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Dynamics of the range and population of the European Mink (*Mustela lutreola* L., 1761) in the Ukraine

Key words: European Mink, range, biotopes, dynamics, trapping, Ukraine, population, Red Data Book of Ukraine

Introduction

In historical times the European mink (Fig. 1) inhabited many rivers of Ukraine. In the early 20th century it was a common but scanty animal in the basins of the Dniester, Dnieper, Danube, Siverskyi Donets and Pivdennyi Buh. The European mink also inhabited some steppe rivers, flowing into the Azov Sea, and other areas. However, even in those old years its range was represented by scattered centers of distribution distanced from each other.

In the mid 20th century there occurred a sharp reduction in numbers of the European mink in Ukraine caused by intensive man-made transformation of wetlands. Especially heavy negative impact on its population was produced by construction of dams of hydropower stations (HPS) on most large rivers and intensification of agricultural industry in their floodplains. In spite that the European mink was included in the Red Data Book of Ukraine (Volokh & Rozhenko 2009), the reduction of the range and numbers of the species still continues. Since this phenomenon is observed in all the European countries, in this paper we took an attempt to reveal characteristics of distribution of the European mink in Ukraine and explore its reasons.

Material and methods

The material for the paper was collected in 1973–2010 in the territories of Volyn, Zaporizhzhia, Dnipropetrovsk, Kirovohrad, Mykolaiv, Odesa, Poltava, Kherson, Chernihiv, Cherkasy and Chernivtsi regions of Ukraine. A particular attention was paid to study the European mink distribution in the Danube Delta, Dniester Delta and the Middle Dnieper basin. The main

Fig. 1 The European mink captured in the Dniester Delta for marking

method was investigation of shores and banks of water bodies, searches for animal shelters, remains of food, etc. To understand the process of the range reduction the count of numbers was carried out that allowed to estimate the status of populations of the species. Taking into account a low number of remained centres of the species habitations and small numbers of animals the information of hunters, foresters, fishermen and other people were of great importance. The most valuable were the data of professional zoologists (Bashta A.-T., Vetrov V., Zhila S., Zhmud M., Evtushevsky N., Kondratenko A., Merzlikin I., Polushina N., Ruzhilenko N., Sirenko V., Selyunina Z. and Tkachuk Yu.), to whom we express our sincere gratitude.

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Discussion

Range

The process of reduction of the range and numbers of the European mink has started long ago, and it should be admitted that true reasons are still not completely known. In Central Russia a significant degradation of the species population happened in 1966–1977 as a result of transformation of river floodplains, intensive felling of forests and ploughing up of floodplain biotopes (Shashkov 1977). In the northwest of Russia from 1936 to 1966 the volume of stocks of skins of the European mink reduced 3.8 times (Danilov & Tumanov 1981). In Belarus Republic in 1959–1989 the border of its distribution moved by ~400 km to the north-east with the approximate rate of 13 km per year (Sidorovich 1995). Rapid disappearance of the European mink in the middle of the 20th century was also recorded in the west of its range – in France, where possible reasons are considered to be the destruction of river valleys in the process of building canals, dredging river channels and liquidation of sloping beaches (Chanudet & Saint 1981). The European mink populations were also affected by other human activities such as pollution of water bodies with waste products and pesticides, cattle grazing in floodplains, cutting down of trees and shrubs in the riverside, etc.

The largest centres of habitation of the European mink in Ukraine previously existed in the forest zone. Unfortunately, any special studies on distribution and numbers of the animal in this zone were not conducted. It is known that in the 1960s the European mink inhabited the basins of the Desna, Prypiat, Teteriv, Sula and other rivers. The highest numbers of its habitations were found in Volyn and Sumy administrative regions (Abelencev 1968). Main biotopes of the European mink in this area were floodplain

Fig. 2 The lake of the Desna floodplain where the European mink occur (Chernihiv region)
Photo by A. Volokh

Fig. 3 Sites of habitation of the European mink in the Carpathians (Chernivtsi region)
Photo by A. Volokh

lakes (Fig. 2) and forest lakes, many of which became shallow or entirely disappeared. It was due to intensive reclamation of bogs and their transformation into agrocoenoses. First it has led to decline in the animals numbers, and then to vanishing of the European mink in their former habitats. In 1976–1980 the numbers of the species only in Zhytomyr region reduced by 3–4 times compared to 1971–1975 (Podlasaja, Kopein 1982). In 1978 one European mink was occasionally caught in Polissia Reserve (Panov 2002), but after 1990 no any encounters were recorded (communication by S. Zhila). Now the European mink still, though extremely rarely, occurs in the territories of Volyn, Rivne, Kyiv and Chernihiv regions (Fig. 4) though everywhere its populations are in depressive state (Volokh 2004).

