PRELIMINARY STUDIES ON ORIGIN AND DISTRIBUTION OF AMERICAN MINK *NEOVISION VISION* WILD POPULATION AT THE EDGE OF ITS INVASION RANGE

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Abstract

The paper presents the preliminary results of wild American mink trapping in 13 fishpond complexes. A total of 13 American minks have been captured in 7 fishpond complexes from February to April 2021. The index of mink trapping success was from 1.7 to 11.5 individuals per 100 trap-nights. Capturing of the American mink will be continued in autumn in order to determine genetic differentiation and origin of the wild American mink population in the south-eastern part of Poland.

Key words: alien species, American mink, distribution and abundance

Introduction

The American mink *Neovison vison* is an alien species in Polish fauna and it has been noted in Poland for about 40 years. Its successful invasion caused it to now inhabit most of Poland. The colonization of Poland by this species began in the north-eastern part of the country, then it settled in western Poland and migrated southwards, where it is still scarce or absent. Genetic studies of wild and farm-bred American minks indicate their two origins which include migration of wild individuals and running away from fur farms (Zalewski et al. 2010).

The process of colonization of new areas by American mink is still not fully recognized. It is not entirely clear whether the area is colonized by a small group of animals that increase in numbers in subsequent breeding seasons, or if there is a continuous influx of minks from neighbouring areas. In the first case, the genetic differentiation of the newly created population will be low and there will be little genetic similarity between the newly created population and the neighbouring populations. In the second case, the newly formed and adjacent populations will not show a significant difference in genetic variation (Dlugosch, Parker 2008, Zalewski et al. 2010). Previous studies of the genetic differentiation of wild American minks showed the presence of at least four subpopulations occurring in western and north-western, central and north-eastern Poland (Zalewski et al. 2010).

The main aim of the study is the initial verification of the hypothesis that the genetic differentiation of the wild American mink population in the south-eastern part of Poland has decreased. Genetic similarity of the population from this part of Poland with the minks from north-eastern Poland will be examined. Furthermore, the morphological variability of the American mink will be determined on the basis of measurements of body length and weight. Minks from fur farms are larger than wild animals. As a result of natural selection, feral individuals become similar in size and body structure to wild minks in successive generations (Zalewski, Bartoszewicz 2012). The paper presents the preliminary results concerning the distribution and abundance of wild American mink in the fishponds of the Lublin region, i.e. the results of American mink capturing.

Materials and Methods

The American minks were caught in 13 fishpond complexes in the southern part of the South Podlasie Lowland, the Lublin Upland and the Western Polesie in south-eastern Poland, in cooperation with pond managers and hunters. The ponds are situated in river valleys, the largest of which is the Wieprz River valley, and they are surrounded by a diverse landscape (Figure 1, Table 1).

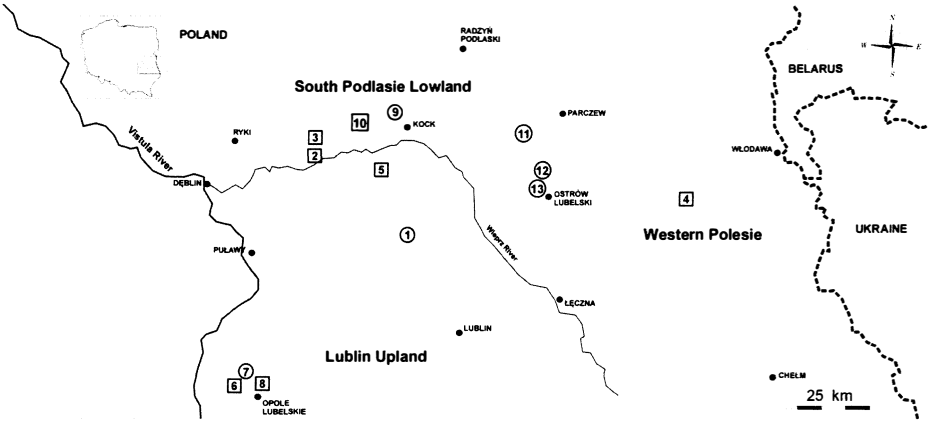

Figure 1. Location of the fish pond complexes. Square – fishpond complex where at least on mink was trapped; circle – fishpond complex where no mink was caught. The fishpond complexes are numbered according to the order in which they were visited in the period from February to April 2021.

