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Original Research Paper

DAMAGE CAUSED BY LARGE CARNIVORES ON DOMESTIC GRAZING ANIMALS IN SLOVENIA

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Summary: Brown bear *(Ursus arctos)*, wolf *(Canis lupus)* and Eurasian lynx *(Lynx lynx)* still occur in Europe but they are forced to live in highly fragmented and human-dominated areas. Like in other parts of Europe they are perceived as a major threat to domestic livestock in most of the Slovenia region, especially in places where cohabitation is unavoidable and conflicts are daily. Predators can threaten sheep, cattle and other farmed domestic and wild animals. For livestock producers and government, depredation can be frustrating and costly. There were over 1000 attacks by predators and killed more than 3500 domestic and breeding wild animals between 1995 and 2001. The most frequent predator was bear while the most frequent prey was sheep.
In this article we would like to present in detail the damage on livestock due to depredation between 1995 and 2001 and other findings concerning large carnivores in Slovenia.

Key words: animals, domestic; animals, wild; *carnivora*; predatory behavior; conservation of natural resources - economics; data collection; Slovenia

Introduction

Europe, which used to be a continent of various natural habitats ideal for large predators (wolf, brown bear and Eurasian lynx), offers today only the fragmented remains of the so-called wilderness suitable for large predators. Predators still occur in Europe but they are forced to live in fragmented and human-dominated areas (1). Today we witness a growing public interest in their preservation; however, their predatory way of living gives rise to conflicts with local economic activities, in particular with free-range breeding of domestic animals. The damage caused by the domestic animals depredation is as old as domestication of the animals themselves. Depredation is the most far-reaching problem in managing large carnivores and the main reason for their control or even extinction.

Their precise number of large carnivores in Slovenia is not known; it would, however, be reliable to say that there are approximately 400-600 bears, 50-80 wolves and around 70-100 lynxes. All three predator species are protected in Slovenia so that the hunting bag size for bear, wolf and lynx is determined quantitatively and structurally with a decree issued by the Ministry of Agriculture, Forestry and Food on an annual basis.

Owing to the uncontrolled grazing areas inadequately fenced in, lack of real, i.e. trained guard dogs and to the absence of shepherds, which results in increased costs of breeding, the damage caused by large carnivores and the costs reimbursed by the state covering this damage are continually going up. In addition to the direct material damage, to wit, the loss of a certain number of production animals, such damage undoubtedly causes secondary losses in live unhurt animals traumatised through stress. Moreover, each killing of sheep and goats is extensively covered by the media which results in creating a negative attitude to large carnivores.

The High-Level Pan-European Conference on Agriculture and Biodiversity (2) put emphasis on the priority of the protection of wild animals in

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the areas characterised by the spread of breeding domestic animals and pointed out the necessity of cohabitation between wild animals and livestock breeders (2). At the European level, three statutory provisions govern the protection and preservation of animal species, namely the Convention on the Conservation of European Wildlife and Natural Habitats (3) and the related European directives (the Council Directive 92/43/EEC on the Conservation of Natural Habitats (4) and of Wild Fauna and Flora, and the Council Directive 79/409/EEC on the Conservation of Wild Birds (5)), which demonstrates how seriously Europe is interested in establishing cohabitation between domestic and wild animals.

The damage caused by the domestic animals depredation in Slovenia is year by year higher and may cause over € 300,000 expenses per year for government due to farmers' compensations claims. To reduce the damages and expenses caused by depredations it is in first place important to know as much as possible information's regarding predators, predator attacks, prey, pasture protection, etc. In view of these the aim of this study is to analyse the damage on domestic and breeding wild animals caused by predation and also to get other relevant information's related with this subject.

Material and methods

Between 1996 and 2001, the Ministry of Agriculture, Forestry and Food gathered data on over 1,000 incidents concerning attacks by bear, wolf and lynx on domestic grazing animals and game reared in pens in Slovenia. The data were collected due to farmers' compensations claims for grazing animals killed by protected predators. For analysis, data have been grouped according to predator, prey, month and year of attack and location of attack. We have arranged and analysed these collected data (groups) using basic tools for addition, arrangement and graph maker in computer program Excel (Microsoft Office Excel, 2003).

