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Wolves in the Toruń Basin

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Abstract. The present wolf population of the Toruń Basin is one of the very few that exist in the central and the western part of Poland. Wolves populated the region at the turn of the 20th and 21st centuries, and at least since 2004 they reproduced in the forests on both sides of the Vistula River. The population from the Toruń Basin is probably an important source of wolves that colonize Western Poland and spread to Western Europe. However, the human pressure on the environment is continuously increasing in the Toruń Basin, therefore the future stability of the existence of wolves in the region is uncertain. The aim of the paper is to present the main data on the occurrence of wolves in the Toruń Basin, together with the main human threats to the wolf population in this region.

Key words: *Canis lupus*, the Toruń Basin, the Bydgoszcz Primeval Forest, predators, Poland.

1. Introduction

The Toruń Basin is a large, latitudinal elongated area (about 250 square km), built mainly of fluvial and eolian sands. The region is characterized by poor soils, not suitable for agricultural purposes (Bednarek & Jankowski 2006). Consequently, the afforestation rate is high in the Toruń Basin, with Scots pine (*Pinus sylvestris*) as a dominant tree species in forest stands on poor habitats. The high proportion of forest in the land use of the Toruń Basin results in the fact that the region is an important refuge of wild animals, such as the wolf (*Canis lupus*).

As the Toruń Basin has been used by wolves for at least 150 years as a part of their traditional migration route from the east to the west (Kowalski 1953; Bereszyński 1998; Jędrzejewski et al. 2002; Fig. 1), the predators have been occasionally observed in the region. In the second half of the 20th century, wolves made some attempts to colonize the local forests, but the occurrence of predators were unstable, mainly because of man hunting (Mastyński 1964, 1967; Andrzejewski & Wołk 1991). Since 1998 the circumstances have changed when the wolf became a fully

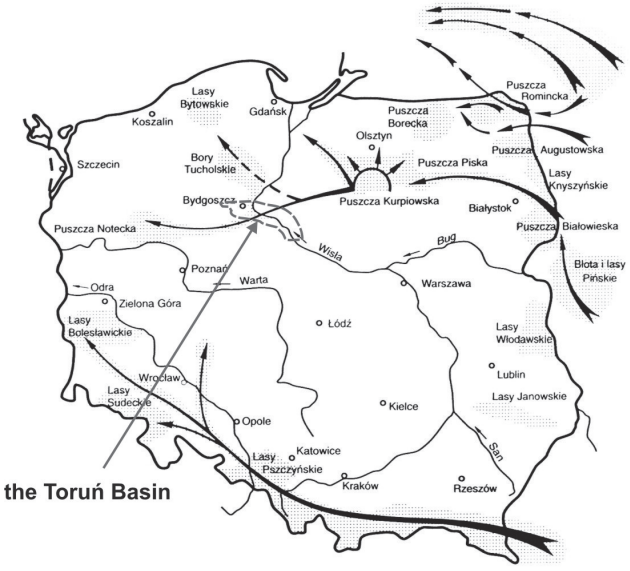

Figure 1. The traditional wolves' migration routes since at least 150 years (Kowalski 1953, modified by Bereszyński 1998)

Figure 2. An adult wolf (probably one of a dominant pair in a pack of the Bydgoszcz Primeval Forest)

Figure 3. A young male wolf

protected species in Poland. At the turn of the 20th and 21st centuries, wolves have successfully colonized the Toruń Basin (Figs. 2, 3). Although two articles have been published regarding the present wolf population in the Basin (Krzemień 2008; Sewerniak 2008), the population has not been described yet in a scientific paper. Some authors have only noted the occurrence of wolves in the region (e.g. Jędrzejewski et al. 2002).

The paper aims at presenting the main data on the occurrence of wolves in the Toruń Basin, including the species ecology and the human threats to the existence of wolves. The article was prepared based on the author's long-term field observations and followings, as well as the data gathered from local foresters and the articles quoted.

2. Wolves in the Toruń Basin in the past

As a result of human impact, the European wolf range significantly decreased during the last centuries, which also influenced the present area of Poland. In the mid-19th century, wolves became very rare in the western part and common in the eastern part of the present Polish territory (Okarma 1997). Even then, forests of the Toruń Basin constituted an important refugium for wolves. Between 1815 and 1841, 16 adult and 83 young wolves were killed (hunted or taken from wolf lairs; Suchocki 1926) only in the area called "Wódek", the western part of the present Forest Division of Cierpiszewo. By the end of the 19th century, wolves were totally exterminated more westward from the line of the Bug, Narew and Biebrza Rivers (Kowalski 1953).