Table 1. Selected details of the studied areas, methods and obtained results. The numbering of fishpond complexes corresponds to the numbering on the map (Figure 1).

No.	Fishpond complex	River	Surrounding landscape	Number of captured individuals	Number of traps	Period (day and month)
1.	Samoklęski	Minina	fields	0	12	1-6 Feb.
2.	Sobieszyn	Wieprz, Świnka	meadows, wetlands	1	11	18-22 Feb.
3.	Wólka Sobieszyńska-Podlodów	Świnka	forest	1	13	25 Feb.-1 Mar.
4.	Stary Brus	Mietułka	forest, meadows, fields, wetlands	6	13	3-7 Mar.
5.	Rawa	Minina	forest, meadows	2	11	9-13 Mar.
6.	Jankowa	Leonka	forest, meadows	1	10	18-22 Mar.
7.	Pomorze	Chodelka	forest, meadows	0	5	18-22 Mar.
8.	Wola Rudzka (Pustelnia, Kulig, Grabówka)	Chodelka, Poniatówka	forest, fields	1	15	24-28 Mar.
9.	Kock	Czarna	fields, forest	0	8	29 Mar.-2 Apr.
10.	Kawęczyn	Struga	fields	1	6	29 Mar.-2 Apr.
11.	Siemień	Tyśmienica, Piskornica	forest, fields	0	13	8-12 Apr.
12.	Tyśmienica	Tyśmienica	forest, meadows	0	8	15-19 Apr.
13.	Babianka	Tyśmienica	forest, meadows	0	5	15-19 Apr.

The minks were caught in the period from February to April 2021 (Table 1) using a live-trapping method (Brzeziński et al. 2019). From 5 to 15 traps were placed at each fishpond complex and left for the next 4 nights (except from Samoklęski fishponds where the traps were left for 5 nights) (Table 1). The number and location of the traps within the fishpond complex depended on the environmental conditions, the size of the complex, the length of the watercourses and the presence of sites where minks were observed in the past. The traps were usually placed at the base of a dike along the rivers and channels surrounding or running inside the complexes. The traps were checked every morning. Parts of fish, mainly Prussian carp *Carassius gibelio* obtained from a fish farm, were left as bait in the traps. The bait was replaced or replenished each day if it was necessary. The density of captured minks was defined as the number of

individuals trapped per 100 trap-nights (the index of mink trapping success), 1 trap-night means 100 traps set during 1 night or 1 trap left for 100 nights (Zalewski, Brzeziński 2014, Brzeziński et al. 2019).

Genetic differentiation of captured animals will be determined based on the analysis of 21 microsatellite markers. The obtained results will be compared with genetic data for wild minks from north-eastern and western Poland (Zalewski et al. 2016).

Results

Thus far, 13 American minks have been captured. These individuals were caught in 7 fishpond complexes located near Lower Wieprz and Chodelka River and Western Polesie wetlands. No minks were captured in the remaining studied fishpond complexes (Table 1). The mean number of trapped minks was 1 individual per fishpond complex. The index of mink trapping success for 6 fishpond complexes was from 1.7 to 4.5 individuals per 100 trap-nights. The fishponds and surrounding wetlands in Stary Brus (Western Polesie) stood out because the trapping success in this area was equal to 11.5 individuals per 100 trap-nights. In April, no mink was trapped although they had been previously observed at these fishponds (Figure 2).