Results

Between 1995 and 2001 there were over 1000 attacks by predators on domestic grazing animals, pigs and fallow deer (Figure 1) with the pick of the attacks in 2001 (Figure 5). More than 3,500 animals were killed (Figure 1) among which by far the most frequent prey was sheep (Figure 3). More than one third (n=1005) of the animals were killed in 1998 (Figure 5). The most frequent predator was the bear with over 2,000 killed animals, followed by wolf and lynx (Figure 2). The number of attacks on domestic animals becomes substantial in the beginning of spring; the attacks reach their peak in summer and start to decrease by the end of the autumn months (Figure 4). The patterns of the predator attacks and attacked animals are the same in all examined years. In view of the obtained results, damage appears mainly in the west and south parts of Slovenia (Figure 6).

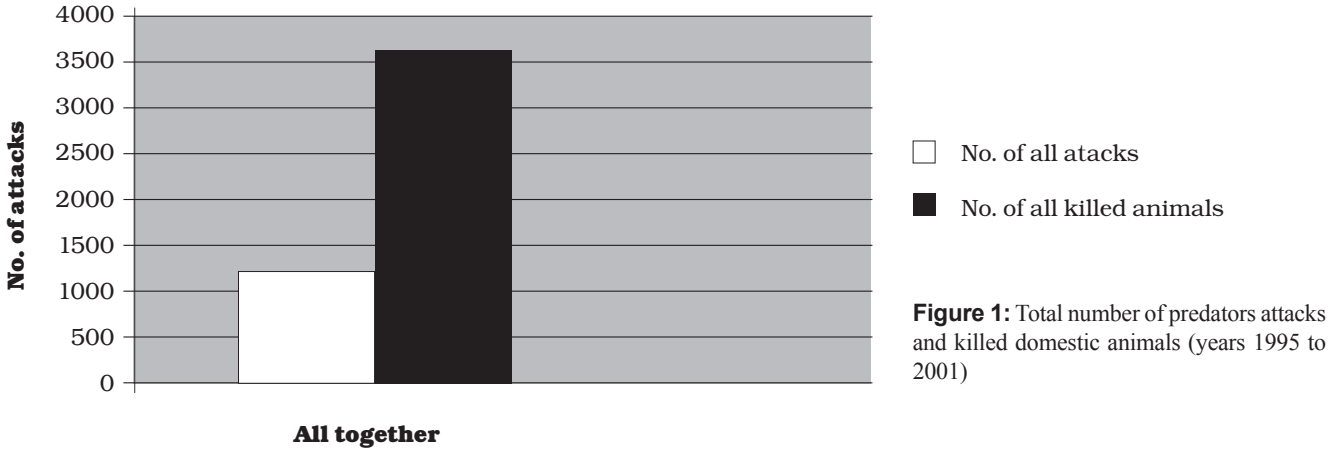

Figure 1: Total number of predators attacks and killed domestic animals (years 1995 to 2001)