Earlier, the European mink was a quite common species in the Carpathians, but afterwards also turned there into a very rare animal (Tatarinov 1973). In the 1960s in Chernivtsi region and at some tributaries of the Prut and Danube it was occasionally captured by poachers (Shnarevich 1959). At present, this animal, according to Y. Tkachuk, very rarely occurs at the sources of the Bilyi and Chornyi Cheremosh (the Prut river basin). Presumably, the European mink still remained in upper reaches of several left tributaries of the Dniester in Ivano-Frankivsk region where it had lived lately (Volokh 2004). In 1980 a small group (~20 individuals) of this species existed in Lviv region (data by N.A. Polushina). However, 30 years have passed since that moment, and the present situation is unknown. A centre of permanent habitation of the European mink exists in the Carpathian Reserve where in 1995 there were recorded 24 individuals (Zagorodnyk et al. 1997). The Zakarpattia region is currently populated by ~50–70 animals, which inhabit upper reaches of tributaries of the Tisa River flowing into the Danube (Bashta & Potish 2007).

It should be noted that the European mink still inhabits the upstream of the Dniester and Prut (Fig. 4), but its numbers are low everywhere. Their typical biotopes in this area are small mountain rivers and brooks (Fig. 3). But, taking

Fig. 4 Present distribution of the European mink in Ukraine

into account that the Carpathians concentrate considerable forest resources, these water bodies are intensively used for transporting timber by different techniques. Though banned by Ukrainian laws, in the places remote from large settlements this activity did not stop. In addition, last years the Carpathian Mountains have become a very popular tourist place which required the development of relevant facilities: building of hotels, roads, ski resorts, restaurants; all that greatly deteriorated ecological conditions for the European mink. It provides a significant unfavourable impact on the Carpathian population, numbers of which continue decreasing.

One of comfort regions for dwelling of the European mink of Ukraine was and still is the forest-steppe zone. According to published materials (Abelencev 1968), in the 1960s it inhabited Ternopil and Khmelnytskyi regions at the left tributaries of the Dniester, and Vinnytsia and Kirovohrad regions – at tributaries of Pivdennyi Buh. However, during expeditions of 1992–2005 we did not succeed in discovering the species. The animal is also not known to local hunters.

Main biotopes of the European mink in these areas were the small rivers with narrow river valleys and stony banks, lacking in floodplain lakes and bogs. Therefore, after the construction in the area in 1950–60s cascades of hydropower stations their reservoirs flooded available habitats for the species and the numbers of the European mink dramatically decreased. Now the animals occurs only in a few sites at the Pivdennyi Buh (Fig. 4).

As long as 1935–1940 the European mink was a numerous inhabitant of the Dnieper tributaries in Kyiv, Cherkasy, Poltava and Sumy regions. However, in 1973–1976, in spite of special searches and attempts to catch (that time the European mink was a trapping species), we did not succeeded in it. One of the reasons of the species vanishing was the construction in 1962–1978 large reservoirs at the Dnieper (Kanivske, Kreminchuhske, Dniprodzerzhinske) which flooded many suitable habitats of the European mink and considerably changed hydrological regime of the tributaries. Ecological conditions of the European mink were much impaired by reclamation of floodplain bogs and lakes, with further use of former wetlands for agricultural production. Today, at banks and shores of many water bodies, earlier inhabited by the European mink, cottages and holiday villages appeared which makes dwelling of some wild animals and birds in such sites completely impossible.

In spite of the published data of encounters of the European mink in the Dnieper basin in the forest-steppe zone (Volokh 2004; Volokh & Roženko 2009), now we suppose that they are related to the American form of the species (*Mustela vison Schreber, 1777*). Nevertheless, a chance of discovering other sites of habitation of the European mink in this area should not be excluded since there are a lot of water bodies suitable for this species.

