

Distribution and Numbers of Wolves in Poland

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Okarma H., 1989: Distribution and numbers of wolves in Poland. Acta the-riol., 34, 35: 497—503 [With 2 Tables & 2 Figs]

The wolf *Canis lupus* Linnaeus, 1758 has had "game species" status since the late 1970's. Hunting is permitted only by licensed hunters from August 1 to March 31. Official reports show that recently over 160 wolves were killed during every hunting season in Poland. Numbers and distribution of kills showed that the wolf has expanded its range since the late 1970's and occupied two core areas: northeastern and southeastern Poland. The south-eastern population was larger: over 60% of the wolves were killed in this area which covers only about 10% of the overall wolf population range in Poland. Sex and age structure of a sample of 152 wolves shot in south-eastern Poland between August 1980 and March 1986 were determined. The sample included 70 adult males, 49 adult females, 18 male and 15 female pups. The small representation of pups in the sample (22%) was perhaps due to hunting biases. The mean body weight of adult males was 46.4 kg and females, 39.3 kg. The average weight of male pups was 26.3 kg and female pups were slightly heavier (27.9 kg) than male ones.

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1. INTRODUCTION

The wolf *Canis lupus* Linnaeus, 1758 is the most abundant large predator occurring in Poland. However to date, no systematic monitoring or analysis of its population has been attempted. After World War II the wolf occurred in about one-third of Poland, and its population was estimated at about 1000 (Sumiński, 1974). Because of losses to wildlife and livestock (Kowalski, 1953b), lobbying by farmers and hunters (Kowalski, 1953a) led to a wolf control program that was launched in 1955. This led to a major decline of wolf numbers and by 1970 its survival in Poland was in doubt. Consequently, biologists and conservationists campaigned to protect wolves. Their efforts succeeded, and in 1975 the wolf was declared a game species (Decree of MFWI, 1975).

Hunting is permitted only with rifles and shotguns during specified season (August 1 to March 31) and only by licensed hunters. Wolf pelts and skulls have recently become prestigious trophies and they can be

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sold for a good price. Wolf numbers are currently estimated, as are other game species, by official procedures based on snow tracking and "observations of the game throughout the year" (Decree of MFWI, 1973). They are carried out by foresters or by members of hunting clubs, depending on who administers a particular area. Currently hunters are encouraged to shoot more wolves: a considerable reward is paid and harvest bags are not enforced.

The purpose of this study was to estimate the wolf numbers and distribution from hunters kills, and to analyse the age and sex structure of wolves killed in southeastern Poland, where a preliminary study on the wolf was made (Okarma, 1984).

2. STUDY AREA AND METHODS

Data on numbers and size of wolves killed were obtained for all of Poland from the State Administration Forest Districts' official reports of 1980/81 through 1988/89 hunting seasons. The estimates of wolf numbers were based on snow tracking censuses and observations carried out throughout the year (Decree of MFWI, 1974). The numbers of animals shot included all those shot during the legal hunting seasons (August 1 to March 31). The distribution of the animals was separated by the administrative division of Poland into provinces (Fig. 1). A sample of kills from the southeastern provinces of Krosno and Nowy Sącz, an area of about 11,000 km² (Fig. 1), was examined from August 1980 to March 1986. Hunters cooperated by quickly reporting their success and carcasses were recovered within 48 ha. Date, location and hunting method were recorded. Animals were classified according to sex and age — pups (less than 12 months) *vs.* adults on the basis of weight, upper canine length and tooth wear (Van Ballenberghe *et al.*, 1975). Teeth were not extracted for age determination since hunters generally wanted the complete skull.

The G-test was used to estimate sex ratio differences among wolves shot (Sokal & Rohlf, 1981)

3. RESULTS AND DISCUSSION

3.1. Distribution and Numbers of Wolves

According to the official data, there are about 500-900 wolves in Poland and 1238 animals were shot during the hunting seasons 1980/81 to 1988/89 (Table 1). During the last 7 hunting seasons an average of 160 animals were killed (Table 1). Since no reliable technique of estimating game population size has been used in Poland, the official population figures should be treated with due caution. Current estimates are based on snow tracking censuses which in the case of ungulates underestimated considerably their numbers (Pucek *et al.*, 1975). The effect of snow tracking censuses biases on the accuracy of estimates of the actual wolf population size has not been evaluated. However, some data indicated that such censuses overestimate the wolf number in Po-

Table 1
Total population estimates and numbers of wolves killed by hunters in Poland from 1980/81 to 1988/89 hunting seasons (courtesy of the Ministry of Agriculture, Forestry and Food Management).

