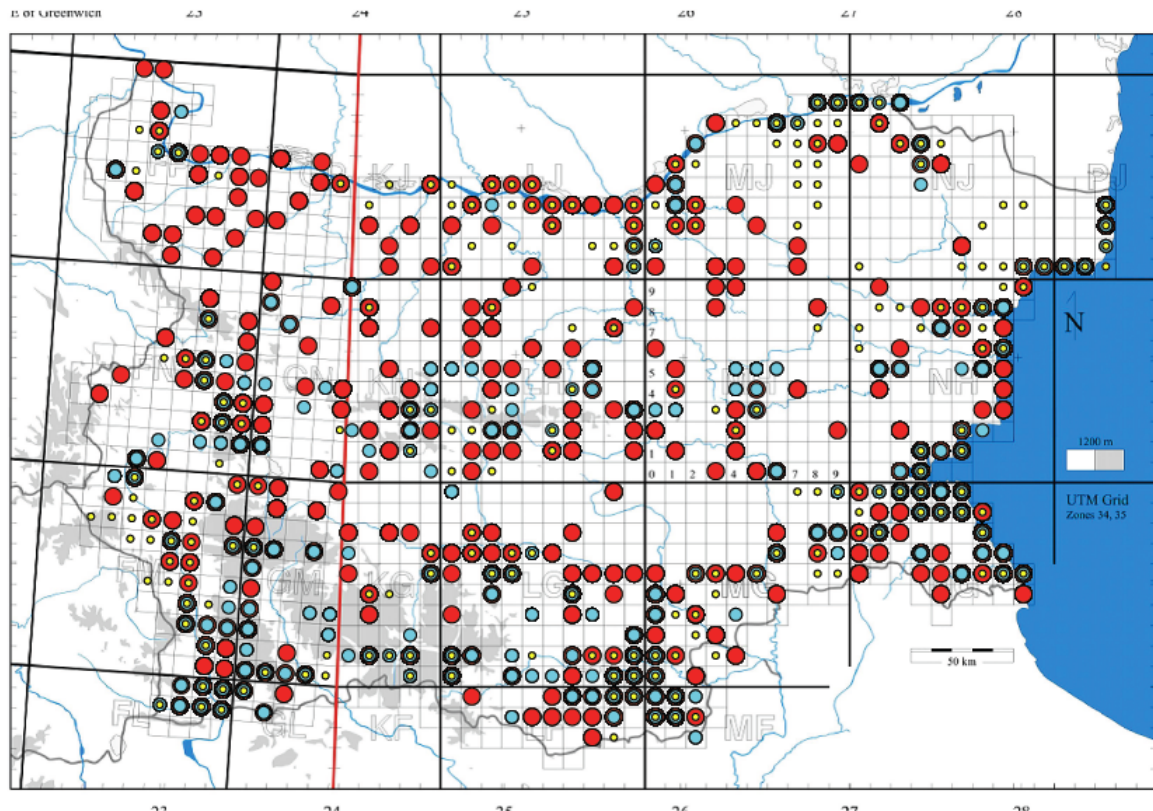


Fig 1. Total area coverage for Bulgarian Odonata database. Legend: Red dots represent all grids covered prior to 2001, while blue and yellow stand for the data after 2001. Blue are for records collected by odonatologists and yellow for volunteers.

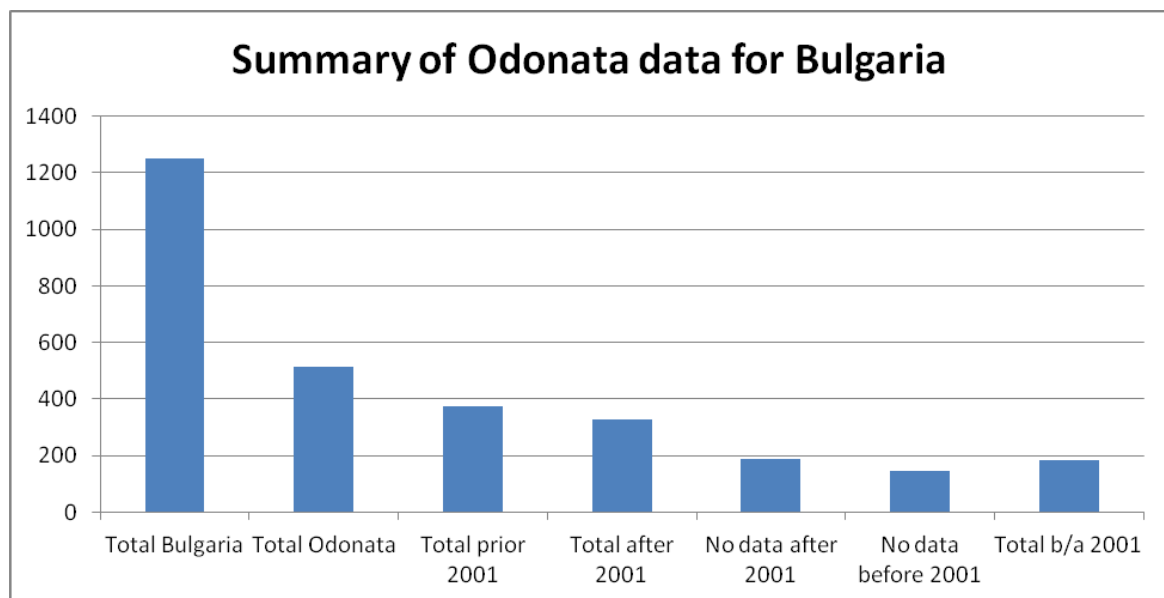


Fig. 2. A summary of Odonata data for Bulgaria before and after 2001. *Total Bulgaria* = Total UTM-grids in Bulgaria; *Total Odonata* = Total UTM-grids with any data on Odonata; *Total prior 2001* = UTM-grids with any data prior to 2001; *Total after 2001* = UTM-grids with any data after 2001; *No data after 2001* = UTM-grids with no data after 2001; *No data before 2001* = UTM-grids with no data before 2001; *Total b/a 2001* = UTM-grids with data before and after 2001.

Case study from Bulgaria

A total of 13 Odonata species were found during this research.

**ZYGOPTERA
CALOPTERYGIDAE*****Calopteryx splendens* (Harris, 1780)**

Localities: 1 (males and females): 15 July 2009.

***Calopteryx virgo* (Linnaeus, 1758)**

Localities: 2 (male and female in copula): 03 August 2005.

LESTIDAE***Lestes barbarus* (Fabricius, 1798)**

Localities: 3 marginal grass vegetation (female): 26 June 2009.

***Lestes dryas* Kirby, 1890**

Localities: 3 marginal grass vegetation (male): 26 June 2009.

***Lestes virens* (Charpentier, 1825)**

Localities: 3 marginal grass vegetation (female): 26 May 2010.

COENAGRIONIDAE***Ischnura pumilio* (Charpentier, 1825)**

Localities: 3 (male): 26 May 2010.

ANISOPTERA**AESHNIDAE*****Aeshna mixta* Latreille, 1805**

Localities: 4 (teneral male): 15 July 2009.

***Anax ephippiger* (Burmeister, 1839)**

Localities: 5 (male): 01 August 2009.

***Anax imperator* Leach, 1815**

Localities: 3 (ovipositing female): 16 June 2008.

CORDULEGASTRIDAE***Cordulegaster heros* Theischinger, 1979**

Localities: 5 (male): 31 July 2005.

CORDULIIDAE***Somatochlora meridionalis* Nielsen, 1935**

Localities: 6 (male). It has been wrongly identified as *S. flavomaculata* (Vander Linden, 1825) by Bechev & Stojanova (2004).

LIBELLULIDAE***Libellula depressa* Linnaeus, 1758**

Localities: 3 (female): 06 July 2009.

