The history of distributional and numerical changes of the wolf Canis lupus L. in Poland

Mieczyslaw Wolsan[1], Maria Bieniek[2], and Tadeusz Buchalczyk[3]

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Abstract. Patterns of the changes in distribution and numerical status of the wolf **Canis lupus L.** in Poland during the Quaternary are presented based on both published and unpublished palaeontological, archaeological and historical records. The wolf inhabited the territory of Poland as far back as the Upper Pleistocene. It was widely distributed in Poland during much of the Holocene, particularly from the Neolithic through Middle Ages. Its populations west of the Vistula were exterminated by the end of the 1860s. The species was very rare on the turn of the 19th century when its range was restricted to the east-central, easte.nmost and southeastern Poland. Early in the 1900s it became more numerous and subsequently reoccupied some portions of its former range. During the 1920s and 1930s it again declined in number and distribution. The species abruptly increased in number during the 1940s, with a peak of above 800 individuals at the mid-century. Early in the 1950s it was dispersed almost throughout Poland. A drastic decrease in the Polish wolf population began about the mid-1950s and continued until about the mid-1960s when it was estimated to be above 100 specimens only. During the late 1960s the wolf population was established between 100 and 200, but already in the early 1970s the species was nearly extinct in Poland (under 60 individuals in 1972). At that time its range was already diminished to the Sobibor Woods; Roztocze; and northeasternmost and southeasternmost Poland. Since about the mid-1970s it has generally been becoming more and more abundant up to about 900 individuals between 1984 and 1986. In consequence, its range has expanded westward once again, including most of the forested areas of Poland.

[[1]Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, Slawkowska 17, PL-31-016 Krakow, Poland.

[2]Research Centre for the Protection of Nature and Natural Resources, Polish Academy of Sciences, Lubicz 46, PL-31-512 Krakow, Poland.

[3]Research Institute, Polish Academy of Sciences, PL-17-230 Bialowieza, Poland.]

The wolf *Canis lupus Linnaeus*, 1758 inhabited the territory of Poland as far back as the Last Interglacial (Eemian). During the Last Cold Stage (Vistulian) it occurred in the areas uncovered with ice sheet. It was widely distributed in Poland and surely relatively common during much of the Holocene, in particular from the Neolithic through Middle Ages (Fig.1). Its populations west of the Vistula were virtually exterminated by the end of the seventh decade of the 19th century. On the turn of the past century, when the species was already very rare, its range was virtually restricted to some forested regions of the east-central, easternmost and southeastern Poland (Fig.2). The decline in number and distribution ceased in the early 1900s, and wolves subsequently dispersed westward, occurring in the northern and northeastern Wielkopolskie Lakes; southeastern Pomeranian Lakes; Masurian Lakes; western and northern Masovian Lowland; Podlasie; Polesie; northern Sandomierz Lowland; western Malopolska Upland; and Carpathian Mountains. The species became less numerous during the 1920s and 1930s and its range diminished at that time to some forested habitats of the central and eastern Masurian Lakes; Podlasie; Polesie; Roztocze; and eastern part of the Carpathians (Fig.3a). The Polish wolf population (*C. l. lupus Linnaeus*, 1758) abruptly increased in number during the fifth decade of the century, with a peak of above 800 individuals at the mid-century (Fig.4). By the late 1940s, besides the wooded regions east of the Vistula, wolves occurred in the eastern half of the Pomeranian Lakes; Drawsko, Notecka and Sudetic Forests; Milicz-Ostrzeszow Woods; and Malopolska Upland (Fig.3b). Early in the 1950s, however, the species dispersed almost throughout Poland, reoccupying much of its original dis-

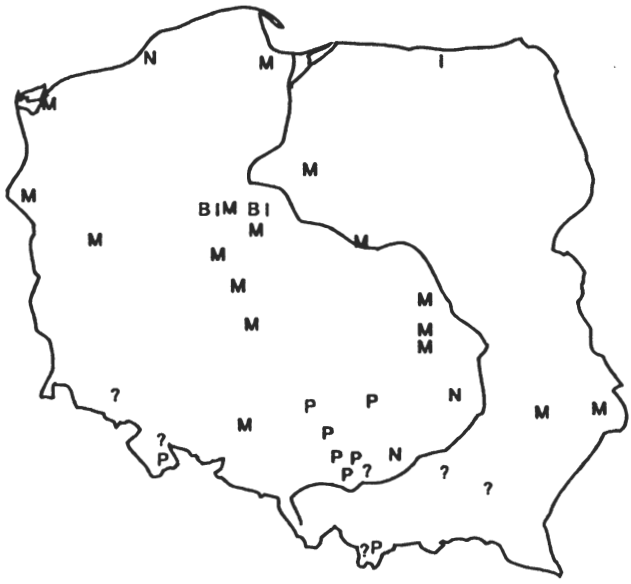

Fig.1. Map of Poland, with the Vistula indicated, showing location of fossil and subfossil records of the wolf from the Upper Pleistocene (P), Neolithic (N), Bronze Age (B), Iron Age (I) and Middle Ages (M). Question marks (?) represent the records of unknown age.