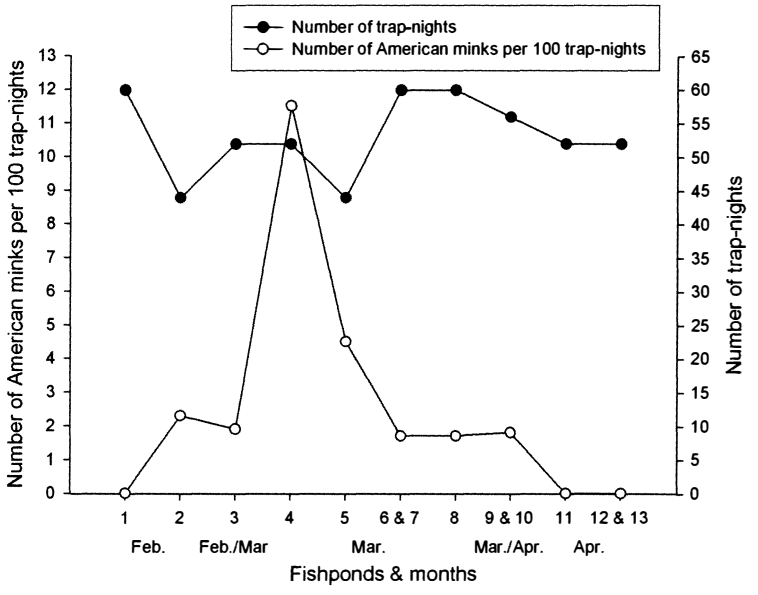

Figure 2. The number of American minks per 100 trap-nights (the mink trapping success index) and the number of trap-nights. Data are presented according to the order of visiting fishpond complexes. Numbering of fishpond complexes corresponds to the numbering in Table 1 and Figure 1. Data that was collected at the same time, i.e., 6 and 7, 9 and 10, as well as 12 and 13, are presented in total.

Discussion

Previous research revealed the presence of at least four genetic groups of wild American mink in Poland. Three groups from north-eastern and central Poland include the populations inhabiting the areas from the Masurian Lake District through the Biebrza basin and the lower Narew river, to the middle Vistula river. The fourth group consists of minks from northern and north-western Poland (Zalewski, Brzeziński 2014). The planned research aims to determine whether the minks captured in south-eastern Poland are related to the populations from north-eastern Poland, especially to the population of the Vistula River. Genetic comparison with domestic minks from fur farms will be examined too. The influx of individuals that escaped from farms might increase genetic diversity. However, it might be supposed that this impact in south-eastern Poland will be much smaller than in western Poland due to the small number of farms (Zalewski et al. 2010). Capturing of the American mink will be continued in autumn and harvesting a total of ca. 20-30 minks from various parts of the Lublin region is planned. Minks will be also monitored at the studied fishponds using rafts during the summer (Reynolds et al. 2004).

Considering that the average index of mink trapping success in Poland is between 7 and 16 individuals per 100 trap-nights, American mink densities obtained in the present study are quite low (Brzeziński et al. 2019). However, Stary Brus (Western Polesie) was a distinct area among other studied fishponds. According to Zalewski and Brzeziński (2014) a density index equal to 10 individuals per 100 trap-nights is high. It suggests that the American mink population in this area is quite large. Since this area borders the Polesie National Park, implementation of an active protection program consisting of catching invasive predators should be considered. Similar programs have been implemented in other national parks, which protect wetlands in western and northern Poland (ptaki-life.pl). Moreover, the whole UNESCO (MAB) biosphere reserve "Polesie Zachodnie", together with the Lower Tyśmienica and Wieprz rivers, should be covered by this protection program. Since the American mink is an alien and invasive mammal, the captured individuals were not released into the environment. These semiaquatic predators harm native animals species, mainly birds and fish in fishpond habitats and other wetlands (Zschille et al. 2014, Niemczynowicz et al. 2017, Brzeziński et al. 2020).

Previous studies concerning the American mink were focused on populations from north-eastern and western Poland. It was due to the high densities of wild minks and a large number of fur farms, as well as threats to local fauna in national parks protecting the wetlands in these parts of Poland. Therefore, it is justified to extend the studies on the American mink population in southern and eastern Poland. Since the south-eastern population of these animals can be increased not only by migrating individuals from the north but also the east, genetic analyses of animals from Belarus and Ukraine are also planned (Zalewski, Brzeziński 2014). The research will be connected with monitoring of the American mink in poorly known areas in south-eastern Poland. It will allow for the determination of the mink's range and interactions between this

species and local animal populations. Studies of the impact of the colonization model and American mink density changes on other vertebrates distribution will be considered. Effect of the American mink population from north-eastern and western Poland on the breeding success of birds will be analysed and then compared to similar data collected in south-eastern Poland. The negative impact of the American mink on the breeding success of waterbirds from inland water bodies is still not well understood.

Conclusions

Results of the present study enable further wide-ranging research aimed at determination of the occurrence and distribution of the wild American mink population in south-eastern Poland, as well as continuation of genetic and morphological studies to assess its descent. Explanation of the process of colonization of new areas by mink will allow for the preparation of guidelines for limiting its expansion rate.

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