***Orthetrum brunneum* (Fonscolombe, 1837)**

Localities: 7 (female): 06 July 2009.

Discussion

The present summary of the data on Bulgarian Odonata highlights the importance of community involvement in species conservation. The achievements of the regional based small scale field studies performed entirely by local volunteers brought up a significant set of records which for some species largely outnumber the total data gained before 2001. It is especially true for Coenagrionidae, such as *Erythromma* species and some *Coenagrion*, like *C. scitulum*. Other species from the family, however, were better represented in the sampling performed prior to 2001. *C. hastulatum* and *E. cyathigerum* exemplify this situation and are evident for the observed sample bias towards lowlands compared to mountain regions after 2001. Beschovski & Marinov (2007) include them both in the group of species with *Northern distribution type* in Bulgaria naturally occurring on the northern lowlands and southern mountains. Another observed tendency of the sampling efforts after 2001 is the bias towards stagnant versus running waters, which is apparent from the large number of records on Gomphidae before 2001 compare to the period after this year. However, this model is not applicable to all lotic species. Calopterigidae and Cordulegastridae were either reported more after 2001 or were represented almost equally for the two sample periods. This could be as a result of another tendency of increased personal engagement towards particular individual species or region. *Cordulegaster insignis* Schneider, 1845 for example was discovered in number of localities along the Danube River where the Bulgarian Odonata database manager (and of the authors of this paper – YK) lives. The interest to this particular species arose after the completed research on the species biology and ecology (Marinov *et al.* 2007) and continued with a considerable increase of the new data following the detailed investigations along the gradient of Danube River tributaries. *Cordulegaster heros* Theischinger, 1979 and *C. picta* Selys, 1854 on the other hand were predominantly discovered during the specialized Dragonfly Tours run by PANDION-D company in S Bulgaria following almost the same routes for about 8 years since 2004.

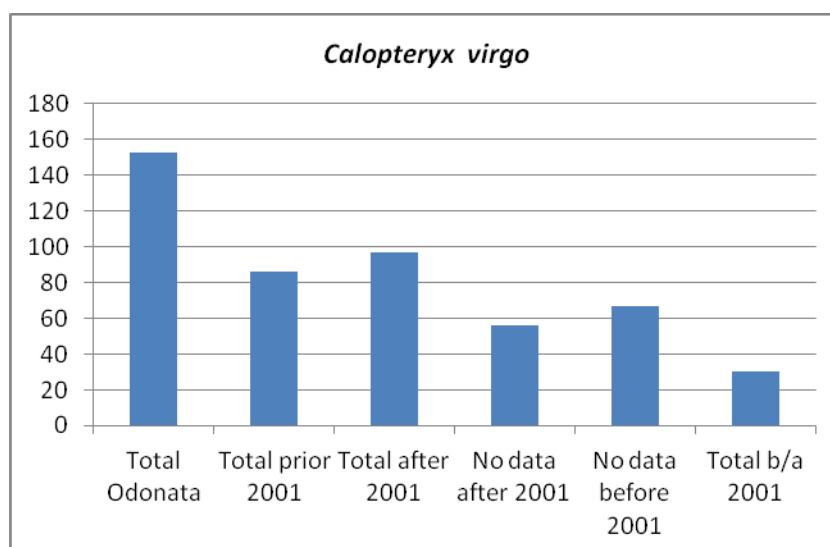
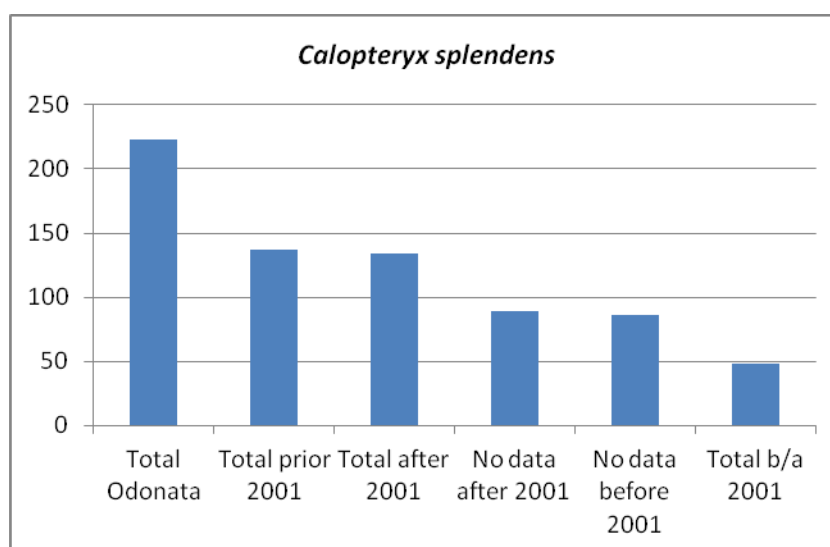
Whatever the reason for the observed inconsistency in the exploration of the Bulgarian Odonata before and after 2001, a review like this should not be generalized to a higher extent than this short discussion and no alarming issues should be raised at this stage. Moreover it does not reflect the complete and very detailed picture of the current status of Bulgarian Odonata because does not consider the number of individual localities within each UTM-grid. It seeks the general pattern of understanding upon this insect group in the country and tries to popularise it nation- and worldwide. The important take-home message is of course for putting more efforts in future sampling on mountain regions and Bulgarian larger rivers. This must be one of the priority targets for individuals and groups wishing to get a direct contact with truly unexplored parts of Europe because, as it is obvious from the short case study presented here, even a short visit to Bulgaria could bring some new UTM-grids to the Odonata coverage map of the country. However, the most important point in this paper is on the crucial role that communities could play in nature exploration and conservation. That is how Bulgaria joins other countries implementing wider public engagement and participation in studying this interesting insect group in Europe.

