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THE PROPOSAL FOR MONITORING METHOLOGY AND PERSPECTIVES OF EUROPEAN POLECAT *MUSTELA PUTORIUS* (LINNAEUS, 1758) ON THE EXAMPLE OF POLAND

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Abstract. Many species considered common are not subject of population studies. This is also true for the European polecat, a species assumed to be widespread. However, recent research suggests that the actual situation may differ from these assumptions. It is essential to conduct thorough research and observations of this species, including in Poland, where it is known to occur, to better understand its population status. Currently, the literature on the population is insufficient, and the available information is based on foreign studies that may not necessarily reflect the actual situation. Monitoring the species enables taking conservation actions if needed to prevent its decline. However, observing this predatory mammal is challenging due to its elusive and nocturnal nature. While various monitoring methods have been developed and described, non-invasive approaches are particularly difficult to implement. The exact distribution and population size of the European polecat in Poland remain unknown. Which creates the need of comprehensive research and monitoring efforts to accurately assess the species' status and implement appropriate conservation measures throughout its acreage. Therefore, this article presents an overview of the species' biology and proposes a non-invasive monitoring strategy based on methods used in international research on mustelids.

Key words: monitoring, European polecat, *Mustela putorius*, population.

INTRODUCTION

Species description

The European polecat *Mustela putorius* (Linnaeus 1758) is one of the largest members of its genus in Poland (Pucek 1984). Despite this, it is smaller than a domestic cat. This species exhibits pronounced sexual dimorphism, with males being almost twice as heavy as females (Sumiński 1993). In Poland, the weight of females ranges from 0.4 to 0.8 kg, while males range from 0.5 to 2 kg (Okarma et al. 2008). This species is characterized by its elongated body, measuring between 28.2 and 44.1 cm (Brzeziński and Romanowski 1997), with a cylindrical shape, short limbs, and a muzzle set on a medium-length neck. The head's colouration is

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quite distinctive, as the arrangement of dark and light guard hairs forms a “mask” (Fig. 1), allowing individual animals to be distinguished from one another. The limbs have five toes each, ending in claws that are also visible in the tracks left by these animals (Brzeziński and Romanowski 1997). The colour of the fur is determined by the pattern of dark guard hairs and the light colouration of the underfur. The ventral parts of the body are usually darker in colour. The coat undergoes changes in colour and structure depending on the season. In winter, the polecat’s fur is lighter in colour as the underfur increases in number and length. This animal is known for expelling a foul-smelling liquid from its anal glands when threatened.

Fig. 1. The European polecat *Mustela putorius* (Linnaeus, 1758) (phot. M. Winiarska)

Species biology

In the wild, European polecats live up to a maximum of 5 years. The longest recorded lifespan for an individual is 14 years. Despite this, they rarely fall prey to other predators, likely due to several adaptations that make them difficult to capture or attack, such as expelling foul-smelling secretions, having dense fur, and loose skin around the neck. The primary cause of death is human-related.

The European polecat establishes and maintains territories by marking its boundaries with secretions from their anal glands, urine, and feces. However, these territories are not clearly defined, with overlapping boundaries that frequently change in shape, which is usually linear, and size. Home ranges vary from 10 to 200 hectares for females and 20 to 1200 hectares for males (Brzeziński and Romanowski 1997).

This animal is predominantly nocturnal, with up to 80% of its activity occurring from dusk till dawn. Peak activity is observed during the first half of the night (Brzeziński et al. 2010), though it can sometimes be seen in the middle of the day. Their activity patterns are

intermittent, with each bout of activity not exceeding 4 hours at a time, and typically lasting about an hour. Daytime activity increases during periods of intense feeding of young or foraging. In extreme conditions, such as severe frosts, they may remain in their shelters for up to 24 hours.

