

## Distribution patterns, species richness and status of bats in Poland

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**Abstract.** This review provides the first up-to-date information on distribution and status of bats in Poland since 1983. The members of southern and northern European bat fauna occur in the country. 24 species (20 breeding) recorded so far can be divided into four groups with respect to their patterns of distribution. (1) Species with no limit of distribution in Poland [15] including (a) those numerous and widespread in all or almost all regions [5]: *Eptesicus serotinus*, *Nyctalus noctula*, *Plecotus auritus*, *Myotis nattereri*, and *M. daubentonii*, and (b) species reported from almost all parts of Poland but patchily distributed – more abundant in some parts of the country while rare or vagrant in another [10]: *Myotis mystacinus*, *M. brandtii*, *M. dasycneme*, *Vespertilio murinus*, *Eptesicus nilssonii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *P. nathusii*, *Nyctalus leisleri* and *Barbastella barbastellus*. (2) Species reaching their north-eastern range of distribution in the Polish lowlands [3]: *Myotis myotis*, *M. bechsteinii* and *Plecotus austriacus*. (3) Species confined to the Carpathians, Sudetes and Kraków-Częstochowa Upland [3]: *Rhinolophus hipposideros*, *Myotis emarginatus* and *Rhinolophus ferrumequinum* (except of the Sudetes). (4) Species of unknown status, most likely vagrants [3]: *Nyctalus lasiopterus*, *Myotis blythii* and *Pipistrellus kuhlii*. Species richness gradient, with the number of species increasing from north to south, reflects the climatic and topographic diversification of Poland. The highest number of species [19–21] is reported from Kraków-Częstochowa Upland, the Carpathians and Sudetes (south Poland), while the lowest [13–14] in the NE corner. *M. emarginatus*, *M. dasycneme* and *R. hipposideros* – classified as endangered, and *M. bechsteinii* – as near threatened, are the rarest of Polish breeding species. In contrast to the situation in Western Europe, *M. myotis* and *B. barbastellus* are relatively abundant and not regarded as threatened.

**Chiroptera, distribution, Poland, status**

### Introduction

Twenty four bat species were recorded in Poland to date (Ruprecht 1983, Rachwald & Szkudlarek 2001, Sachanowicz & Ciechanowski 2005, this paper). Two different types of bat faunas (those that are southern European, represented by *Rhinolophus hipposideros*, *R. ferrumequinum*, *Myotis emarginatus*, *M. myotis*, *Plecotus austriacus*, and those typical of the boreal zone, represented by *Myotis daubentonii*, *M. brandtii* and *Eptesicus nilssonii* – Horáček et al. 2000) overlap in the country, what makes it a territory of special interest from the zoogeographical perspective. Several southern species reach their northern range limits in Poland, but no species reach their southern limits in the country.

Since the atlas work by Ruprecht (1983), who recorded 21 species, there has been not current and adequate review of the bat distribution in Poland. However, in the last two decades the knowledge on distribution of Polish bats has increased gradually due to the extensive field activity of

Table 1. The regional distribution of bats in Poland: I – Baltic Coast, II – Pomerania Lakelands, III – Wielkopolska-Kujawy Lakelands, IVa – East-Central Lowlands, IVb – West-Central Lowlands, V – Southern Uplands and Podkarpacie, VI – Kraków-Częstochowa Upland, VII – Sudetes, VIII – Carpathians (VIIIa – Tatras, VIIIb – Beskids), IX – Masurian Lakeland, X – Suwałki Lakeland, XI – Podlasie Lowland, XII – Polesie and Wołyń. (+) data from Ruprecht (1983), O – species recorded after 1983 for the first time, n – minimal number of species  
Tabela 1. Regionalne rozmieszczenie nietoperzy w Polsce: I – Pobrzeże Bałtyku, II – Pojezierza Pomorskie, III – Pojezierza Wielkopolsko-Kujawskie, IVa – Niziny Środkowo-Wschodnie, IVb – Niziny Środkowo-Zachodnie, V – Wyżyny Południowe i Podkarpacie, VI – Wyżyna Krakowsko-Częstochowska, VII – Sudety, VIII – Karpaty (VIIIa – Tatry, VIIIb – Beskidy), IX – Pojezierze Mazurskie, X – Pojezierze Suwalskie, XI – Nizina Podlaska, XII – Polesie i Wołyń. (+) dane z Ruprechta (1983), O – gatunek stwierdzony pierwszy raz po roku 1983, n – minimalna liczba gatunków

	I	II	III	IVa	IVb	V	VI	VII	VIIIa	VIIIb	IX	X	XI	XII
<i>R. hipposideros</i>	-	-	-	-	O	+	+	+	-	+	-	-	-	-
<i>R. ferrumequinum</i>	-	-	-	-	-	-	+	-	-	O	-	-	-	-
<i>M. myotis</i>	+	+	+	+	+	+	+	+	+	+	-	-	O	-
<i>M. blythii</i>	-	-	-	-	-	-	-	-	O	-	-	-	-	-
<i>M. bechsteinii</i>	O	O	+	O	+	+	O	+	+	+	-	-	-	O
<i>M. nattereri</i>	+	+	+	+	+	+	+	+	O	+	+	O	+	+
<i>M. emarginatus</i>	-	-	-	-	O	-	+	O	O	+	-	-	-	-
<i>M. mystacinus</i>	+	O	+	+	+	+	+	+	+	+	+	-	-	O
<i>M. brandtii</i>	+	+	+	O	+	+	+	+	O	O	-	O	+	+
<i>M. dasycneme</i>	O	+	+	+	+	+	+	+	O	-	+	O	+	O
<i>M. daubentonii</i>	+	+	+	+	+	+	+	+	O	+	+	O	+	O
<i>V. murinus</i>	+	+	+	+	+	+	+	+	+	+	+	O	+	+
<i>E. nilssonii</i>	O	O	+	+	O	+	+	+	+	+	+	+	+	O
<i>E. serotinus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>P. pipistrellus s. l.</i>	+	+	+	+	+	+	+	O	O	+	+	+	+	+
<i>P. pipistrellus</i>	O	O	O	-	O	O	O	O	O	O	-	O	-	-
<i>P. pygmaeus</i>	O	O	-	O	-	O	O	-	-	O	-	O	O	-
<i>P. nathusii</i>	+	+	+	+	+	+	O	+	-	O	+	+	+	+
<i>P. kuhlii</i>	-	-	-	-	-	O	-	-	-	-	-	-	-	-
<i>N. lasiopterus</i>	-	-	-	-	+	-	O	-	-	-	-	-	-	-
<i>N. noctula</i>	+	+	+	+	+	+	+	+	O	+	+	+	+	+
<i>N. leisleri</i>	O	+	+	+	+	+	+	O	+	O	O	O	+	+
<i>P. auritus</i>	+	+	+	+	+	+	+	+	+	+	+	O	+	+
<i>P. austriacus</i>	O	-	+	+	+	+	+	+	O	+	-	-	O	+
<i>B. barbastellus</i>	O	+	+	+	+	+	+	+	+	+	O	O	+	O
n	18	17	17	17	20	20	22	19	18	20	13	14	15	16

numerous amateur bat workers. As a result of recent faunal surveys the picture of bat distribution and their status in the country has changed. Many articles on bats were published but most of them in Polish, what makes them almost inaccessible for bat scientists outside Poland. Moreover, the results of numerous regional bat surveys are accessible only as the abstracts of papers presented at annual Polish Bat Research Conferences (OKCh).