In the early 20th century the smallest number of centers of habitation of the European mink were in the steppe zone, predominantly they were located in the deltas of the Dniester (Brauner 1923), Dnieper, Pivdennyi Buh and in the middle reaches of Siverskyi Donets (Migulin 1938). The species also inhabited some rivers, entered the Black and Azov Seas. Although, further intensive transformations of natural landscapes, which were of the greatest scale exactly in the steppe zone, made impossible the European mink dwelling in many places as early as in the first half of the 20th century. Among them a very negative impact on the steppe populations of the species was provided by construction of hydropower stations (Dnieper HPS – 1932, Kahovska HPS – 1955) and transformation of most riverside meadows into agrocoenoses (1953–1960). Nevertheless, in 1960–1965 the density of its colonies in the lower reaches of the Dniester and Danube (Odesa region) as well as at left tributaries of the Siverskyi Donets (Luhansk region) was considered as the highest in Ukraine (Abelencev 1968). After the dust storms of 1969 when winds drifted a lot of soil, all steppe rivers became very shallow and not really suitable for the European mink dwelling.

All known findings of the European mink in the Black Sea area, confirmed by museum material (n=24), are related to Odesa region. These are Stensivsko-Zhebrianski Plavni, the riverbank of the Danube, the Dniester Delta (the Turunchuk River and Biliaevski Plavni). In this area main biotopes of the animal are represented by flood-

plain lakes and narrow channels between them (Fig. 5).

Now the highest numbers of the European mink in Ukraine remained only in the Danube Plavni. In this area, in the end of the 20th century, the Danube Biosphere Reserve and its protected zone supported 390–550 ind. of the species (Zhmud 1999). However, in the adjacent areas the animals disappeared almost everywhere. The main reason of vanishing of the European mink in this region is construction of polders to protect agricultural lands from floods and considerable transformation of wetlands for agriculture and stock-raising.

In the Dniester Delta as long as 1980–1983 this animal was rather equally distributed along the banks and shores of different water bodies, and its population density reached to 6–8 tracks/1 km of the route. Although, since 1984 the numbers showed a steady decrease: in 1987 the area supported ~ 60, and in 2000 – not more than 10 ind. (Rozhenko 2006). Even in the most comfort sites of the delta the population density of the European mink reduced to 0.5–1.0 ind./1 km (Rusev 1999). It was caused by disappearance of ~ 90 % wetlands due to the impact of Dubosari HPS and Dniester HPS. As a result of their work the river runoff in the delta became ~ 30 % per winter and spring, and ~ 20 % in summer, when prior to the building of hydropower stations this percentage was distributed as 28–37 % for the spring and summer runoff, and only 17–19 % – for the winter. This new hydrological regime deteriorated the environment conditions for the European mink, otter and ermine but improved them for foxes, martens and raccoon dogs.

In 2005–2006 the European mink population in the Dniester Delta reached its minimum over the last 100 years. After that it was a slight growth in numbers which in 2009 amounted to ~40. In some sites of the Dniester Delta the population density reached to 2–4 ind./1 km of the route, giving a hope for the population increase. The causes of this positive phenomenon are not quite understandable though we cannot exclude that it is a consequnce of prohibition on the commercial fishery and limitation of hunting in the territory of the newly formed Lower Dniester National Natural Park (2008).

In the first half of the 2oth century the European mink was a usual trapping species in the lower reaches of the Dnieper (Zubko 1940). After the end of building the dam of Kakhovka HPS (1953–1955) the area of suitable biotopes was reduced, which also observed in other territories of Ukraine. It entailed a sharp decrease of the European mink numbers and its vanishing in many sites of the region. While in 1967 it was quite frequently occurred in the Black

Fig. 5 Sites of habitation of the European mink in the Dniester Delta Photo by N. Roženko

Sea Reserve located in the estuarial part of the Dnieper (Abelencev 1968), in 1977 only several individuals remained (Berestennicov 1977). In 1995–2003 in the same places the European mink was seen only 4 times (Selunina 2008) that is an evidence of extremely low numbers.