European polecats are excellent swimmers and diggers, using these skills to obtain food by digging up rodent burrows. Despite this, their primary sense used in hunting is smell. Small prey are consumed whole. The European polecat is an omnivore, feeding on the most readily available prey in a given location and time. Their diet usually includes earthworms, spiders, snails, insects, anurans, reptiles, birds and their eggs, and even carrion of large mammals (Lodé 1997). In Białowieża, it was noted that anurans made up to 98% of their winter diet, with rodents serving only as a dietary supplement (Jędrzejewski et al. 1993). Polecats exhibit “surplus killing” when encountering a large number of defenseless prey in a confined area, such as chickens in a coop or a large number of breeding anurans in a water body. Some of the excess prey can be stored in previously dug caches as food for later. The largest found cache contained about 100 killed anurans (Danilov and Rusakov 1969). Such food stores can sustain the animal for weeks, although polecats typically do not return to them after a few visits.

European polecats reach sexual maturity at approximately 12 months of age. During the breeding season, which occurs from March to April, males reach their peak activity. They may travel distances of up to 8 kilometers per day (Brzeziński et al. 1992) and are often found in areas outside their typical home range. Emaciated and weakened individuals do not participate in breeding. When two males encounter each other during this period, they exhibit aggressive behavior and engage in fights. Males do not partake in raising the young. Ovulation in females is induced by the length of copulation and male behavior. Pregnancy lasts about 40 days. Like most mustelids, European polecats experience embryonic diapause. The young are born between April and June in specially prepared nests, which are built in hidden crevices that are difficult to observe. A typical litter consists of 4 to 8 young, but litters of up to 12 individuals have been reported (Brzeziński and Romanowski 1997). The young are altricial – they are born blind, toothless, with closed ear canals, and covered only in downy fur. They open their eyes after about a month. Nursing continues up to 2 months, and from the 3rd week, as their milk teeth begin to emerge, the young start supplementing their diet with solid food. A month after weaning, the young begin to separate from the mother, initially learning to hunt from her, and eventually forming smaller, nomadic family groups consisting of several young polecats (Okarma et al. 2008). This period is critical, as it involves a nomadic lifestyle, and mortality rates are high during this time.

The European polecat is primarily distinguished from other mustelids by its two-tone fur. Unlike the European polecat, pine martens and beech martens lack the light spots on the head and have characteristic light patches on the chest and neck, which polecats do not possess. Polecat-ferrets and ferrets can be distinguished from the European polecat by their lighter colouration and narrower skulls, though the latter is difficult to observe or compare when the animal is in motion. For dark-coloured ferrets or polecat-ferrets, differentiation based on phenotype is nearly impossible. In comparison to the European polecat, minks have a dark undercoat and more uniform fur colouration. The steppe polecat, which is the other polecat species found in Poland, occurs only in the eastern part of the country. It can be distinguished from the European polecat by its lighter underfur, which contrasts more with the “mask” on its head than in its counterpart. Additionally, the tail is a more reliable indicator, as the first half of the steppe polecat’s tail is light-coloured from the base, while the remaining part is dark.

In contrast, the European polecat's entire tail is covered in uniformly dark fur. The European polecat can freely interbreed with ferrets, polecat-ferrets, and steppe polecats, which further complicates the differentiation of these species.

Habitat requirements

The primary habitat preferences of the European polecat are uncertain, as it currently inhabits areas significantly altered by humans and highly diverse environments, thus no uniform biotope is designated for the species. However, it does not avoid forests and can also be found in field groves, wetlands, gardens, parks, pastures, meadows, and areas near human settlements outside the centers of large cities. Habitat choice is somewhat dictated by seasonality, food availability, and the distribution of water bodies. In forests, this mammal prefers moist forests with water bodies (Brzeziński et al. 1992). Studies conducted in Białowieża National Park showed that in winter, this mammal did not inhabit coniferous forests but favored riparian forests and alder forests. Within these structures, the polecat also moved close to water bodies. In areas where human settlements are less accessible to polecats, forests were also preferred in winter, while in other seasons, the polecat was more likely to inhabit meadows and swamps (Jędrzejewski et al. 1993).

