

REPORT ON HABITAT SELECTION OF LYNX

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Project 101114131 — LIFE22-NAT-PL-LIFE LYNX PL LT DE



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1 INTRODUCTION

The Eurasian lynx (*Lynx lynx*) once inhabited almost all of Europe and most of Asia. As a result of human activity, the species has disappeared from all densely populated areas, particularly from the western and central parts of the European Plain (Okarma and Schmidt 2013).

In Europe, the lynx's continuous range includes Scandinavia, Finland, Russia, Estonia and part of Latvia. Further west and south (Lithuania, Belarus, Ukraine, Poland, the Balkans), the population is more fragmented and the species' range is discontinuous. A native lynx population, covering a relatively large area, is found in the Carpathians (<http://www.lcie.org/>). Reintroduced local populations of this predator have been established in the mountains of Switzerland, France, Slovenia, Croatia, Bosnia and Herzegovina, the Czech Republic, Austria and Germany (Von Arx et al. 2004). The current number of lynx in Europe is estimated at around 9,000 individuals, of which 1,500–2,000 belong to the Baltic population (<http://www.lcie.org/>).

The overall status of the lynx population in Europe is currently assessed as stable. This applies in particular to populations inhabiting the Fennoscandian region and certain Baltic countries, such as Latvia, where numbers remain relatively high despite hunting. The lynx is an example of a successful reintroduction to many areas from which it had been eradicated (Kaczensky et al. 2013). Successful lynx reintroductions in Central and Western Europe carried out in the 1970s may indicate this species' great potential for population growth, even in highly developed countries (Switzerland, France, Germany) (Von Arx et al. 2004). However, some local, isolated lynx populations (e.g. the Balkan population) are considered critically endangered (Von Arx et al. 2004). In Poland, the lynx occurs in two separate populations: the Carpathian population and the north-eastern (Baltic) population.

The LIFE22-NAT-PL-LIFE LYNX PL LT DE project, entitled 'Expanding the range of the lynx population in northern Poland', aims to improve the precarious situation of the species at the edge of its natural range in Poland and to address the identified problems and threats. As part of the project, plans are in place to release at least 40 lynx into the wild in northern Poland. This will significantly bolster existing populations and expand the range through the colonisation of new territories. The released lynx will also provide highly valuable data from GPS telemetry collars. This will enable an analysis of the species' actual environmental selectivity and the formulation of recommendations for measures aimed at maintaining ecological connectivity along the Northern Ecological Corridor and within the local network of N2000 sites.

2 AIM OF THE STUDY

The LIFE project aims to improve the situation of the Eurasian lynx at the edge of its natural range in Poland (conservation status of the species: ‘unfavourable – poor [U2]’) and to address the problems and threats described in the report submitted to the European Commission in 2019.

The main objectives of the LIFE22-NAT-PL-LIFE LYNX PL LT DE project entitled ‘Expanding the range of the lynx population in northern Poland’ are:

- To restore the historical range of the Baltic meta-population of lynx in Central Europe by establishing genetically diverse local populations situated at short distances from one another.
- Creating conditions for the effective dispersal of lynx and gene flow within the Baltic meta-population in Poland through bridge populations between the compact range of the species in Eastern Europe and peripheral populations in Central Europe, as well as facilitating the natural return of lynx to north-eastern Germany.
- To maintain public acceptance of active lynx conservation in Poland, Lithuania and Germany, and to secure support for the strategy for the conservation and management of the Baltic lynx population in Poland, developed in collaboration with key stakeholders and partners from various countries.

These objectives will be achieved through a series of activities planned as part of the Project. One such activity is the analysis of the environmental conditions affecting lynx occurrence, based on historical data and the GPS locations of lynx released into the wild.

As part of this interim report, data have been collected on the environmental conditions affecting the occurrence of lynx within the project area up to the start of the project. The report also presents preliminary findings regarding lynx released into the wild as part of this project, as well as case studies. However, no statistical analyses were carried out on the GPS locations (from telemetry collars) of the lynx released into the wild. These will be included in the final report, together with recommendations for measures aimed at maintaining ecological connectivity along the Northern Ecological Corridor and within the local network of N2000 sites.

3 THE NORTHERN AND THE AREA COVERED BY THE PROJECT

In 2005, at the request of the then Ministry of the Environment, the 'Project for ecological corridors linking the European Natura 2000 network in Poland' was prepared (Jędrzejewski et al. 2005). The aim of this project was to identify a network of sites that would ensure ecological connectivity on a national scale, whilst also forming part of ecological corridors on a continental scale. Seven main corridors were identified, each of which connects areas situated on opposite sides of the country's borders. These were termed international corridors. The remaining corridors, linking areas within the country to the main corridors, were termed national corridors. Together, they form a network of ecological corridors of national and international significance. The corridor with the best-preserved ecological connectivity in the Polish lowlands is the Northern Corridor (KPN). The main part of this corridor runs through a belt of lake districts from the eastern to the western border of the country. It connects the Augustów, Knyszyn and Białowieża Primeval Forests in the east with the Cedyński Landscape Park in the west. It passes through the Biebrza Valley, the Piska Primeval Forest, the Iława Lake District, the Tuchola Forest, the Kashubian Lake District, the Koszalin, Goleniów and Wkrzań Primeval Forests, the Krajeńskie, Waleckie and Drawskie Forests, and the Gorzów Primeval Forest (Fig. 1).



Fig. 1. **Northern ecological corridor**

The route of the Northern Ecological Corridor falls entirely within the area of the project currently under implementation (Fig. 2).

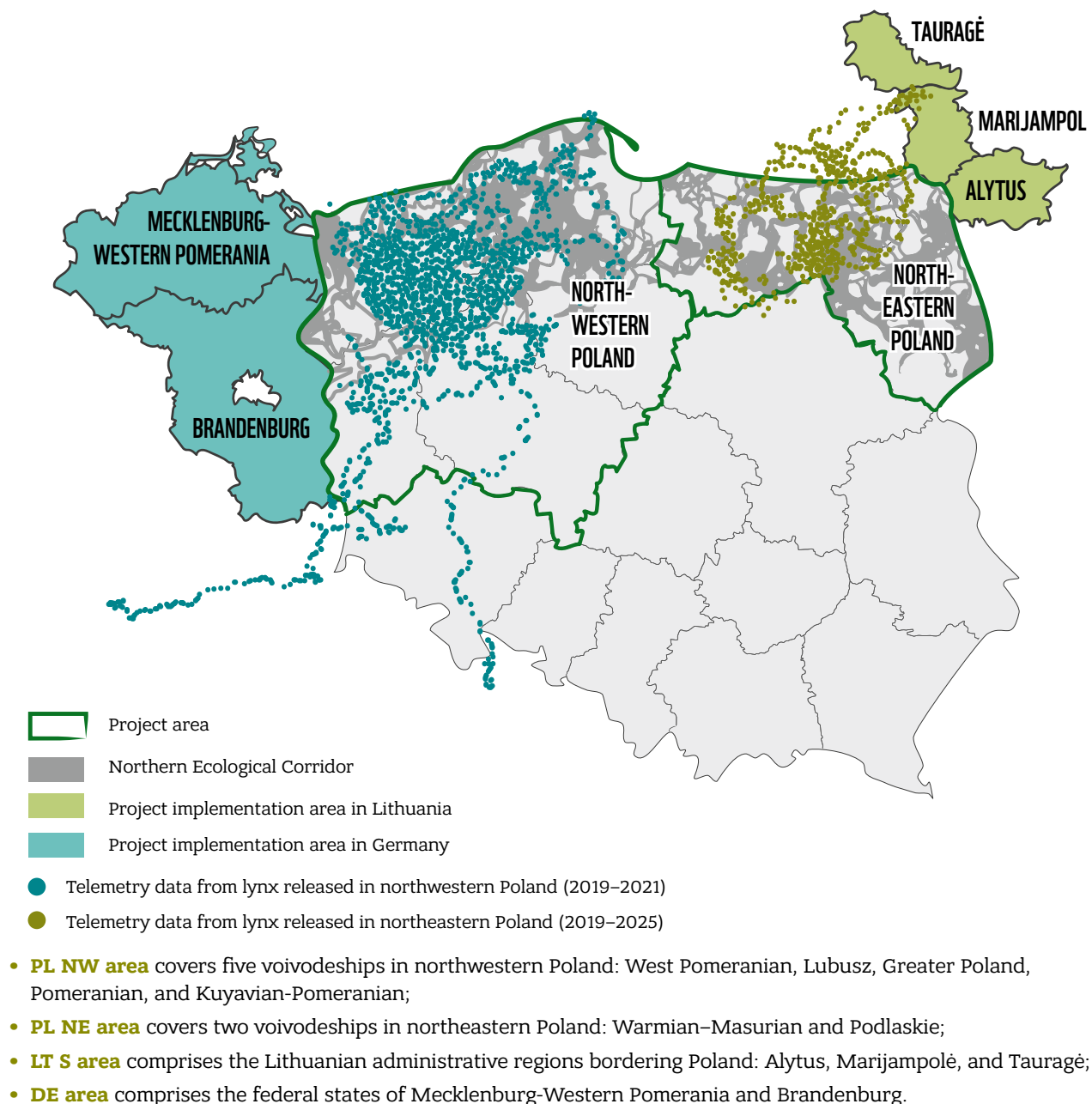


Fig. 2. **Lynx movements against the background of the project area**

Source: materials from ZTP and WWF Poland for the LIFE project.