The last region where this species occurred in the steppe zone, is the Siverskyi Donets basin. In the 1980s the European mink was studied at ponds of the fishery plant near Luhansk, where its population density amounted to 2 ind./1000 ha (Sulik 1979). This region still supports some insignificant number of the European mink. Besides, for the period of about 10 years the European mink was registered in the protected zone of the Streltsivskyi Steppe Reserve at the Cherepakha River, where in 2002 its numbers constituted ~10 individuals (Kondratenko & Borovik 2006). Very rarely the animal was seen on banks of left tributaries of the Siverskyi Donets (Kolesnikov & Kondratenko 2006; Limansky & Kondratenko 2006).

In spite of the recent creation of several new reserved areas in the Siverskyi Donets basin it did not succeed to stop the process of reducing the local population of the European mink.

Impact of trapping and other factors

The European mink was always an object of trapping as a valuable fur animal. However, many trappers evidence that in Ukraine its resources, unlike the otter, never suffered from strong hunting press. It is known that in 1924 the procurement stations of Kherson City received 50 skins of the European mink from the lower reaches of the Dnieper.

In 1935–1936 in this area there were trapped 71 animals (Zubko 1940), and in 1967–1977 – 1 (Berestennicov 1977). In 1927/28 in Ukraine a total of 2300 skins were delivered to the procurement stations, and in 1928/29–2298 skins. In the 1950s the most of skins were stocked by trappers of Odesa region (18–137 skins), Kherson region (4–55) and Luhansk region (5–47), though some skins were also delivered from the regions of Vinnytsia, Zakarpattia, Ivano-Frankivsk, Lviv, Mykolaiv, Poltava, Ternopil, Khmelnytskyi, Kharkiv, Cherkasy and Chernivtsi (Abelencev 1968). Such a vast geography of stocks proves that in the middle of the 20th century the European mink was an almost widespread species in our country.

In the 1960s–90s, as a result of intensification of the muskrat catching with the use of leghold traps, the trapping became to provide a noticeable negative impact on resources of the European mink. Unfortunately, that period of time the so-called 'black market' was widely developed, and skins of many valuable fur animals were illegally sold. Therefore official materials, characterizing the factual catching of the European mink, are not available. In the 1950s-60s trappers of the Lower Dnieper Cooperative Farm of Fur Animals in Kherson region caught about 181 000, in 1961/66 – above 100 000, and in 1960–1966 in Mykolaiv region – almost 35 000 muskrats.

In Odessa region in 1966 there were stocked almost 110 000 muskrat skins (peak of trapping); among them 90 000 skins from the Danube lakes and limans which still are main habitation sites of the European mink. However, any skin of the European mink from these administrative regions was not delivered to the procurement stations. Although, according to M. Zhmud and S. Ivanov, in 1984–1988 in the Danube area almost each muskrat trapper annually captured 5–20 European minks.

Similar situation was observed in the Dniester Delta, in the protected zone of Streltsivskyi Steppe Reserve and in other areas where during the muskrat trapping there were captured in traps also a certain number of the European minks. Drop of demand for the muskrat fur and decline of this rodent numbers in the late 20th century favoured the reduction of its trapping. Apparently it should have contributed to the renewal of resources of the European mink but it did not happened.

The European mink populations is much affected by vehicles. Annually several animals died on crossings of highways (Fig. 6). In addition in all sites of habitation a part of animals dies in nets and different fish catchers (Abelencev 1968; Rozhenko 2006). Among natural enemies wolves and feral dogs must be mentioned. Ecologically related species also provide a considerable impact on the European mink populations. The otter was always regarded as the

species competitor forcing out the mink from wetlands due to trophic and topic competition (Geptner et al. 1967). However, later it was found out that the same situation occurs in case of weak feeding and protective properties of the biotope (Sidorovich 1995), an in some territories a noticeable antagonism between these two species may be not present (Danilov & Tumanov 1981).

Nowadays it is considered that an essential negative impact on groups of the studied species is provided by the American mink *(M. vison)*. It was for the first time introduced into Europe in the early 20th century but especially actively reared in the 1970s.