Hunting season	Total population estimates	Numbers of wolves shot
1980/81	533	50
1981/82	503	62
1982/83	678	157
1983/84	925	141
1984/85	906	132
1985/86	888	164
1986/87	954	180
1987/88	955	211
1988/89	913	141
Total	—	1238

land since the same animals can be counted in the neighbouring forest administration units (Trokowicz, 1980).

It seems that the numbers and distribution of kills may reflect the numbers and distribution of wolves better than the official estimates. The distribution of such kills showed that wolves inhabit currently an area of about 150,000 km² with two core areas: southeastern and north-eastern Poland (Fig. 1). This agrees with Sumiński (1974) and Buchalczyk (1983). Moreover, this study revealed that the southeastern population inhabiting Krosno, Nowy Sącz and Przemyśl provinces (Fig. 1) is the larger one: from 1980/81 to 1988/89 hunting seasons more than 60% of wolves were killed in this area that covers about 10% of the overall wolf population range in Poland.

The number of wolves shot could reflect both hunting efforts and a population trend itself. Although it is very difficult, if at all possible, to distinguish and quantify these two tendencies, the distribution of wolves killed in the early 1980's and nowadays seem to show that the wolf has expanded its population range (Fig. 2). It was due to both declaring it a game species and increasing numbers of red deer which are the main prey of wolves in lowlands (Reig & Jędrzejewski, 1988) and mountains (Leśniewicz & Perzanowski, 1989).

In spite of the high price paid for wolf trophies, poaching does not seem to be greatly influencing the population size because hunting is tightly controlled, including access to rifles and strong poisons. Trapping is entirely prohibited.

The wolf population in Poland faces the problem of a changeable management policy. Policy changes are due to continuous controversy over this predator between wildlife biologists and conservationists on one side and hunters, foresters and farmers on the other (Okarma, 1987). Management decisions at various periods of time have been the

result of pressure from these two lobbies. Recently it has been felt that wolves have caused excessive losses of wildlife and that their number should be considerably reduced. The current management policy encourages hunters to shoot more wolves: high rewards are paid and harvest bags are not enforced. The future of the wolf in Poland depends on a better understanding and acceptance of its ecological value on the basis of systematic study of wolf population and its influence on prey species.

3.2. Body Weight

The average body weight of wolves killed in southeastern Poland (Table 2) was similar to that in northwestern Canada and Alaska (Paradiso & Nowak, 1982). Body weight of adult males ranged from 35 to 67 kg and females, from 27 to 50 kg, which is consistent with Mech (1974) who found that males in Minnesota weighed from 20 to 80 kg and females from 18 to 55 kg.

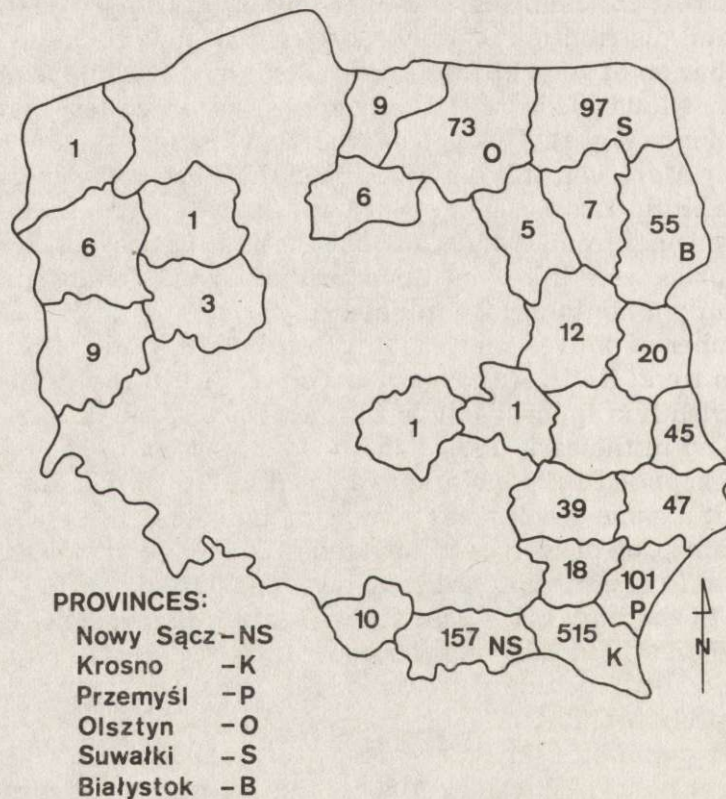


Fig. 1. Numbers of wolves killed by hunters in Poland within administrative borders of particular provinces from 1980/81 through 1988/89 hunting seasons (courtesy of the Ministry of Agriculture, Forestry and Food Management).