As part of project POIS.05.01.00-00-341/10 'Active conservation of the lowland lynx population in Poland', implemented by WWF Poland, the 'Northern Ecological Corridor Conservation Programme' was drawn up. It contains recommendations regarding the maintenance and improvement of ecological connectivity for this area. The sites of the planned measures were located in the eastern and central parts of the Northern Ecological Corridor. More than 10 years have passed since this document was drawn up. During this time, a number of linear infrastructure projects have been built in the area, such as motorways, expressways, and border barriers on the border with Belarus and Russia (Kaliningrad Oblast). Hence, the development of new recommendations for measures aimed at maintaining ecological connectivity along the Northern Ecological Corridor, which links areas of high natural value, including N2000 sites, takes on particular significance.

4 ENVIRONMENTAL FACTORS INFLUENCING THE OCCURRENCE OF THE LYNX WITHIN THE AREA COVERED BY THE PROJECT

4.1. Characteristics of the area



Fig. 3. **Lynx distribution in Europe, as of 2023**, www.lcie.org/Large-carnivores/Eurasian-lynx

The main causes of the lynx's extinction in many parts of Europe are environmental changes – deforestation and the creation of extensive built-up areas. Although it would be difficult to envisage a return to the pre-industrial landscape on a significant scale, certain emerging trends are favourable for the conservation of the lynx. One important factor contributing to favourable conditions for the species' occurrence may be the increase in forest cover in Poland. Since the

end of the Second World War, significant areas of woodland have emerged on land previously used for agriculture, as a result of natural forest succession or deliberate afforestation.

The increase in forest cover in this area is certainly a factor facilitating the migration and spread of lynx. Well-preserved connections between large forest complexes provide a basis for the designation of ecological corridors. **In northern Poland (from the eastern to the western national border), the so-called northern ecological corridor has been designated. According to experts, this is the best-preserved migration corridor of European significance in the Polish lowlands (Jędrzejewski et al. 2005). Consequently, this may contribute to the expansion of this species' range in Central and Western Europe (WWF Poland Report, 2015).**

Human population density, road network density and traffic intensity also have a significant impact on the environmental conditions affecting the occurrence of lynx. All these parameters are determined by the accessibility of the terrain to humans and, consequently, the pressure on the environment. The project area covers the provinces with the lowest population density in Poland, e.g. the Podlaskie, Warmian-Masurian and West Pomeranian provinces. Even lower population densities are found in Lithuania, which is linked to the country's severe depopulation. These trends will help to create better conditions for the occurrence of lynx. A factor limiting the expansion of this species' population may be the development of the expressway and motorway network, as well as heavy traffic on regional and local roads.

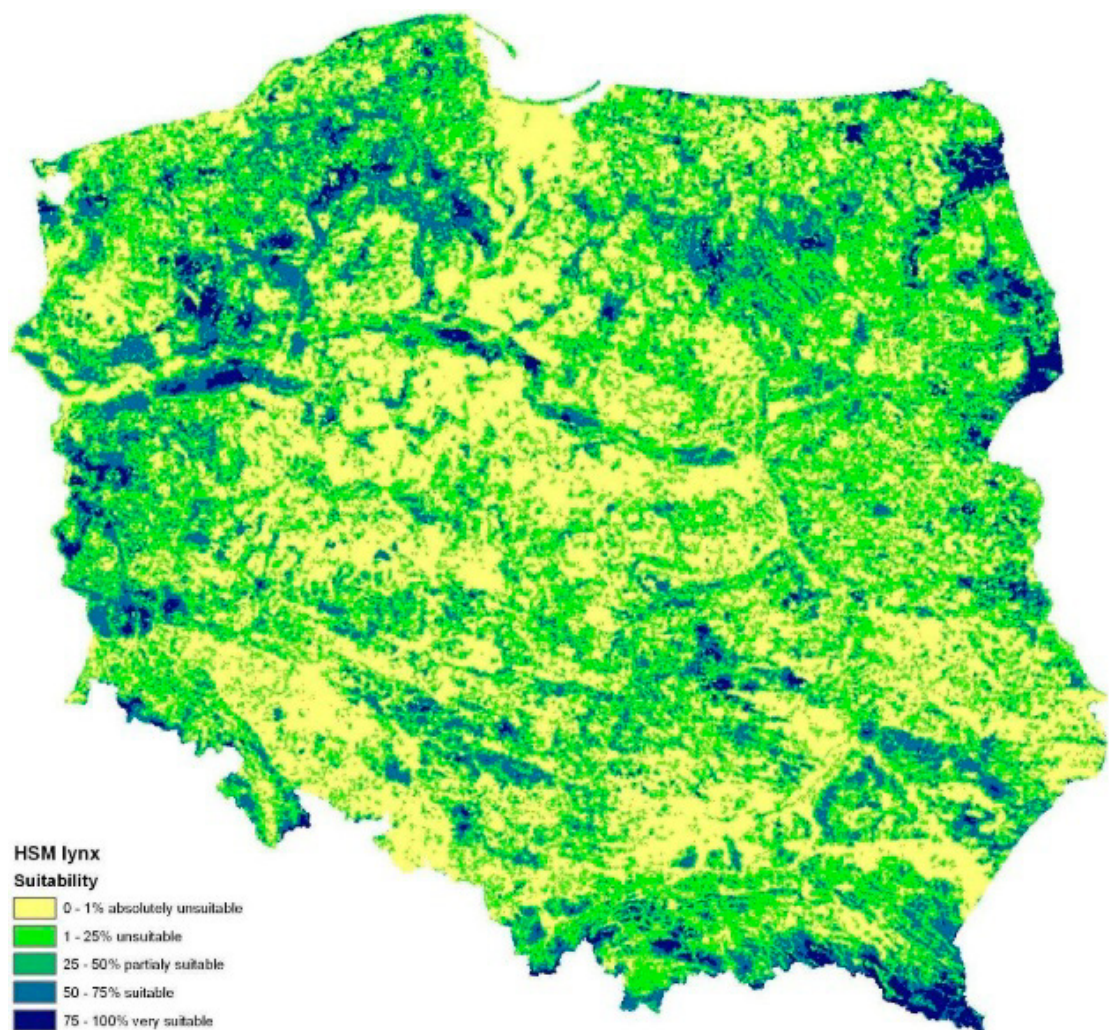


Fig. 4. **Availability of natural habitats for lynx**

Analyses of habitat availability in Poland in relation to the lynx's needs, carried out using a geographic information system (GIS) and taking into account environmental factors such as the presence and size of forested areas, the degree of undergrowth development, road density and human settlement density, supported the reintroduction of this species in north-western and north-eastern Poland (Schmidt 2016). The availability of areas best suited to the species' needs is shown on the map (Fig. 4).

The area where lynx releases are taking place is characterised by a relatively high density of roe deer and red deer, as well as the presence of local fallow deer populations. A comparative analysis of prey in the areas where lynx reintroduction is taking place in the Masurian Lake District and in West Pomerania, as well as in the Białowieża Forest, shows that the diet of this predator consists primarily of cervids, particularly roe deer.