In this review we summarise the actual distribution status and abundance of bat species in Poland.

## Material and Methods

For the analysis of bat distribution, gaps in data from Ruprecht (1983) were filled, based on published material available from 1983 to 2005 (Table 1). In some cases significant, unpublished data also were used. The existing physio-geographical division of Poland (Kondracki 2001), based on geo-botanical regions, was adapted to create an adequate geographical

division (Fig. 1) as a background to describe the distribution of bats. We have made some modifications, such as splitting clearly distinct subregions from the bigger units, or joining similar units into one bigger, uniform region. The division applied herein was based on 12 geographical regions and subregions (Fig. 1). Four regions (IX, X, XI, XII) are in eastern Europe, while the rest of the country is situated in western Europe (Kondracki 2001). Short regional characteristics are presented below, compiled according to Kondracki (2001).

Region I, the Baltic Coast is rather flat and strongly influenced by the Atlantic climate, with mild winters, cool summers and high level of precipitation. Specific, maritime types of vegetation occur only in this region.

The northern Pomerania Lakelands (II) and the southern Wielkopolska-Kujawy Lakelands (III) are considered here as separate regions of the uniform area. The former region has a dense network of postglacial lakes and is mostly forested, with beech *Fagus sylvatica* and Scotch pine *Pinus silvestris* as dominant tree species. In northern, moraine zone, the landscape is hilly (up to 329 m a. s. l.). Subatlantic types of vegetation occur in this region. The latter region is warmer and drier than former, with fewer lakes and a landscape dominated by farmland. The largest North European bat hibernaculum – Nietoperek Bat Reserve is located there in underground military tunnels (Urbańczyk 1990).

The large Central Lowland Region was split into the East-Central Lowlands (IV a) and the West-Central Lowlands (IV b). The whole area is flat and has no natural lakes, with the dominant landscape being typical Polish farmland. The climate is relatively warm and has a low level of rainfall. The influence of continental climate gradually increases towards the east. The vegetation in the East-Central Lowlands is an intermediate between Central and Eastern Europe; oak *Quercus robur* and *Pinus sylvestris* dominate in forests.

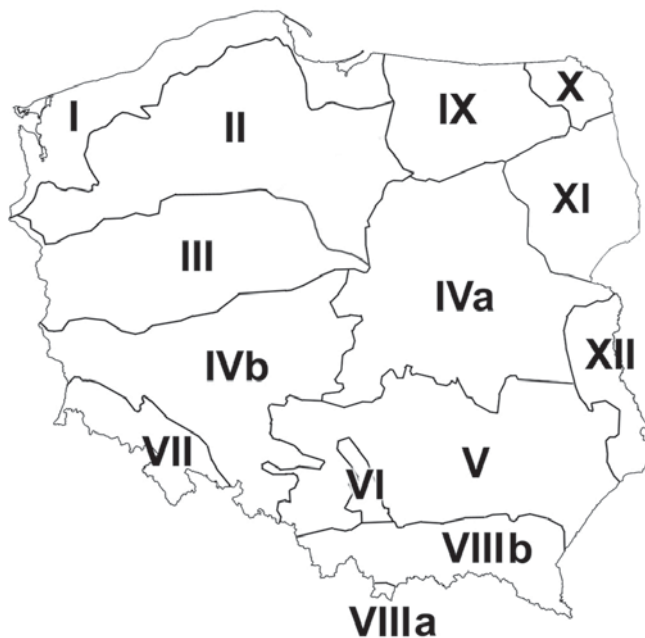


Fig. 1. Geographic division of Poland applied in the text: I – Baltic Coast, II – Pomerania Lakelands, III – Wielkopolska-Kujawy Lakelands, IV a – East-Central Lowlands, IV b – West-Central Lowlands, V – Southern Uplands and Podkarpacie, VI – Kraków-Częstochowa Upland, VII – Sudetes, VIII – Carpathians (VIIIa – Tatras, VIIIb – Beskids), IX – Masurian Lakeland, X – Suwałki Lakeland, XI – Podlasie Lowland, XII – Polesie and Wołyń.

Based on Kondracki (2001), changed.

Rys. 1. Podział geograficzny Polski zastosowany w tekście: I – Pobrzeże Bałtyku, II – Pojezierza Pomorskie, III – Pojezierza Wielkopolsko-Kujawskie, IV a – Niziny Środkowo-Wschodnie, IV b – Niziny Środkowo-Zachodnie, V – Wyżyny Południowe i Podkarpacie, VI – Wyżyna Krakowsko-Częstochowska, VII – Sudety, VIII – Karpaty (VIIIa – Tatry, VIIIb – Beskidy), IX – Pojezierze Mazurskie, X – Pojezierze Suwalskie, XI – Nizina Podlaska, XII – Polesie i Wołyń. Według Kondrackiego (2001), zmodyfikowane.

The Southern Uplands and Podkarpacie (V) regions are combined because of their similarity, but the Kraków-Częstochowa Upland (VI) is noted as a separate region. The Southern Uplands is a warm and relatively dry region with types of vegetation (forests with *Abies alba*, xerothermic swards, secondary shrubs) typical for South-Central Europe. In some of its parts, limestone or gypsum caves, mines and underground quarries occur, however large areas are covered by loess sediments. The Kraków-Częstochowa Upland is a rocky, karstic range (hills up to 500 m a. s. l.), with over 1000 natural limestone caves.

The Sudetes (VII), a middle-height (up to 1600 m a. s. l.), old mountain range (with ca. 70 caves and numerous old mines), is a northern part of the Bohemian Upland. Its climate is rather cold with high level of precipitation. The Tatras (VIII a) and Beskids (VIII b) are noted as distinct parts of the Carpathians (VIII). The Tatras form the highest Polish mountain range (up to 2499 m a.s.l.) with a harsh climate, and vegetation and landscapes typical of the alpine zone of high mountains. Over 650 karstic caves (the deepest and longest in Poland) occur there. The Beskids are a densely forested middle-height mountain ranges, consisting mainly of sandstone (about 400 tectonic caves). A distinct but small, limestone massive, the Pienins, is adjoined to the Beskids region in this analysis. Polish mountain woodlands are dominated by spruce *Picea abies* at higher altitudes (and in heavily managed treestands); while beech dominates in lower altitudes (only in the SE part of the Carpathians it does reach the upper timber line).