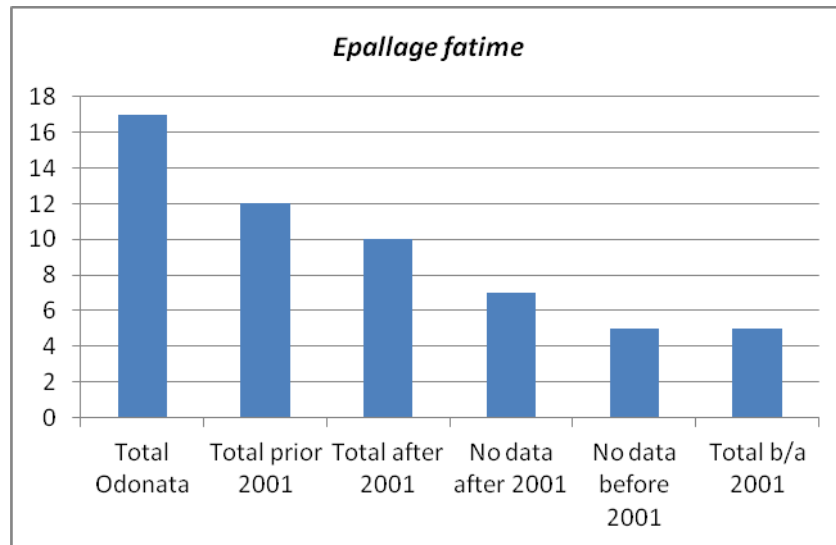
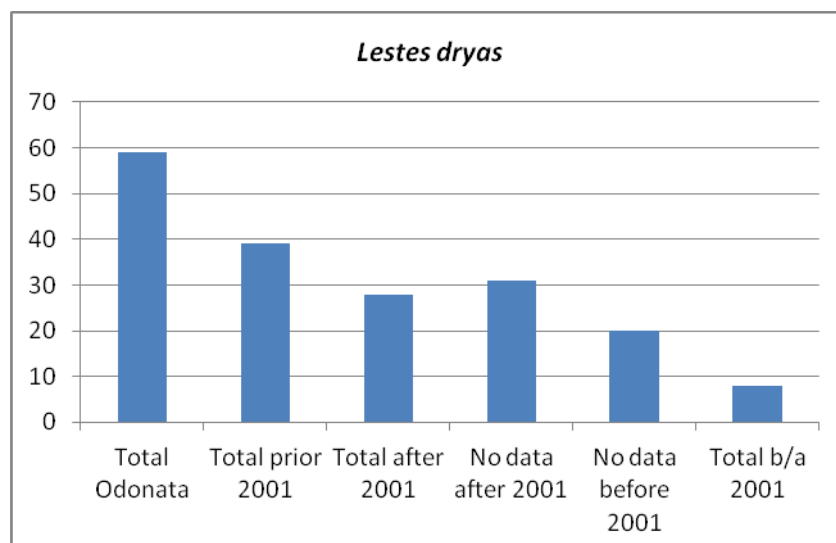
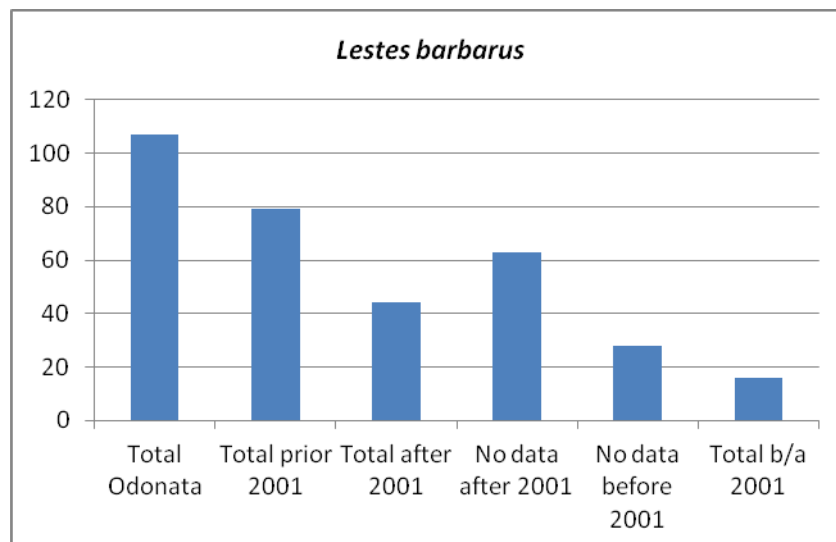
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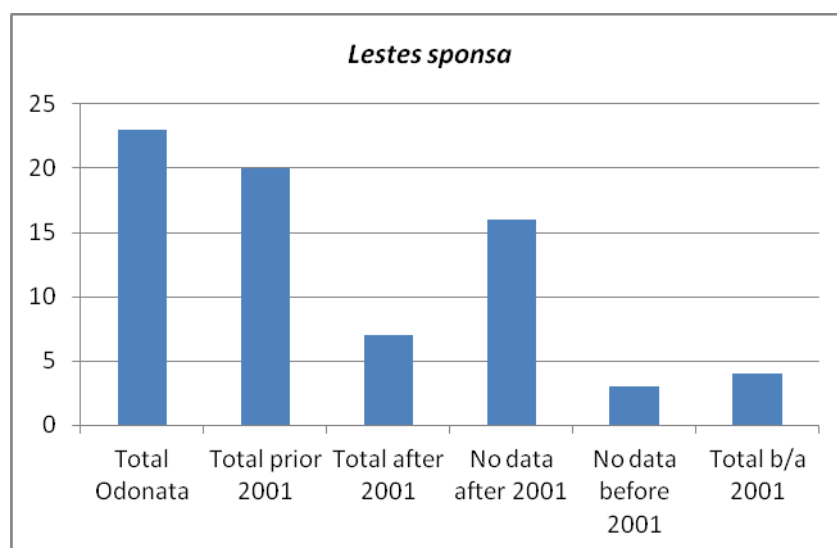
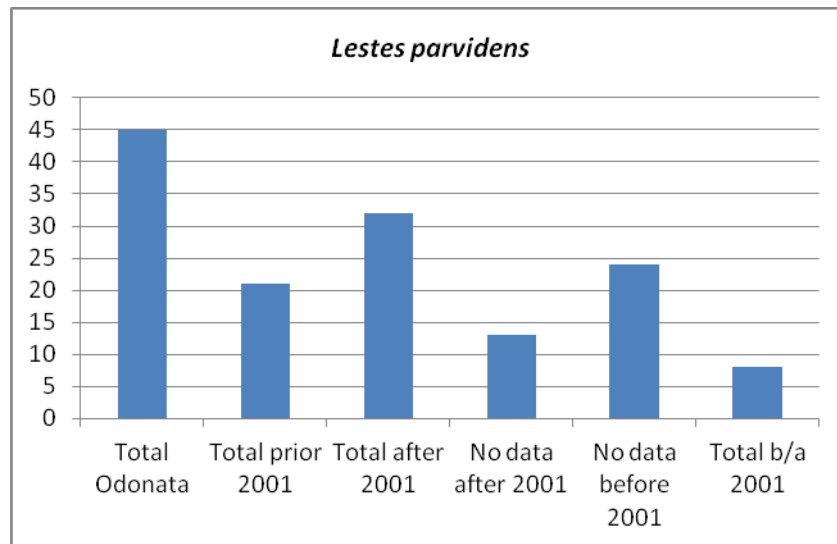
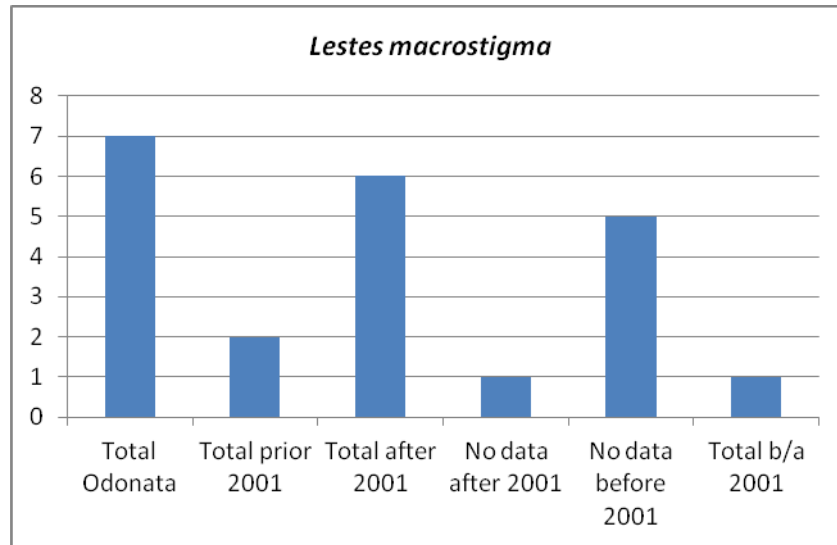
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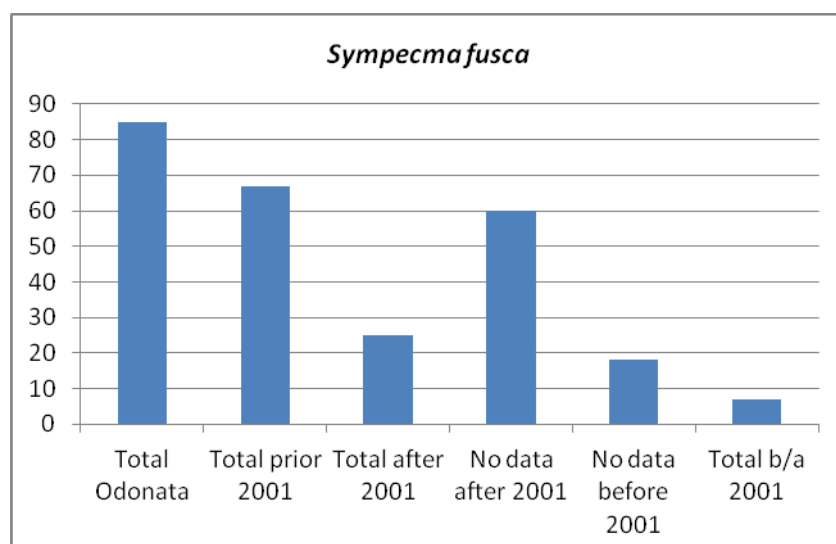
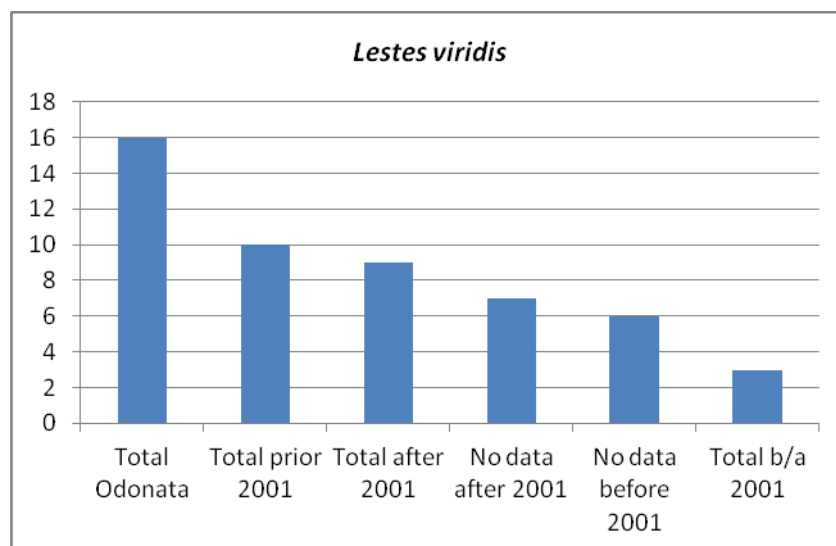
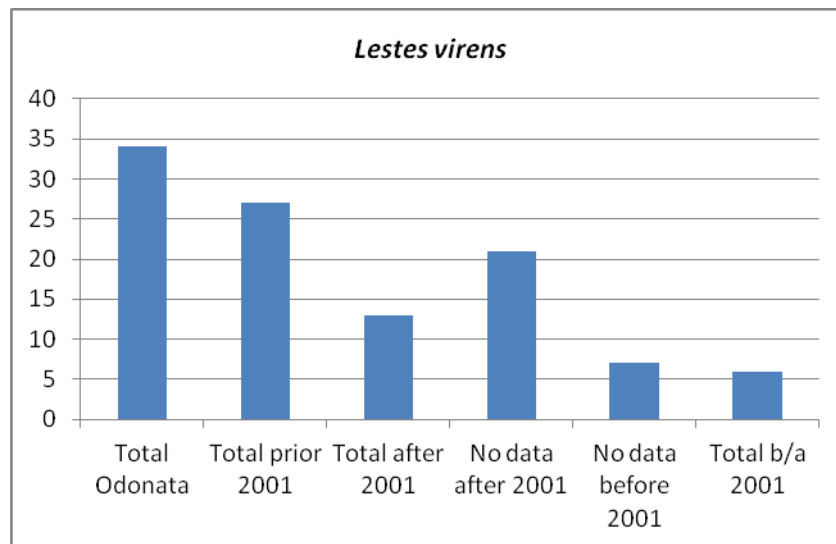
Appendix. Individual summaries for data compilations of Bulgarian Odonata species before and after 2001. Note the small correction here: *Total Odonata* = Total UTM-grids with any data on the concrete species in Bulgaria.