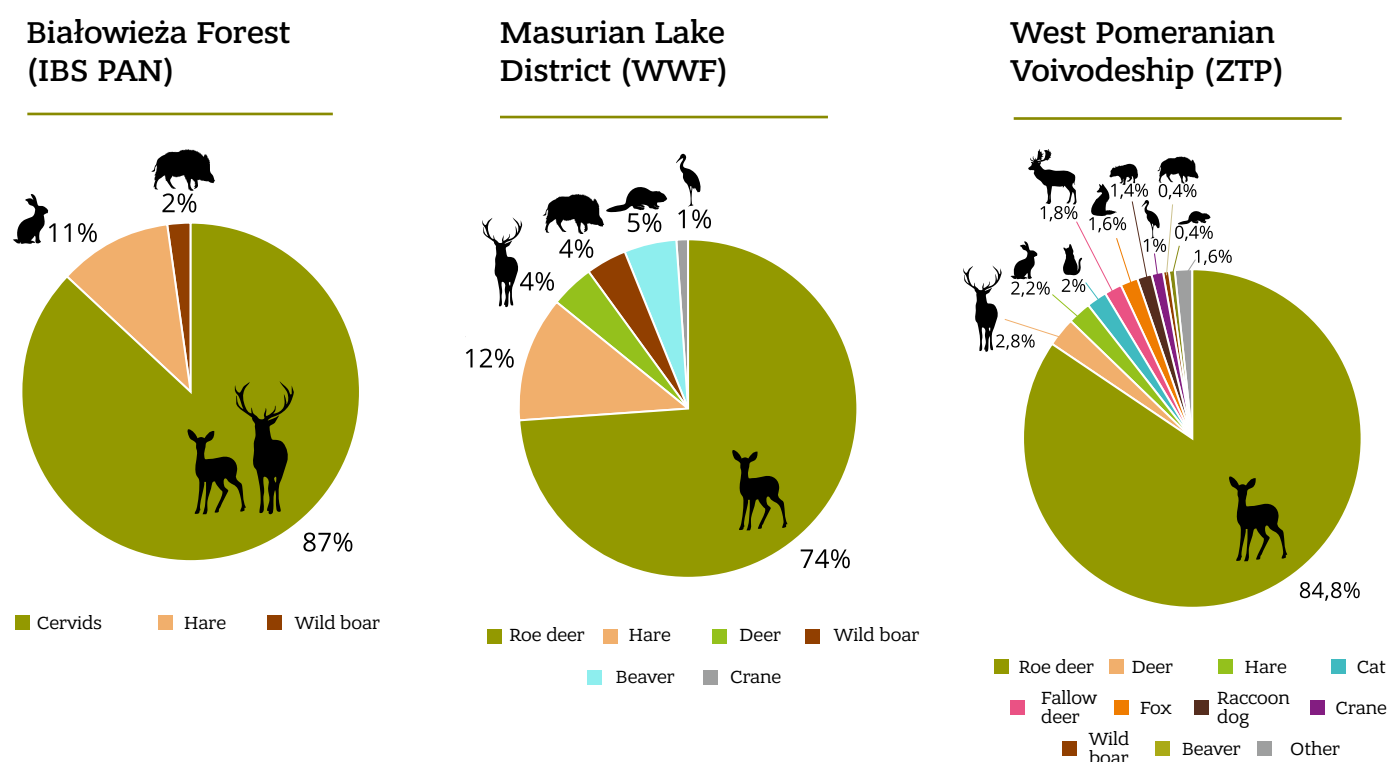


Fig. 5. **Analysis of the lynx diet in various areas of occurrence**

4.2. Data and results from previous projects

In the 21st century, lynx reintroduction programmes were launched on the fringes of the natural range of the Baltic population – in northern Poland and in Lithuania. In these areas, the density of individuals was low, and the local populations were partially isolated from one another. Consequently, measures were taken to strengthen these populations through the reintroduction of lynx. These programmes were carried out, amongst other places, in the Masurian Lake District (in north-eastern Poland), in Western Pomerania (in north-western Poland) and in the south-eastern part of Lithuania. This report draws on the results and findings from projects carried out by the WWF Poland Foundation between 2012 and 2015 and by the West Pomeranian Nature Society between 2017 and 2022.

4.2.1. Reintroduction of lynx in the Masurian Lake District

The lynx has been strictly protected in Poland since 1995. However, the Masurian population – the westernmost part of the Baltic population – was almost extinct by the end of the 20th century. At the beginning of the 21st century, only isolated individuals were observed in this region. Consequently, measures were taken to re-establish the local lynx population in the Masurian Lake District.

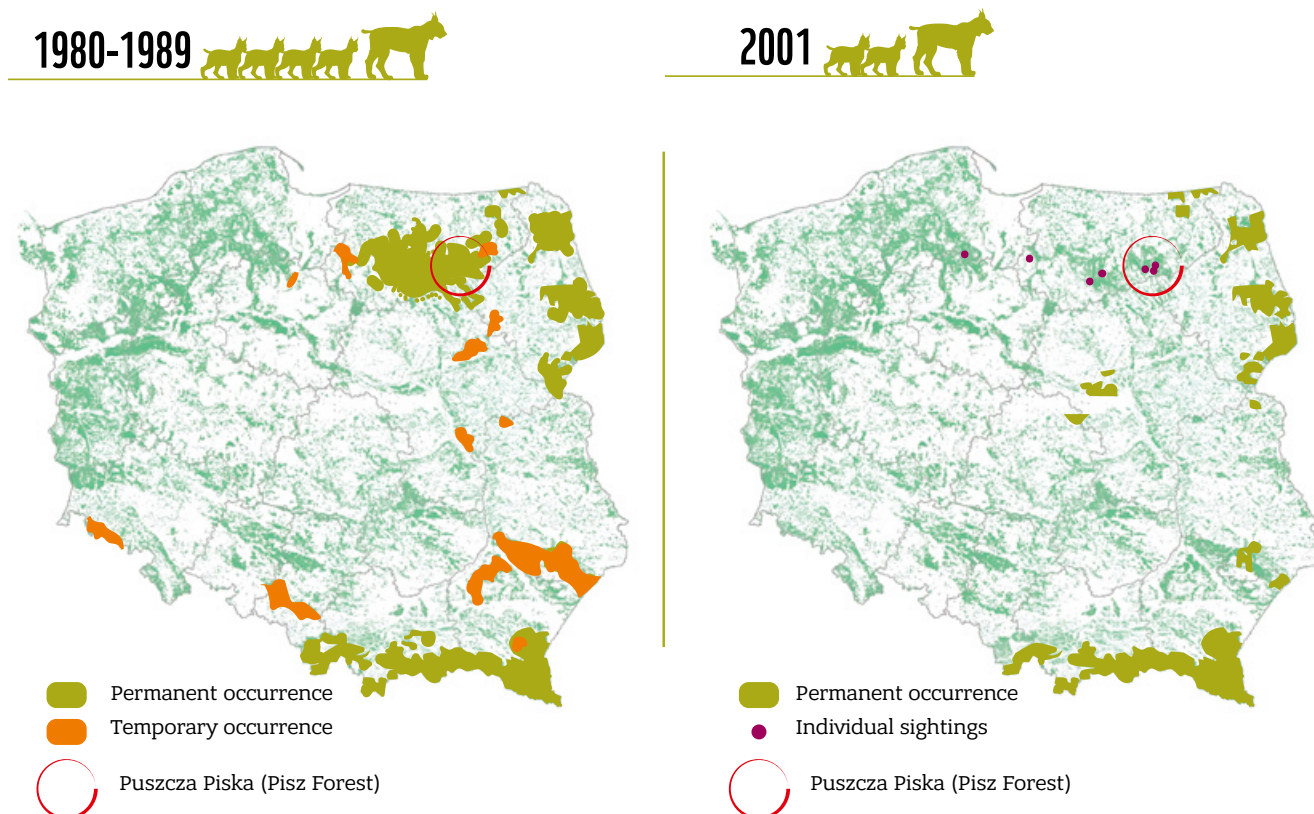


Fig. 6. **Distribution of lynx in the Masurian Lake District**

As part of the activities of the Kadzidłowo Wildlife Park and projects run by the WWF Poland Foundation between 2004 and 2020, over 30 lynx were released into the wild. Two methods were used for this purpose. In the first, known as 'born to be free', young lynx from breeding programmes were released into the wild. The second method, 'wild to wild', involved capturing animals in their natural habitat and then releasing them into the wild in a new location – in this case, lynx from Estonia were released into the Piska Forest.

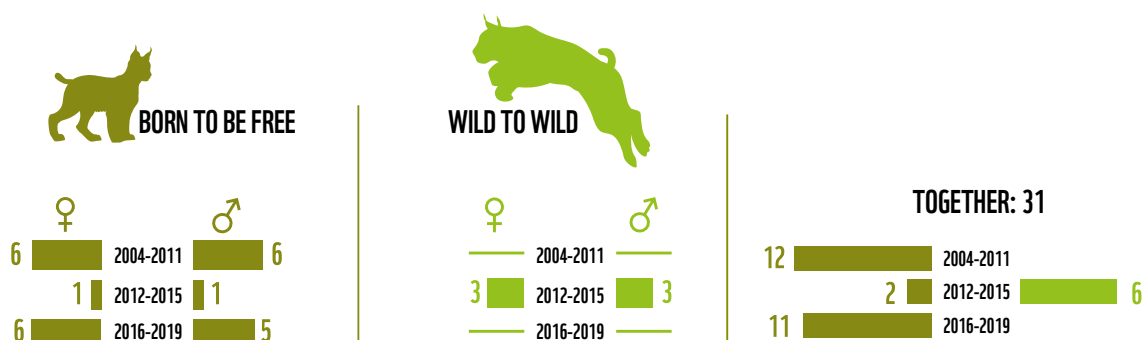


Fig. 7. **Results of the lynx reintroduction in the Masurian Lake District**

Since 2010, lynx released into the wild in the Piska Forest (Masurian Lake District) have been fitted with telemetry collars. As part of project POIS.05.01.00-00-341/10 'Active conservation of the lowland lynx population in Poland', carried out between 2012 and 2015, an analysis of GPS locations from the telemetry collars was conducted. In total, approximately 15,000 locations from 10 lynx were analysed. The size of the areas in which the lynx moved varied, ranging from 380 km² to approximately 17,000 km². Not all areas occupied by the lynx could be considered individual home ranges in the strict sense. The territories occupied by males were generally larger than those occupied by females (Fig. 8).