The Masurian Lakeland (IX) is an intermediate between the subatlantic Pomerania Lakelands and the subboreal Suwałki Lakeland. The highest number of lakes and largest area of forests are located there. Some areas that were previously included as the western part of the Masurian Lakeland (Ruprecht 1983, Ciechanowski et al. 2002), are included in the Pomerania Lakelands region instead, because of differences in landscape and vegetation (Kondracki 2001). The Suwałki Lakelands (X) and the Podlasie Lowland (XI) are heavily influenced by continental climate. They have the highest share of subboreal elements in vegetation (large peat bogs, locally taiga-like spruce forests). The Podlasie Lowland is intermediate between the East-Central and Belorussian Lowlands.

Polesie and Wołyń (XII) are the westernmost parts of the East European marshland (Polesie) and forest-steppes (Wołyń) regions. In fauna, flora and vegetation, both have elements typical for Eastern Europe. The mesophilous forests of the last four regions are characterised by lack of the beech, and a significant share of the lime *Tilia cordata*.

## Species review

### ***Rhinolophus hipposideros* (Bechstein, 1800) – lesser horseshoe bat**

The range of this species covers the Kraków-Częstochowa Upland, the Carpathians and eastern part of the Sudetes; single records are known also from the SE edge of Podkarpacie (Ruprecht 1983) and from the SW edge of the West-Central Lowlands (Hebda & Nowak 2002). Additionally, it was found in Bieszczady (SE part of the Beskids) for the first time (Postawa & Wołoszyn 2000). Ruprecht (1983) reports only one, historical record from the Sudetes, where numerous, new localities (including nurseries) were discovered recently (Szkudlarek et al. 2001, Furmankiewicz & Nowakowski 2003, Szkudlarek & Paszkiewicz 2003). The species is most abundant in the Beskids, where the largest nurseries and winter colonies (up to over 500 individuals in Zbójecka Cave – Nowak & Piksa 1997) are known (Mleczek et al. 1994, Paszkiewicz et al. 1998, Węgiel et al. 2001).

### ***Rhinolophus ferrumequinum* (Schreber, 1774) – greater horseshoe bat**

The single individuals of this bat (most likely a vagrants) were observed four times in winter: three records come from different caves of the Kraków-Częstochowa Upland (Ruprecht 1983, Postawa & Zygmunt 2000, Nowak et al. 2001 b) and one from a cave in the Carpathians (Mleczek et al. 1994). One dead specimen was found in the attic of Szczyrzyc monastery in the Beskids (Szkudlarek et al. 2003).

### ***Myotis myotis* (Borkhausen, 1797) – greater mouse-eared bat**

This bat reaches its north-eastern European limit in Poland (Mitchell-Jones et al. 1999). It is widespread and numerous in south and central Poland except for the eastern part of the East-Central

Lowlands. Northernmost, it reaches Baltic Coast in the north-west and along the Vistula River, where a small breeding population inhabits the area of Gdańsk (Ruprecht 1983, Bielecka-Rządowska & Rachwałd 1988, Jarzembowski et al. 2000, Ciechanowski 2003). Since 1983, the species' known range has been extended, following new records in the Podlasie Lowland (Kupryjanowicz 1994, Kowalski et al. 1995) and additional new sites from the Baltic Coast (Bernard 1994, Blohm et al. 1999, Wojtaszyn et al. 2000), as well as from the Pomerania Lakelands (Bernard et al. 1991, Kowalski et al. 1995, Ciechanowski et al. 2001a, Gawlak et al. 2002, Kasprzyk et al. 2003, Ciechanowski unpubl., K. Kasprzyk in litt.) (Fig. 2). In NE Poland, records of single adult males are scarce and no nursery roosts was reported (Kowalski et al. 1995, Sachanowicz & Krasnodębski 2003). Recently, *M. myotis* is known from all regions except for the Polesie and Wołyń, Masurian, Suwałki and a large part of the Pomerania Lakelands (Fig. 2). Although geographically restricted, it is the most numerous species among bats hibernating in Polish underground roosts, both caves (Labocha & Wołoszyn 1994, Mleczek et al. 1994, Furmankiewicz & Furmankiewicz 2002) and larger fortifications – about 18 000 individuals hibernate in Nietoperek Bat Reserve (Sachanowicz & Ciechanowski 2005). The populations from eastern Germany move partially to western Poland for winter, as indicated by several records of banded bats in the fortifications of Baltic Coast and Wielkopolska-Kujawy Lakelands (Harmata 1996).

***Myotis blythii* (Tomes, 1857) – lesser mouse-eared bat**

One individual of the species was captured in a mist net in 2005 at a cave entrance in the Tatras (K. Piksa in litt.). This is the first record of lesser mouse-eared bat in Poland, possibly linked to



Fig. 2. Distribution range (black) and extralimital localities (black circles) of the greater mouse-eared bat *Myotis myotis* in Poland.

Rys. 2. Zasięg (na czarno) i pojedyncze stanowiska (czarne punkty) nocka dużego *Myotis myotis* w Polsce.

its population in neighbouring Slovakia, where the bat is known as widespread (Mitchell-Jones et al. 1999). *M. blythii* was reported to occur also in the Slovakian Tatras (Pjenčák et al. 2003). The species was supposed to appear in Poland much earlier but no direct evidence was available (Kowalski & Ruprecht 1981, Sachanowicz & Ciechanowski 2005).

#### ***Myotis bechsteinii* (Kuhl, 1817) – Bechstein’s bat**

The species is restricted to southern and central Poland. After 1983 new localities were found in the Central Lowlands (Fuszara & Cygan 1993, Kowalski et al. 1996, Dąbrowska et al. 1998, Domański 2003), Polesie and Wołyń (Piskorski et al. 2001), as well as (marginally) the western part of the Pomerania Lakelands (Bernard & Samoląg 1991) and the Baltic Coast (Duszyńska in Wołoszyn 2001). These extend the north-eastern limits of *M. bechsteinii* range, as given in Baagøe (2001a), (Fig. 3). The species was reported also from the Kraków-Częstochowa Upland (Postawa & Zygmunt 2000) for the first time. It is considered as rare in Poland, however locally it may be quite numerous and reproducing populations are confirmed in several forest complexes of the Central Lowlands (Kowalski et al. 1996) and Southern Uplands (Hejduk et al. 2001), as well as the Polesie and Wołyń (Piskorski et al. 2001, Kowalski et al. 2002). *M. bechsteinii* seems to be much more frequent in the Sudetes (Ruprecht 1983, Szkudlarek et al. 2002) than in the Carpathians (Piksa & Nowak 2002). The largest Polish hibernaculum of Bechstein’s bats is the Nietoperek Bat Reserve, where up to 24 individuals were counted (Sachanowicz & Ciechanowski 2005).