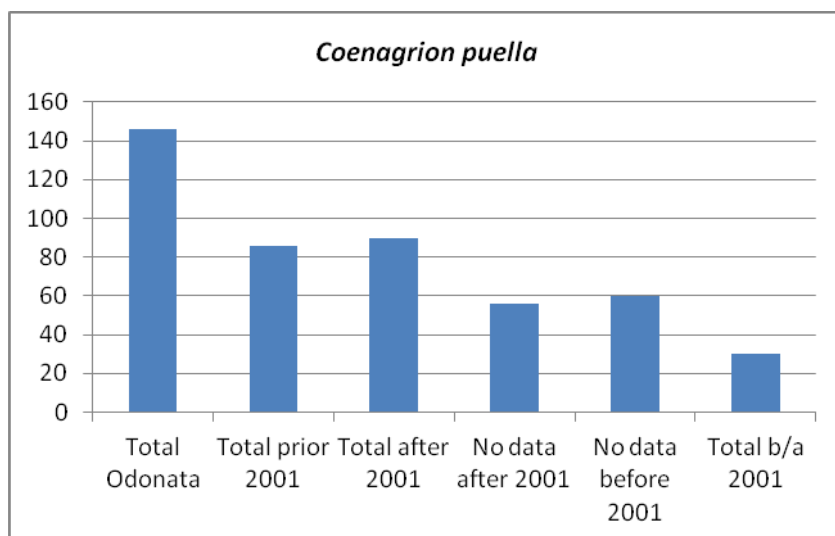
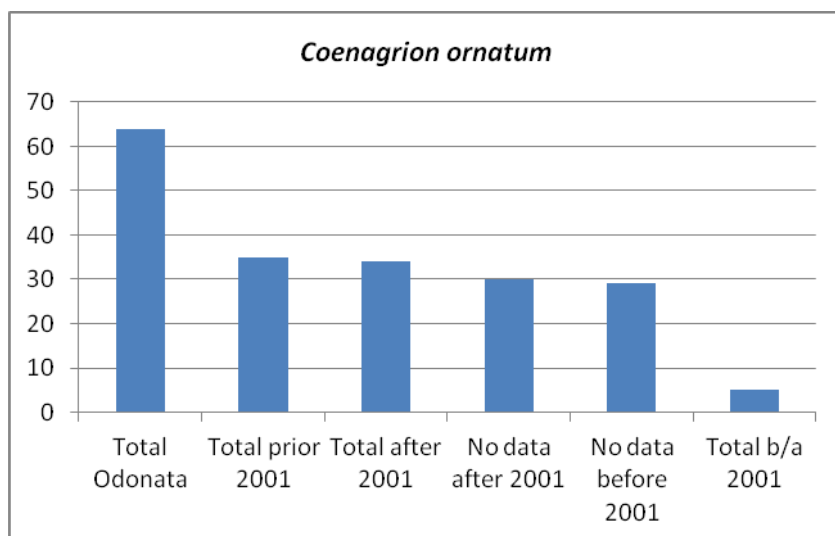
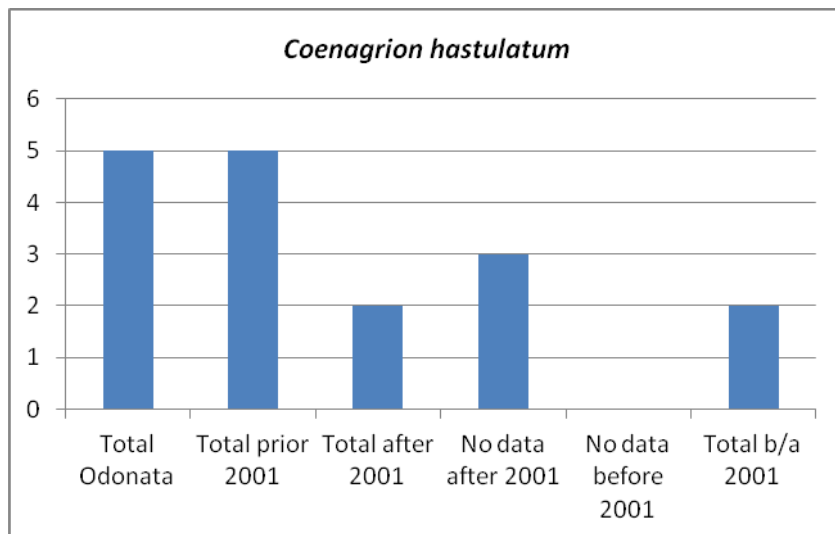
CALOPTERYGIDAE