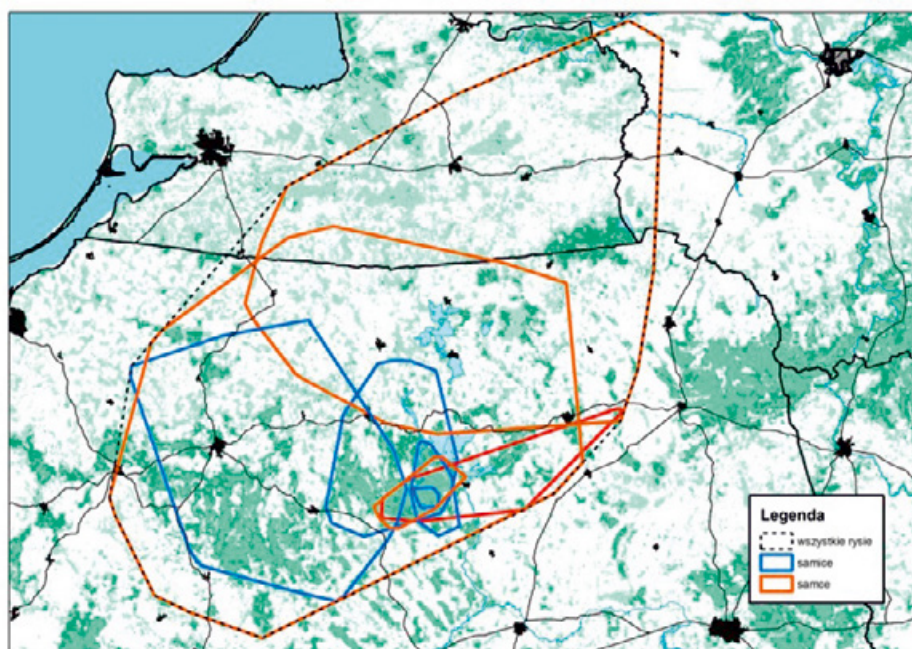


Fig. 8. **Maximum territories occupied by males (brown line) and females (blue line) and all individuals (black dotted line), determined on the basis of GPS locations between 2012 and 2015**

Casual observations revealed that lynx were frequently present in certain specific areas, e.g. in young stands (Fig. 9).



Fig. 9. **Occurrence of lynx in young stands**

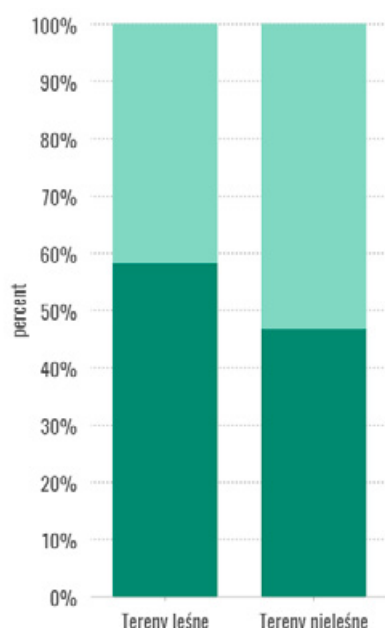


Fig. 10. **Occurrence of lynx in forested and non-forested areas**

A comparison of lynx occurrence in forested and non-forested areas showed that they are more frequently found in the former (Fig. 10).

To conduct a more detailed analysis of environmental preferences, the lynx's range was divided into six categories. Based on land use and shelter conditions, the following categories were identified: (1) forest, (2) young growth, (3) scrub, (4) tree stands, (5) grassland, (6) arable land. The frequency of lynx GPS locations within each category is illustrated in Figure 11.

An analysis was carried out of lynx preferences for inhabiting specific land categories. Where the percentage of GPS locations was higher than the percentage share of a given land category, this indicated a preference for lynx to inhabit that area. The analysis showed that in forested areas, lynx overwhelmingly favour young stands, whilst in open areas they favour shrub thickets. They clearly avoid arable land, which is devoid of vegetation for part of the year (Fig. 12).

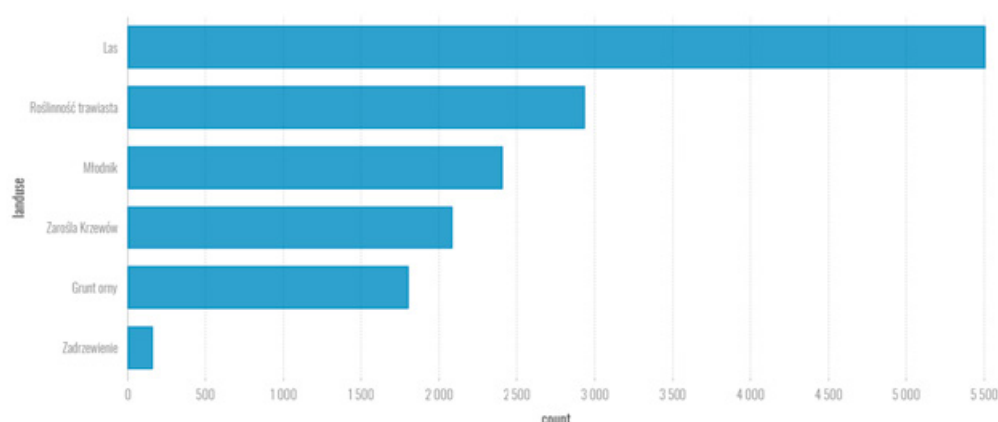


Fig. 11. **Occurrence of lynx in individual land-use categories**

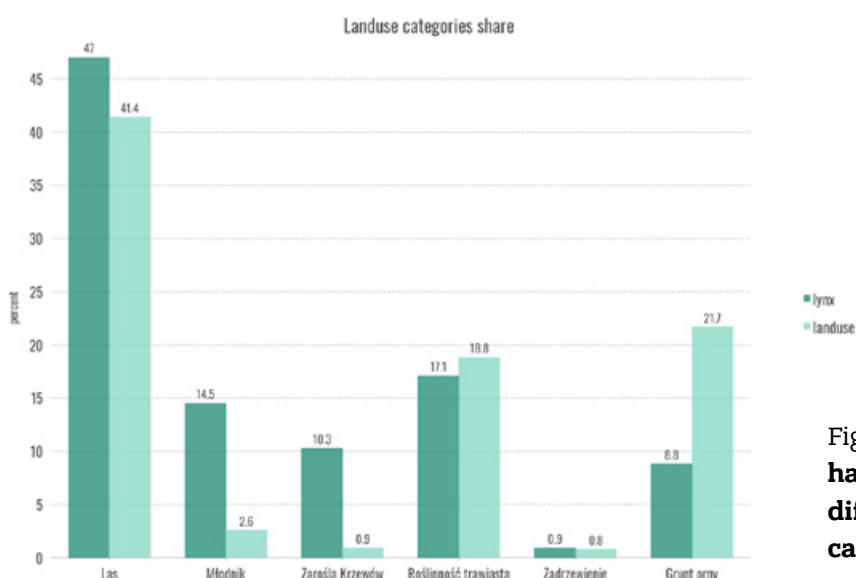


Fig. 12. **Analysis of lynx habitat preferences across different land-use categories**

Analysis of the density of lynx locations and their movements enabled the identification of local ecological corridors (Fig. 13).

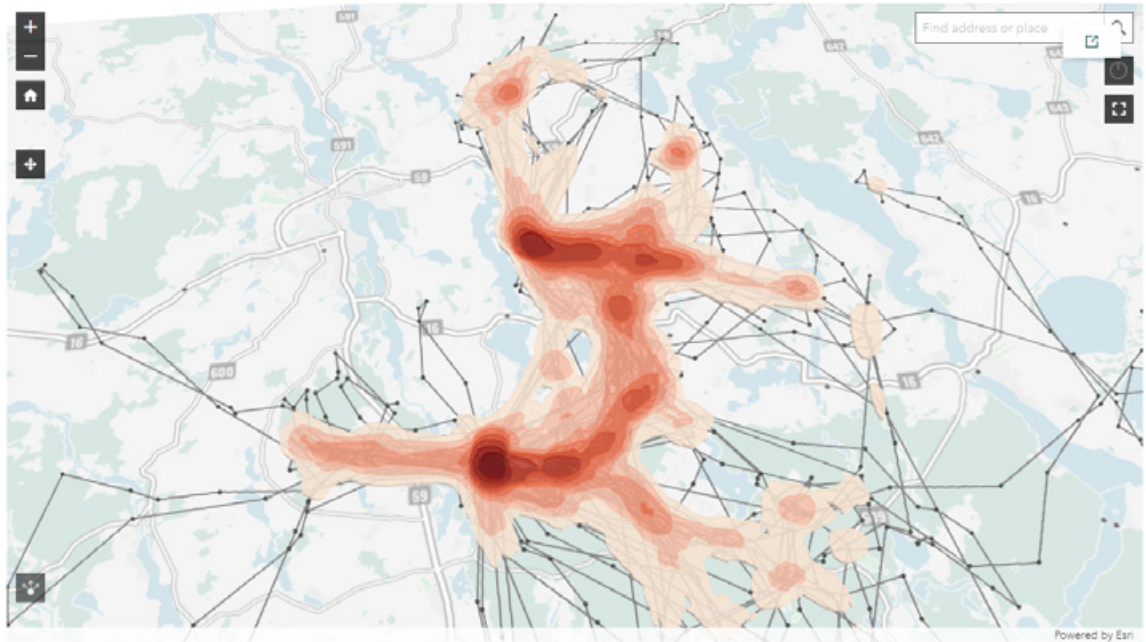


Fig. 13. **Local lynx migration corridors**

Thanks to telemetry, it has been possible to record interesting instances of lynx behaviour, such as the crossing of natural and man-made migration barriers. One of the females fitted with a telemetry collar, WLYN2, swam across a lake over a distance of at least 450 m (Fig. 14).