#### ***Myotis emarginatus* (Geoffroy, 1806) – Geoffroy’s bat**

The range of this species is restricted to the Kraków-Częstochowa Upland, the Carpathians and eastern part of the Sudetes. Since 1983, new localities have been found in the Bieszczady Mts (SE part of the Beskids) (Postawa & Wołoszyn 2000), Tatras (Nowak 2001), Sudetes (Kokurewicz 1990, Szkudlarek et al. 2002) and (marginally) in the SW edge of the West-Central Lowlands (Hebda & Nowak 2002), where it was not reported by Ruprecht (1983). Recently, the highest number of wintering bats (12) was observed in 2003, in Niedźwiedzia Cave (Sudetes) (Furmankiewicz et al. 2003). At present, reproduction of this species is known only in the Carpathians. A recent finding of a nursery colony (ca. 200 individuals – Węgiel et al. 2001) and additional summer and winter records from the same area (Wołoszyn & Mysłajek 1994, Piksa 2000, Szkudlarek & Paszkiewicz 2001, Mysłajek 2002), contradict the statement of Kokurewicz (1990), that the Polish population of *M. emarginatus* is isolated from the main species’ range. Geoffroy’s bat appears to be relatively numerous and frequent species among bats netted at the entrances of some caves in the Beskids Mts in summer (Węgiel et al. 2004). The conclusion from recent works suggests that either the population size proposed by Kokurewicz (1990) (about 100 individuals) was underestimated, or its number has significantly increased in recent years.

#### ***Myotis nattereri* (Kuhl, 1817) – Natterer’s bat**

In the last 20 years the species was recorded as occurring in the regions where it was not observed previously (Ruprecht 1983): the Suwałki Lakeland (Sachanowicz et al. 2001) and the Tatras (Piksa & Nowak 2000). The species seems to be widespread and numerous almost everywhere in Poland, although it may be rarer in the Carpathians (Mleczek et al. 1994). It is a numerous bat in Polish underground hibernacula, being regionally a dominant species in winter bat assemblages (e.g. Jarzembowski et al. 2000, Postawa & Zygmunt 2000, Lesiński et al. 2001b, Kasprzyk et al. 2003), including those inhabiting village wells (Kowalski et al. 2001) and urban drainage systems

(Grzywiński & Kmiecik 2003). 3646 individuals were counted in Nietoperek Bat Reserve, which is the largest Polish hibernaculum (Sachanowicz & Ciechanowski 2005).

### *Myotis mystacinus* (Kuhl, 1817) – whiskered bat

The distribution range of this bat probably covers the whole of Poland, but surprisingly, it was reported from only a few locations. Recently, only NE Poland has no confirmed locality (except for one old record) of this species (Ruprecht 1983, Kasprzyk 1997). It was reported as a new species in the Pomerania Lakelands (Jarzembowski & Stepniewska 1996) and the Polesie and Wołyń (Piskorski et al. 2000). No reproduction or summer colonies were observed in northern Poland to date. The species is probably more frequent in central and southern Poland (Ignaczak et al. 2001, Lesiński & Gwardjan 2001) but seems to be rare everywhere in the country, except for the Tatras, where it is the most numerous species in cave bat assemblages and its largest hibernacula are located (Piksa 1998, Piksa & Nowak 2000). It is also the commonest bat in the foothills of the Tatras in the summer period (Harmata 1990). In contrast to *M. brandtii*, it is much rarer in forests of central-eastern Poland – it was found in small numbers in Kozienicka and Łuków Forests (Kowalski et al. 1996, Sachanowicz & Krasnodebski 2003) but not recorded either in Białowieska or Kampinoska Forests (Kowalski & Lesiński 1995, Rachwald et al. 2001). Although rarely distinguished from *M. brandtii* during winter censuses, whiskered bat is known to hibernate regularly in several Polish sites outside of the Tatras (e.g. Furmankiewicz & Furmankiewicz 2002, Szkudlarek et al. 2002).



Fig. 3. Distribution range (black) and extralimital locality (black circle) of Bechstein's bat *Myotis bechsteinii* in Poland.  
Rys. 3. Zasięg (na czarno) i pojedyncze stanowisko (czarny punkt) nocka Bechsteina *Myotis bechsteinii* w Polsce.

### ***Myotis brandtii* (Eversmann, 1845) – Brandt’s bat**

Until 1983, this bat was considered one of the rarest in Polish fauna as known from very few sites scattered in south, central and NW parts of the country (Ruprecht 1983). However, in the last two decades, it was found in all remaining regions, except for the Masurian Lakeland: the Tatras (Piksa 1998), Beskids (Paszkiwicz et al. 1998, Postawa & Wołoszyn 2000), Suwałki Lakeland (M. Wojciechowski in litt.), East-Central Lowlands (e.g. Sachanowicz & Ruczyński 2001) and the eastern part of the Baltic Coast (Ciechanowski & Sachanowicz 2003). It seems to be much more numerous in some parts of the country than previously thought, particularly in the woodlands of central and eastern Poland (Kowalski et al. 1996, Ignaczak et al. 2001, Sachanowicz & Ruczyński 2001), where locally it may be a frequently observed house dwelling species (Sachanowicz & Krasnodebski 2003). Like *M. mystacinus*, it seems to be very rare (locally absent) in the belt of lakelands in northern Poland. Brandt’s bat is rarely distinguished from the former species during winter bat censuses, however it is known to hibernate in small numbers in several Polish sites (e.g. Furmankiewicz & Furmankiewicz 2002, Szkudlarek et al. 2002).

### ***Myotis dasycneme* (Boie, 1825) – pond bat**

The species’ records are known from almost the whole of Poland. Since 1983, it has been found in the Polesie and Wołyń (Piskorski et al. 2000), the Baltic Coast (Ciechanowski & Przesmycka 2001), the Tatras (Nowak et al. 2001 a, but erroneously given in Ruprecht 1983 – see Piksa 1998 for explanation) and Suwałki Lakeland (Wojciechowski et al. 1999), where it was unknown previously (Ruprecht 1983). Former information of Sitowski (1948) about occurrence of *M. dasycneme* in Pieniny massive (here as Beskidy Mts) was included in Ruprecht (1983), however it early became considered as doubtful (Kowalski 1955). Several new sites, in addition to only one marginal record, were reported from the Pomerania Lakelands (Ciechanowski et al. 2002, Ciechanowski et al. 2003). The pond bat is a rare species in Poland; most records refer to adult males found in summer (Krzyszowski 1956, Kowalski & Lesiński 1995, Piskorski et al. 2000, Lesiński 2001) or single individuals in the hibernation period (e.g. Kowalski & Lesiński 1995, Gawlak 1996, Postawa & Zygmunt 2000, Nowak et al. 2001a, Furmankiewicz & Furmankiewicz 2002, Sachanowicz 2003). The largest Polish hibernaculum of pond bats (up to 34 individuals) is located in Biebrza valley. This area and surrounding Podlasie Lowland, concentrate the highest number of *M. dasycneme* winter sites (Kowalski et al. 2003). Only a few recent breeding localities (nurseries, captures of lactating females or juveniles) are known, most of them located in northern Poland (e.g. Wojciechowski et al. 1999, Ciechanowski et al. 2002, 2003).