In cities, the species is more numerous in winter due to food scarcity outside of urban areas and easier access to shelters with optimal temperature conditions. This is likely related to the unfavorable surface-to-volume ratio of the polecat's body, which requires a suitably adapted metabolism in warm-blooded animals (Scholander et al. 1950; Lindstedt and Boyce 1985). Additionally, the home range significantly decreases, even to an area of 0.5 hectares (Herrenschmidt 1982), which is associated with reduced activity in winter. Studies conducted in Switzerland (Weber 1989a) showed that polecats change their resting places every few days and do not strongly attach to one, with a few exceptions. Additionally, it was observed that winter shelters differ as polecats choose more ground-level refuges such as burrows of various mammals, including those dug by polecats themselves, or human buildings, while in summer, polecats prefer above-ground shelters. In autumn, these mammals prefer locations outside human settlements, returning to synanthropic shelters in late winter and early spring.

In mountainous regions, the European polecat is found up to an altitude of 1300 meters above sea level (Okarma et al. 2008).

Distribution and population in Europe and Poland

In Europe, the European polecat is found almost across the entire continent. Its range extends uninterruptedly from the Atlantic coast to the Ural Mountains, excluding only the Mediterranean islands, the southern parts of the Balkans, and the extreme north of Scandinavia. In the United Kingdom, it is currently confined to Wales and two smaller locations in the north.

In Poland, the European polecat is present throughout the country, except for a few unrecorded habitats. It does not shy away from coastal areas, inhabiting both sandy beaches and cliff edges. It also occurs in mountainous regions. However, in the Carpathians, its population is small, and its ranges are typically located near rivers, streams, and human settlements.

In most of the eastern part of the European polecat's range, the population trend is stable. However, both in Poland and in most other European countries, the population trend is considered to be declining. The Fig. 2 illustrates the distribution of the European polecat across Europe, along with population trends in individual countries. The direction of the arrows indicates the population trend (Croose et al. 2018).

Fig. 2. Distribution of the European polecat with population trends in various countries (based on Croose et al. 2018)

It is important to consider population fluctuations, as the European polecat's population can decrease by half during the winter. A very high density in the eastern part of the species' range is considered to be 1 individual per km^2, which this species achieves in the forested areas of Russia and Belarus (Skumatov et al. 2016). In the western range, the polecat is an uncommon animal, with density values typically around 1 individual per 10 km^2. Even in optimal habitat conditions, the density rarely reaches 5–10 individuals per 10 km^2 (Skumatov et al. 2016).

There is no easily accessible up-to-date information on the population of this mammal in Poland. However, thanks to the efforts of the Polish Hunting Association's Research Station in Czempiń, it is possible to estimate the species' population based on harvest data. The latest data collected in 2019 indicates that the harvest of polecats across Poland in 2018/2019 was 1.9 thousand individuals. This is the lowest recorded number of harvested individuals in the decade 2009–2019, except for 2011 when the same number was harvested. This suggests that the polecat population in Poland is likely estimated in the thousands rather than tens or hundreds of thousands As of 30th January 2023 the distribution of the species presents it to be common throughout the whole country (Fig. 3).