After the First World War, the range of wolves spread further to the west, beyond the Bug River (Kowalski 1953), and wolves were observed again in the Toruń Basin. However, their existence in the region did not last long. The attempt to colonize the region brought about the intensive activity of hunters, which resulted in hunting of 2 adult wolves in the Bydgoszcz Primeval Forest in 1925 (Suchocki 1926). According to Okarma (1997), just before the Second World War, wolves were again totally exterminated in the areas located further to the west, beyond the line of the Bug, Narew and Biebrza Rivers.

As every war results in the expansion of wolves (Kowalski 1953), after the Second World War wolves again populated forests of the Toruń Basin. Mastyński stated (1964) that 1952 was the culmination year of the wolf invasion in Pomerania. Taking into account the facts presented by Mastyński (1964, 1967), it can be assumed that in the early 1950s, forests of the Toruń Basin were populated by some wolf packs and wolves successfully reproduced in the region. After the wolf extermination began in 1955 ("the wolf action"), the size of the wolf population significantly decreased. However, in 1964 the stable population of wolves still existed in the Toruń Basin. At that time, the number of wolves in the Basin (together with some adjacent areas) was estimated at 20–30 individuals (Mastyński 1964). In the 1960s, wolves were permanently exterminated and in 1966 there were no wolves not only in the Toruń Basin, but also in the whole former Bydgoszcz District (Mastyński 1967).

The next successful attempt to colonize the Toruń Basin with wolves took place in the 1980s. This was described by Andrzejewski and Wołk (1991). According to the authors, the colonization was a political consequence of commandeering hunters' guns when the "Martial Law" was introduced in Poland in 1981. From 1983 until at least 1986, wolves occurred and reproduced in the present Forest Division of Toruń (in the 1980s, part of the Dobrzejewice Forest Division). The wolf pack was seriously shattered during

the hunting on the 27th of December 1986, when 3 out 5 encountered wolves were hunted down and another one (injured) was killed few days later (Andrzejewski & Wołk 1991). The last (in the 20th century) stated reproduction of wolves in the Toruń Basin took place in 1986. Starting from the aforementioned winter hunting on 27.12.1986 until the end of the century, wolves were observed in the Toruń Basin only occasionally, mainly in its eastern part (the Dobrzejewice Forest Division). As the Basin is an important part of the traditional migration route of wolves from the eastern to the western part of Poland (Fig. 1), wolves could try to colonize the region or only cross it while migrating to the west. There were occasions when such individuals were hunted down by hunters, as wolves were thought to be wild, feral dogs, for instance in 1989 in the Forest Division of Cierpiszewo.

Figure 4. A wolf den in the Toruń Basin

3. The present wolf population

3.1. Remarks on ecology

3.1.1. Colonization and the number of individuals

At the turn of the 20th and 21st centuries, wolves occurred in the eastern part of the Toruń Basin (the Dobrzejewice Forest Division). The population dynamics of the wolf pack from the Dobrzejewice Forest Division has not been well recognized. Based on field observations of local foresters, it can be assumed that until 2003, the pack consisted of more than 4 wolves. Since 2003 their estimated number has decreased and until now it has oscillated around 2–4 individuals. In spite of the decrease, wolves still populate and reproduce in the eastern part of the Toruń Basin. In the Dobrzejewice Forest Division, 3 wolf dens were found, including 2 dens used for rearing of pups in 2008 and in 2009.

At present, the pack occurring in the Dobrzejewice Forest Division is the only one that populates the forest situated on the right Vistula bank of the Toruń Basin. In the Toruń Forest Division, which includes forests located north and north-west of Toruń, the occurrence of wolves has not been confirmed in this decade.

There are more information on the occurrence of wolves in the Bydgoszcz Primeval Forest located in the Toruń Basin on the left Vistula bank. It also concerns the colonization course and population dynamics. It can be assumed that the present, stable wolf population began in this Forest in 2004. The occurrence of wolf in the forest between Bydgoszcz and Toruń was initiated in its western part. In 2004, wolves and their trails were observed in the Forest Division of Solec Kujawski and in the western part of the Cierpiszewo Forest Division (Krzemień 2008). At that time, predators visited the Gniewkowo Forest Division (the eastern part of the Bydgoszcz Primeval Forest) only occasionally. At least since 2004, wolves have successfully reproduced in the Forest. In 2004 a wolf den was found in the Łążyn Forest District and in 2005 – in the Żółwin Forest District, where also wolf pups were observed (Krzemień 2008).