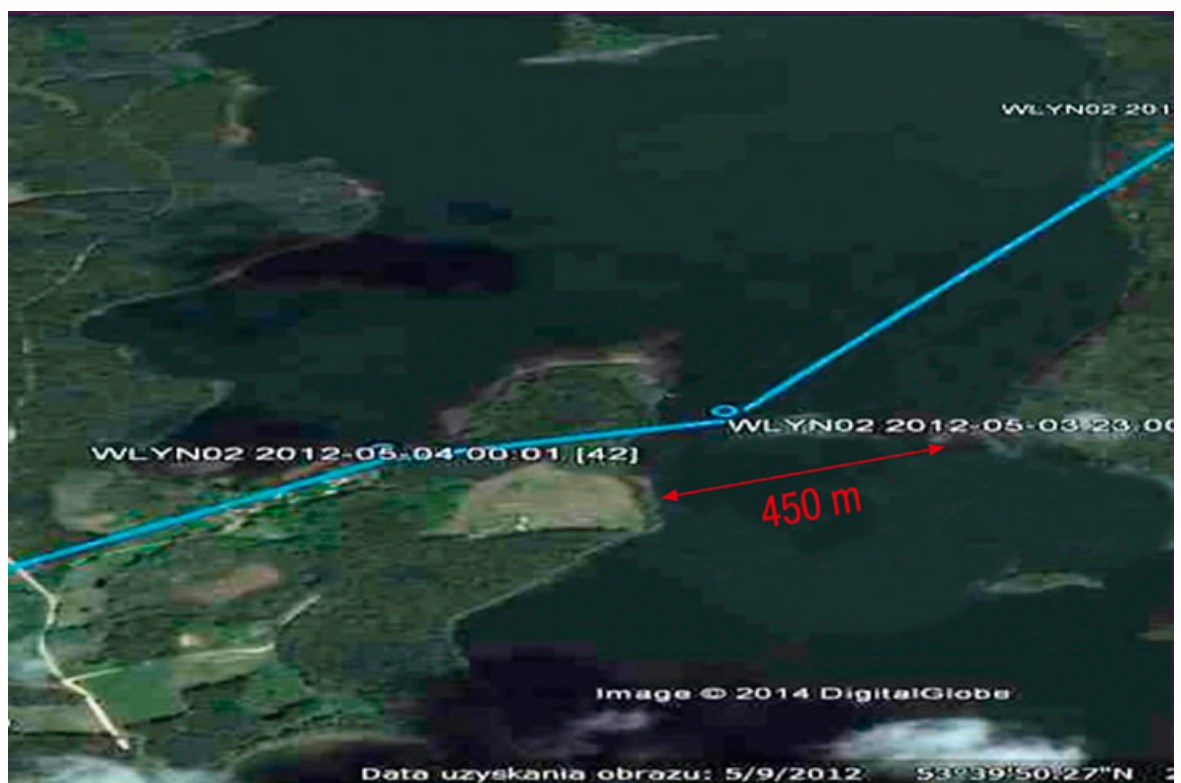


Fig. 14. **The lynx's route across the lake, covering a distance of at least 450 m**

Another lynx (a male) crossed the S7 expressway using the so-called ‘green bridge’ (Fig. 15).

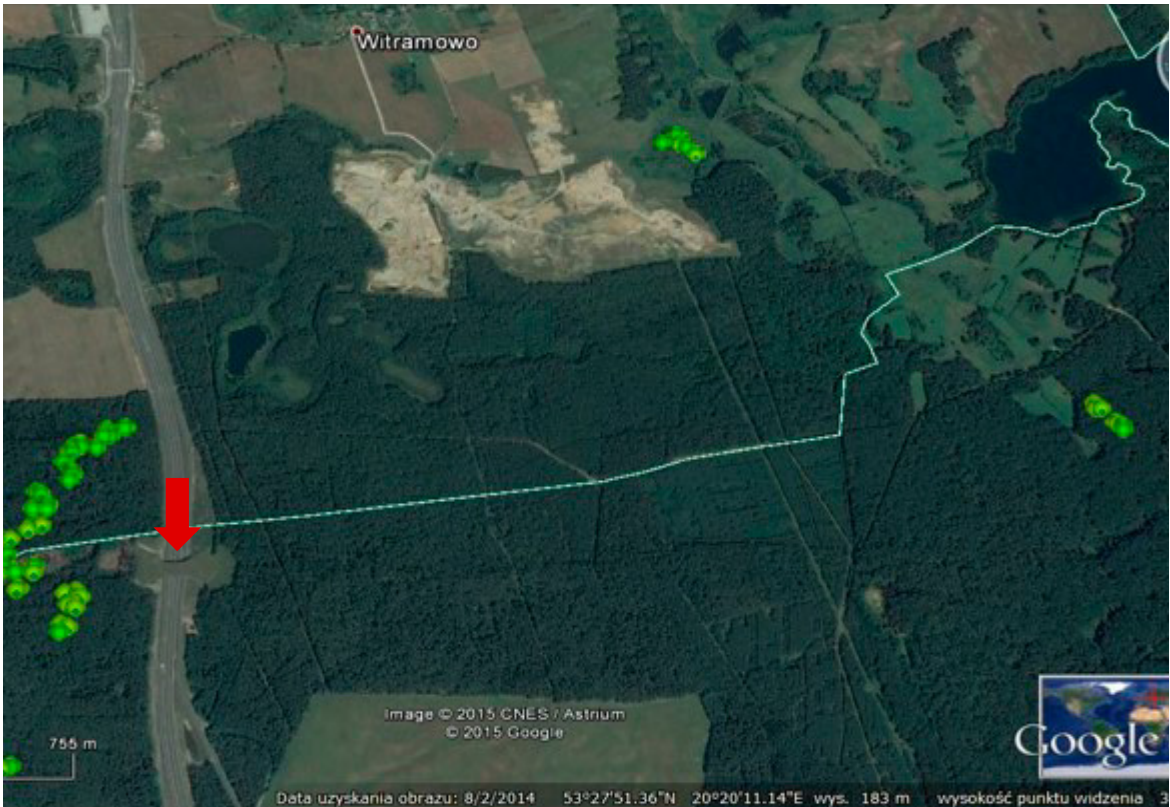


Fig. 15. The lynx’s route across the S7 expressway, using the ‘green bridge’

4.2.2. Reintroduction of lynx in north-western Poland

The lynx released into the wild in north-western Poland were bred in captivity. From 2019 until the start of the LIFE project at the end of 2023, the West Pomeranian Nature Society released over 100 individuals into the wild, and between 2023 and 2025, a further 23 lynx were reintroduced as part of the project. As early as the first year after their release, the lynx began to breed. In the early years of reintroduction, females had between 2 and 5 cubs per litter. Currently, the lynx population in north-western Poland is among the largest in the country.

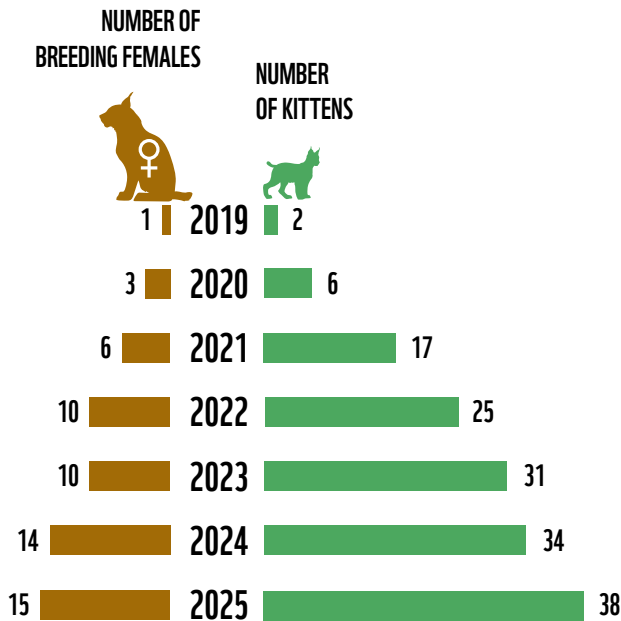


Fig. 16. Number of family groups (female + cubs) recorded in north-western Poland

Source: West Pomeranian Natural History Society

Thanks to telemetry data obtained as part of the ongoing project (lynx have been monitored in the wild since 2019), a rich dataset has been compiled on the occurrence of lynx released into the wild and their migration patterns. Individuals released into the wild between 2019 and 2022 are thriving in landscapes that have been moderately altered by humans, but are able to overcome major anthropogenic barriers. During their long-distance journeys, they make use of wildlife crossings created as part of motorway construction, or bypass them altogether.