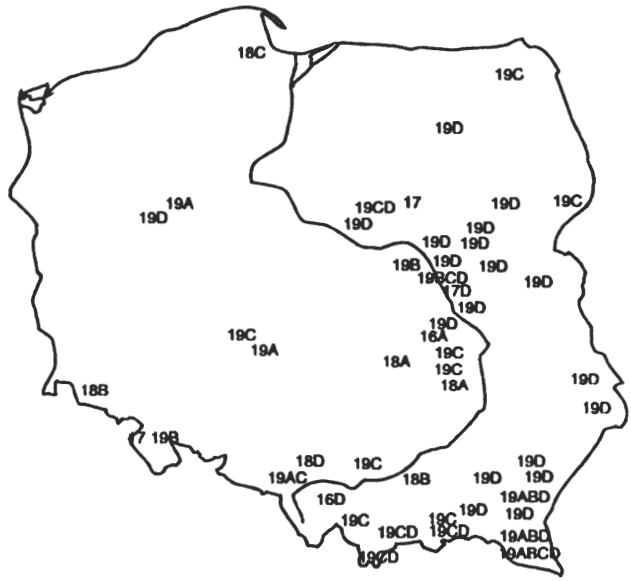

Fig.2. Map of Poland, with the Vistula indicated, showing location of historical records of the wolf up to 1899. Numbers 16, 17, 18 and 19 represent the records from the 16th, 17th, 18th, and 19th centuries; while letters A, B, C and D indicate the first, second, third and fourth century quarters; respectively.