Since 2005 wolves have evidently moved to the eastern part of the Bydgoszcz Primeval Forest and after 2006, signs of their occurrence have been observed less and less frequently in the Forest Divisions of Solec Kujawski and Bydgoszcz (Krzemień 2008). The reproduction area has also been changed at that time. Wolves have dug some dens that are periodically and interchangeably used in the eastern part of the Forest (Fig. 4).

The estimated dynamics of the population (2004/2005–2009/2010) of wolves in the Bydgoszcz Primeval Forest is presented in Figure 5. As it appears from the field observations, the packs of wolves were formed in the Forest in the following way: probably during the first years of their occurrence (2004–2005), wolves formed one pack that generally spread over the western part of the Forest. It can be assumed that since the winter of 2005/2006 until 2008, there were two packs in the area (Sewerniak 2008). The winter of 2007/08 appears to be a period with the largest number of wolves in the Bydgoszcz Primeval Forest during the whole decade (Fig. 5). Since then, a significant decrease in the number of wolves has been observed in the Forest. At present, probably there is only one wolf pack in the Bydgoszcz Primeval Forest, which spreads mainly in the area of the Cierpiszewo and the Gniewkowo Forest Divisions.

The decrease in the number of wolves, observed in the Bydgoszcz Primeval Forest since 2008 (Fig. 5), seems to be caused by different reasons. Only one thing can be stated for sure – the road traffic was an important threat to

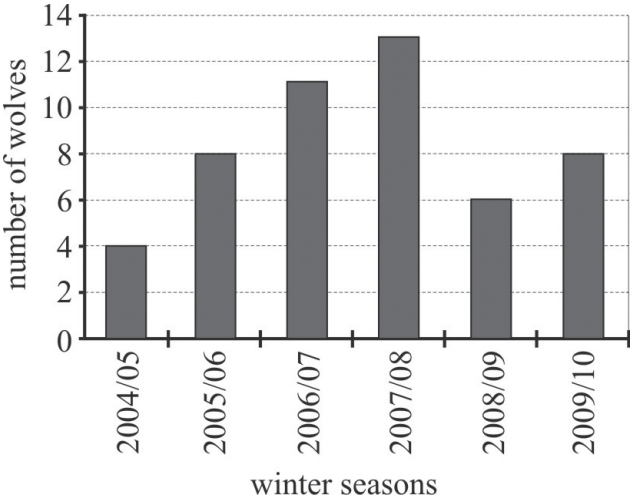

Figure 5. The estimated population dynamics (2004/2005–2009/2010) of wolves in the Bydgoszcz Primeval Forest

Figure 6. A young wolf killed by a car near Otłoczyn on a road number 1 (14.05.2009)

wolves. Since 2004, at least three wolves have been killed by cars near Toruń (Fig. 6). There is a high possibility that some young individuals of the local population (Fig. 3) left the refuges of the Toruń Basin to colonize forests in Western Poland, which offers them large refuge areas. According to the national census conducted in 2001, the average number of wolves in one pack was 5.5 in the Carpathians and 2.4 in the central and in the western part of Poland (Jędrzejewski et al. 2002). In the winter of 2007/2008, the pack of wolves that occupied the eastern part of the Bydgoszcz Primeval Forests consisted of ca. 9 individuals, so the pack was relatively numerous. Such high number of wolves in a pack could be an important reason for young individuals to migrate from the Toruń Basin. Of course the decrease in the number of wolves in the Basin can also be caused by other reasons.

Although the Vistula River is not a serious obstacle for migration of wolves, there are no data related to crossing the river by wolves or other interesting matters, e.g. a relatedness of two present wolf populations in the Toruń Basin, which populate the forests on both sides of the Vistula. One can assume that the wolf pack from the Dobrzejewice Forest Division could be a source population for wolves that colonized the Bydgoszcz Primeval Forest in 2004, as in 2003 the number of wolves in the Dobrzejewice Forest Division significantly decreased.

3.1.2. The main refuges and size of territories

There are two areas of primary significance for the occurrence of the present-day pack of wolves that populate the Bydgoszcz Primeval Forest. The first is a huge postfire area, located mainly in the Cierpiszewo Forest Division, where nearly 30 square km of pine stands were burnt in 1992. Today the area is covered mostly by even-aged, about 15 years old pine thickets that are not easily penetrated by people, and thus offer good shelter conditions for wolves.

