

# Distribution and status of small and medium-sized carnivores in Latvia

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The present status of 11 small and medium-sized carnivores found in Latvia was estimated as part of the Latvian and European mammal atlas work. The main sources of information for the period since 1970 were questionnaires to amateur mammal observers and game statistics of the Latvian Forest Service. Data on estimated numbers and annual kill were available for game species—raccoon dog (*Nyctereutes procyonoides* Gray), red fox (*Vulpes vulpes* L.), European badger (*Meles meles* L.), pine marten (*Martes martes* L.), polecat (*Mustela putorius* L.), American mink (*Mustela vison* Briss.) — and for non-game species that are caught as bycatches, especially otter (*Lutra lutra* L.). For these the population trends since 1920 were estimated. The reliability of game statistics is evaluated. The main factors influencing the status of the populations are suggested to be hunting, interspecific competition and habitat destruction. Four of the species, i.e. otter, stone marten (*Martes foina* Erxl.), stoat (*Mustela erminea* L.) and European mink (*Mustela lutreola* L.), are included in the up-dated Red Data list 1992, but the European mink is the only highly endangered species in Latvia at present.

## 1. Introduction

In total, 14 carnivore species inhabit the territory of Latvia at present. Of these, 11 are small to medium-sized: red fox (*Vulpes vulpes* L.), raccoon dog (*Nyctereutes procyonoides* Gray), stoat (*Mustela erminea* L.), European mink (*Mustela lutreola* L.), weasel (*Mustela nivalis* L.), polecat (*Mustela putorius* L.), American mink (*Mustela vison* Briss.), stone marten (*Martes foina* Erxl.), pine marten (*Martes martes* L.), European badger (*Meles meles* L.) and otter (*Lutra lutra* L.). Although most are game animals, they form one of the less studied mammal groups in Latvia.

Historically, three periods of study on the distribution of mammals in Latvia can be distinguished:

- a) early 20th century (Greve 1909),
- b) 1970:s (Tauriņš 1982, Latvijas PSR Zinātņu Akadēmija Bioloģijas institūts 1985),
- c) the present project “Atlas of Latvian mammals” of which here reported study formed a part.

Some additional studies on small and medium-sized carnivores also provided valuable information. The role of the raccoon dog in local conditions was investigated by I. Lapiņa (1966). The pine marten and badger diets have been studied by A. Šmits (1990) and A. Zoss (1992) respectively.

Most literature exists for otter, beginning with reports on foraging conducted by Baron Rummel in the 1930s (Lange 1970), but systematic studies began only in 1986 (Ozoliņš & Rantiņš 1988, 1992a, 1992b). In the present paper we report preliminary results of the Atlas project, regarding the small and medium-sized carnivores. Additionally, the main population trends along with possible causal factors are evaluated.

## 2. Materials and methods

The Atlas project was based on both summaries of all published and unpublished materials and new questionnaire data. The species presence data were mapped using the standard European UTM-grid system. Altogether, Latvia was divided into 739 squares of 10×10 km. In the distribution maps, all 50×50 km or 10×10 km squares with at least one record, from the period after 1970 (general rule of European Mammal Atlas – EMMA Guidelines 1992), are shaded. In this study regarding game species, data of Latvian Forest Service game statistics were used to map their distribution according 50×50 km squares. Regarding non-game species, data obtained through questionnaires were used to map their distribution according 10×10 km squares. The questionnaires launched in 1991–1993 were directed to volunteers: amateur observers, who had already contributed to several ornithological studies as well as to professional zoologists. Fifty-two volunteers and 6 professionals responded. Amateur observers were required to report all mammal species found in 10×10 km squares they visited regularly. Fifty-seven squares of 10×10 km from all parts of country are covered by these questionnaires (Fig. 2). Professionals collected data throughout the country. The game statistics for both numbers present and killed mammals were available for the following periods: 1923–1940 (Kalniņš 1943), 1947, 1950, 1955, 1957–1989 (Kronitis 1970, Vanags 1989, Ziediņš 1990) and 1990–1993 (unpubl. annual reports of the Latvian Forest Service). Local statistics were compiled annually (by March) by foresters as a part of their ordinary duties. In general, the number of animals present was based on the opinion of forester, but not on the results of proper surveys. Therefore we have asked experienced hunters involved in Mammal Atlas work to comment upon general trends in statistics. Their estimate not always coincided with conclusion based only on figures of game statistics. We paid attention to this additional information discussing presented changes in number.