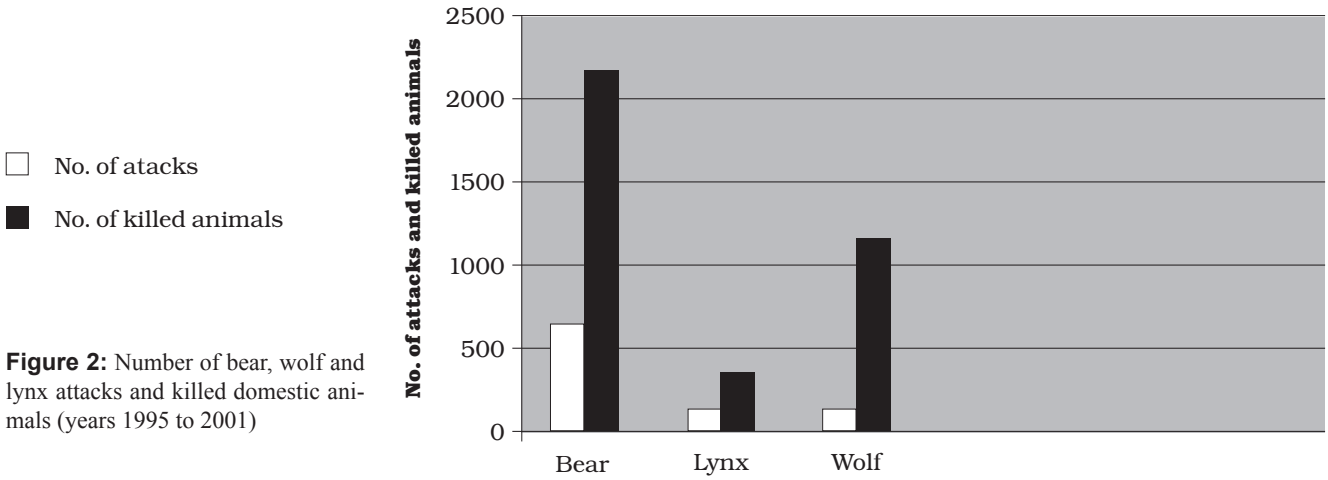

Figure 2: Number of bear, wolf and lynx attacks and killed domestic animals (years 1995 to 2001)

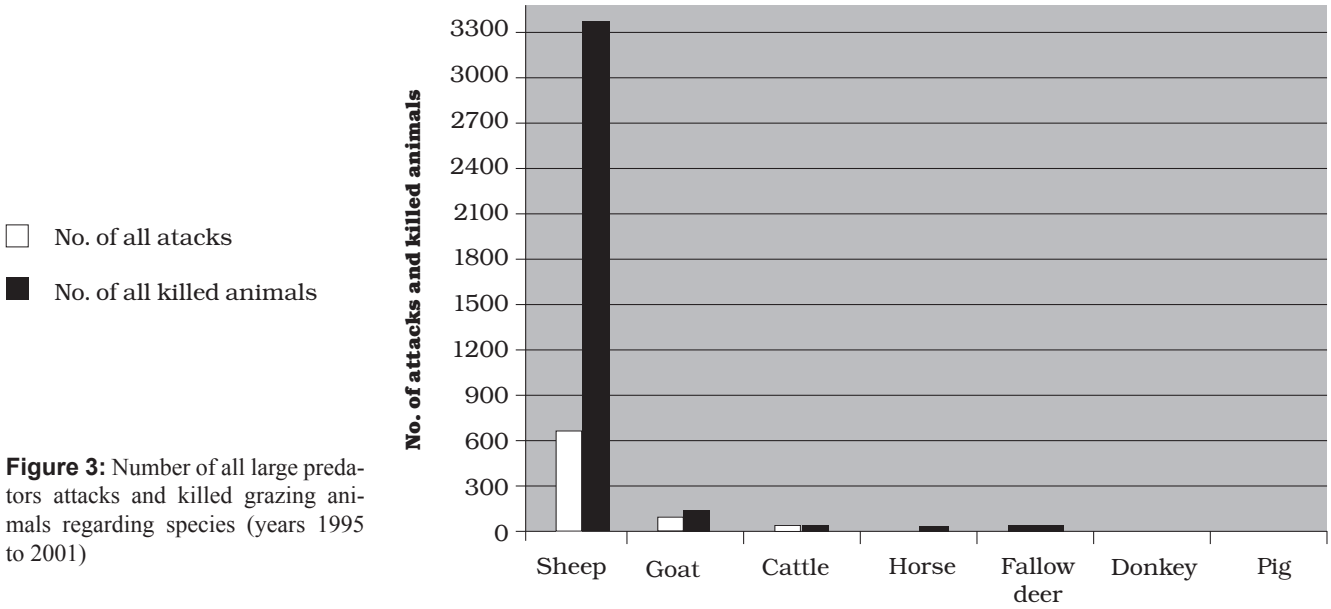

Figure 3: Number of all large predators attacks and killed grazing animals regarding species (years 1995 to 2001)