The second area (ca. 40 square km) – the central part of the artillery range, is located in the Gniewkowo Forest Division. The area comprises military training yards and their buffer zone, where the activity of both soldiers and foresters has not been intensive for years. The buffer zone is mostly covered with heathlands and grasslands mixed with pine and birch forests, which developed as a result of natural succession.

The author estimates the territory of the present-day pack of wolves from the Bydgoszcz Primeval Forest at about 350 square km. It includes both the above described areas and the timber pine forest around them. In comparison with territories of wolves described by Jędrzejewska and Jędrzejewski (2001) from the Białowieża Primeval Forest (154–343 square km), this territory is relatively large. It is interesting that when two packs of wolves occupied the Bydgoszcz Primeval Forest, their territories partly overlapped. This implies that these two packs could be closely related. The telemetric research conducted by Jędrzejewska and Jędrzejewski (2001) proved that such overlapping of territories can occur when packs of wolves are closely related.

One can assume that the territory of the pack of wolves from the Dobrzejewice Forest Division is also large. It can be stated that "Zielona Kępa" is an important refuge of the pack – an island of the Vistula River located near the village of Pokrzywno. The island (ca. 3 square km) is uninhabited and relatively rarely visited by people. Moreover,

Figure 7. Deer group of about 100 individuals in the military area located south of Toruń

Figure 8. Feral dogs hunting a hind of red deer in winter 2005/2006

it is mostly covered with thick bushes that form favourable shelter conditions for animals.

3.1.3. Wolf predation in aspect of human interests

As it appears from carcasses, red deer (*Cervus elaphus*) is the main menu item of wolves in the Toruń Basin. The species is also the basic prey of wolves in other parts of Poland (Śmietana & Klimek 1993; Jędrzejewski et al. 2000; Nowak et al. 2005). In the Toruń Basin, young individuals and hinds of different age distinctly prevail among the red deer preys. A very high density is characteristic of the red deer population in the region that is especially relevant to the area of the artillery range located in the Gniewkowo Forest Division. Female deer groups (together with young individuals of both sex), which consist of even more than 100 animals, can be observed in the region (Fig 7). According to the author's estimation, even 1000 red deer can occur in the present-day territory of the pack of wolves in the Bydgoszcz Primeval Forest. Such a number of cervids has a distinct influence on the forest ecology and forest management. Predation of wolves on red deer can reduce the costs of forest protection from the pressure of cervids. However, it can be stated that until now, the impact of wolves on the decrease of the number of red deer specimens in the Toruń Basin, has been less significant than expected. It is not surprising when the opinion of Mech is taken into consideration, that wolves can distinctly influence the population of ungulates only when their total biomass is lower than 10 t per one wolf (Bereszyński 1998). Taking into account the number of wolves and the density of ungulates (especially red deer), one can state that the total biomass of ungulates per one wolf in the Bydgoszcz Primeval Forest is higher than the critical value proposed by Mech.

It is interesting that since wolves populated the forests of the Basin during the present decade, there has been recorded only one adult male of red deer hunted down by predators. Preying on adult male red deer is observed in regions characterized by thick snow cover in winter (e.g. in the Carpathians), whereas the Toruń Basin is a region with low average annual snowfall, as compared to other regions of Poland.

The carcasses found in the Toruń Basin indicate that wolves here prey on other species, such as roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), fox (*Vulpes vulpes*) and feral dogs. The diet of wolves in the Toruń Basin is actually particularly analysed by scientists from "the Association for Nature WOLF".

In the Toruń Basin, preys are usually eaten by wolves in some days after preying, also together with other species – mainly foxes (*Vulpes vulpes*) and ravens (*Corvus corax*). When an adult hind of red deer is preyed, usually only a skull, a mandible and some bigger bones are left few days later. Calves are usually entirely eaten, even together with such parts as hooves, which are found in excrements of wolves as undigested parts.