## 3. Results and discussion

### 3.1. Evaluation of the presented game statistics

Although fluctuations in animal numbers are common phenomena (Maksimov 1984, Begon

et al. 1986), there are some peculiarities which make our data suspect. The most striking peculiarity is the synchronism in the trends for ecologically unrelated species, e.g. European badger and red squirrel (*Sciurus vulgaris* L.) (Fig. 3J). We attempted to evaluate the possible causes for above mentioned trends from the point of view of variable economic and organizing conditions of game management as well as comparison with similar data in neighboring countries. The remarkable positive trends for most game species during the last three years is undoubtedly due to an increase in the number of State foresters. Simply, more people count more specimens. Similarly, the decreases during the 1970s are associated with personnel cuts in the forestry sector in 1975. The evaluations of game animals by foresters were influenced also by such political (economical) factors as the changes in fur prices. Similar later trends of numbers was also recorded for some species in Estonia (Laanetu 1984), Lithuania (Bluzma 1990) and in the previous East Germany (Goretzki & Liess 1989). The remarkable increases seen in game statistics for most of the considered species after 1983 seem to be associated with the doubling of fur prices throughout the former Soviet Union. The changes of forest cover (Fig. 3A) in Latvia might be taken into account, however, we could not recognize how far foresters in reality included in statistics animals from the surrounding areas.

### 3.2. Distribution and status of species

#### *Red fox*

The red fox was found in all 50×50 km Atlas plots (Fig. 2) and was also the most recorded species by Atlas volunteer respondents. Furthermore, it has always been a significant game species. The annual harvest was comparatively stable and has even increased in the last decade (Fig. 3B). E. Tauriņš (1982) suggested that fox numbers could be partly controlled by the wolves (*Canis lupus* L.). However, during recent years, both species have increased simultaneously, as suggested by official game statistics (Fig. 3G). Epizootic diseases, particularly mange and rabies, also influence the population. Reductions in number due to epizootics were recorded in 1946–

50 and 1955–57 (Tauriņš 1982). During the last 20 years, red foxes as well as racoon dogs infected with rabies and mange were rather common, but these numbers (50–300 cases annually) fluctuated spatially and temporally (Perevoščikovs 1994). In 1991, pre-oral immunization of racoon dogs, badgers and foxes was begun in Latvia to restrict rabies.

#### *Racoon dog*

During the present survey, the racoon dog was found in all 50×50 km Atlas plots (Fig. 2). In Latvia, the racoon dog was recorded for the first time in 1943 (Lapiņa 1966, Tauriņš 1982) as an invader from neighboring countries. It was first released in Belarus, already in 1936 (Nikiforov et al. 1991). In 1948, less than 100 specimens were simultaneously released in two areas of eastern Latvia (Lapiņa 1966). An immediate rapid population increase was recorded (Fig. 3H), and since 1952, hunting of racoon dog has been allowed. Shortly afterwards, racoon dog was recognized as a pest, in regard to the native fauna (Ezeriņš 1961).

The hunting of racoon dog increased considerably after 1983, when also fur prices rose. Nevertheless, several years later the harvest decreased to the previous level (Fig. 3H). It indicates that the initial increase in population density has levelled off. According to hunters and foresters, the racoon dog is presently a common prey of wolves and roaming dogs. The influence of these carnivores on the racoon dog population could be increased during years with mild winters, since the racoon dog is then active all the winter. Unfortunately, its influence on native mammal and bird species in Latvia remains unknown.