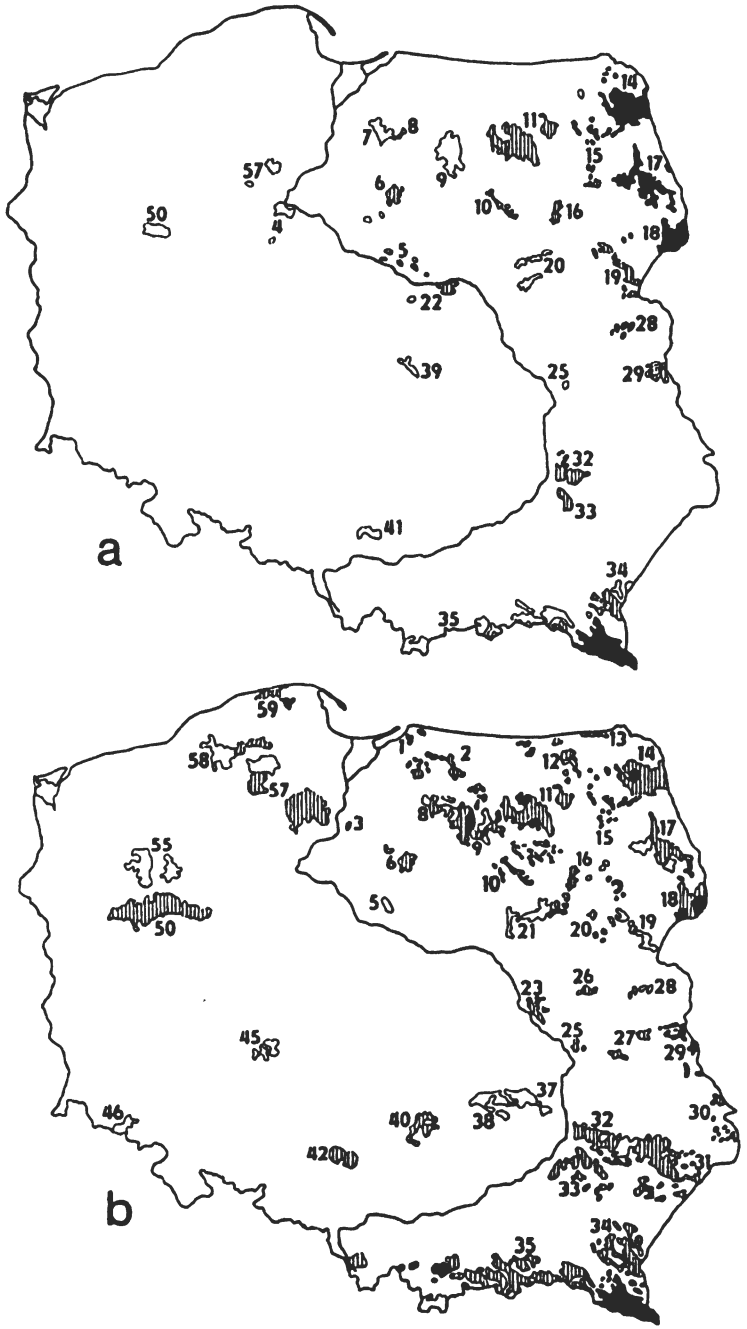

Fig.3 a,b. Map of Poland, with the Vistula indicated, showing distribution of the wolf in the 1900-1939 period (a) and 1940s (b). For more explanation see ~~text.~~ p. 380.

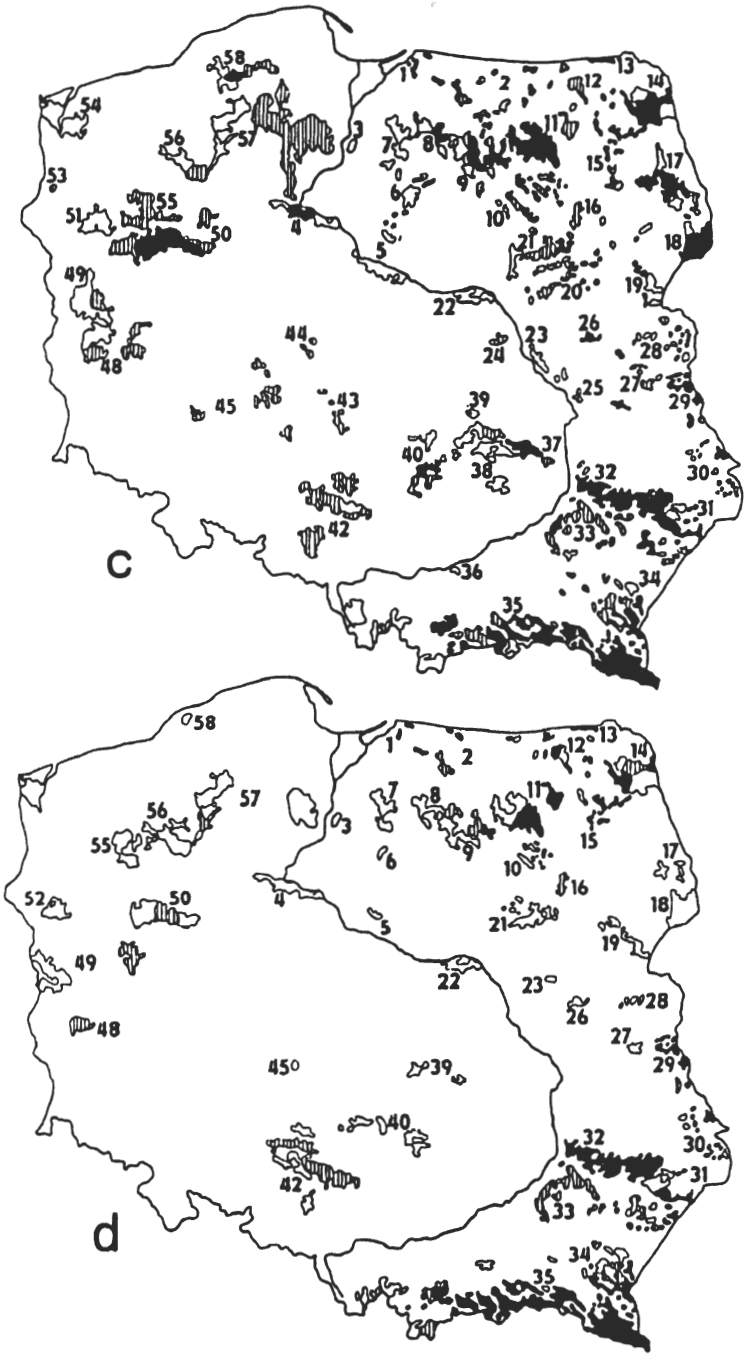

Fig.3 c,d. Map of Poland, with the Vistula indicated, showing distribution of the wolf in the 1950s (c) and 1960s (d). For more explanation see ~~text.~~ p. 380.