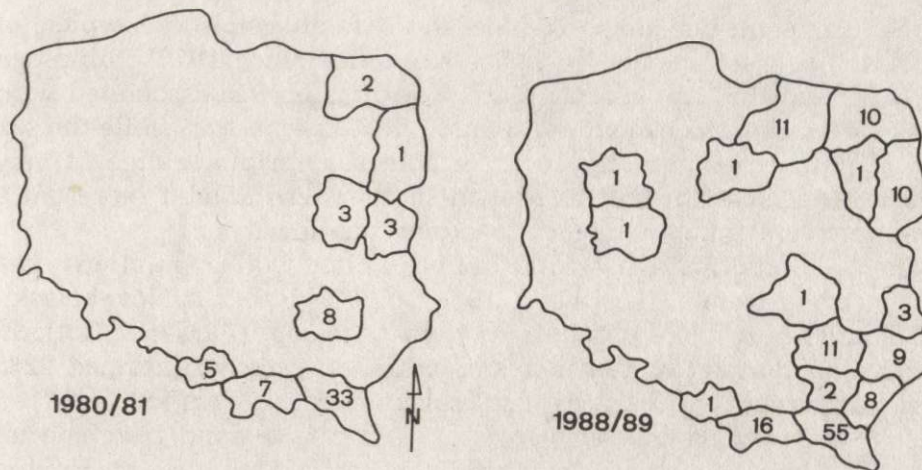


Fig. 2. Numbers of wolves killed by hunters in Poland within administrative borders of particular provinces in 1980/81 and 1988/89 hunting seasons (courtesy of the Ministry of Agriculture, Forestry and Food Management).

Table 2
Average body weight of wolves killed by hunters in south-eastern Poland from 1980 to 1986 (kg).

Sex	Adults			Pups		
	N	\bar{x}	SD	N	\bar{x}	SD
Males	70	46.4	7.2	18	26.3	4.8
Females	49	39.3	4.9	15	27.9	5.0

Paradiso and Nowak (1982) stated that among the adults of any one region males are usually, but not always, larger than females. This pattern was confirmed in the examined sample of wolves shot in south-eastern Poland since body weight of females averaged 15% less than that of males (Table 2).

Body weight of male pups ranged from 19 to 35 kg and female ones from 20 to 35 kg. Female pups were slightly heavier than male ones (Table 2) which is consistent with Parker and Lutich (1986) who found that females were slightly heavier than males in the 0.5 year class while in older classes the males were heavier.

3.3. Sex and Age Ratios

A sample of 152 wolves killed included 70 adult males, 49 adult females, 18 male and 15 female pups. The sex ratio among adults did not differ significantly from 1:1 ($G=3.71$, $df=1$, $p>0.05$) while in pups it was almost exactly 1:1. The overall male:female ratio of all animals was

86:64. The slight bias towards males in the total sample was typical of most wolf populations studied in North America (Mech, 1970). Pulliainen (1965) found that an extreme bias toward males was associated with the tendency for males to migrate into unoccupied areas; while the sex ratios approached equality on an established breeding range. It may be suggested that the wolves shot in southeastern Poland represent a population showing a tendency to extend its range.

The fraction of pups in winter in unexploited wolf populations normally ranges from 13% (Kelsall, 1968) to 20% (Fuller & Novakowski, 1955) and in exploited populations from 35 to 55% (Parker & Luttich, 1986). The sample of wolves examined in this study contained 22% pups. However, the hunting biases can effect age ratios observed among killed wolves. Most wolves are killed in Poland from special hunting stands (towers) at bait sites (author's unpubl. data). Having enough time a hunter normally choose the biggest individual which promises a good trophy. Such a specific hunting technique may greatly affect pup:adult ratio observed among shot wolves.

Acknowledgements: The study was supported by the grant RR II 17/I-1 co-ordinated by the Academy of Agriculture of Poznań.