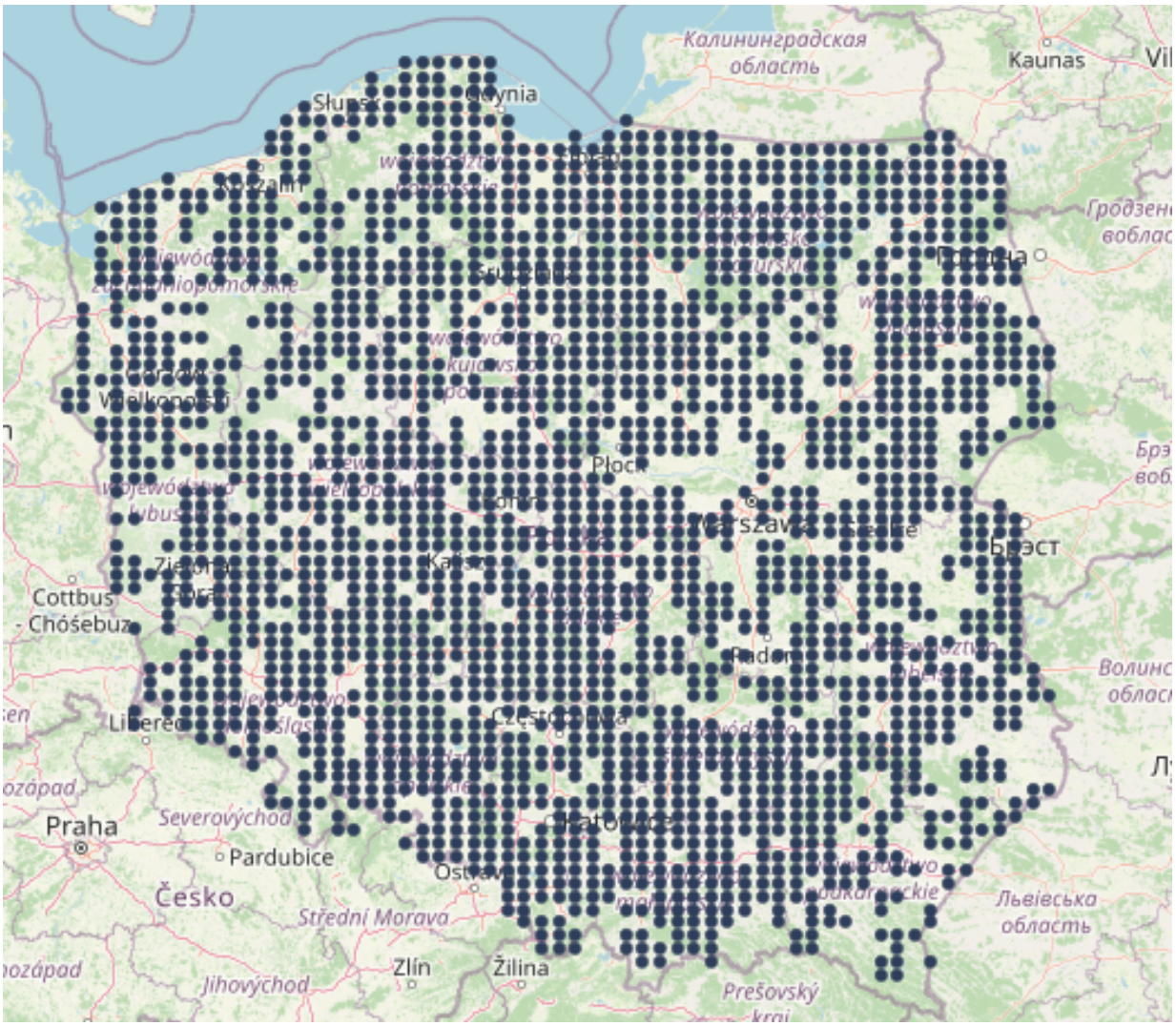

Fig. 3. Distribution of the European polecat *Mustela putorius* in Poland as of January 30, 2023 (source: https://www.iop.krakow.pl/Ssaki/gatunek/109 public domain)

Habitat threats

The main cause of the decline in the European polecat's population in the western part of its range is the transformation and loss of its preferred wetland habitats and farmland with shrubbery (Roger et al. 1988; Baghli and Verhagen 2003; Croose 2016). In areas rich in wetlands, the decline in population and threats to the polecat are particularly high in autumn, winter, and during periods characterized by low amphibian activity (Weber 1989b; Lodé 1991; Baghli et al. 2002). The polecat is also susceptible to significant mortality from road accidents, likely not only due to the danger posed by roads but also because its prey is often found near roadways (Birks 1993; Barrientos and Bolonio 2008).