#### *Stoat*

The questionnaire survey revealed occurrence of stoat in 44 10×10 km Atlas plots (Fig. 2). Previously, the stoat was considered to be a rather rare species distributed throughout the country (Greve 1909). Decreases in number after World War II are indicated in Latvia (Grunte 1962, Tauriņš 1982), Lithuania (Prūsaite 1988) and in the former Soviet Union (Nasimovich 1977). Reasons for this decline are suggested to have been the destruction of habitats including drainage of wet areas and regulation

of water streams, use of pesticides and fertilizers, and competitor species (Nasimovich 1977). In Latvia, competition between stoat and the more numerous American mink is possible. For example, at lake Engure (Fig. 1) prior to the appearance of American mink, stoat was regularly recorded as a predator of duck nests, but later it disappeared (Lab. of Ornithology, unpubl. data). In comparison with weasel, the stoat is more commonly found close to human settlements, and even seen in the City of Riga. As a result, more records were obtained for the Atlas project (Fig. 2). Nevertheless, we consider the stoat to be more rare than the weasel. The stoat was previously an insignificant game species. During 1957–1966, its annual harvest was only 6–60 specimens (Kronitis 1970). Since 1977, it is protected by law, and it was included in the Red Data Book of Latvia in 1980.

#### *European mink*

Only three reliable records of European mink are known for the last several decades (Fig. 2):

- a) In 1984, an individual was observed by one of authors (J.O.) in a dredged river near Belarus.
- b) In Western Latvia, visual observation at a close distance was recorded by a professional zoologist (M. Šternbergs) in 1991.
- c) One trapped specimen was presented by a hunter in the very north-east part of Latvia in 1993.

There were some additional records of European mink mentioned in the questionnaires. However, due to possible confusion with American mink, these must be carefully checked before acceptance. In 1986, more than 500 skins of trapped mink from different regions of Latvia were examined but no specimens of European mink were found.

At the end of the 19th century, European mink inhabited all parts of Latvia, but was considered to be a rather rare species, at least in comparison with Estonia (Maran 1991). During the first half of this century, European mink occurred in a sparse population throughout western Latvia. It was more frequent in the eastern part close to the border with Russia and Belarus (catchment area of the River Daugava/West Dvina) (Lange 1970). After the World War II, a

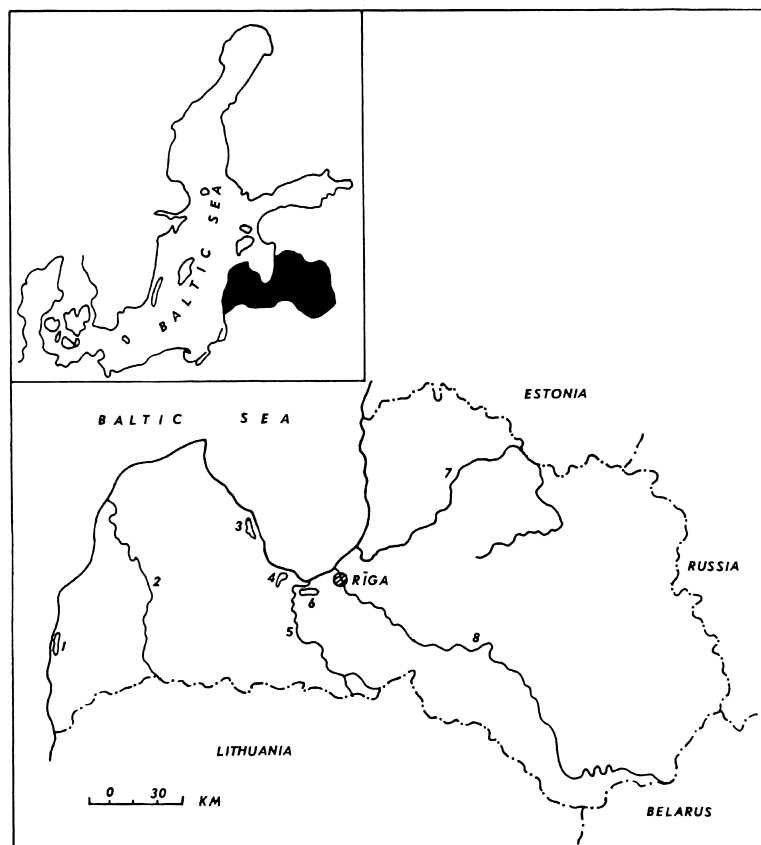


Fig. 1. Study area, 1 = Lake Liepāja, 2 = River Venta, 3 = Lake Engure, 4 = Lake Kaņieris, 5 = River Lielupe, 6 = Lake Babīte, 7 = River Gauja, 8 = River Daugava.

rapid decline of its population was noticed (Tauriņš 1982). The reasons for this decline could have been the same as suggested for the Estonian population (Maran 1991): destruction of habitats and the expansion of American mink.