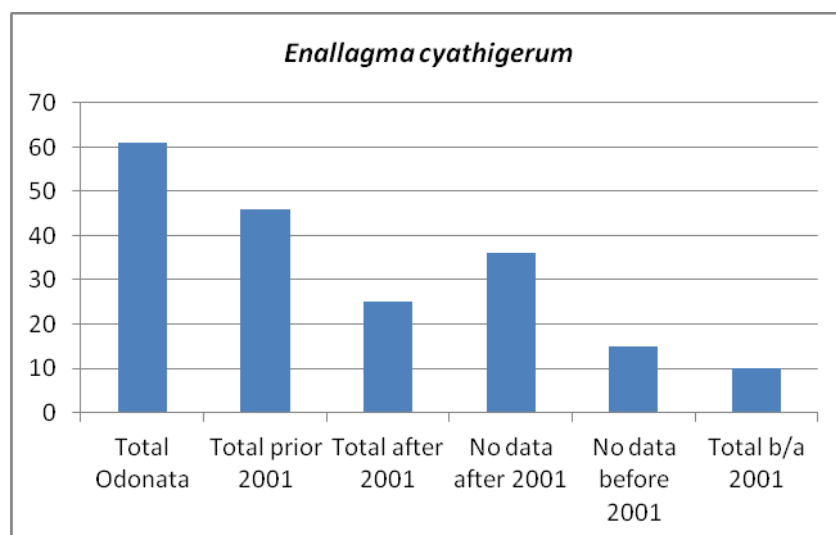
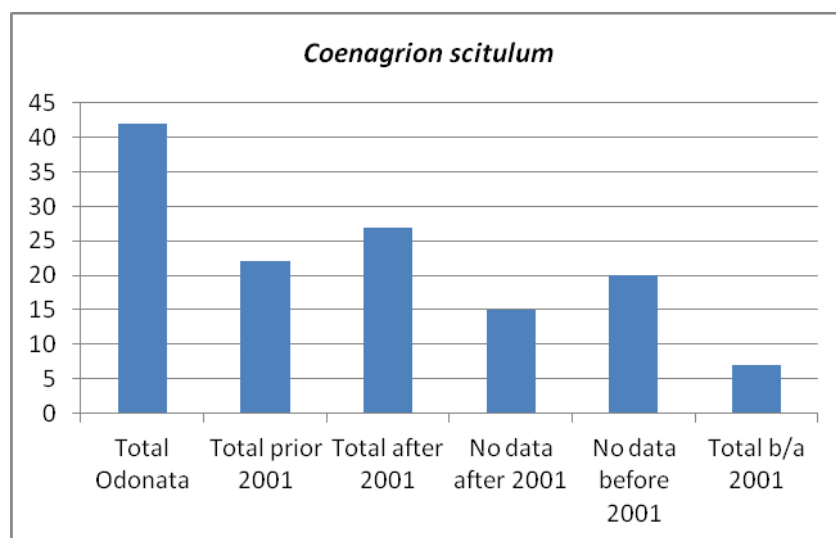
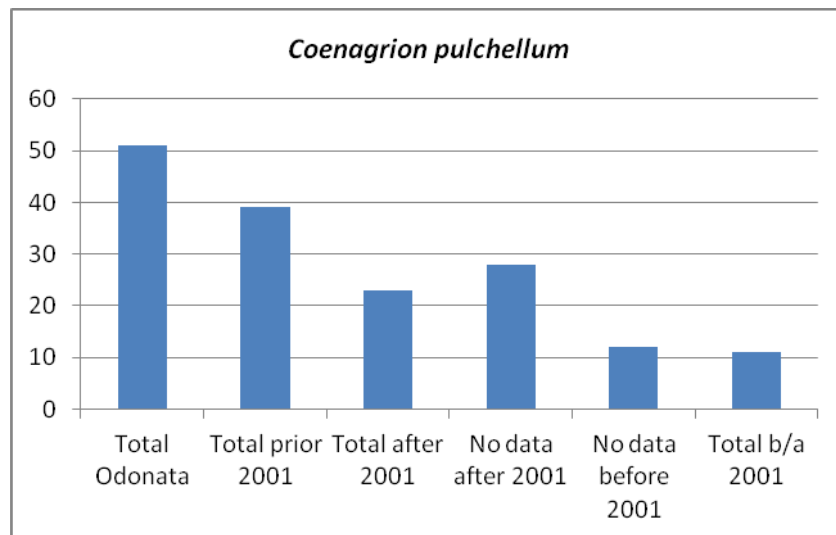


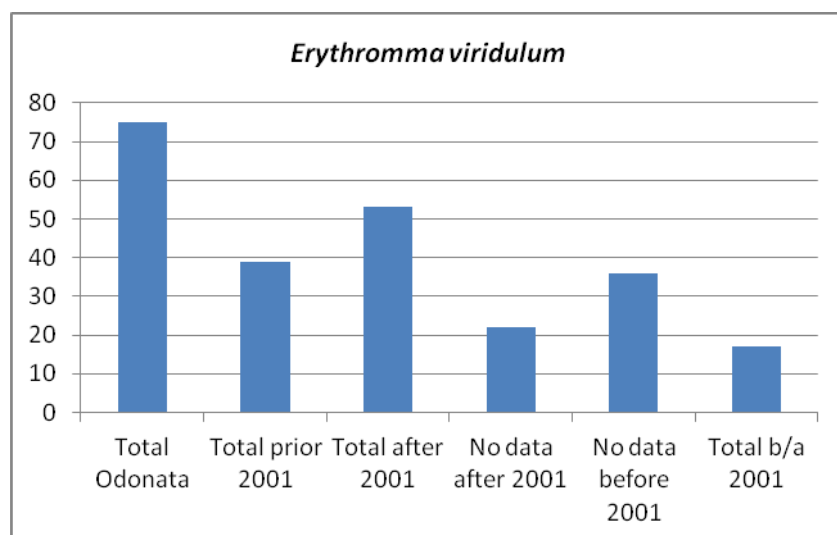
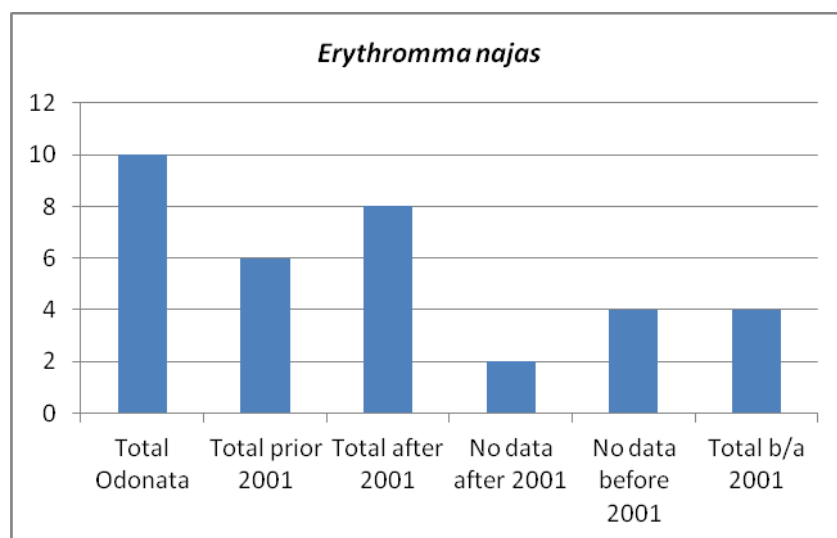
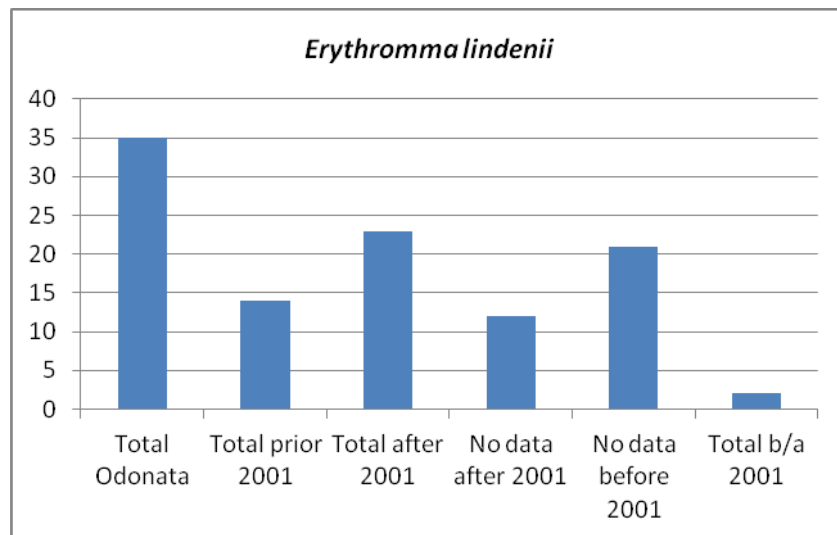
EPALLAGIDAE**LESTIDAE**