METHODOLOGY

Method – species monitoring concept

The European polecat, being a secretive and nocturnal animal, is difficult to observe. Due to the lack of legal protection and the absence of immediate and significant threats to its population, it does not attract much scientific or general interest in Poland. However, as

previously mentioned, the polecat's population in Poland is likely only in the thousands and shows a declining trend. Therefore, the primary goal of monitoring would be to determine more accurately the occupied ranges of this mammal and its precise population numbers in specific regions and across the entire country.

For species monitoring, we have at our disposal both non-invasive methods – such as camera traps, interviews with hunters and farmers, and searching for animal traces in a given area – and invasive methods, including live traps, active searching, and flushing out animals. Due to the secretive and timid nature of these animals and their well-being, the proposed monitoring will focus primarily, though not exclusively, on non-invasive methods.

Example of species observation form at the site:

Species observation form at the site	
Species	Common and scientific name, and author according to current nomenclature Tchórz zwyczajny *Mustela putorius* (Linnaeus, 1758)
Name of site	Name of the monitored site Rogów Las
Protected areas at the site	If applicable, specify the protected areas such as Natura 2000 sites, national and landscape parks, nature reserves, ecological sites, documentation sites, etc. If none, write "none"
Geographical coordinates	Provide the geographical coordinates of the site in the format: N XXº XX' XX" E XXº XX' XX"
Elevation above sea level	Specify the elevation of the site in meters above sea level or a range, e.g., "from 200 to 250 m"
Site area	Size of the area expressed in hectares (ha) or square kilometers (km^2) 10 km^2
Site location and general description	The description is intended to facilitate the identification of the site. It should include the location and character of the area, noting the specific part of the site for which the geographical coordinates are provided. The site is located in the northwestern outskirts of the city, in a multi-species deciduous forest, partially characterized as a riparian forest. It is situated northwest of the residential area near… Street. The site can be reached by driving down… Street to the end of the residential area. The geographical coordinates are provided for a point located at the southeastern boundary of the local population.
Habitat characteristics of the species at the site	A brief description of the species' habitat at the site: The monitored forest includes small groves and clearings. Within the forest, there are paths approximately 0.5 meters wide, overgrown with shrubs ranging from 30 to 50 cm in height. There are also wide strips of vegetation with full stands of trees such as oaks, beeches, and pines. Additionally, ponds and marshes are present. The forest understory is dominated by dense ferns and moss. On the northern edge of the forest, there are apple orchards, fallow lands, and unused agricultural fields.
Information about the species at the site	Information about the species' occurrence at the site, previous studies, and other relevant facts; results from previous years' studies: On 24.04.2020, two individuals were observed, and X shelters were found.
Is monitoring required in the following years?	Yes or no. If no, provide a reason for discontinuing monitoring: Yes
Observer	Name of the person conducting the monitoring: Jan Kowalski
Observation dates	Dates of all observations: 24.04–30.04.2020

RESULTS

Monitoring is based on observing habitats and their quality in terms of parameters such as the availability of prey and shelters, as well as on observing the individuals themselves and their presence at the site. Indicators and assessment of species.

The first table (Table 1) presents three selected indicators used to assess the population status and abundance of the European polecat at a given site. These are, in order: “Relative Total Number of Individuals”, “Density of Individuals”, and “Occurrence of Shelters”. The first indicator is a cardinal indicator and is also required to calculate the second indicator in the table below.

Table 1. Indicators related to the European polecat population and their measurement methods

Indicator	Measure	Method of measurement/determination
Relative total number of individuals	numerical value	predictated on the number of individual observations through interviews, road accident data involving polecats, and the use of camera traps with preliminary individual differentiation supported by DNA tests from fecal samples if possible
Density of Individuals	/10 km^2	on the basis of the area of the studied habitats and the total number of individuals observed
Occurrence of shelters and dens	numerical value	determinated based on transects and interviews, and the presence of shelters used by polecats

N – relative total number of individuals.

Evaluation of population status indicators (Table 2) allows for the assessment of the site’s effectiveness in terms of the species’ presence. This enables the categorization of habitats and their comparison.