A study entitled ‘Spatial analysis of GPS data from lynx reintroduced as part of project POIS.02.04.00-00-0143/16 ‘The Return of the Lynx to North-West Poland’, as shown in Figure 17. It is crucial to determine the preferred forest cover of the landscape used by lynx, which ranges from 16 to 69 per cent, with an optimal forest cover of around 40 per cent. Within this range of forest cover, the probability of lynx colonising an area is 50 per cent. This finding challenges the previously held belief that the lynx is a typically ‘forest’ animal. The probability of lynx colonising an area also increased with the degree of fragmentation of forest complexes. Furthermore, when settling in a new area, lynx preferred sites with high densities of roe deer.

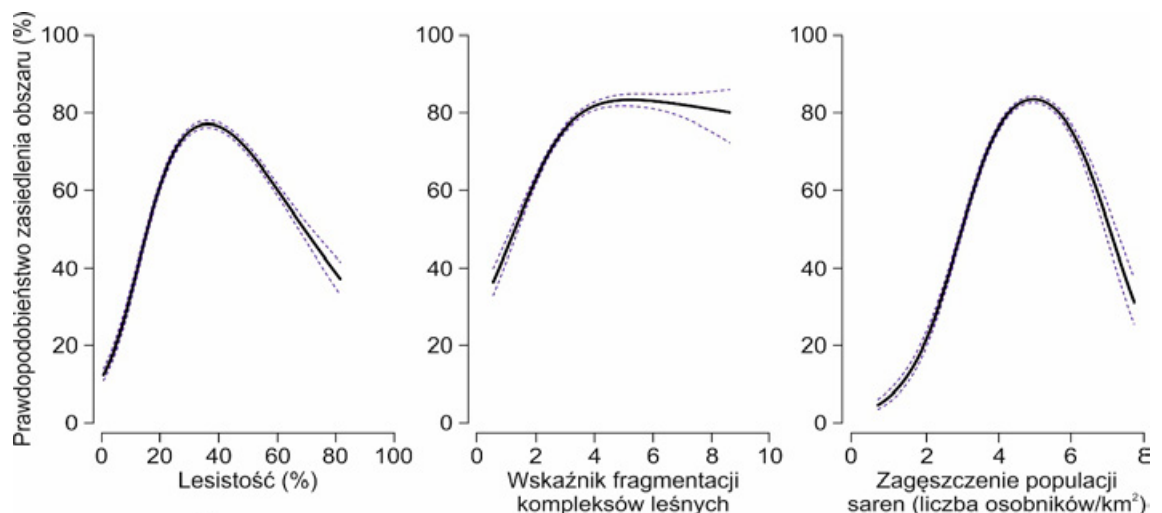


Fig. 17. **Land use by lynx in north-western Poland**

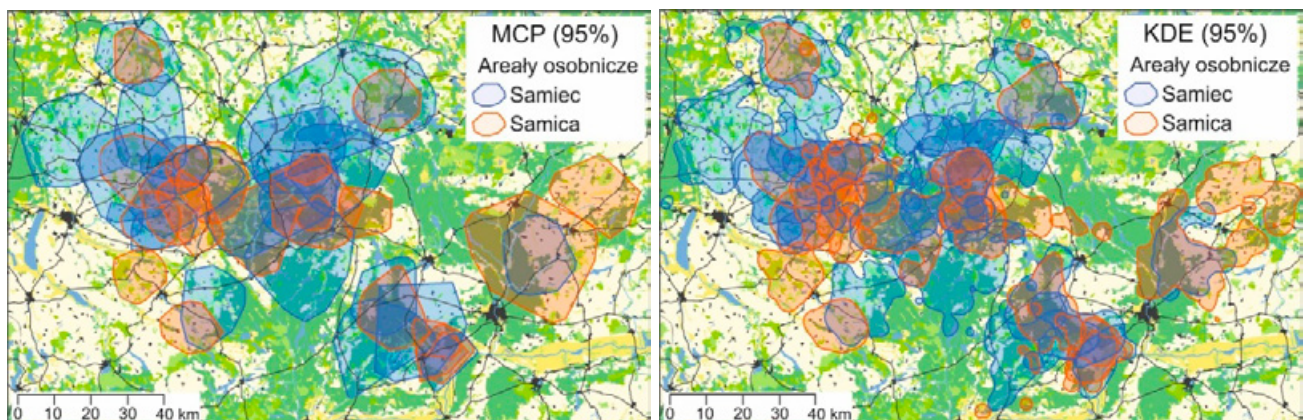


Fig. 18A-B. **Home ranges of male and female lynx determined (A) using the MCP method and (B) using the KDE method**

The average home range size estimated using the MCP method for all lynx was 304 km², whilst using the KDE method it was 313 km². Males utilised larger home ranges than females, as estimated by both the MCP method (421 and 252 km² and 274 km² respectively), as well as by the KDE method (411 and 274 km² respectively); this is illustrated in Figures 18A–B. The current distribution of lynx in north-western Poland is shown in Figure 19.

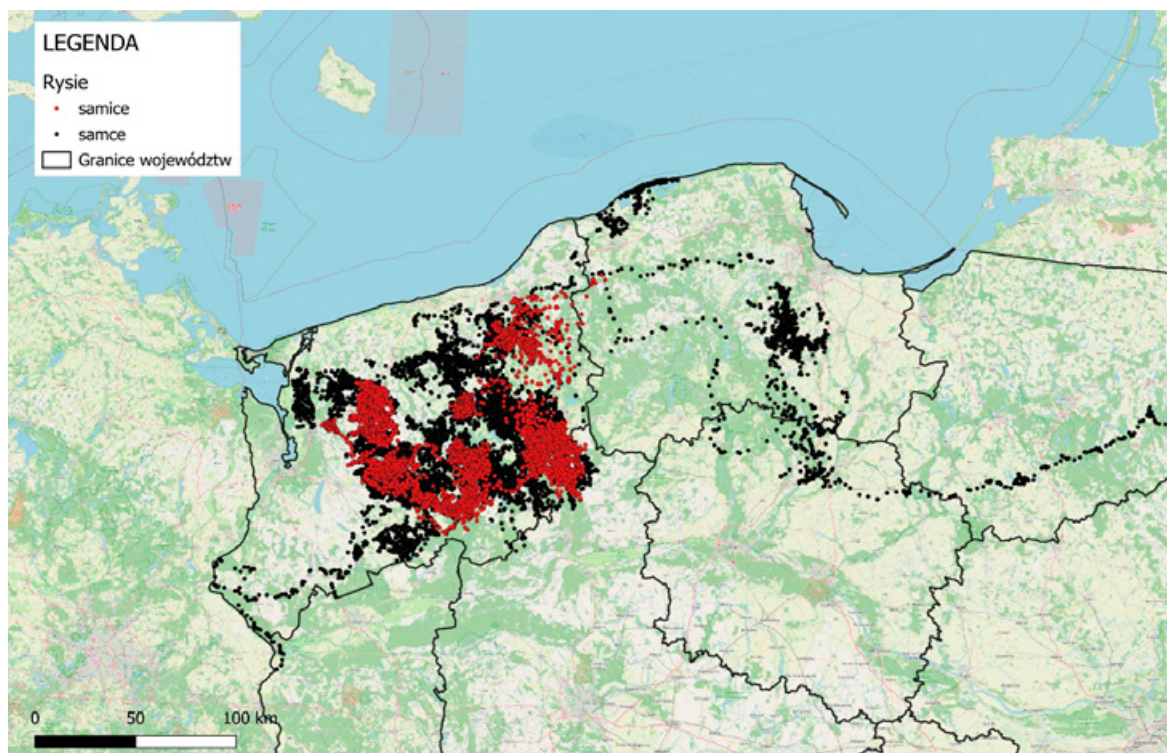


Fig. 19. **Current distribution of lynx in north-western Poland**

4.3. Current distribution of lynx in Poland based on GIOŚ data

Survey data collected and analysed for the Chief Inspectorate for Environmental Protection (GIOŚ) during the 2023/24 season revealed a widespread (permanent or sporadic) distribution of lynx across northern Poland (Fig. 20). This is undoubtedly the result of effective reintroduction programmes carried out in this area over many years.



Distribution map of the Eurasian lynx (*Lynx lynx*) in a 10×10 km grid for the period 01.05.2023–30.04.2024
Based on survey data from Forest Districts, National Parks, Forest Experimental Stations, and the Polish Hunting Association.