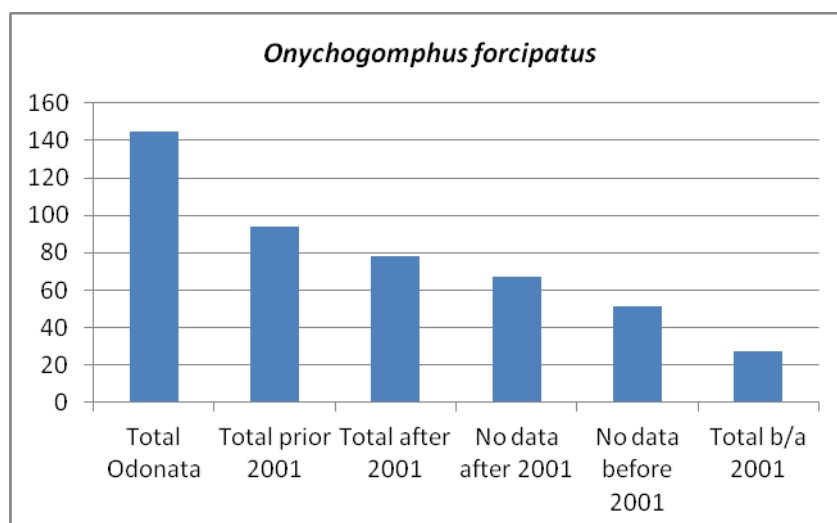
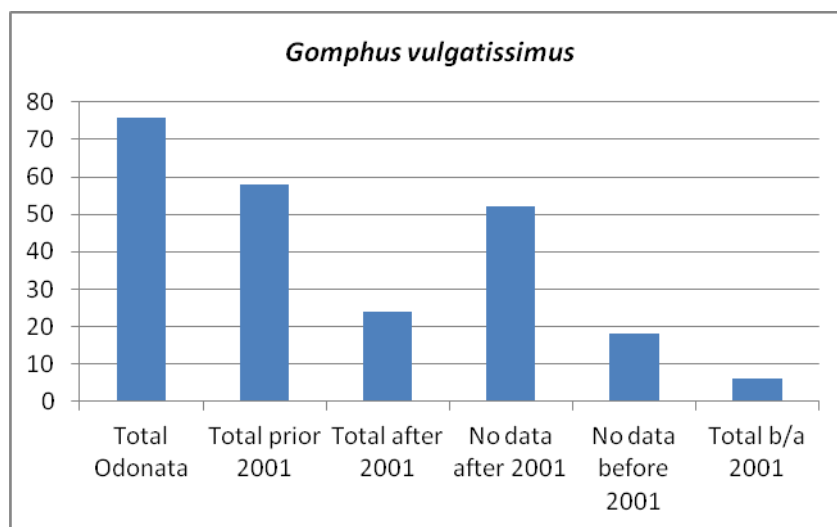
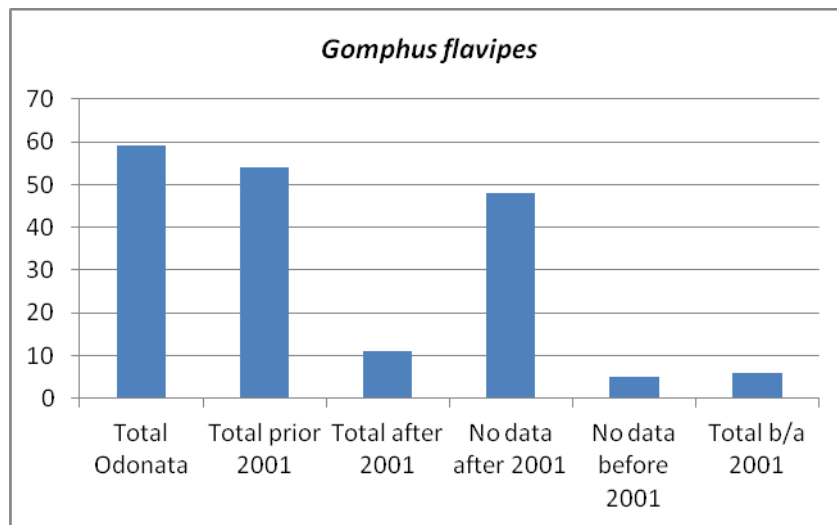


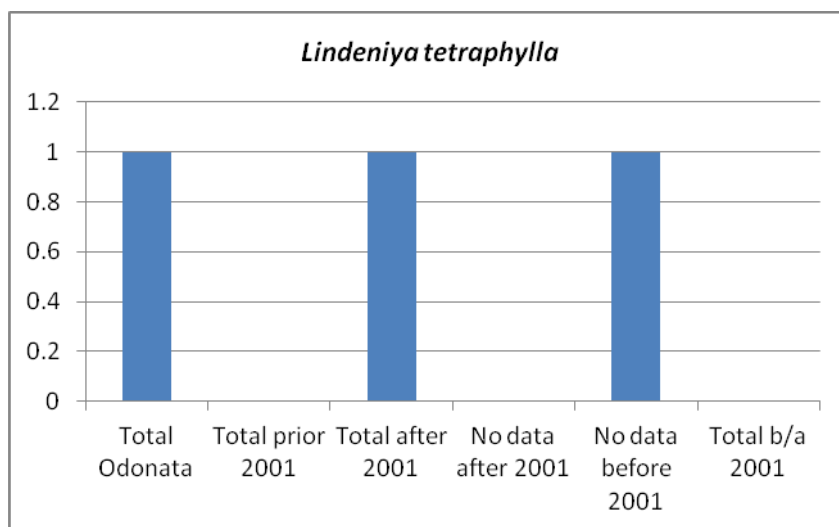
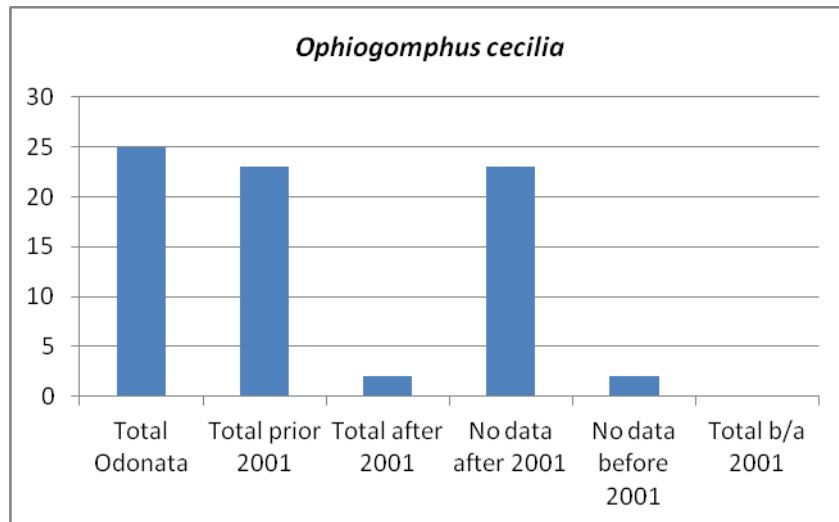