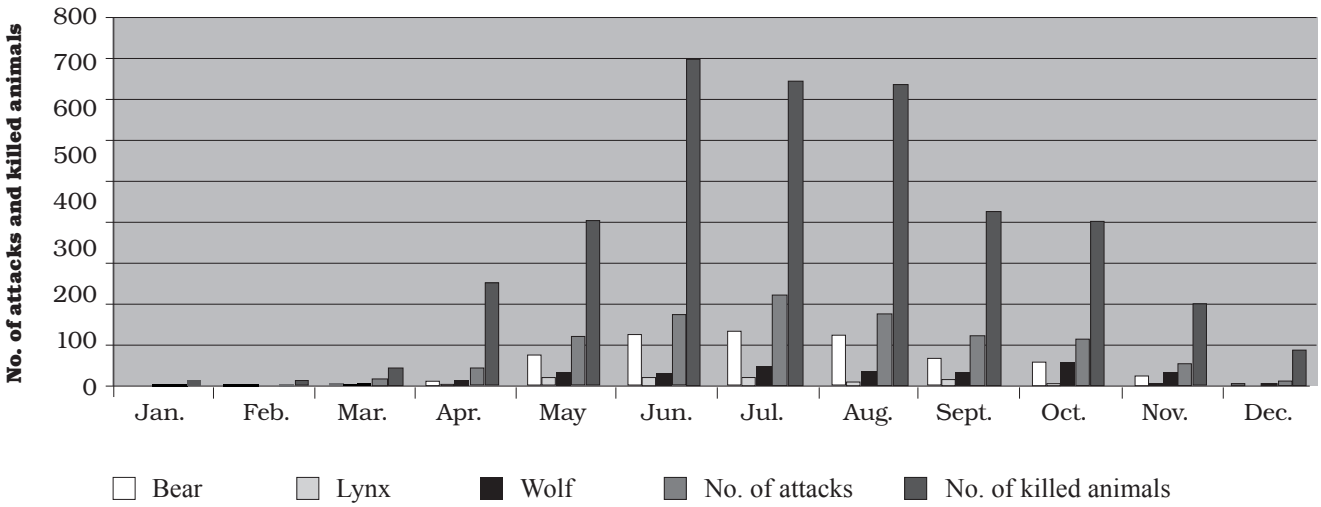

Figure 4: Number of bear, wolf and lynx attacks and killed animals regarding month (years 1995 to 2001)

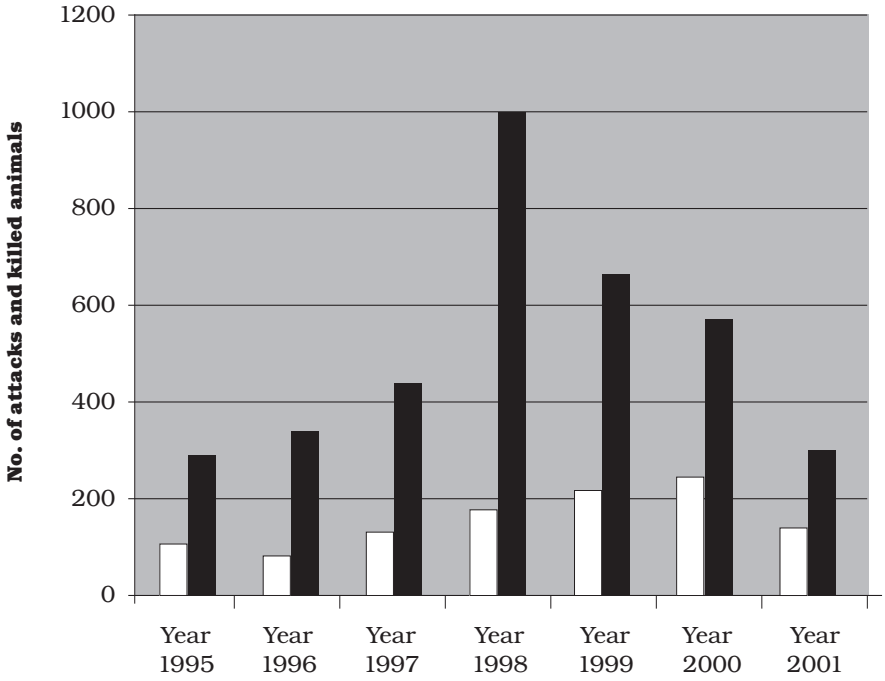

Figure 5: Number of large carnivores attacks and killed animals regarding years (1995 to 2001)