- Permanent occurrence
- Occasional occurrence

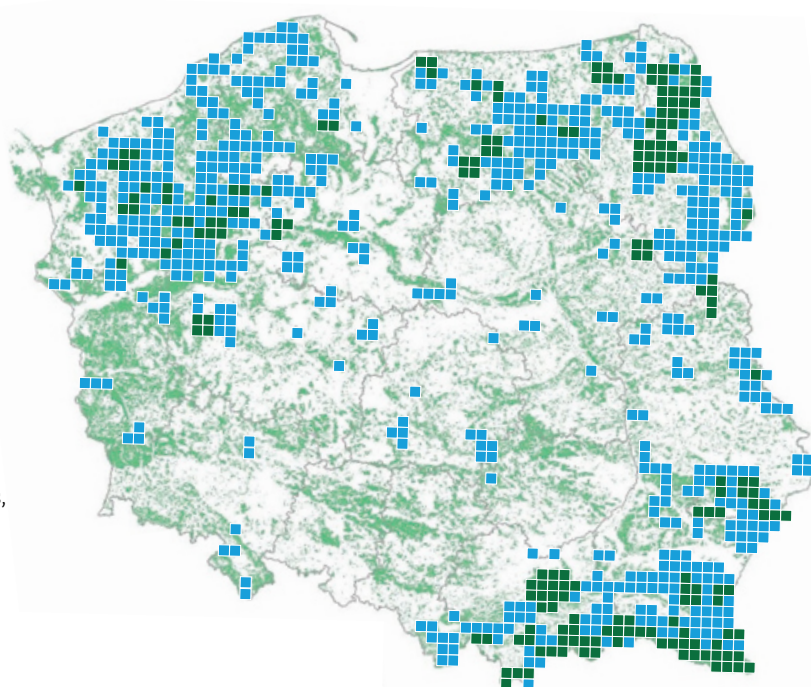


Fig. 20. **Distribution of lynx in Poland based on data from the Chief Inspectorate for Environmental Protection (GIOŚ)**

4.4. Preliminary analysis of telemetry data obtained during the implementation of the LIFE22-NAT-PL-LIFE LYNX PL LT project in 2024–2025

Analysis of telemetry data collected from monitored lynx (14 females, 31 males) reveals the following patterns:

1. In north-western Poland, lynx form a compact range within the West Pomeranian Voivodeship, with a clear tendency to expand their range eastwards into the Pomeranian Voivodeship. During the analysed period, no monitored lynx travelling from west to east were recorded crossing the Vistula. Nor were any crossings of the western border observed, although this had occurred between 2019 and 2023. The use of space by lynx, both within their stationary ranges and during long-distance migrations, takes place independently of the routes of the northern ecological corridor.

Analysis of the data collected at the end of the project will need to identify the network of corridors used by lynx and define the specific criteria by which these predators select their migration routes.

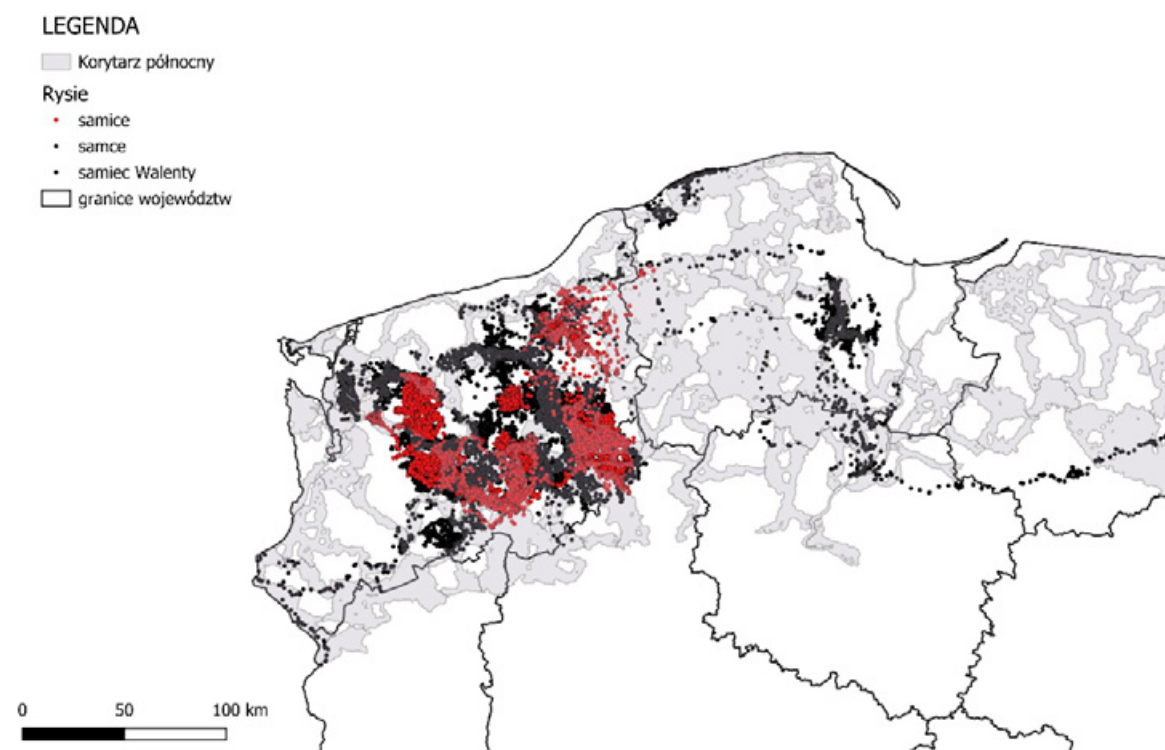


Fig. 21. **Distribution of lynx in north-western Poland in relation to the northern ecological corridor**

2. The individuals reintroduced in 2025 in north-eastern Poland did not contribute to the local population. The female, Wronka, was recaptured due to undesirable behaviour, whilst the male, Bilbo, was recaptured due to a scabies infection caused by * *. The males, Jajko and Śnieg, left Poland via the border with the Kaliningrad Oblast, where they could not be monitored. Jajko was observed in Lithuania, whilst Śnieg was shot in Russia.

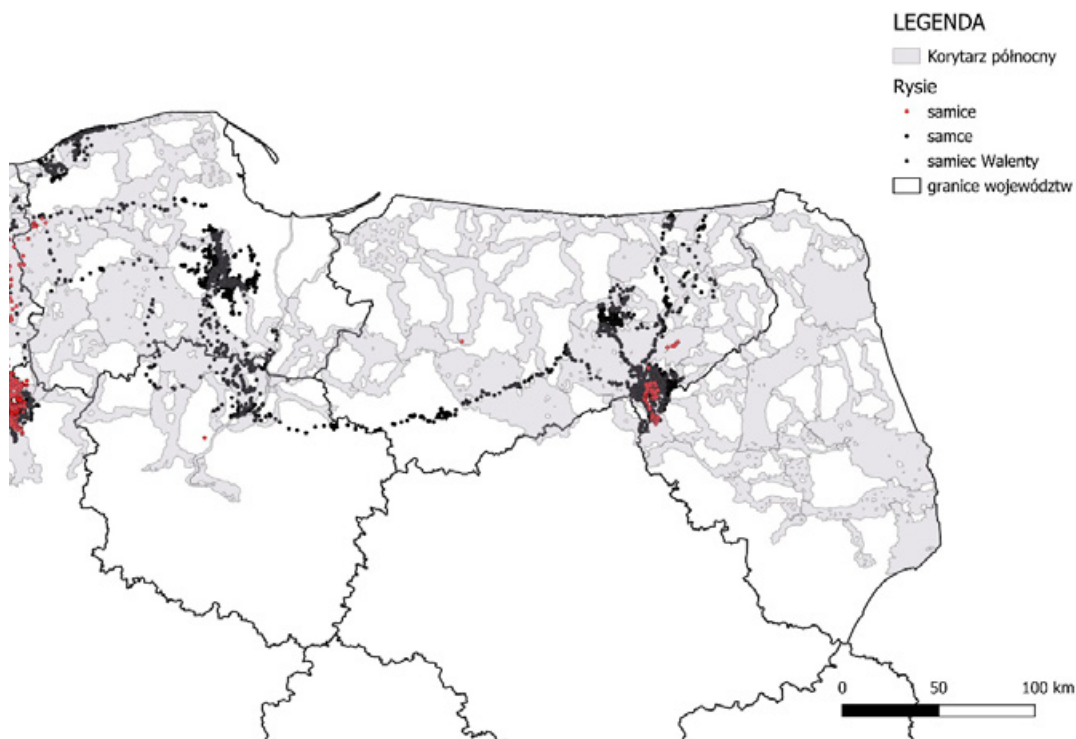


Fig. 22. **Telemetry data for lynx released into the wild in north-eastern Poland in 2025**

3. The most interesting data in terms of population connectivity was provided by the male Walenty, released into the wild in 2025 in north-eastern Poland, who migrated westwards, crossing the Vistula near Grudziądz, south of the northern ecological corridor. His journey through the Warmian-Masurian Voivodeship, as mapped by telemetry points, deviates very clearly from the defined areas of the northern ecological corridor. Walenty proved that connectivity between the eastern and western populations is possible, although when we began the project we had expected migration to take the opposite direction.