### ***Myotis daubentonii* (Kuhl, 1817) – Daubenton’s bat**

The species occurs in all parts of Poland. Since 1983, it has been recorded in the regions where previously unknown: the Suwałki Lakeland (Sachanowicz et al. 2001, Postawa & Gas 2003), the Polesie and Wołyń (Piskorski et al. 2001) and the Tatras (Piksa & Nowak 2000). It seems to be less numerous only in some areas without a network of rivers and lakes, where locally its breeding was not confirmed (Piskorski & Urban 2003, Sachanowicz & Krasnodebski 2003). In Poland, *M. daubentonii* is one of the most numerous species hibernating in underground roosts (e.g. Labocha & Wołoszyn 1994, Szkudlarek et al. 2002, Lesiński 2001, Lesiński et al. 2004). However, in the largest European hibernaculum (Nietoperek Bat Reserve) its number decreased from 17,000 in 1991 to ca. 7,000 recently (Sachanowicz & Ciechanowski 2005).



### ***Vespertilio murinus* Linnaeus, 1758 – parti-coloured bat**

Dispersed localities of this poorly known bat were reported from almost all parts of Poland (Ruprecht 1983). After 1983, it was found as a new species in the Suwałki Lakeland (Postawa & Gas 2003). Thanks to re-identification of bat specimens in historical collections, the species was reported from the SW part of the West-Central Lowlands (Wrocław city) for the first time (Kock & Bogdanowicz 1998). Only a few regions with confirmed breeding are known: Podlasie (numerous nurseries in Białowieża Forest – Hermanns et al. 2001), the Baltic Coast (Ciechanowski 2001) and the Pomerania Lakelands (Vistula River Valley – Ciechanowski & Sachanowicz 2003). Most records refer to non-breeding individuals; the species is numerous during autumn migration, mating and hibernation in some larger cities of central and western Poland (e.g. in Warsaw – Lesiński et al. 2001a). Summer aggregations of males were found in some areas where no breeding was recorded: in the Sudetes (Szkudlarek & Paszkiewicz in: Mikusek & Pikulska 1999) and the Carpathians (Paszkiewicz et al. 1998).

### ***Eptesicus nilssonii* (Keyserling & Blasius, 1839) – northern bat**

The records of this species were reported from all regions of Poland, although they seem to be very unevenly distributed. Since 1983, it has been recorded in the West-Central Lowlands (Hebda & Nowak 2002), Baltic Coast (Ciechanowski & Szkudlarek 2003), eastern edge of the Pomerania Lakelands (Ciechanowski et al. 2002) and the Polesie and Wołyń (Piskorski et al. 2000), where it was previously unknown (Ruprecht 1983). However, permanent, breeding populations are probably restricted to eastern Poland and the mountains, which confirms its status of a boreal-alpine species (Rydell 1993). The records of nursery colonies or captures of lactating females are known from the Suwałki Lakeland (Sachanowicz et al. 2001), Podlasie (Kowalski et al. 1994), Polesie and Wołyń (Piskorski et al. 2000), the Carpathians (Krzanowski 1963, Lesiński 2004), NE and SE part of the East-Central Lowlands (Kowalski et al. 1994, Sachanowicz & Krasnodębski 2003) and in the Southern Uplands (Piskorski & Urban 2003, Sachanowicz & Wower 2005). There is a high density of hibernation and/or detector records in the Masurian and Suwałki Lakeland regions (Sachanowicz et al. 2001, Fuszara et al. 2002), Carpathians (Piksa & Nowak 2000, Postawa & Wołoszyn 2000) and the Sudetes (Szkudlarek & Paszkiewicz in: Mikusek & Pikulska 1999, Szkudlarek et al. 2002). *E. nilssonii* is the most numerous species among the bats hunting in cultivated tree stands of the Białowieża Forest (Rachwald & Labocha 1996). The sporadic records from the remaining regions of Poland refer to single non-breeding or hibernating individuals (Labocha & Wołoszyn 1994, Kowalski et al. 1996, Postawa & Zygmunt 2000, Kasprzyk 1997, Blohm et al. 2000, Hebda 2001, Lesiński et al. 2001b, Ciechanowski & Szkudlarek 2003).

### ***Eptesicus serotinus* (Schreber, 1774) – serotine**

One of the most numerous species in summer, distributed evenly throughout Poland (Ruprecht 1983). Lower densities may be expected in the larger forest areas of northern Poland, where the species can be locally absent far from human settlements (Rachwald et al. 2001). *E. serotinus* regularly spends winter in Poland, although – as an obligatory house-dweller – it is rarely encountered in underground hibernacula (e.g. Jarzembowski et al. 2000, Postawa & Zygmunt 2000, Lesiński et al. 2001b), only locally being more numerous in bunkers (Sachanowicz & Zub 2002).

***Pipistrellus pipistrellus* (Schreber, 1774) – common pipistrelle  
and *Pipistrellus pygmaeus* (Leach, 1825) – soprano pipistrelle**

The forms belonging to one of the two sibling species (sensu Jones & Barratt 1999) were reported from the whole country. Since 1983, they have been found in the Sudetes (Rachwald & Szkudlarek 2001, Szkudlarek et al. 2002) and the Tatras (K. Piksa in litt.), where they were previously unknown (Ruprecht 1983). *P. pipistrellus* s.l. breeds in south-western Poland (Hebda 2001) and unlike *P. nathusii* (Strelkov 2000), also in the Carpathians (Paszkievicz et al. 1998). It seems to be rarer in the Central Lowlands (Kowalski & Lesiński 1995, Hejduk et al. 1999, Ignaczak et al. 2001, Sachanowicz & Krasnodębski 2003) than in northern Poland (Kowalski et al. 2001, Rachwald et al. 2001, Ciechanowski et al. 2002). Although no special surveys on these taxa have been conducted in Poland, both sibling species were separated in 12 of the 14 regions (Gałosz & Labocha 2000, Ciechanowski et al. 2001b, Rachwald & Szkudlarek 2001, Sachanowicz et al. 2001, Ciechanowski 2003, Postawa & Gas 2003, Ciechanowski & Piksa unpubl.). *P. pipistrellus* has not been yet recorded in Podlasie and the East-Central Lowlands, where only *P. pygmaeus* was found. On the other hand, *P. pipistrellus* is frequent in the Sudetes, where *P. pygmaeus* was not observed (Rachwald & Szkudlarek 2001). However, both species occur sympatrically in several areas in central, western and northern Poland (Rachwald & Szkudlarek 2001, Gałosz & Labocha 2000, Ciechanowski 2003). The species (*P. pipistrellus* s. l.), known as a long-distance migrant (e.g. Gaisler et al. 2003), was formerly regarded as leaving Poland completely for winter (Kowalski & Ruprecht 1983). However, about 20 winter localities are known recently (including hibernating colonies up to 150 individuals), although their distribution is restricted to western part of the country. Winter presence of both pipistrelle species was confirmed for Poland (review by Wojtaszyn et al. 2004).