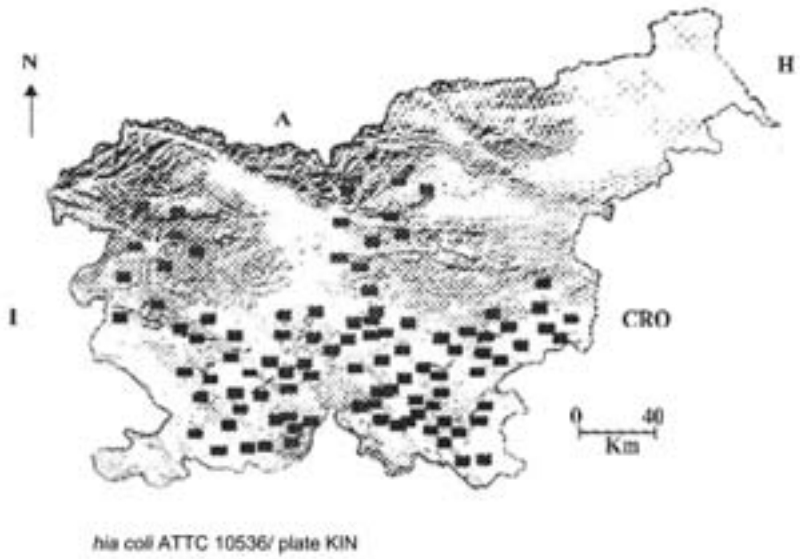

Figure 6: Locations (■) of bear, wolf and lynx attacks on domestic animals in Slovenia (years 1995 to 2001). I – Italy; A – Austria; H – Hungary; CRO – Croatia.

Discussion

In the past, damage was established on field crops and on individual domestic animals while more detailed and accessible data have been available for less than ten years. In Slovenia, the last decade has seen a rapid increase in the number of sheep and goats, for two reasons, i.e. an additional activity in agriculturally less developed areas and a national-level incentive to prevent the overgrowth of arable surfaces. In accordance with the data by the Statistical Office of the Republic of Slovenia (6, 7) the number of sheep increased from 22,000 in 1992 to 105,000 in 2004. At the same time certain changes were seen in the statutory treatment of the status of wild animals in Slovenia.

The brown bear *(Ursus arctos)* is a permanently present predator in Slovenia and since the end of WW II it has been considered under protection and its hunting bag size has been subject to strictly determined criteria and a limited number. At the same time hunting societies and organisations took care of additional foraging in the bear areas: this is how most bears were kept away from settlements and fields. In the last decade, however, due to statutory restrictions most feeding places have become dis-

used. Furthermore, owing to inadequate municipal infrastructure and the uncontrolled slaughter of domestic animals on farms, bears have started coming closer to the settlements and even entering them as food is plentiful. With sheep breeding increasing and spreading to the bear areas or to their vicinity, particularly to the poorly protected pastures, sheep became an easy prey, i.e. food, for the bear, which has also been reported by many foreign authors (8, 9, 10). In accordance with the latest information (11) bears may cause as much as over € 130,000 of damage on domestic grazing animals in a single summer, thus they of all predators cause most difficulty to livestock breeders and the state. Figure 2 clearly demonstrates that the number of killed animals is by far larger than the number of attacks on animals. Bears usually kill several animals in a single attack and is the only one among predators that breaks into night penning where livestock is kept.

In Slovenia, the wolf *(Canis lupus)* has had various statutory statuses over a relatively short period. In the last fifty years there were awards for wolves shot, poisoned, trapped and killed. Today it enjoys complete protection. Until 1990, the wolf had the status of a transitory animal which in winter migrated from neighbouring Croatia (Gorski Kotar) to the south of Slovenia. In this period losses among red deer in the regions of Kočevsko and Notranjsko were recorded. In the last decade, enjoying complete protection, the wolf has become a permanently present predator with documented lairs; at the moment it is present in Slovenia in the already mentioned approximate number.

As distinct from bear and lynx, damage on domestic animals caused by wolves is seen year-round with most frequent attacks on herds during the summer and autumn months (Figure 4). Similarly to bears, wolves also kill several animals in a single attack; consequently, the number of killed animals is twice the number of attacks (Figure 2), which is also shown in the damage caused in 2002 when it exceeded € 150,000 (11) and was the highest so far. Similar problems caused by wolves killing domestic animals are reported in Europe (12, 13, 14) and elsewhere in the world (15, 16).