This species is protected by law since 1977. In 1980, it was included in the Red Data Book of Latvia. In an up-dated Red List of 1992, it was confirmed as an almost extinct, but occasionally occurring species. The recovery of this species is doubtful due to competition with the very widespread American mink (Sidorovich 1993) and the lack of undisturbed habitats.

#### Weasel

Occurrence of the weasel was reported for 32 Atlas plots of 10×10 km (Fig. 2). The scanty data on distribution was presumably influenced by difficulties in observing the species. Our own subjective experience, obtained during the sur-

veys of otter habitats including the finds of dead weasels in some areas, rather indicates that weasel is the most common among the native *Mustela* species. Also formerly, the weasel was considered more common than stoat (Greve 1909). According to some publications (Grunte 1962, Tauriņš 1982, Latvijas PSR ZA Biol. Inst. 1985), the number of weasels declined during the 1960s. Changes in the structure and use of agricultural lands, introduction of the racoon dog and American mink, as well as the use of poisons in pest rodent control are factors suggested to be responsible for the decrease of the population. Due to its small body size, the weasel may be better protected from interspecific competition than the stoat. At the same time, weasels are not found on coastal lakes (J. Vīksne, pers. com.) inhabited by American mink. The weasel has never been a significant game species in Latvia. Since 1977 it is protected by legislation. Between 1980 and 1992 it was included in Red Data Book of Latvia.

