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Abstract: This chapter deals with conflicts that appeared between hunters, livestock breeders and lynx after its reintroduction in Switzerland in the early 1970s. The negative attitude of these two groups of people towards lynx and predators in general arises mainly from emotional and ecological level. From an ecological point of view there is no real conflict. In the last two centuries almost all big mammals became extinct in Switzerland. Nowadays hunters and lynx are again in competition for wild prey species and breeders have to reconsider their management plans to protect their livestock. This paper gives an overview of these conflicts and gives some information about the compensation system implemented in Switzerland.

Conflicts with the Lynx: Depredation and Competition with Hunters

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Abstract. In the last two centuries, almost all big mammal species have become extinct in Switzerland. First the ungulates such as ibex, red deer, and roe deer disappeared, and were later followed by the big carnivores such as brown bear, wolf, and lynx. During the past 80 years, the ungulate populations have increased in Switzerland as a result of natural re-populating and re-introduction and the re-establishment of an important forest cover. Lynx were re-introduced in the early 1970s. Hunters and livestock breeders are the two groups of people most likely to come in conflict with lynx. Their present management of wildlife and livestock was established during the absence of large predators. Their negative attitude towards lynx and predators in general arises mainly from emotional and economic factors. Scientific research shows that conflict does not exist at the ecological level. Radiotelemetry studies carried out in Switzerland showed that the diet of lynx consisted more than 80% of smaller ungulates like roe deer and chamois. Livestock depredation occurrs regularly but rarely. Under settled conditions, lynx density attains 1 adult per 100 km^2 and the annual consumption rate for one adult lynx amounts to 50 to 60 smaller ungulates. At the population level, this numerical impact represents about 6% to 9% of the roe deer population and 2% to 3% of the chamois population. Censuses of ungulate population demonstrated that the quantitative impact of lynx is not perceptible on the population level under normal conditions. In addition, the hunting bag has not altered over time. At the expanding front of the lynx population, numerical and functional effects are possible because of the re-adaptation of the predator-prey relationship. In Switzerland, livestock depredation by lynx has occurred since 1973. Sheep represented more than 90% of the cases. Damage to livestock is compensated by the state. The basic pattern over time was identical in different regions: a slow increase of the number of attacks at the beginning of the colonization, followed by a period of rapid increase, then a decrease in the number of cases and stabilization at a lower level. The peaks coincided with the colonization of new areas by lynx and are related to the changing hunting behavior of lynx and prey species during the colonization period.

Introduction

Hunters and livestock breeders are the two groups of people coming in conflict with lynx. Their present management of game species and livestock species respectively was put in place in the absence of large predators. Confronted with the lynx, they act or react with different backgrounds. The driving elements are to be found primarily at the emotional and economic level. From an ecological point of view there is no real conflict, but these conclusions are of minor value to people because they are harder to be understood and accepted. What then can an ecologist or wildlife researcher do to minimize the conflict and contribute to cohabitation between lynx and humans? Shall he argue with emotional or economic facts? He should at least be aware of these driving elements when arguing with these groups of people and make adequate use of them. Ecologists are key figures in setting up management plans for the conservation of the lynx. Their contribution will be based on the aim to offer the best ecological basis for the species, but they will also have to take into account economic and emotional features and have to consider the long term aspect. A well-directed participation of the concerned parties (hunters, livestock breeders, local people) will also be necessary. Cohabitation between people and lynx and predators in general will only be possible if emotional reactions

can be channeled, economical loss reduced and ecological aspects improved. To draw up management plans, hard ecological facts are needed. Some of this knowledge, obtained by means of field studies, is presented in the following chapters.

Hunters and lynx in competition for wild prey species

In the last two centuries, almost all big mammals species have become extinct in Switzerland. First the ungulates such as ibex, red deer, and roe deer disappeared, and were followed later by the big carnivores such as brown bear, wolf, and lynx. During the past 80 years, ungulate populations have increased in Switzerland as a result of natural recovery and re-introduction as well as re-establishment of an important forest cover. Chamois and roe deer have almost tripled their densities during the last 50 years. Lynx were re-introduced in the early 1970s. Switzerland offers large areas with good habitat for the lynx. Maps of potential habitat show core areas in the Alps and the Jura Mountains (Hausser 1995). The return of a large predator into areas free from predators for almost 100 years is not only a great ecological gain, it is also a very exciting scientific experiment. This predator-free period led to hunting practices, which hunters believe today to maintain a long-lasting tradition and to be incompatible with the presence of a predator like the lynx. In fact, a great part of the hunting tradition seen today emerged only during this century and the prey-predator relationship existed in a dynamic system for a very long time without the interaction of humans. This does not mean that coexistence of hunters and natural predators is impossible; they can act in a complementary way.

Radiotelemetry studies on lynx carried out in Switzerland show that the diet of lynx consisted of more than 80% of smaller ungulates like roe deer and chamois (Breitenmoser and Haller 1993, Liberek 1992). Livestock depredation occurred regularly but very rarely. When hunting for wild prey species, the mean interval between consecutive kills was five days and the average exploitation degree of carcasses is nearly 75%. Kill sites are normally spread all over the territory. Under settled conditions, lynx density approached 1 adult per 100 km^2, and the annual consumption rate for one adult lynx reaches 50 to 60 smaller ungulates (Breitenmoser et al. 1993). On the population level, this numerical impact represents about 6% to 9% of the roe deer population and 2% to 3% of the chamois population (Breitenmoser and Haller 1993). We have to consider that with the presence of lynx, the overall loss among the ungulate populations will not be increased by the simple addition of lynx kills. We will observe compensatory effects in mortality. A roe deer fawn killed by lynx in summer, could have been killed in a car accident or died of disease later during the year.