***Pipistrellus nathusii* (Keyserling & Blasius, 1839) – Nathusius' pipistrelle**

The species was recorded in all parts of Poland, except the Tatras. Since 1983, it has been found in the Carpathians (Paszkievicz et al. 1998) and the Kraków-Częstochowa Upland (Gałosz & Labocha 2000), where it was previously unknown. It seems to be more restricted to lowlands (when compare to *P. pipistrellus* s. l.), as only few records are known from mountain areas (Paszkievicz et al. 1998). The species is one of the most numerous bats throughout the belt of the northern lakelands (Kowalski & Lesiński 1994, Kowalski et al. 2001, Sachanowicz et al. 2001, Ciechanowski et al. 2002), where most of nurseries are located (Strelkov 2000). The largest known nursery, found in Pomeranian Lakelands, included about 720 adult females and juveniles (Sachanowicz & Ciechanowski 2005). *P. nathusii* is much less abundant (locally absent) in central and southern Poland, especially in areas with few water bodies (e.g. Hejduk et al. 1999, Piskorski & Urban 2003, Sachanowicz & Krasnodębski 2003). The records of breeding are not so frequent in central and southern parts of the country (Kowalski et al. 1996, Ignaczak et al. 2001). No reproduction was confirmed in some areas of SW Poland (Strelkov 2000), but the species may be locally abundant there during mating and migration periods (Furmankiewicz & Szkudlarek 2001). *P. nathusii* is a long-distance migrant (e.g. Gaisler et al. 2003) and traditionally was considered as summer visitor in Poland (Kowalski & Ruprecht 1981). Its abundance increases significantly along the Baltic Coast during the spring and autumn migration (Jarzembowski 2003). However, the first hibernating individual was found in Gdańsk (eastern part of the Baltic Coast) in 2003 (Sachanowicz & Ciechanowski 2005).

### ***Pipistrellus kuhlii* (Kuhl, 1817) – Kuhl’s pipistrelle**

This southern species was discovered in Poland only recently. One individual was found in 2005, in the western part of Southern Uplands (Sachanowicz et al. 2006). No data on breeding are available, thus it is hard to state if the record refers to a vagrant, accidental transport by a vehicle or initial stage of the species’ invasion. *P. kuhlii* is known to extend its range in Europe during the last years (Bogdanowicz 2004).

### ***Nyctalus lasiopterus* (Schreber, 1780) – greater noctule**

A vagrant in Poland, known only from two separate areas. A skull of this species was found in a pellet of *Tyto alba* from Królików, the West-Central Lowlands (Ruprecht 1983). On 25 July 1988 a male was caught in a mistnet while leaving the roost in Bielany (in the suburbs of Kraków). The roost was located under tin plates in the roof of a church and was shared with a colony of *N. noctula* (Harmata 1988).

### ***Nyctalus noctula* (Schreber, 1774) – noctule**

This is widely distributed and numerous species, known from all parts of Poland, including the Tatras (K. Piksa in litt.), where it was previously not reported (Ruprecht 1983). The noctule, known as a long-distance migrant, was formerly regarded as a summer visitor in Poland (Kowalski & Ruprecht 1983). In fact, the individuals from Polish populations partially migrate to Germany, Hungary and Slovakia for winter (Harmata 1996, Gaisler et al. 2003, Kañuch et al. 2004). However, recently it hibernates regularly in some larger cities of Central Lowlands (Lesiński et al. 2001b, Szkudlarek et al. 2002) and the Baltic Coast (Dzięgielewska & Dzięgielewski 2002).

### ***Nyctalus leisleri* (Kuhl, 1817) – Leisler’s bat**

Dispersed records are known from the whole of the country. Previously it was considered to occur only in southern and central Poland (Ruprecht 1983). However, since 1983 it has been reported from the Baltic Coast (Łochyński et al. 2002, Ciechanowski 2003) and even from the Masurian (Kasprzyk & Ruprecht 1996) and Suwałki Lakelands (Sachanowicz et al. 2001). The reproduction in northern Poland was confirmed only in the Pomerania Lakelands (Ciechanowski et al. 2002) and the Baltic Coast (Ciechanowski 2003). In addition, Leisler’s bat was found in the Beskids (Mysłajek 2002) and the Sudetes (Kokurewicz 1991) for the first time. *N. leisleri* is regarded as rare in Poland, except for some forest complexes, such as Kozienicka Forest (Central Lowlands) or Białowieża Primeval Forest (Podlasie), where it seems to be one of the most numerous bat species (Kowalski et al. 1996, Rachwald et al. 2001). Recently, it was frequently recorded also in several landscape parks of central and southern Poland (Hejduk et al. 1999, Piskorski et al. 2001, Mysłajek et al. 2002, Piskorski & Urban 2003). No winter records of the species are known from Poland up to date, what confirms its status of a long-distance migrant (reported movement from Poland to Slovakia – Gaisler et al. 2003).

### ***Plecotus auritus* (Linnaeus, 1758) – brown long-eared bat**

One of the most abundant and most widely distributed species in Poland (Ruprecht 1983). Since 1983, it has been found in the Suwałki Lakelands (Kasprzyk 1997, Sachanowicz et al. 2001), where it was previously unknown. As a sedentary species, it is numerous bat in Polish underground hibernacula (e.g. Jarzembowski et al. 2000, Piksa & Nowak 2000, Postawa & Zygmunt 2000,

Gawlak et al. 2002, Szkudlarek et al. 2002), particularly in the small village cellars (Lesiński et al. 2004). The highest number of hibernating individuals (ca. 800) were counted in Nietoperek Bat Reserve (Sachanowicz & Ciechanowski 2005).

### ***Plecotus austriacus* (Fischer, 1829) – grey long-eared bat**

This bat occurs in southern, central and marginally in northern Poland and probably extended its range northwards during the last few decades. The northernmost localities in NW Poland are in the Wielkopolska-Kujawy Lakelands (Ruprecht 1983, Wojtaszyn et al. 2002, K. Kasprzyk in litt.). Recently, new localities were found in eastern part of the Baltic Coast (grounded female found on 18 November 2005 in Gdańsk city – Ciechanowski unpubl.), the Central Lowlands (Kowalski et al. 1997) and Podlasie (Kowalski & Lesiński 1988, Ruprecht 2004). These findings significantly extended the species' range in the country (Fig. 4). The species was also reported from the Tatras for the first time (Piksa 1998, Piksa & Nowak 2000). *P. austriacus* regularly hibernates in several Polish sites, although in smaller number than the former species (e.g. Szkudlarek et al. 2002, Sachanowicz 2003, Lesiński et al. 2004).