In 1974 only in Finland there were ~2000 farms with approximately 1.5 mln individuals of the European mink. Monitoring of its wild populations has been carried out already since 1951 (Westman 1966). Especially high numbers of the American mink was registered in Sweden. It rapidly occupied available biotopes and began to cause much loss to aviculture, fishery and small game. Therefore in Sweden the resources of American minks started being intensively exploited: only in 1954–1964 they trapped 18 000 individuals (Thompson 1964).

The introduction of the American mink was never done in Ukraine but it was reared in 18 fur farms, more than in 20 cooperative farms, in some commercial enterprises and private farms. Over the period 1966–1987 in the state sector the total number of the American mink increased more than 6 times, and in 1987 amounted to 350 000 individuals. In 1958–1966 only the enterprises situated in the Carpathians (Zakarpattia, Ivano-Frankivsk, Lviv and Chernivtsi regions) stocked about 85 000 skins of the American mink (Tatarinov 1973). Large mink-breeding farms kept 20–60 000 individuals of the standard form characterized by a significant heterozygosity and high ecological adaptivity. In addition, depending on commercial demand and with experimental purpose there were reared representatives of recessive forms: silvery-blue (genotype *pp*), pastel (*вв*), palomino (*tptp*) and others (Kuznezov & Cepkov 1985).

Creation of lots of farms involved in breeding of the American mink in Ukraine, their predominate location in river floodplains and escape of a certain number of animals have entailed the development of its wild populations in many areas. It should be noted that this species was reared in all administrative regions of Ukraine. Unfortunately, in the Danube Delta supporting the largest population of the European mink in Ukraine, at Lake Safian was also located a farm which raised the American mink. That is why it became the region which formed the centre of habitation of this species which is able to be a great competitor to the European mink.

Fig. 6 In the Dniester Delta several animals died annually on crossings of highways
Photo by N. Roženko

It was experimentally proved that in case of copulation of the European and American minks the fertilized females end its pregnancy with resorption of embryos and, thus, there is a reproductive isolation between these two species at the embryonic level (Ternovsky 1977). This fact was not discovered in the wild but it was registered a high aggression of the American mink toward the European one (Sidorovich 1995). Besides, the copulation of the first species is in February-March, a month earlier than that of the European mink, and goes in shorter terms (Kuznezov & Cepkov 1985). The European mink also turned out to be less resistant to Aleutian disease and others, which causative agents were introduced together with the American mink to our continent (Tumanov 2003).

So, against the background of low numbers of the European mink in Ukraine and other part of its range, annual contribution of the population with escaped animals from fur farms and relevant enrichment of genotype, the larger and more productive American mink got great advantage over the European form. It is a competitor not only for the latter but also for the otter, as occupies the water bodies inaccessible for this species and uses a wider spectrum of food resources (Bevanger & Albu 1987).

In spite of the large range and commercial value it is impossible to make analysis of the dynamics of numbers of the European mink in Ukraine because of lack of reliable data. On the one part it because of a sporadic character of the animal distribution, practical and methodical complexities of the census, on the other part – it is impossible to distinguish tracks of its activity from the American mink. Habitations, ecology and appearance of these animals are so similar that only some experts are ready to recognize the species of the mink in the field. For the American mink it is known 30 mutations of genes (10 dominant and 20 recessive), which are responsible for hair colouration. In some places there were already discovered animals with a white spot on the upper lip that makes it more difficult to identify the European and American species in nature (Kuznezov & Cepkov 1985). In connection with these facts, in 1980 the Main Management Board of Hunting Economy of Ukraine recommended to count representatives of these two species together as a 'wild mink'. However, the results of these count data are such far from true that they cannot be used even for a scientific paper.

After the start of raising (1959) of the American mink in the fur farm at Kherson, in the Lower Dnieper Plavni the escaped animals developed a steady population. Already in 1968, 1971–1972, 1985–1987 we regularly recorded these minks in different sites of the region. In a short time the numbers of the mink in the fur farm were increased from 6900 (1988) to 11 800 (1995). Consequently the number of escapees also increased which contributed to the wild population of the American mink. Now the representatives of this species by irrigation canals penetrated to the regions located at the northwestern coast of the Azov Sea. That is why the prospects of conservation of the European mink in the Lower Dnieper basin are very problematic.