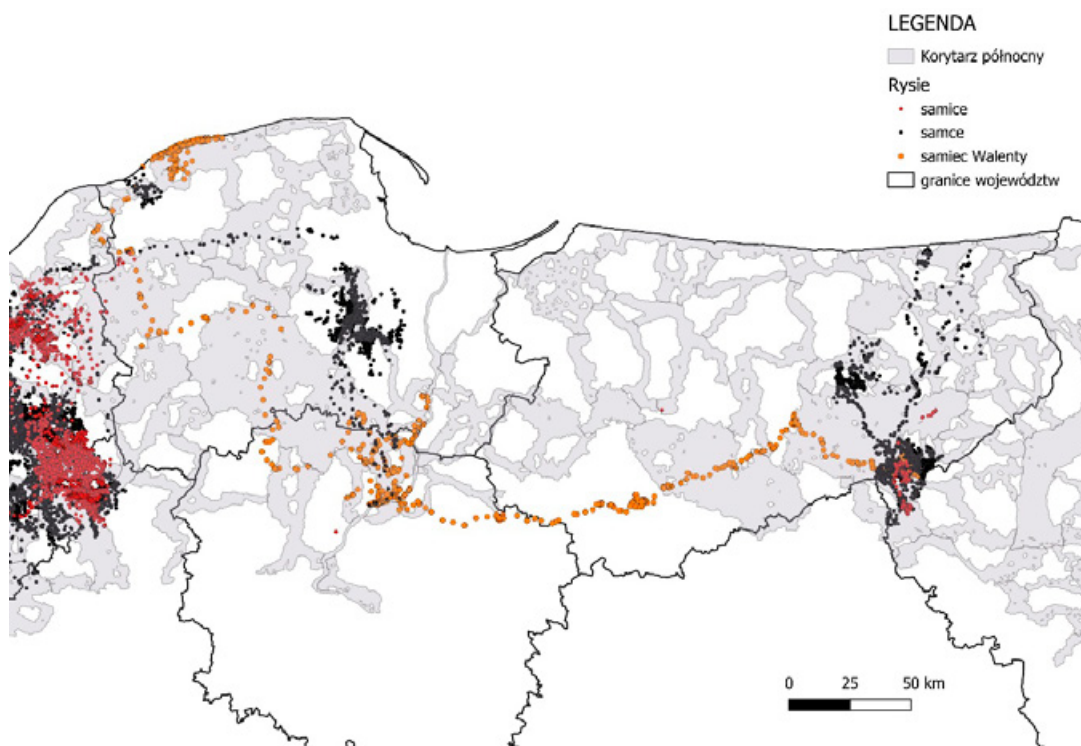


Fig. 23. **The journey of the male Walenty from east to west, from the Piska Forest to the Słowiński National Park**

5 THE ROLE OF THE LIFE22-NAT-PL-LIFE LYNX PL LT DE PROJECT ENTITLED ‘EXPANDING THE RANGE OF THE LYNX POPULATION IN NORTHERN POLAND’ IN IMPROVING ECOLOGICAL CONNECTIVITY IN EUROPE

According to experts, the long-term survival of the Baltic lynx population in Poland is possible provided that the number of local populations of this predator is increased and ecological connectivity with its range in the east of the continent is maintained. Due to the lack of reliable information on the conservation status of the lynx in Belarus, the political situation and the construction of a dam on the border with that country, the integration of the lynx population in northern Poland with the contiguous range of this predator in the Baltic states takes on particular significance. The size of the Baltic population across the four EU countries (Estonia, Latvia, Lithuania and Poland) is estimated at 1,500–2,000 individuals. In Estonia and Latvia, the lynx has the status of a game species, whilst in Lithuania and Poland it is a protected species. The lynx’s range in Lithuania therefore forms an important link connecting the northern part of Poland with the contiguous range of the species, which begins in neighbouring Latvia.

During the implementation of the lynx reintroduction project in north-western Poland, migrations of this predator to Germany were also recorded. Therefore, the implementation of this project, through the release of at least 40 lynx in northern Poland, will contribute in the long term to the creation of a contiguous range for the species. This will enable effective gene flow between peripheral populations and the centre of the Baltic population’s range, and may also replenish isolated populations in Western Europe (Fig. 24 and Fig. 25). Maintaining ecological connectivity between local populations, as well as on a transcontinental scale, will be key to this process. The released lynx will also provide highly valuable data from GPS telemetry collars. This will enable an analysis of the species’ actual environmental selectivity and the formulation of recommendations for measures aimed at maintaining ecological connectivity along the Northern Ecological Corridor and within the local network of N2000 sites.

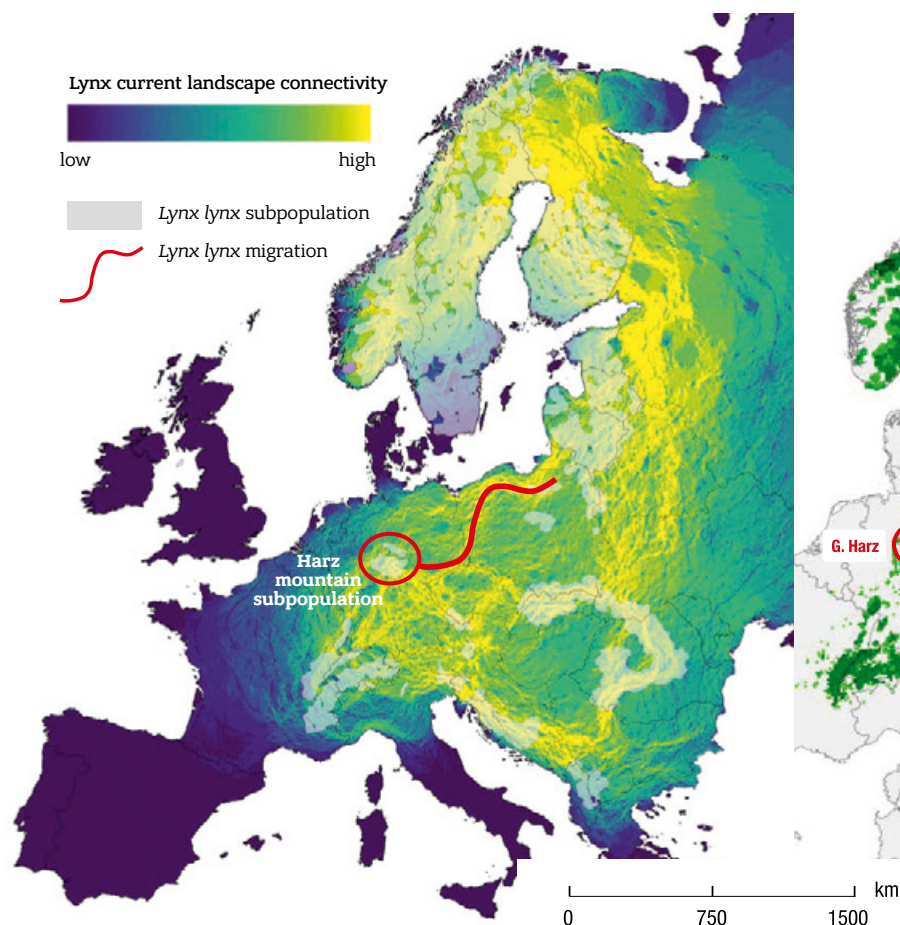


Fig. 24. **Functional connectivity and the current layout of protected areas indicate the existence of numerous poorly protected migration corridors for the Eurasian lynx**

Source: adapted from Iannella M., Biondi M., Serva D., *Biological Conservation* 291 (2024).

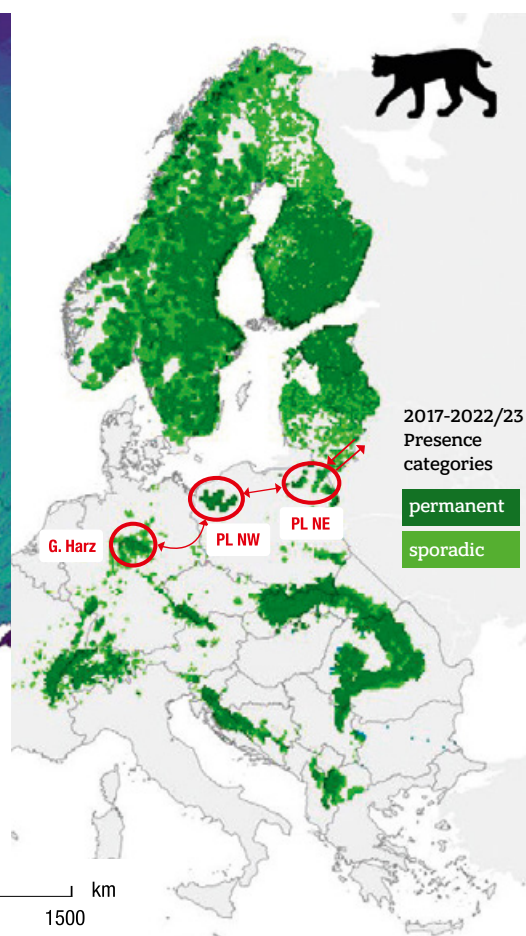


Fig. 25. **Distribution of large carnivores and population data for 2017–2022/23**

Source: adapted from <https://lciepub.nina.no>.



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