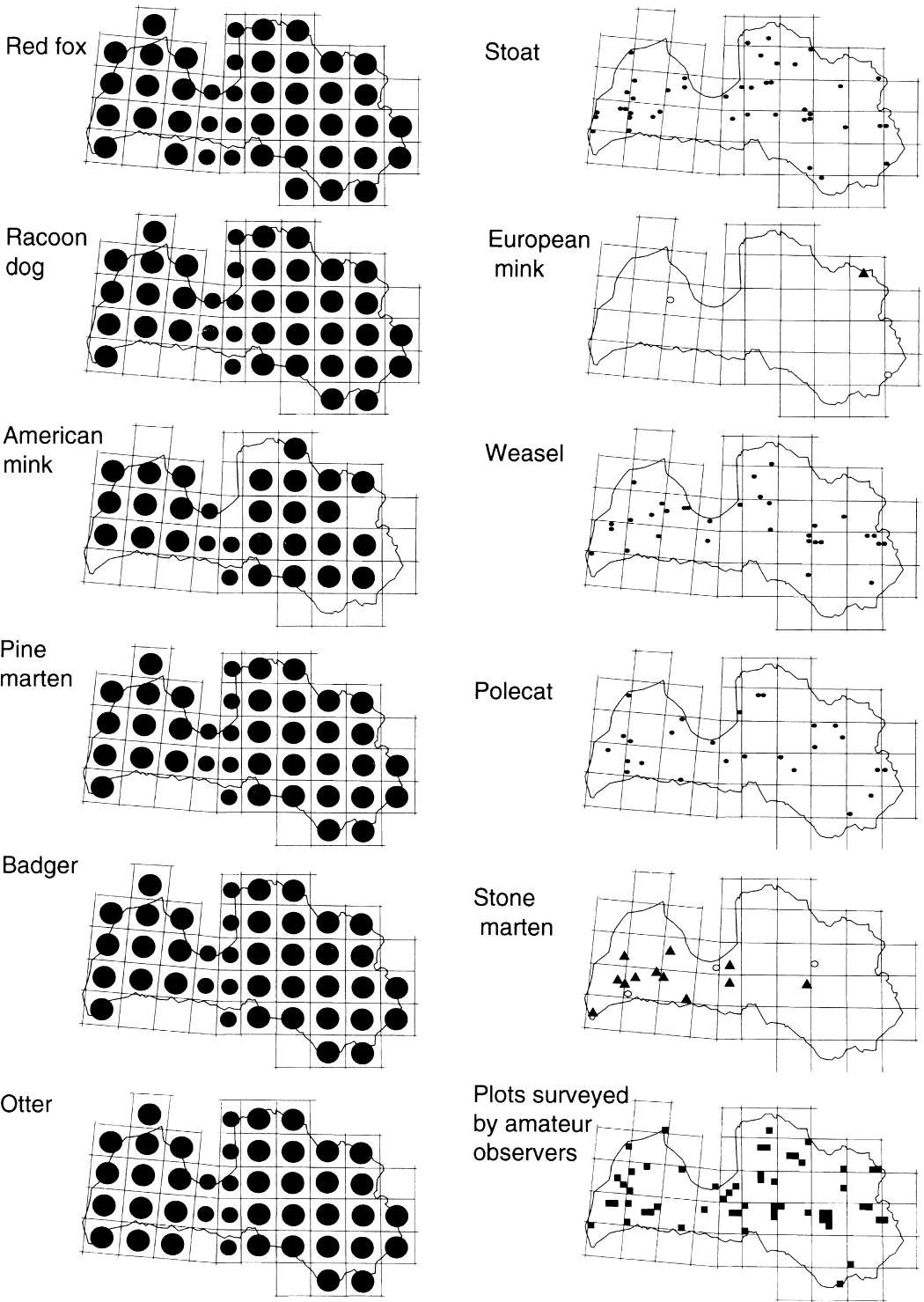
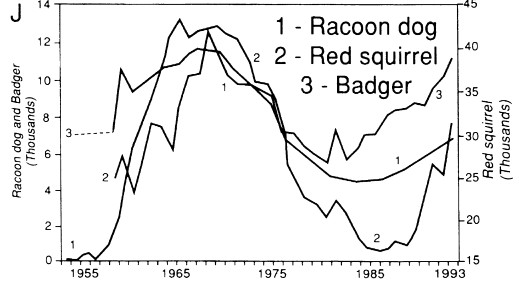
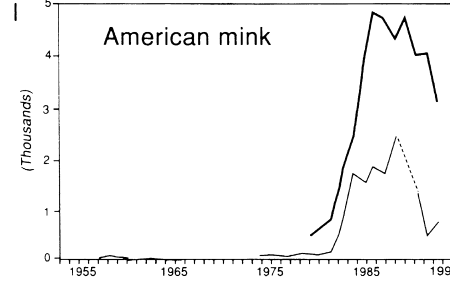
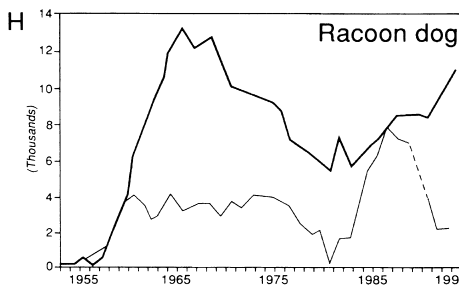
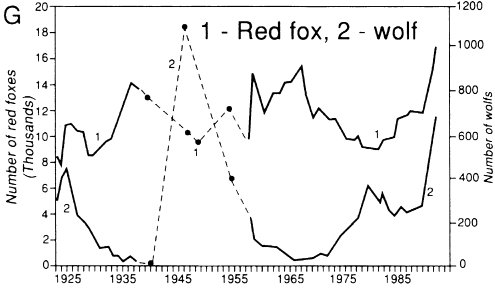
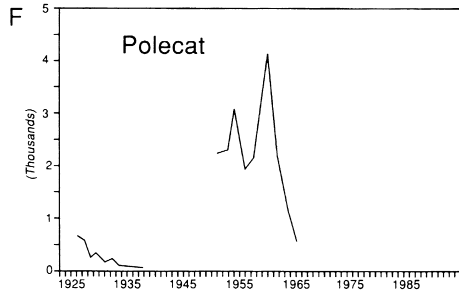
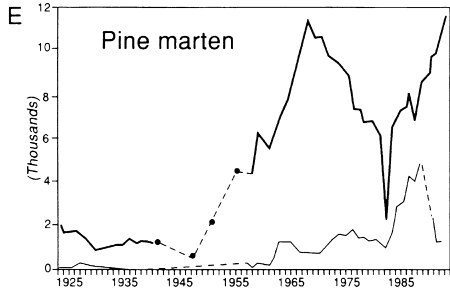
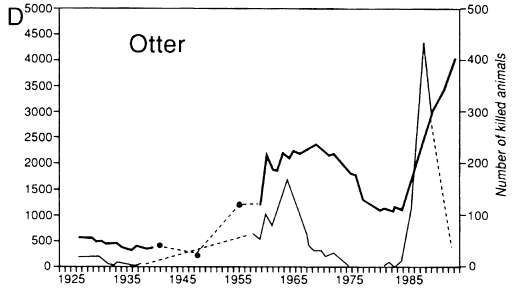
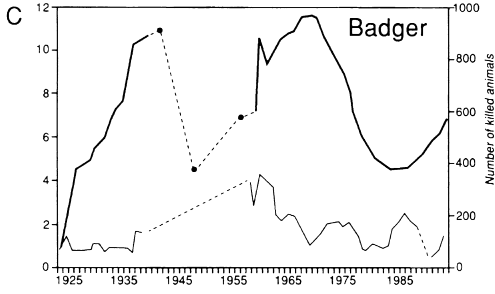
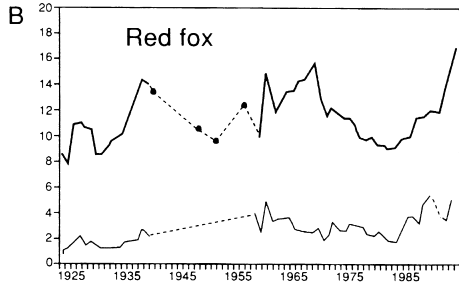
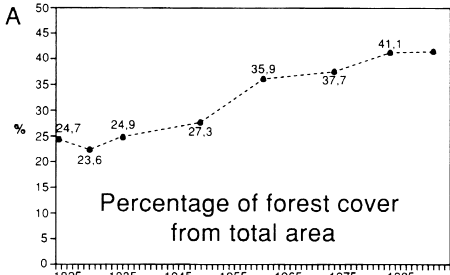