REFERENCES

1. Buchalczyk T., 1983: *Canis lupus* Linnaeus, 1758. [In: „Atlas of Polish mammals”. Z. Pucek & J. Raczyński eds]. PWN — Polish Sci. Publ.: 139—140 and map No 0066 on p. 135. Warszawa.
2. Fuller W. & Novakowski N., 1955: Wolf control operations, Wood Buffalo National Park, 1951—1952. Can. Wildl. Serv., Wildl. Manage. Bull. Series 1, No. 11: 1—20.
3. Kelsall J., 1968: The migratory barren-ground caribou in Canada. Can. Wildl. Serv. Monogr. No. 3. Ottawa: Queen's Printer. 1—340.
4. Kowalski Z., 1953a: Ogłaszamy alarm wilczy [Alert: wolves]. *Łowiec Polski* 1/1010: 4—5. [In Polish]
5. Kowalski Z., 1953b: Wilk i jego zwalczanie [The wolf and its persecution]. Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa. 1—57. [In Polish]
6. Leśniewicz K. & Perzanowski K., 1989: The winter diet of wolves in Bieszczady Mountains. *Acta theriol.*, 34:373—380.
7. Mech D., 1970: The wolf: the ecology and behavior of an endangered species. Garden City, New York: The Natural History Press. 1—384.
8. Mech D., 1974: A new profile for the wolf. *Nat. Hist.*, 83: 26—31.
9. Okarma H., 1984: The physical condition of red deer falling prey to the wolf and lynx and harvested in the Carpathian Mountains. *Acta theriol.*, 29:283—290.
10. Okarma H., 1987: Wilk w Polsce [The wolf in Poland]. *Myśliwiec*, 87(4):12—19. [In Polish]
11. Paradiso J. & Nowak R., 1982: Wolves. [In: Chapman J. A. and G. A. Feldhamer, eds. “Wild Mammals of North America”] The Johns Hopkins Univ. Press. Baltimore. 1—1147.
12. Parker G. & Luttich S., 1986: Characteristics of the wolf in Northern Quebec and Labrador. *Arctic*, 39:145—149.

13. Pucek Z., Bobek B., Łabudzki L., Miłkowski L., Morow K. & Tomek A., 1975: Estimates of density and number of ungulates. *Pol. Ecol. Studies*. 1:121—136.
14. Pulliainen E., 1965: Studies of the wolf in Finland. *Ann. Zool. Fennici*. 2:215—259.
15. Reig S. & Jędrzejewski W., 1988: Winter and early spring food of some carnivores in the Białowieża National Park, eastern Poland. *Acta theriol.*, 33:57—65.
16. Rozporządzenie Ministra Leśnictwa i Przemysłu Drzewnego z dn. 17 XI 1975 [Decree of the Ministry of Forestry and Wood Industries declaring the wolf a game species]. (Dz. Ustaw Nr 38). [In Polish]
17. Sokal R. & Rohlf F., 1981: *Biometry*. Second ed. W. H. Freeman & Co., New York, N. Y. 1—859.
18. Sumiński P., 1974: The wolf in Poland. Proc. 1st Working Meeting of Wolf Specialist and of 1st Int. Conference on the Conservation of the wolf. Stockholm, 1973:44—52.
19. Trokiewicz L., 1980: [On the wolf tract in the Biebrza river valley]. *Przeg. Zool.*, 24:137—145. [In Polish]
20. Van Ballenberghe V., Erickson A. & Byman D., 1975: Ecology of the timber wolf in Northeastern Minnesota. *Wildl. Monogr.*, 43:1—43.
21. Zarządzenie Nr 10 Ministra Leśnictwa i Przemysłu Drzewnego z dn. 31.01.1974 w sprawie ustalenia szczegółowych zasad opracowania łowieckiego planu hodowlanego oraz sprawozdania z jego wykonania. [Decree of The Ministry of Forestry and Wood Industries on calculating the harvest bags of game species]. *Dziennik Urzędowy Min. Leśn. i Prz. Drz.* Nr 2, poz. 9. 1974. [In Polish]

Received 7 June 1989, Accepted 20 October 1989.

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ROZMIESZCZENIE, LICZEBNOŚĆ I POZYSKANIE WILKÓW W POLSCE

Streszczenie

Wilk posiada status gatunku łownego od 1975 roku. Polowanie dozwolone jest od 1 sierpnia do 31 marca, a skóra i czaszka stały się ostatnio niezwykle cennym trofeum. Według oficjalnych danych zabito w Polsce w sezonach łowieckich 1980/81—1988/89 1238 tych drapieżników, z czego ponad 60% w województwach krośnieńskim, nowosądeckim i przemyskim. W ciągu ostatnich 7 sezonów łowieckich zabijano w naszym kraju średnio ponad 160 wilków. W próbie 152 wilków odstrzelonych w południowo-wschodniej części kraju stwierdzono 70 dorosłych samców (średnia masa ciała 46.4 kg), 49 dorosłych samic (39.3 kg) oraz 18 młodych samców (26.3 kg) i 15 samic (27.9 kg).