Many other areas of the country inhabited by the mink require special studies to determine its species status. For instance, recently there were published data on distribution of the European mink in Dnipropetrovsk region (Bulakhov & Pakhomov 2006). However, they are not confirmed by special researches or museum material and therefore are a question of doubt. In addition, in this administrative region several fur farms breeding the American mink have been functioning for a long time.

Today, conservation and restoration of the European mink resources in Ukraine is a matter of extreme difficulty. Except for the Dniester Delta there are not registered any places where its number is growing even if the trapping is absent. Everywhere weak centres of the European mink are isolated between many groups of the American species being another threat for its survival. In these conditions inbreeding can bring a great negative for the indigenous mink. On the example of the American mink it was proved that in case of copulation between brothers and sisters during three generations the fertility dropped from 4.3 to 1.03, and in some cases hereditary mutilations appeared. Especially considerable affect of inbreeding is seen when low animal numbers are low (Johansson 1962). Usually the process of displacement of the indigenous European mink by the introduced form lasts 7–10 years after formation of

its populations. Soon it leads to vanishing of all centres of habitation of the European species (Sidorovich 1995). The worst situation developed in the forest-steppe and steppe parts of the Dnieper basins, where biotopes of the European mink were the most transformed and where considerable resources of the American mink are concentrated.

In the beginning of the 21st century Ukraine supported 200–250 individuals of the European and 8–10 000 of American minks. At this, unlikely to the middle of the 20th century, nowadays the major population of the European mink is concentrated in the steppe zone. Some researchers (Panov 2002) assume that after the appearance of its stronger competitor in the country the renovation of most centres of habitation of the European mink became impossible.

Now populations of the studied species in Ukraine have real contours only in the Danube Delta and the Dniester Delta, in the middle reaches of Siverskyi Donets and in the upstream of some Carpathians rivers. We can only hope that they did not lose their ability to renewal. An important matter in this process can be the expansion of the muskrat range which has comensal relationships with the mink (Proulx et al. 1987). The objective reasons which can contribute to it are the collapse of muskrat trapping and considerable reduction of Ukrainian farms involved in breeding of the American mink which will prevent support of genofond and replenishment of the American mink population with new escapees.

Conclusions

In the early 20th century the European mink inhabited many areas of Ukraine but the highest number of its habitations was located in the forest zone.

In the 1950s–60s there occurred a sharp reduction in numbers and numbers of this species in Ukraine caused by intensive man-made transformation of wetlands. In the 21st century a major part of the European mink population is situated in the steppe zone.

Especially heavy negative impact on the populations of the studies species was provided by building of dams of hydropower stations, and intensification of agriculture and stock-raising in river floodplains. It changed hydrological regime of water bodies, deteriorated quality of wetlands, and made impossible the habitation of the European mink in many water bodies.

The introduction of the American mink was never done in Ukraine, but due to the animals escaped from fur farms wild populations nowadays developed in many places. Taking into account that at the early 21st century our country supported 200-250 individuals of the European mink and 8-10 000 of the American mink, the latter well adapted itself to new conditions.

1. Now the range of the American mink covers almost the whole territory of Ukraine except for the Crimean Peninsula. Everywhere weak centres of the European mink are isolated between many groups of the American species being another threat for its survival.
2. Indigenous populations of the European mink in Ukraine remained only in the Danube and Dniester Deltas, in the middle reaches of Siverskyi Donets and in the upstream of some Carpathian rivers.
3. In spite that the European mink was included in the Red Data Book of Ukraine (1994, 2009) as a vanishing species, it still did not succeed in stopping the reduction of its range and degradation of populations.

Summary

Dynamics of the range and population of the European Mink (*Mustela lutreola* L., 1761) in the Ukraine

In the early 20th century the European mink range covered the basins of the Dniester, Dnieper, Danube, Siverskyi Donets, Pivdennyi Buh and some steppe rivers, flowing into the Azov Sea. In the mid 20th century there occurred a sharp reduction in numbers of the European mink in Ukraine caused by intensive man-made transformation of wetlands. In the forest zone especially heavy negative impact was caused by intensive reclamation of bogs and tree felling, and in the forest-steppe and steppe zones by building of dams of hydropower stations and intensification of agriculture in river floodplains.