Fig. 2. Distribution of medium-sized mammalian carnivores in Latvia. Large black dot (left side) = presence in game statistics in the 1990s; small black dot = presence in questionnaires since the 1970s, small open dot = an observed specimen, triangle = a killed specimen.



### *Polecat*

The polecats were recorded by the questionnaires in 26 of the 10×10 km Atlas plots, spread all over Latvia (Fig. 2). Though widespread, the population seems to be rather sparse. Previously, the polecat was considered to be frequently occurring in the East Baltic (Greve 1909). The decrease of its population can be presumed to have occurred already during the first half of this century (Fig. 3F). Nevertheless, during the late 1950s and early 1970s, the annual harvest was about 10 times higher than in the 1920s and 1930s. In the late 1970s, it again did not exceed 500 individuals (Tauriņš 1982) and in hunting season 1991/92 the number of killed specimens was only 409 animals. Unfortunately, the accounting for polecats present was never carried out, but the annual harvest was registered irregularly. The population might be depressed by the numerous American mink in riparian habitats as well as by roaming dogs and cats in agricultural landscapes. More attention to the status of its population is required.

### *American mink*

The American mink occurred in almost all 50×50 km Atlas plots (Fig. 2). It is common along estuaries of the larger rivers and in coastal lakes rich in waterfowl, e.g. Lake Babite, Engure, Kaņieris, Liepāja (J. Viksne, pers.com.) (Fig. 1). The American mink is considered as the most serious predator of waterfowl (Tauriņš 1982, Lab. Ornit. 1984). According to our own personal experience, the American mink is the most common carnivore in the coastal zone and one of the most common mustelids in the country, but the population density is very uneven. Like the otter (Ozoliņš & Rantiņš 1992a), the American mink might be favored by beaver (*Castor fiber* L.) activity on foraging and protective conditions, particularly in anthropogenic habitats. The American mink was introduced in neighboring coun-

tries in the 1950s. Nevertheless, in Latvia it was observed in nature already in 1944 along the River Gauja (Tauriņš 1982). This species appeared at first as escaped (sometimes may be have been released) from fur farms, and later as invasion from adjacent countries. Unfortunately, the detailed course of colonization in Latvia is not documented. In the mid 1970s at the lake Engure (Fig. 1), the American mink appeared and subsequently exhibited a rapid increase in numbers (A. Mednis, pers. com.). Since 1979, its population size has been estimated by foresters for official game statistics (Fig. 3I). Unfortunately, the coexistence of two mink species was not taken into account for game statistics. The present decline of the mink in harvest statistics does not relate to a population decrease, but is due to a fur market decline. More intensive hunting, preferably with live-catch traps, would be necessary to diminish the competition with native mustelids.