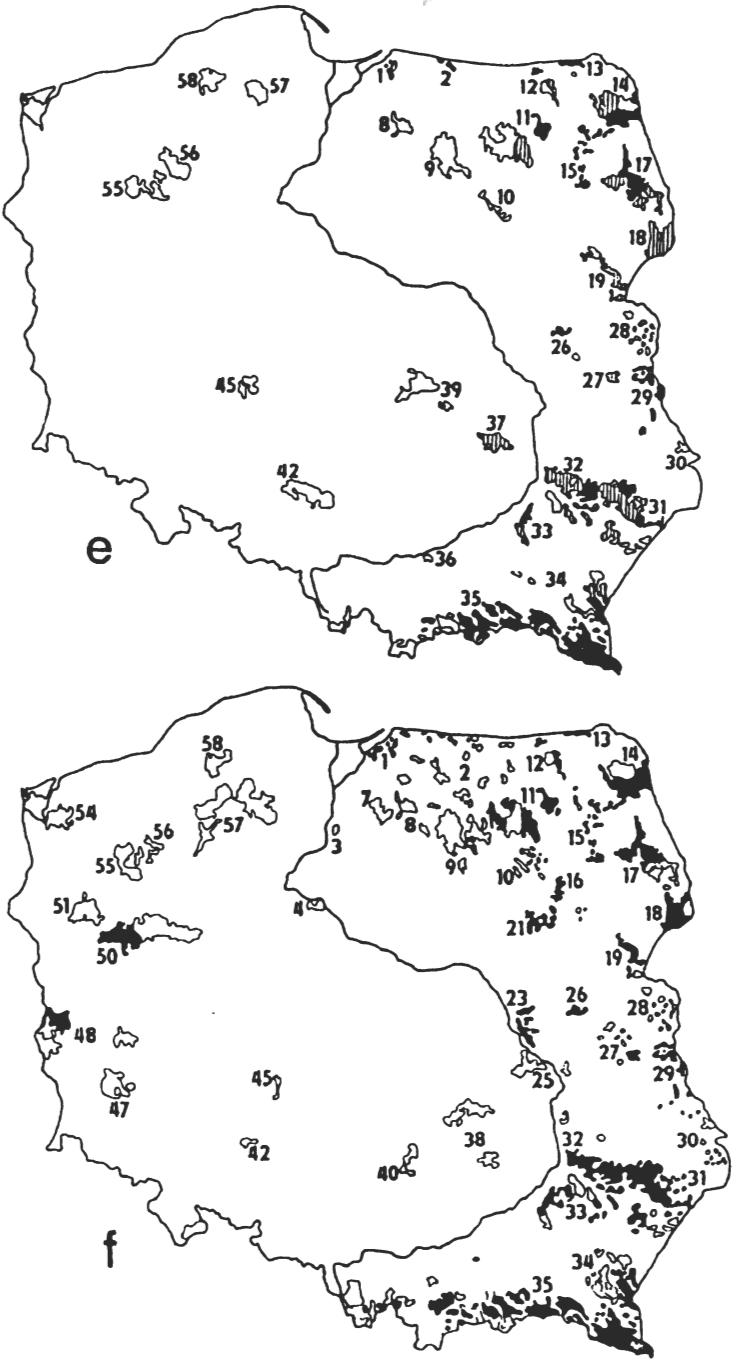

Fig.3 e,f. Map of Poland, with the Vistula indicated, showing distribution of the wolf in the 1970s (e) and between 1980 and 1986 (f). For more explanation see ~~text.~~ p. 380.