After formation of fur farms in the 1960s in all regions of Ukraine, the American mink penetrated into wetlands. Nowadays it developed several wild populations, its range swiftly expanding and already occupies a major part of the country except for the Crimean Peninsula. Under expansion of a more aggressive and ecologically resistant American mink the vanishing of the studied species goes with a rapid rate. Currently, the populations of the European mink in Ukraine remained only in the Danube and Dniester Deltas, in the middle reaches of Siverskyi Donets and in the upstream of some Carpathian rivers.

In spite that the European mink was included in the Red Data Book of Ukraine (1994, 2009) as a vanishing species, it still did not succeed in stopping the reduction of its range and degradation of populations.

References

Abelencev, V.I. (1968): Kunicevi: Fauna Ukraine. Ssavci. – Kiev: Naukova dumka **1** (3): 1–280 (ukr.).

Bashta, A.-T.; Potish, L. (2007): Ssavci Zakarpatskoi oblasti. – Lviv: 1–260 (ukr.).

Berestennicov, D.S. (1977): Mlekopitayschie chernomorskogo zapovednika. – Vestnik zool. Kiev. **2**: 12–17 (russ.).

Bevanger, K.; Ålbu, Ø. (1987): Konkurranse mello m mink og oter? – Fauna. Stockholm **40** (1): 20–22.

Brauner, A.A. (1923) Selskokhozajstvennaja zoologia. – Odessa: Gosizdat: 1–435 (russ.).

Bulakhov, V.L.; Pakhomov, A.E. (2006): Biologichne riznomanitta Ukraine. Dnipropetrovska oblast. Ssavci (Mammalia). – Vid-vo Dnipropetrovsk. nac. univer.: 1–356 (ukr.).

Chanudet, F.; Saint, G.M.-Ch. (1981): La répatition du vison européen (*Mustela lutreola*) dans le sud-ouest de la France. – Ann. Soc. sci. natur. Charente–Maritime **6** (8): 851–858.

Danilov, P.I.; Tumanov, I.L. (1981): Kunji severo-zapada SSSR. Leningrad. Nauka: 1–256 (russ.).

Geptner, W.G.; Naumow, N.P.; Yurgenson, P.B., Sludsky, A.A.; Chirkova, A.F.; Bannikow, A.G. (1967): Mlekopitayschie Sowetskogo Soyza. Morskie korowi i khischnie. – Moskva: Wisshaja shkola **2** (1): 1–1004 (russ.).

Grigorjev, G.P.; Zlobin, B.D. (1975): Sostojanie i perspektivi ondatrovodstva v Pridunajskikh ozerakh. – Okhota-pushnina-dich: Sbornik nauch.-tekh. informacii. Kirov. 49–50: 3–11 (russ.).

Johansson, I. (1962): Korsning mellan inavelslinjer. – Vára pälsdjur **14**: 363–365.

Kolesnikov, M.A.; Kondratenko, A.V. (2006): Sovremennoe sostojanie population redkikh vidov khischnikh mlekopitayschikh semejstva Mustelidae na ygo-vostoke Ukraine. – In: Teriofayna skhodu Ukraine. Praci teriliogichnoi shkoli. Lugansk **7**: 55–62 (russ.).

Kondratenko A.V.; Borovik, E.N. (2006): Teriologicheskie issledovanija v zapovednike «Strelcovskaja step» – In: Teriofayna skhodu Ukraine. Praci teriliogichnoi shkoli. Lugansk **7**: 18–23 (russ.).

Kuznezov, G.A; Cepkov, N.M. (1985): Norka. – In: Nauchnie osnovi zverovodstva. Leningrad. Nauka: 5–16 (russ.).

Limansky, S.; Kondratenko A. (2006): Sovremennoe sostojanie teriofauni v zapovednike «Melovaja flora» – In: Teriofayna skhodu Ukraine. Praci teriliogichnoi shkoli. Lugansk **7**: 29–32 (russ.).

Migulin, O.O. (1938): Zviri URSR (mareriali do fauni). – Kharkiv: AN URSR: 1–426 (ukr.).

Panov, G.M. (2002): Dynamika arealiv ta chiselnosti napivvodnikh khutrovikh zviriv v Ukraine u drugij polovini XX stolittja. – Visnik Lviv. nac. univer. Biologia. N30: 119–132 (ukr.).