The lynx *(Lynx lynx)* was reintroduced in Slovenia in 1973. According to certain information, prior to 1973 lynx were present in Slovenia until 1910. Its reintroduction was by far the most successful as far as Europe is concerned so that it is now present in the entire south-west of Slovenia. Before there were so many sheep in Slovenia, lynx caused damage mainly on roe deer. It causes approximately 20,000 of documented damage annually (11), which corresponds to its smaller number among the predators in Slovenia. Similarly to bears, it causes most damage on sheep and goats during the summer months (Figure 4).

There are some differences in number of attacks and killed animals between the years (Figure 5), however sheep as prey undoubtedly occupy by far the first place among domestic animals. It is followed by goats, other domestic animals and fallow deer (Figure 3). As mentioned above, the number of attacks by individual species of predators reflects their number in Slovenia, with bears being the most numerous predator. If the obtained results are analysed, damage occurs mainly in the west and south parts of Slovenia (Figure 6) where suitable conditions enabling the existence of large wild carnivores predominate and at the same time these are the areas where intense sheep-breeding has been brought back to life.

According to the data available to us there is no obvious difference between the attacks in protected and unprotected pastures, which shows how inadequate and insufficient fencing, i.e. protection of domestic animals while grazing, is. Protected pastures are considered to be all those pastures which are protected with any type of fence whatsoever, by a shepherd or a dog while unprotected pastures are those without any protection and control over the animals. In order to have a better insight into the above mentioned types of pastures we would urgently need the data relating to the size of pastures which, however, were not a part of the damage reports.

Most owners put up fences to prevent uncontrolled grazing of sheep and goats but they forget the protection against predators breaking in. The old method of control over grazing domestic animals by shepherds and dogs has become almost discontinued, while at the same time these pastures are irresistibly spreading to the forest edge and even into the forest, which additionally represents favourable conditions for the attacks by predators on domestic animals. The fact that in Slovenia most sheep stay out overnight, facilitates the attacks by predators.

At present, there is a project underway in Slovenia, the main purpose of which is to test various systems of protection of domestic animals, which would enable at first sight an absurd situation: a statutory protection of large predators and their

cohabitation with domestic grazing species, with preventing significant damage at the same time. It has been decided to solve the problem of cohabitation of domestic animals and predators living in the same area so as to observe European guidelines relating to the protection of large predators and the simultaneous encouragement of sheep-breeding. Such a decision is also supported by two studies, the first relating to bears conducted in Norway (8) and the second relating to lynx conducted in France (17), which report that hunting bag size of predators is not a solution, as their place is usually taken by a new predator, while Breitenmoser (18) sees the solution in a changed method of sheep and goat-breeding in the areas where pastures are mostly unprotected. It is, however, reasonable to also take into consideration the fact that in the areas with a high predator-related risk it will probably be necessary to grant priority to predators, i.e. protect them, and move grazing animals to less hazardous areas (8).

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PREGLED ŠKOD VELIKIH ZVERI NA DOMAČIH PAŠNIH ŽIVALIH V SLOVENIJI

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Povzetek: Rjavi medved *(Ursus arctos)*, volk *(Canis lupus)* in ris *(Lynx lynx)* se še vedno pojavljajo v Evropi, kjer pa so prisiljeni živeti v zelo razdrobljenih in z ljudmi poseljenih področjih. Tako kot v ostalih evropskih državah, predstavljajo velike zveri tudi v Sloveniji glavno grožnjo domačim pašnim živalim. Ta je še posebej evidentna v krajih kjer se sobivanju ni mogoče izogniti in prihaja do stikov vsak dan. Predatorji lahko ogrožajo ovce, govedo kot tudi druge domače in gojene divje pašne živali. Za rejce in vlado predstavlja predatorstvo veliko neprijetnost, ki je povrhu še zelo draga. Med leti 1995 in 2001 je bilo zabeleženo preko 1000 napadov in ubitih preko 3500 domačih in gojenih divjih živali. Najpogoste je napade povzročal medved, med tem, ko je bila najpogostejša žrtev napadov ovca.
V članku bi radi podrobneje predstavili škodo na domačih pašnih in gojenih divjih živalih, ki so jo med leti 1995 in 2001 v Sloveniji povzročili veliki predatorji.

Ključne besede: živali, domače; živali, divje; *carnivora*; predatorsko vedenje; naravni viri, varovanje - ekonomija; podatki, zbiranje; Slovenija