### *Stone marten*

Stone martens were reported killed or observed in 15 of the 10×10 km Atlas plots (Fig. 2). The stone marten entered the East Baltic region after the development of agriculture. It has always been considered to be a rare species (Greve 1909, Tauriņš 1982). Although the coexistence of two marten species has never been taken into account in game statistics, it can be considered that data reflect only the pine marten. The stone marten is too rare to influence the total numbers. The ratio between the stone and the pine martens hunted during the first half of this century was one to four (Lange 1970). In the forest district south of Riga during 1988–92 two of 15 trapped martens were stone martens (A. Liepa, pers. com.). In south-western Latvia, a hunter's harvest in 1993 was 22 martens, none of which were stone marten (V. Rēders, pers. com.). Although stone marten is found in southern Estonia (Timm 1991), no reliable records have been obtained from

Fig. 3. Changes in the estimated number and specimens killed of medium-sized mammalian carnivores and the wolf in Latvia (the negative correlation between numbers of red fox and wolf is insignificant  $r = -0.157$ ;  $P > 0.05$ ). — annual count, — annual catch, ..... no data available, • data presented.

northern Latvia at present. Apparently, Latvia lies at the periphery of the species distribution range. The stone marten is included in the Red Data book of Latvia since 1992.

#### *Pine marten*

It is a wide-spread species throughout Latvia (Fig. 2). In Scandinavia, the pine marten is a typical inhabitant of mature forests (Lindström 1989). In Latvia, it is more common in dominant spruce forests (Tauriņš 1982) and therefore is more numerous in the interior. The pine marten is an important fur species. Hence, we suggest that its abundance is highly influenced by hunting pressure. In the 1930s, the number of pine martens was rather low (Fig. 3E) and a rapid increase of number after World War II may be explained by hunting limits (Tauriņš 1982) as well as increase of forest cover (Fig. 3A). Although entirely the trend is rather questionable, the current increase in population size is supported by hunters and our own observations. Decreased hunting pressure due to the significant general reduction of fur prices is perhaps the main reason. The present status of the pine marten population allows an increase in exploitation.

#### *European badger*

The badger was found throughout the country (Fig. 2). Trends in game statistics (Fig. 3C) are similar to those of most medium sized carnivores, but according to interviewed hunters the badger population is rather stable. Historically, it is a game species, but is no longer popular. Its economic significance is very small. Badger is mainly shot for fat or for sport during excavation of burrows in racoon dog hunts. Protection of this species should include a ban on the destruction of the permanent burrows.

#### *Otter*

The otter was found all over Latvia (Fig. 2). The Latvian distribution densities of this species has been described as very uneven (Tauriņš 1982). According to the same author, the population was more dense in the West and East, but sparser in North and North-East, as well as in the coastal

lowland. Otter numbers decreased already in the first half of this century (Fig. 3D). The rapid development of agriculture associated with land reclamation, a comparatively small forest area, as well as persecutions from fish and crayfish breeders (Lange 1970) are possible reasons for the decrease. Between the Second World War and about the mid 1960s, an increase in population size was observed in the entire East Baltic (Laanetu 1984, Bluzma 1990). This was succeeded by a quite rapid decrease which extended till the 1980s (Fig 3D). However, according to Ozoliņš & Rantiņš (1992b) the decreasing trend was shorter, and there is a lag between real numbers and official statistics by a few years. They also found that the population was stable (ca 4000 animals) or even slightly decreasing due to the remarkable hunting press (Ozoliņš & Rantiņš 1994) during the last ten years. The average density of the population was estimated as 0.8 to 3.3 animals per 10 km of waterway (Ozoliņš & Rantiņš 1992a) and the present distribution is probably determined only by the occurrence of suitable habitats.

Since 1974, otter is excluded from the list of game species. Nevertheless, otter kills are allowed as bycatch of beaver trapping. The rate of the legal bycatch is 200–500 specimens annually, or 6–9% of the trapped beaver number. The otter was included in the Red Data Book of Latvia between 1980 and 1987 and after 1992.

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