Fig.3. Map of Poland, with the Vistula indicated, showing distribution of the wolf in the 1900-1939 period (a), 1940s (b), 1950s (c), 1960s (d), 1970s (e) and between 1980 and 1986 (f) based on published and unpublished records. Solid areas indicate the established populations; open areas represent woods only strays were observed in; shaded areas mean the former and/or the latter. 1 - Kadyny Woods, 2 - wooded areas of Warmia, 3 - wooded areas of the Kwidzyn region, 4 - Bydgoszcz Forest, 5 - Wloclawek-Gostynin Woods, 6 - Brodnica Woods, 7 - Ilawa Woods, 8 - Taborz Woods, 9 - Nidzica Forest, 10 - Kurpiowska Forest, 11 - Pisz Forest, 12 - Borecka Forest, 13 - Romnicka Forest, 14 - Augustów Forest, 15 - wooded areas in the Valley of the Biebrza river, 16 - Czerwony Wood, 17 - Knyszyn Forest, 18 Bialowieza Primeval Forest, 19 - Mielnik Forest, 20 - Kamienczyk Forest, 21 - Biala Forest, 22 - Kampinos Forest, 23 - Otwock-Garwolin Woods, 24 - Stromiec Forest, 25 - Kozienice Forest, 26 - Luków Woods, 27 - Parczew Woods, 28 - Chotylow Woods, 29 - Sobibor Woods, 30 - Strzelce-Hrubieszow Woods, 31 - Roztocze Woods, 32 - Sol Forest, 33 - Sandomierz Forest, 34 - Carpathian Highland Woods, 35 - Carpathian Forest, 36 - Niepolomice Forest, 37 - Ilza Forest, 38 - Swietokrzyska Forest, 39 - Pilicka Forest, 40 - Wloszczowa-Opoczno Woods, 41 - Cracow Upland Woods, 42 - Silesian Forest, 43 - wooded areas of the Sieradz region, 44 - Krotoszyn Woods, 45 - Milicz-Ostrzeszow Woods, 46 - Sudetic Forest, 47 - Lower Silesian Woods, 48 - Zielona Gora Woods, 49 - Lubuska Forest, 50 - Notecka Forest, 51 - Gorzów Wielkopolski Forest, 52 - Nadodrzanskie Woods, 53 - Piasek Forest, 54 - Goleniow Forest, 55 - Drawsko Forest, 56 - Krajenka Woods, 57 - Tuchola Woods, 58 - Koszalin Forest, 59 - Wierzchucino Forest.

tribution (Fig.3c). A drastic decrease in wolf populations began about the mid-1950s and continued until about the mid-1960s when they were estimated to be above 100 specimens altogether. During the late 1960s the Polish wolf population was established between 100 and 200, but already in the early 1970s the species was nearly extinct, with its population under 60 in 1972 (Fig.4). This steep diminution in number was accompanied by gradual disappearance of the species over most of the territory of Poland (Fig.3d). Early in the 1970s its range was already reduced to the forested areas of the eastern Masurian Lakes; northern Podlasie; Roztocze; central and eastern Carpathians; and Sobibor Woods (Fig.3e). Since about the mid-1970s the species has generally been becoming more and more abundant, reaching a maximum of approximately 900 individuals between 1984 and 1986 (Fig.4). In consequence, its distribution has expanded westward once again, affecting most of the forested habitats of Poland (Fig.3f).

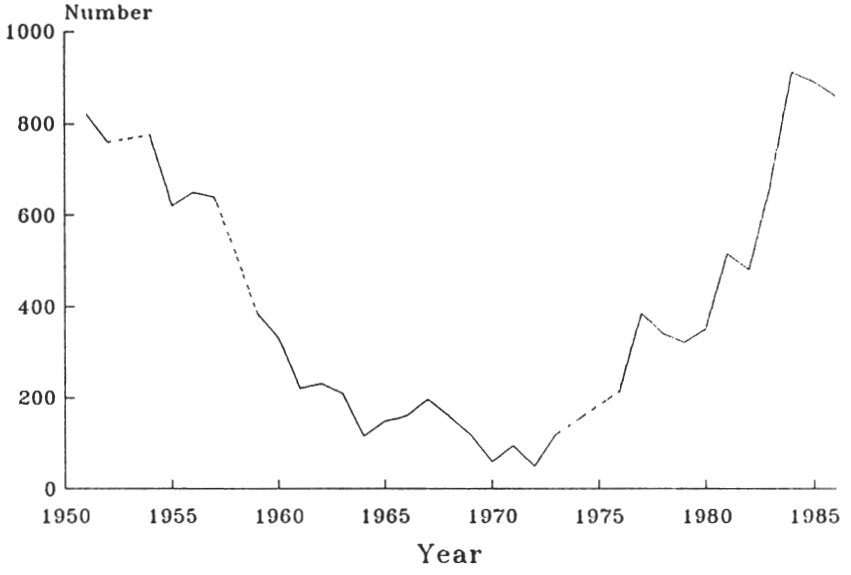

Fig.4. Changes in the numerical status of the wolf in Poland in the period from 1951 through 1986 based on the estimation of the Ministry of Agriculture, Forestry and Food Economy. Broken line indicates no data.