Podlasaja, A.I.; Kopein, K.I. (1982): Vlijanie anthropogennikh faktorov na chiselnost khischnikh mlekopitayschikh. – In: Tez. dokl. 3 sjezda vsesoyz. teriol. ob-va AN SSSR. Moskva. **1**: 243–244 (russ.).

Proulx, G.; McDonnell, J.A.; Gilbert, F.F. (1987): The effect of water level fluctuations on Muskrat, *Ondatra zibethicus*, predation by Mink, *Mustela vison*. – Can. Field – Natur **101** (1): 89–92.

Rozhenko, N.V. (2006): Khizhi ssavci Pivnichno-Zachidnogo Prichornomorja (fauna, dynamika, chiselnist ta morphologia): – Avtoref. kand. biol. nauk. – Institut zoologie NAN Ukraine: 1–24 (ukr.).

Rusev, I.T. (1999): Sovremennoe sostojanie population redkikn mlekopitayschikh delti Dnestra i puti ikh sokhranenia. – In: Sokhranenie bioraznoobrazia bassejna Dnestra: Mater. mezhdunar. nauch. konf. – Kishineu: 205–206 (russ.).

Selunina, Z.V. (2008): Kunicevi khizhaki v rajoni ćornomorskogo biosphernogo zapovidnika, jaki potrebujut okhoroni. – Znakhidki tvarin Chervonoi knigi Ukraine. Kiev: 241–347 (ukr.).

Shashkov, E.V. (1977): Izmememija chiselnosti europeuskoj norki, vidri i vikhukholi za poslednie 25 let. – Bull. MOIP. Biologia. **82** (1): 23–28 (russ.).

Sidorovich, V.E. (1995). Norki, vidra, laska i drugie kunji. – Minsk: Uradzhaj: – 1–191 (russ.).

Shnarevich, I.D. (1959): Mlecopitayschie Sovetskoj Bucovini. – Zhivotny mir Sovetskoj Bucovini. Chernovickij univer: 5–65 (russ.).

Sulik, V.G. (1979): Kunji Luganskogo zapovednica i ego okrestnostej. – In: Mater. vsesojuz. soveschanija po ekolog. osnovam ochrani i rac. ispolzovanija khischnich mlecopitayschikh. Moskva: 343–344 (russ.).

Tatarinov, K.A. (1973): Fauna khrebetnikh zakhodu Ukraine. – Vid-vo Lvivsk. nac. univer.: 1–257 (ukr.).

Ternovsky, D.V. (1977): Biologia kuniceobraznikh. – Novosibirsk. Nauka. 1–280 (russ.).

Thompson, H.V. (1964): Wild mink. – Agriculture **71** (12): 564–567.

Tumanov, I.L. (2003): Biologicheskie osobennosti khischnikh mlekopitayschikh Russia. – Sankt-Peterburg. Nauka: 1–448 (russ.).

Volokh, A.M. (2004): Pochirenna i chiselnist europeuskoj norki (*Mustela lutreola* L., 1766) v Ukraine. –Visnik Lviv. nac. univer. Biologia. **38**: 118–128 (ukr.).

Volokh, A.M.; Rozhenko, N.V. (2009): Europeiska norka (*Mustela lutreola* L., 1766). – Chervona kniga Ukraine. Tvarinnij svit. – Kiev: Globconsalting: 540 (ukr.).

Westman, K. (1960): Minkin levinneisyydestä suomessa. – Suomen riistä. **18**: 101–116.

Zagorodnyk, I; Pokinchereda, V.; Kiseljuk, O.; Dovganich, J. (1997): Teriofauna Karpatskogo biosphernogo zapovidnika. – Vestnik zool. Kiev. (Dodatok): 1–60 (ukr.).

Zhmud, M.E. (1999): Resursi mislivskikh ssavciv ta chlakhi jikh racionalnogo vikoristannja. – Biориznomanitnist Dunajskogo biosphernogo zapovidnika, zberezhennja ta jogo upravlinnja. Kiev: Naukova dumka: 247–252 (ukr.).

Zubko, J.L. (1940): Fauna ssavciv Nizhnnogo Dnipra. – Nauk. zap. Kharkiv. derzh. ped. inst. **4**: 49–87 (ukr.).

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