Hunting and traffic kill statistics indicated no significant change in a local population of roe deer in the Jura Mountains inhabited by lynx (Liberek 1992). National statistics published annually by the Federal Office of Environment, Forestry and Landscape show that the hunting bag of ungulate species is stable or has even increased over the last decades in Switzerland and in most of the regions inhabited by the lynx. During colonization of new areas by lynx, numerical and functional effects among the prey population are possible because of the re-adaptation of the predator-prey relationship. By studying the situation at the expanding front of the lynx population, Haller (1992) observed, that compared to the situation of an already established population, lynx occupied smaller home ranges and were taking prey within smaller areas. During the same period, a decrease in the population of the chamois took place in this area. In the following years, the monitored lynx increased their home range and killed prey over a much larger area. All these observations were made within a hunting sanctuary

with a very high population of chamois and are to be considered as a special case. During the following years, ungulate populations recovered but the initial density was not reached again.

We can expect that numerical impact will primarily be observed during the initial period of the colonization within areas with very high or clumped prey abundance. Much less is known about the anti-predator response of the prey species. We can assume from different observations of the development of the mean group size of ungulates and from the damage intensity in forests that prey species also change their spatial behavior and their distribution. We can also expect that the presence of lynx will not significantly alter the hunting bag of ungulates in areas where ungulates are free-ranging. Special situations like captive or semi-captive breeding of ungulates in enclosures may increase the risk of depredation by lynx.

Lynx and livestock depredation

In Switzerland, livestock breeding has been the subject of important changes during this century due mostly to changing economic constraints. These economic guidelines did not consider the presence of large predators like lynx. Breeding of goats and horses decreased drastically during this century, whereas breeding of cattle increased but the number of breeders decreased. During the first decades of this century, sheep were getting fewer. Their numbers have started to increase since the 1950s. Today, there are about 400'000 sheep in Switzerland, i.e. as many as 100 years ago. Sheep are expected to be the main subject of the conflict with lynx and other large predators in the near future.

In Switzerland, livestock depredation by lynx has occurred since 1973, two years after the re-introduction of lynx. A compensation system has been operating since the beginning of the re-introduction. The Swiss League for the Protection of the Nature paid a total amount of about CHF 100'000.-- for damage up to 1988, when a new federal law on the hunting and the protection of birds and mammals came into force. Since then, compensation has been paid by the federal and the cantonal governments. Each case of attack has to be confirmed by a state game warden. Since 1973, a total amount of CHF 227'322.-- has been paid in compensation. Today, about CHF 15'000.-- are paid annually for livestock damage by lynx. Sheep represented more than 90% of the cases. The number of kills reached a first peak at the beginning of the 1980s. The next years were characterized by a decreasing number of cases followed by a new peak in the middle of the 1980s. Starting from 1988, the number of cases decreased and stabilized in 1992 at a lower level (Capt 1993). In Switzerland, there are no special preventive measures taken, such as guarding or nocturnal housing of sheep to minimize the risk of attacks and losses.

The basic pattern of livestock depredations over time was similar in different regions: A slow increase of the number of attacks at the beginning of the colonization, followed by a period of rapid increase, then a decrease in the number of cases and stabilization at a lower level. Seasonally, the highest predation rate occurred from June to August, when sheep are most accessible to lynx. At this time of the year they are left in remote pastures interspersed with forests at higher elevations in the Alps. The peak impacts on livestock coincided with the colonization of new areas by lynx and were possibly related to the changing hunting behaviour of the lynx and the prey species during the colonization period. During this phase, wild prey species may become more vigilant and adopt a less clumped distribution. At first, the predator may compensate by preying on sheep, the most frequent livestock species. A high predation rate within a small area cannot develop because of the relatively high unpredictability of the livestock resource over the year. The wild ungulates are a more predictable resource, but the

alertness and behavior of these species force the predator to enlarge its hunting range to ensure a sufficient predation success.

We can therefore expect that depredation on livestock will be highest during the colonization period and will stabilize later at a lower level. Experience shows that depredation on livestock will continue. It is important to know the reasons leading lynx to prey on livestock. This knowledge could facilitate the use of adequate preventive measures. On the other hand, the applications of such measures will not be possible without concessions by livestock breeders. In the case of the lynx, sheepholders show little motivation to act in a preventive manner. The reasons may be the very low probability of losing animals to lynx and the relatively low economic loss it would produce. The situation could change with the coming of other large predators like wolf or bear. From a general point of view, conflict management should consider different approaches to avoid conflicts by protecting livestock; to limit conflicts by assuring an efficient compensation system; and to resolve conflicts by removing problem animals.

It is not yet established, if depredation on livestock by lynx is primarily due to specialized individuals or if this phenomenon depends more on environmental constraints. Observations made in the field tend to support the second explanation. Pastures with a high percentage of borders surrounded by large forests, and where a large part of the pasturage lies within a buffer zone of 50 meters from this border seem to be more vulnerable than others. To fully evaluate this complex problem, other elements such as the effect of herd size and breed also have to be investigated.

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