Table 2. Evaluation of European Polecat population status indicators

Indicator	Rating		
	FV	U1	U2
Relative total number of individuals	observed several or more individuals	observed at least one to several individuals	no individuals observed
Density of individuals	≥1 individual/10 km^2	<1 individual/10 km^2	0 individuals/10 km^2
Occurrence of shelters and dens	at least one shelter was found	no shelters observed, but there are conditions for it to exist	no shelters observed, and no conditions for shelters

FV – favourable status; U1 – unfavourable status; U2 – bad status.
Cardinal indicators:
• Relative total number of individuals

Habitat condition indicators

The habitat condition indicators selected in Table 3 and 4 allow for further and more detailed categorization of the habitat. Specifically, they determine its quality and take into account the threats that may affect the European polecat and impact its population.

Table 3. Components of habitat quality indicators

Components of the indicator	Measure	Method of measurement/determination
Presence of highways	numerical value	presence of asphalt or dirt roads with specified traffic volume (number of cars per hour per road) within a 0.8 km radius of the observed individual
Presence of water bodies	description	based on available habitat data
Food base*	description	presence of common amphibians and rodents
Type of terrain	description	open/semi-open/closed space
Proportion of favorable habitat	%	relative coverage of woody vegetation
Presence of predators*	numerical value	density of species creating competition (European otter and American mink) or threat (European wolf, Red fox, European wildcat, Pine marten, Golden eagle, Eurasian eagle-owl) for the polecat population

* Density calculated based on research and data for specific species characteristic of the given area.

Table 4 contains a list of point evaluations of the habitat quality indicators. A score of 1 for a particular indicator is awarded to a site that meets the best possible conditions. Scores of 0.5 and 0 points are awarded when the habitat does not fully meet the conditions favorable for the presence of the polecat.

Table 4. Component evaluation points of habitat quality indicators

Components of the indicator/ Point evaluation	0	0,5	1
Presence of highways	<12	7–12	≥6
Presence of water bodies	lack of water bodies	one or more water bodies are present, but there is no standing water	one or more water bodies are present, including at least one standing water body
Food base	no rodents or amphibians present	only rodents or only amphibians present	both rodents and amphibians present
Type of terrain	open	semi-open	closed
Proportion of favorable habitat	<20%	≥20–60>%	≥60%
Presence of predators*	high density	moderate density	low density

After accumulating the total sum of the component evaluation points (Table 4), we obtain the value of the Composite Habitat Quality Indicator. This allows us to determine the final assessment of habitat quality (Table 5).

Table 5. Cumulative evaluation of habitat condition

Indicator/rating	FV	U1	U2
Points	5–6	4,5–2,5	2–0

FV – favourable status; U1 – unfavourable status; U2 – bad status.

DISCUSSION

Monitoring perspectives: The monitoring perspective of the European polecat, *Mustela putorius*, is a kind of long-term forecast on the state of both the population and the habitat of this mammal, which is mostly declining. It takes into account the most significant threats based on available literature, as it is inevitable to know or estimate every possible individual preference of the polecat. These forecasts are particularly important because, despite being considered a common species, the polecat has a declining trend in Europe. Therefore, there may be a need for regulation, observation, and potentially protective actions if a significant deterioration in the population and environment of these animals is observed.

The prospects for maintaining the species in a given habitat have been evaluated as FV, which means favorable, in those locations that show any signs of polecat presence and have demonstrated an overall favorable environmental state, creating perspectives for the preservation and stability of the species. Unfavorable assessments, U1 and U2, require consideration of whether the polecat could function properly over the long term in these areas.

Overall assessment: The species assessment at a site should be determined based on the evaluation of population status indicators and the overall quality assessment of the habitat at the site. The overall assessment is determined by the lowest of the three given ratings (FV, U1, U2).