COENAGRIONIDAE

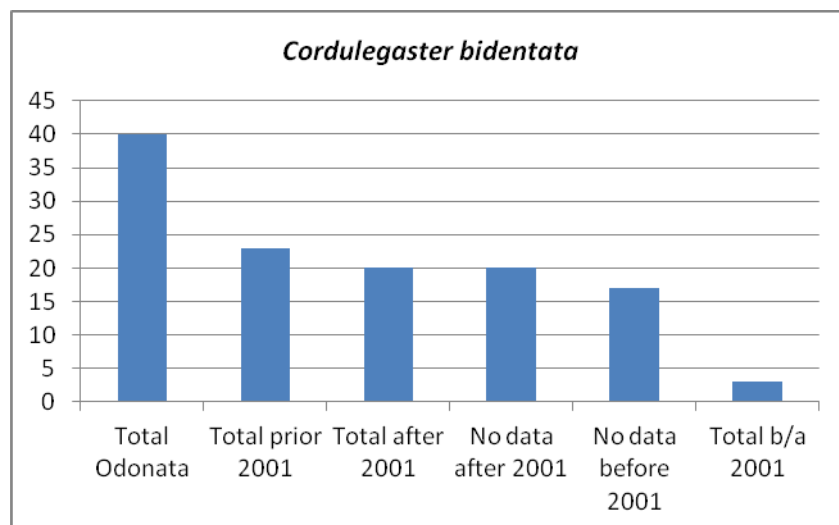


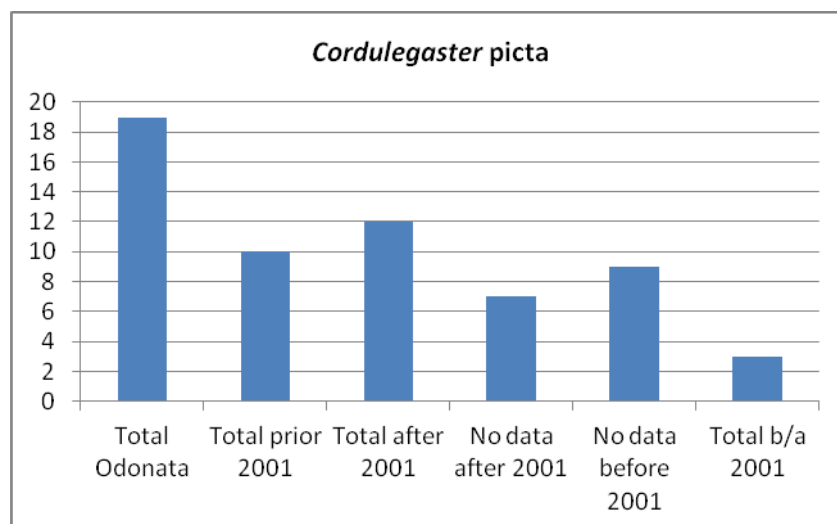
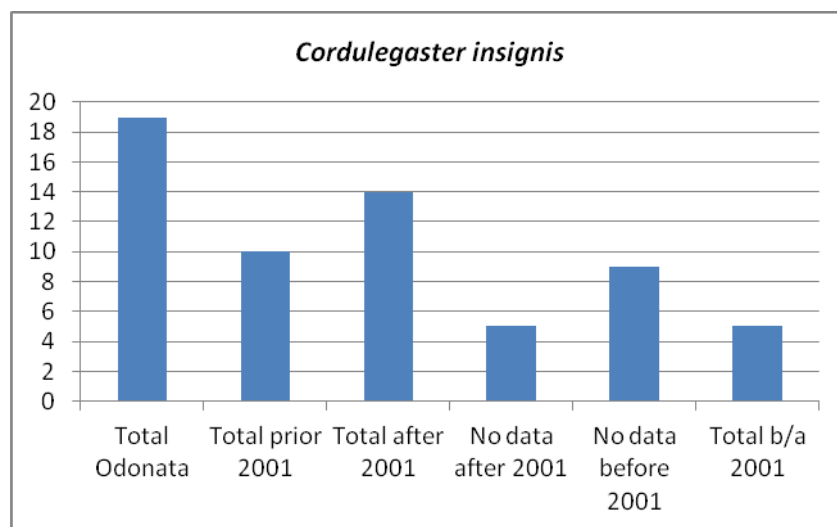
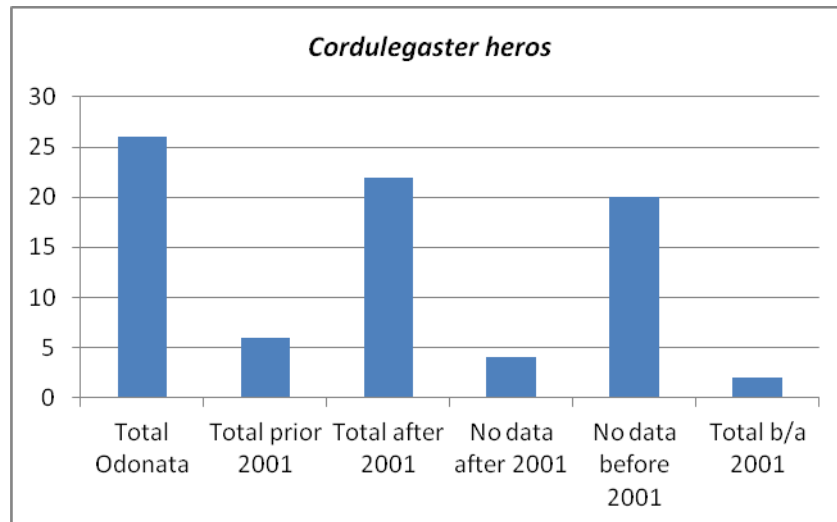