The wolves of the Toruń Basin exploited preys much less at the end of the winter 2005/06, when extremely harsh conditions occurred in the Toruń Basin (ca. 40 cm of the frozen snow cover, the air temperature even ca. 20 degrees below zero). During that winter, relatively many carcasses were found, so wolves were recognized by some hunters as a big threat to the existence of the red deer population in the Toruń Basin (Łogin 2007). However, only some of the dead animals were hunted by wolves. Undeniably some

Table 1. Some characteristics concern wolves killed by cars in the Toruń Basin

Date of an accident	Location			Sex	Approx. age (years)
	forest division	forest district	number of section		
17.11.2005	Cierpiszewo	Chorągiewka	252	♂	3–4
02.02.2006	Gniewkowo	Zajezierze	114	♀	2–3
14.05.2009	Gniewkowo	Karczemka	251	♂	1

deer specimens were killed by feral dogs (Fig. 8). Furthermore, it was proved by Jędrzejewski et al. (1992) that the mortality of ungulates during extremely harsh winters is significantly higher than during milder winters, and this has nothing to do with predation of wolves.

After some years of analyses on wolves' preys, in relation to their species, sex and age structure, one can state that the predation of wolf does not constitute a serious threat to the interest of hunters in the Toruń Basin. Moreover, one can believe that due to predation of wolf, the populations of ungulates will become stronger in the future, and this is favourable to the interest of hunters. This kind of effect induced by the predation of wolf was observed by Bereszyński (1998) in the Forest Division of Sarbia in Western Poland.

In this decade no wolves preying on domestic animals have been observed in the Toruń Basin (with exception for feral, semi-domestic dogs). Preying on cattle happened in this region in the 1980s (Andrzejewski & Wołk 1991). It seems that the important reason for this kind activity of wolves was the exploitation of the wolf population by hunters. Small packs of wolves, which are weakened by man, might not be able to prey on wild animals regularly, so such packs can hunt for domestic animals (Nowak & Mysłajek 2006).

It is interesting that, despite the fact that the Toruń Basin is not a mountainous area, wolves take advantage of the relief when they hunt here. They use dunes as traps when chasing animals, and thus wolf preys are often found in depressions between dunes.

3.2. The main human threats to wolves

The first group of human threats includes direct threats, among which the road traffic seems to be the most important one for the local population of wolves. During the last few years, three wolves were killed in car accidents near Toruń (Tab. 1, Fig. 6). Two individuals were killed on the national road no. 15, which crosses the territory of the pack in the Bydgoszcz Primeval Forest. Wolves cross the road at least a few times a week so the road constitutes their great threat. The third wolf was killed on the national road no. 1 in May, 2009 (Fig. 6). These roads are actually neither fenced nor provided with "green bridges" for animals.

Poaching is yet another potential direct threat to wolves. Although this activity cannot be excluded, no poached wolves were recorded in the Toruń Basin during this decade.

The second group of human threats comprises activities that can indirectly threaten the existence of wolves in the Toruń Basin. The potential indirect threats can be associated with different human activities (e.g. spreading of human settlements into forest areas, forest management), however the illegal forest exploitation for motor sports appears to be the most serious indirect threat to the existence of wolves. The problem involves all the forests in the Toruń Basin but it is particularly relevant to the artillery range, as it is an important refuge for the pack of wolves in the Bydgoszcz Primeval Forest.

4. Conclusion

The wolf population in the Toruń Basin is one of the very few that populate the central and the western part of Poland. Probably the population constitutes an important source of wolves that colonize Western Poland and spread to Western Europe. Now, when finally after many years, there is a fairly stable population of wolves in the region, it is a big challenge to consider the presence of wolf in many human activities. As at present, the human pressure on the environment is continuously increasing in the Toruń Basin, the future stability of the existence of wolf in the region is quite uncertain. Therefore, it is crucial that this matter is given careful consideration. There is no exaggeration in the statement that the stable occurrence of wolves in the Toruń Basin is possible only if people can tolerate it. It would evidently help people to learn the tolerance if they were aware of the fact that the wolf is not an enemy of man, but a natural component of forests and a predator, which needs a place to live.

To create the social respect for wolves, as well as to the nature in general, we need good ecological education, which is important because the respect to the nature re-

quires some human sacrifice. Among the things, which can be done for wolves is building of "green bridges" over main roads. Also, there should be certain limitations imposed on some human activities, for example a real, exacted ban on the illegal forest exploitation for motor sports. Both, the lack of "green bridges" and illegal forest cross driving seem to be the most important threats to the existence of wolves in the Toruń Basin. Wolf is a species protected not only by the Polish law, but also by the international resolutions (e.g. the Bern Convention; the Habitats Directive), so we are strictly obliged to consider the presence of wolves in the Toruń Basin in human activities. It would be advisable to impose the protection of main wolf refuges in the region.

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