### ***Barbastella barbastellus* (Schreber, 1774) – barbastelle**

The species was formerly regarded as restricted to south and central Poland (Ruprecht 1983). However, recently it was recorded in the new regions: along the Baltic Coast (Bernard et al. 1994, Jarzembowski et al. 2000, Wojtaszyn et al. 2000), the Masurian Lakeland (Kasprzyk & Fuszara 1992, Kasprzyk 1997), Suwałki Lakeland (Sachanowicz et al. 2001) and the Polesie and



Fig. 4. Distribution range (black) and extralimital localities (black circles) of the grey long-eared bat *Plecotus austriacus* in Poland.

Rys. 4. Zasięg (na czarno) i pojedyncze stanowiska (czarne punkty) gacka szarego *Plecotus austriacus* w Polsce.

Wołyń (Piskorski et al. 2001). The localities of the barbastelle are currently known from almost all parts of Poland, but it seems to be very rare or absent from large areas in the NW (Pomerania region – Kowalski & Szkudlarek 2003). From the other side, it is a dominant species in winter bat assemblages in the NE Poland (Sachanowicz & Zub 2002, Fuszara et al. 2002). The largest Polish hibernaculum (min. 1870 individuals) was discovered recently in underground tunnel in Krzystkowice, western part of West-Central Lowlands (Wojtaszyn et al. 2005). There are relatively few records known from the Carpathians, in contrast to the Sudetes, where *B. barbastellus* appears to be a frequent species (Kowalski & Szkudlarek 2003). In spite of its relatively frequent occurrence only anecdotal data are available on the roosts of nursing colonies (Kasprzyk & Fuszara 1992, Kowalski & Lesiński 1995, Sachanowicz & Krasnodębski 2003).

### Distributional patterns of Polish bats

1. Species with no limit to their distribution in Poland (15)

1 a. Species numerous and widespread throughout Poland (3): *Eptesicus serotinus*, *Nyctalus noctula*, *Plecotus auritus*.

1 b. Species widely distributed in Poland although regionally varying in abundance (2): *Myotis nattereri*, *Myotis daubentonii*.

1 c. Species reported from almost all parts of Poland but patchily distributed – more abundant in some parts of the country while rare or vagrant in others (10): *Myotis mystacinus*, *Myotis brandtii*, *Myotis dasycneme*, *Vespertilio murinus*, *Eptesicus nilssonii*, *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Pipistrellus nathusii*, *Nyctalus leisleri*, *Barbastella barbastellus*.

2. Species reaching their north-eastern limits of distribution in the Polish lowlands (3): *Myotis myotis*, *Myotis bechsteinii*, *Plecotus austriacus*.

3. Species confined to the Carpathians, Sudetes and the Kraków-Częstochowa Upland (3): *Rhinolophus hipposideros*, *Myotis emarginatus* and *Rhinolophus ferrumequinum* (the latest species was not recorded in the Sudetes).

4. Species of unknown status, most likely vagrants (3): *Nyctalus lasiopterus*, *Myotis blythii* and *Pipistrellus kuhlii*.

Group 1 consists species of different status and distribution. Among them *M. brandtii* and *M. mystacinus* are more abundant in central and southern Poland, while very rare or absent in northern Poland. This may be caused by competition (unconfirmed) with species of the genus *Pipistrellus* (Baagøe 2001b), being the most frequent bats in the lakeland zone (Kowalski & Lesiński 1994, Ciechanowski et al. 2002). The other species have boreal-alpine distribution (*E. nilssonii*) or seem to be more associated with a continental climate (*B. barbastellus*). At least two species (*M. daubentonii*, *P. nathusii*) seem to have their distribution affected by the abundance of lakes and rivers, which reflects their diets – mainly chironomid flies, breeding in aquatic environment (Beck 1995); the same factor can affect *M. dasycneme* and (partially) *P. pipistrellus* s.l. All members of the group 2 are thermophilous species, but their distribution may be affected by differences in migratory behaviour. *M. myotis* is known to be an occasional migrant (up to 390 km), which results not only in several records out of its distributional range in Poland (Fig. 2), but also findings from Latvia and Sweden (Mitchell-Jones et al. 1999). *M. bechsteinii* and *P. austriacus* are rather sedentary species (movements up to 62 km), (Mitchell-Jones et al. 1999, Baagøe 2001a), thus only few extralimital records are known (Figs. 3, 4). Mouse-eared and grey long-eared bats are recent (mostly Holocene) newcomers in the European fauna (e.g. Sevilla 1989) and may still extend their ranges, as it is supposed for *P. austriacus* in NE Poland (Kowalski et

al. 1997). In general, Polish bat fauna is dominated by the species associated with the temperate humid zone (11 species, including 7 endemic for the zone – Table 2). Mediterranean taxa (sensu Horáček et al. 2000) are less numerous (9), and almost all (except for *P. pipistrellus* s. l.) reach N or NE limits of distribution in the country (groups 2 and 3). Only three species have their ranges centered in the boreal zone. At present, it is impossible to characterise the status of new members in Polish bat fauna: *M. blythii* and *P. kuhlii*. However, the beginning of country colonisation, in the case of the latter species, may not be excluded.

### Species richness and conservation status

Two gradients of species richness may be identified in Poland (Fig. 5); very well pronounced south-north gradient (reflecting difference between mountains/uplands – lowlands/lakelands), with the number of species increasing towards the south; and less clear – east-west gradient (reflecting the transition from continental to atlantic climate). The greatest number of species was reported from the Carpathians (excluding the Tatras) and the warm, karstic Kraków-Częstochowa Upland, while the lowest number – from the coldest north-eastern part of the country (Table 1).

In contrast to situation in Western Europe, *B. barbastellus* and *M. myotis* are not regarded as vulnerable or near threatened species in Poland. *M. dasycneme* and *M. emarginatus* seem to be the rarest among Polish breeding species. They may also be stated, along with *R. hipposideros* and *M. bechsteini*, as the most threatened bats in the country (Table 2).



Fig. 5. Species richness gradient of bats in Poland.  
The sibling species of *P. pipistrellus* (sensu Jones & Barrat 1999) are not included.  
Rys. 5. Gradient bogactwa gatunkowego fauny nietoperzy Polski.  
Pominięto bliźniacze gatunki *P. pipistrellus* (sensu Jones & Barrat 1999).