Selection of monitoring areas and their suggested size. Monitoring should first cover areas where the species is suspected to occur or where there is significant hunting harvest based on interviews with hunters or data obtained from research stations of the Polish Hunting Association. Due to the limited knowledge of the exact distribution area of the species, it is recommended to cover as large an area as possible in the initial monitoring to obtain the most objective data on a national scale.

The concept of a monitoring site should be distinguished, which refers to the area where activities involving observation and estimation of species occurrence will take place. For monitoring the European polecat, these will be areas conducive to the species' maintenance in a given environment. If a shelter or den of the polecat is found and its presence is confirmed, a monitoring site expressed in area units (km^2, ha) can be immediately established. Due to the significant variations in the individual ranges of the polecat (see Species biology), it is recommended to designate an area of at least 100 hectares around the den to cover as much of the individual's range as possible. There should be several such areas to enable the most objective estimates when calculating population density. If no dens or live individuals are found, it is possible to find other traces confirming the species' presence, such as clear tracks, feces, guard hairs, and downy hairs, or dead individuals. These materials should ideally be genetically tested to confirm their species affiliation. For example, tissue fragments and fur can be analyzed using microsatellite sequence analysis to identify the species (Martínez-Cruz et al. 2022).

Determining population status indicators

Relative total number of individuals. To determine the number of individuals in a given area as accurately as possible, multiple data sources should be used. Useful data might include information on the capture of the species in the designated area, data on road accidents involving the European polecat, as these pose a real threat to them, and independent searches for individuals and traces of the European polecat supported by appropriate genetic research if possible (see Selection of monitoring areas and their suggested size).

Additionally, as part of the monitoring, it is worth setting up specially constructed camera traps in the form of a baited tube, and based on the sum of all collected data and the most accurate identification of individuals, we obtain the relative number of individuals of the species in the given area. Polecats do not react to camera traps and can be observed without bait, although this happens rarely (Fig. 4).

Fig. 4. A European polecat captured by a camera trap on 21.08.2023

Density of individuals. Calculated based on the designated monitoring area and the obtained relative total number of individuals per 10 km^2.

Occurrence of shelters. This assessment involves identifying shelters used by polecats in the monitored area. Such shelters can include buildings like elements of barns, burrows of various species such as badgers, natural cavities, piles of branches, or roots and decayed parts of trees. Caution should be exercised when examining shelters, as polecats can be very well hidden and not visible even from a distance of 0.5 meters. Shelters also change depending on the season (see Habitat requirements). If a shelter is not identified, an assessment can be made predicting the potential for a shelter to form or the conditions favorable for a polecat to hide.

Both traces of individuals, the individuals themselves, and shelters can be searched using the transect method, where for every 20 hectares of area, 0.2 hectares of transects are allocated.

Determining habitat condition indicators

Determining components of the composite habitat quality indicator:

Presence of highways. The degree of road usage by car drivers should be determined, meaning counting the average number of cars passing through the road crossing the monitored area per hour. The measurement can be averaged (the measurement can last shorter but not less than 30 minutes) or come from external data. If more than one road crosses the area, a measurement should be taken on each road and the results averaged. Only roads that allow car passage should be considered.

Presence of water bodies. Due to the species' preference for residing near water bodies, this factor should be included in the overall environmental assessment. Polecats are very keen on staying near large and small rivers, lakes, ponds, and drainage ditches. These types of water bodies are a food source for them, especially in winter when they search for hibernating amphibians.

Food base. Based on available data or own estimates, the occurrence of rats, other small rodents, and amphibians in the monitored area should be considered. It should be noted that, being a generalist feeder, the polecat also utilizes other available resources; however, in most cases, small mammals form the basis of its diet.

Type of terrain. Polecats prefer covered areas that allow them to hide from threats and prey. Therefore, it is necessary to assign a value indicating whether the terrain is mostly open, such as unmanaged fields; semi-open, such as meadows or parks; or closed (covered), such as forests.

Proportion of habitat favorable for the species. Woody plants are preferred by polecats as places and sources of materials for shelter. The relative coverage of the area with woody vegetation should be calculated based on maps and external land data.