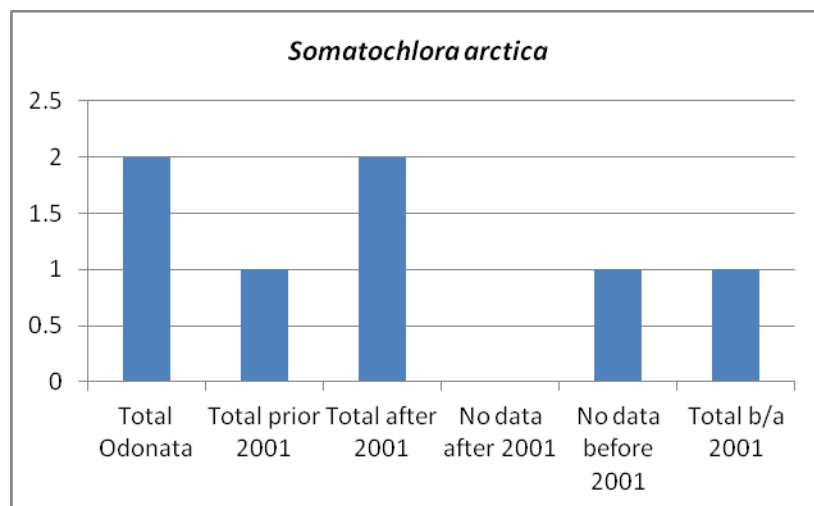
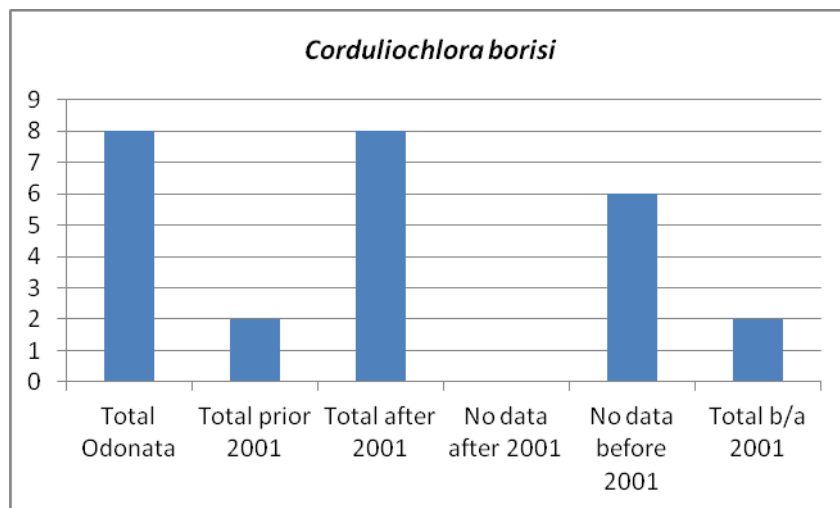
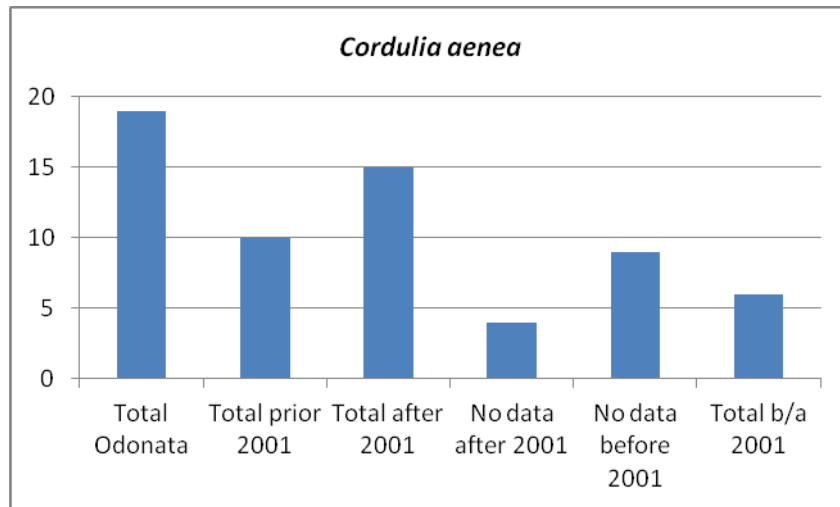
GOMPHIDAE

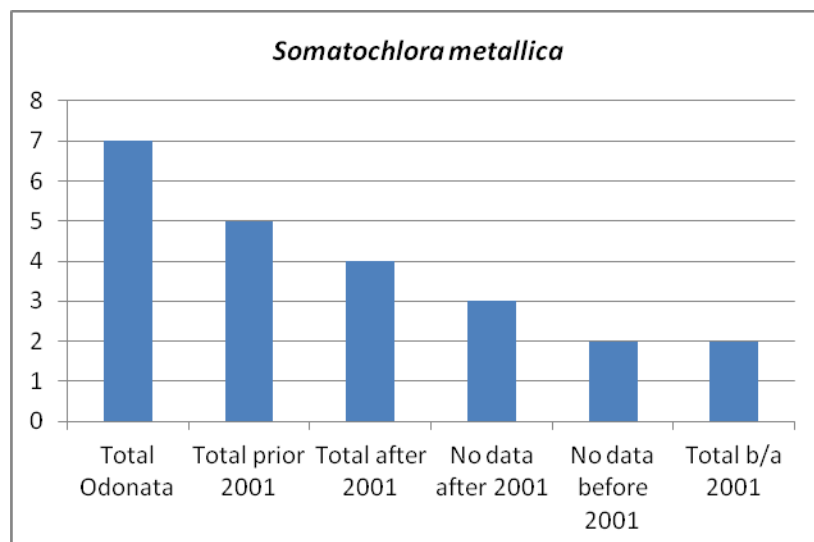
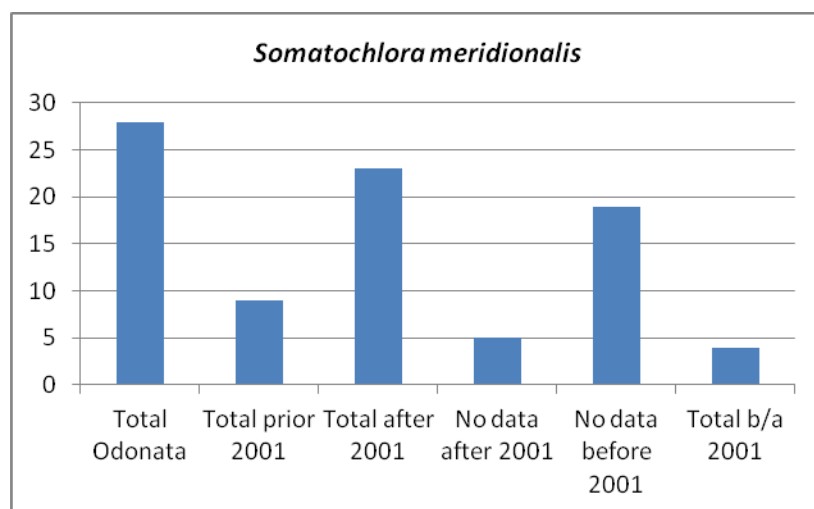
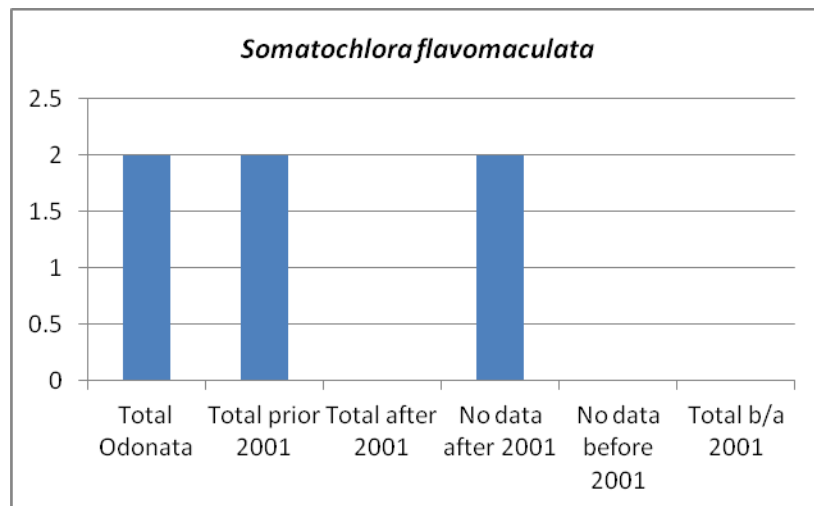


CORDULEGASTRIDAE





CORDULIIDAE



LIBELLULIDAE