Table 2. Distributional and conservation status of bats in Poland and in the Palearctic Region. Abbreviations: EN – endangered, VU – vulnerable, NT – near threatened, LC – least concern, LR: nt – lower risk: near threatened, LR: lc – lower risk: least concern, DD – data deficient; BO – boreal, TH – temperate humid, TA – temperate arid, MD – Mediterranean; en – endemic for the zone, ce – range is centered in the zone  
Tabela 2. Status ochronny nietoperzy w Polsce i w Palearktyce oraz ich związek ze strefami klimatycznymi. Skróty: EN – zagrożony, VU – narażony, NT – bliski zagrożenia, LC – mniejszej troski, LR: nt – mniejszego ryzyka: bliski zagrożenia, LR: lc – mniejszego ryzyka: mniejszej troski, DD – dane niedostateczne; BO – strefa borealna, TH – strefa umiarkowana wilgotna, TA – strefa umiarkowana sucha, MD – strefa śródziemnomorska; en – gatunek endemiczny dla strefy, ce – centrum zasięgu gatunku znajduje się w danej strefie

species	conservation status		climatic zone association (Horáček et al. 2000)
	Polish Red Data List (Głowaciński 2002)	Palaeartic Region (Hutson et al. 2001)	
<i>R. ferrumequinum</i>	LC	LR: nt	MD ce
<i>R. hipposideros</i>	EN	VU	MD ce
<i>M. myotis</i>	–	LR: nt	MD ce
<i>M. blythii</i>	–	LR: lc	MD ce
<i>M. nattereri</i>	–	LR: lc	TH en
<i>M. bechsteinii</i>	NT	VU	TH en
<i>M. emarginatus</i>	EN	VU	MD ce
<i>M. brandtii</i>	–	LR: lc	BO ce
<i>M. mystacinus</i>	–	LR: lc	TH ce
<i>M. dasycneme</i>	EN	VU	TH en
<i>M. daubentonii</i>	–	LR: lc	BO ce
<i>V. murinus</i>	LC	LR: lc	TH ce
<i>E. nilssonii</i>	NT	LR: lc	BO ce
<i>E. serotinus</i>	–	LR: lc	TA/MD
<i>P. pipistrellus</i>	–	LR: lc	MD ce
<i>P. pygmaeus</i>	–	–	MD ce
<i>P. nathusii</i>	–	LR: lc	TH en
<i>P. kuhlii</i>	–	LR: lc	MD
<i>N. leisleri</i>	VU	LR: nt	TH en
<i>N. noctula</i>	–	LR: lc	TH en
<i>N. lasiopterus</i>	–	LR: nt	TH ce
<i>P. auritus</i>	–	LR: lc	TH ce
<i>P. austriacus</i>	–	LR: lc	MD ce
<i>B. barbastellus</i>	DD	VU	TH en

## Streszczenie

**Wzorce rozmieszczenia, bogactwo gatunkowe i status nietoperzy w Polsce.** Praca niniejsza przedstawia pierwszy, aktualny przegląd informacji o rozmieszczeniu i statusie nietoperzy Polski od ukazania się w 1983 roku "Atlasu rozmieszczenia ssaków w Polsce". W polskiej chiropterofaunie występują zarówno gatunki południowe (głównie śródziemnomorskie) jak i północne (nemoralne i borealne). Dotychczas na terenie Polski stwierdzono 24 gatunki nietoperzy (dla 20 potwierdzono rozród), reprezentujące 2 rodziny i 8 rodzajów, które podzielono na 4 grupy, wyodrębnione ze względu na podobieństwo ich wzorców rozmieszczenia:

(1) gatunki obejmujące swoim zasięgiem całą Polskę (15), w tym:

(a) częste i rozpowszechnione we wszystkich lub prawie wszystkich regionach (5): *Eptesicus serotinus*, *Nyctalus noctula*, *Plecotus auritus*, *Myotis nattereri*, *Myotis daubentonii*. W grupie tej jedynie *M. daubentonii* wykazuje większe zróżnicowanie rozmieszczenia, warunkowane zagęszczeniem sieci jezior i rzek.

(b) podawane z niemal wszystkich regionów, ale plamowo rozmieszczone – liczniejsze w niektórych częściach kraju, a rzadkie lub wręcz sporadyczne w innych (10): *Myotis mystacinus*, *Myotis brandtii*, *Myotis dasycneme*, *Vespertilio murinus*, *Eptesicus nilssonii*, *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Pipistrellus nathusii*, *Nyctalus leisleri*, *Barbastella barbastellus*. W grupie tej zaznaczają się taksony częstsze w północnej Polsce,

typowe dla strefy pojezierzy (*P. nathusii*, *M. dasycneme*), częstsze w regionach południowych (*M. brandtii*, *M. mystacinus*) lub reprezentujące borealno-górski typ rozmieszczenia (*E. nilssonii*).

(2) gatunki osiągające swoją północną lub północno-wschodnią granicę zasięgu w nizinnej części Polski (3): *Myotis myotis*, *Myotis bechsteinii*, *Plecotus austriacus*.

(3) gatunki ograniczone do Karpat, częściowo Sudetów i Wyżyny Krakowsko-Częstochowskiej (3): *Rhinolophus hipposideros*, *Myotis emarginatus* and *Rhinolophus ferrumequinum* (nie stwierdzony w Sudetach).

(4) gatunki o niejasnym statusie, najprawdopodobniej tylko sporadycznie zalatujące (3): *Nyctalus lasiopterus*, *Myotis blythii* i *Pipistrellus kuhlii* (możliwość jego zawleczenia nie można wykluczyć w chwili obecnej).

Gradient bogactwa gatunkowego chiropterofauny, z liczbą gatunków wzrastającą z północy na południe, odzwierciedla klimatyczne i topograficzne zróżnicowanie terenu Polski. Największą liczbę gatunków (19–21) odnotowano na Wyżynie Krakowsko-Częstochowskiej, w Karpatach i Sudetach, zaś najniższą (13–14) – w północno-wschodniej części kraju. Dziewięć gatunków umieszczono na Polskiej Czerwonej Liście Zwierząt. Najrzadszymi gatunkami nietoperzy odbywającymi rozród na terenie Polski są *M. emarginatus* i *M. dasycneme*, sklasyfikowane – wraz z *R. hipposideros* – jako zagrożone wyginięciem (EN). Do grupy tej należy zaliczyć także *M. bechsteinii*, klasyfikowanego jako bliski zagrożenia (NT). *M. myotis* i *B. barbastellus*, w przeciwieństwie do sytuacji w Europie Zachodniej, są względnie częste i nie uważa się ich za gatunki zagrożone wymarciem.

## Acknowledgements

We thank Krzysztof Kasprzyk and Michał Wojciechowski for unpublished records, Tomasz Cofta, who kindly produced the figures and Jessamy Battersby for correction of the English.

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received 8. 6. 2005