Presence of predators. The density of species known to compete with the European polecat (e.g., the European otter and American mink) or confirmed threats (e.g., European wolf, red fox, European wildcat, pine marten, golden eagle, and Eurasian eagle-owl) should be calculated based on available studies and data for the given species in the monitored area.

Time, frequency and technical requirements of the monitoring

Monitoring the European polecat is best conducted during periods when these animals are more active, such as the mating season and when young are becoming independent. This includes the period from March to mid-May when males increase the daily distance they travel (see Species biology), and the late summer and autumn period (from August to November) when the young first become independent and subsequently disperse, although the population size decreases during this time (see Species biology). It is recommended to conduct monitoring at least every five years, optimally every two or three years. Initially, to better understand the previously unexamined dynamics of the Polish polecat population, it is advisable to conduct intensive exploratory monitoring over as large an area of the country as possible, as current information on this topic appears to be outdated or too general.

For monitoring purposes, the following might be useful:

- watch,
- camera (for documenting the area, shelters, and individuals),
- off-road vehicle (recommended for larger areas),
- binoculars,
- current maps or orthophotomaps with marked boundaries of the site,

- species observation work cards or notebook,
- pre-prepared camera traps and bait with spare battery power,
- field bag or small backpack,
- GPS receiver.

CONCLUSIONS

The distribution and population size of the European polecat in Poland remain largely unknown. Currently, this knowledge is based solely on assumptions and limited data. This creates a need for detailed and comprehensive monitoring studies to accurately assess the species' status in the country and potentially implement measures to stabilize its population. Additionally, due to the limited number of studies conducted, no perfect methods for observing this elusive species have been developed. This proposal is one of the attempts to find such a method. Both invasive and non-invasive methods have their limitations, so it would be necessary to expand the selection of methods to suit the specific habitat and the species' situation at the site in order to achieve the best possible representation of results.

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PROPOZYCJA MONITORINGU ORAZ PERSPEKTYWY OCHRONY TCHÓRZA ZWYCZAJNEGO *MUSTELA PUTORIUS* (LINNAEUS, 1758) NA PRZYKŁADZIE POLSKI

Streszczenie. Wiele gatunków uznawanych za pospolite nie podlega czynnym badaniom rzeczywistego stanu populacji. Dotyczy to również tchórza zwyczajnego, gatunku uważanego za szeroko rozpowszechniony. Jednakże najnowsze badania sugerują, że faktyczny stan może odbiegać od tych założeń. Konieczne jest przeprowadzenie szczegółowych badań i obserwacji tego gatunku, także w Polsce, gdzie stwierdzono jego występowanie, w celu lepszego zrozumienia stanu populacji. Obecnie literatura dotycząca populacji tchórza zwyczajnego jest niewystarczająca, a dostępne informacje opierają się głównie na badaniach zagranicznych, które niekoniecznie odzwierciedlają rzeczywistą sytuację w Polsce. Monitorowanie gatunku pozwala na podjęcie działań ochronnych w przypadku jego zagrożenia. Obserwacja tego drapieżnego ssaka jest jednak utrudniona ze względu na jego skryty i nocny tryb życia. Pomimo opracowania i opisania różnych metod monitorowania stosowanie metod nieinwazyjnych jest trudne do zaimplementowania. Dokładny zasięg występowania i liczebność populacji tchórza zwyczajnego w Polsce pozostają nieznane, co stwarza potrzebę kompleksowych badań i działań monitoringowych w celu precyzyjnej oceny statusu gatunku oraz wdrożenia odpowiednich

środków ochronnych na całym obszarze jego występowania. Niniejszy artykuł przedstawia przegląd biologii gatunku oraz proponuje strategię nieinwazyjnego monitorowania opartą na metodach stosowanych w międzynarodowych badaniach nad łasicowatymi.

Słowa kluczowe: monitoring, tchórz zwyczajny, *Mustela putorius*, populacja.