

Beaver management in Norway: a model for continental Europe?

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Abstract: While Norway has been managing beaver (*Castor fiber*) for more than 150 years, most central European countries have little experience and none are presently harvesting beaver, despite rapidly growing populations and conflicts. Here we present the Norwegian beaver management model as an example. The main goals are to enhance biodiversity, produce a harvestable surplus, and reduce beaver-human conflicts. Beaver management should maximize recreational opportunities and allow landowners to profit from the beaver resource, e.g. through the lease of beaver hunting. Harvest quotas are determined by municipal game boards and divided among landowners according to the amount of beaver habitat they own. Few landowners hunt beaver themselves. Most beaver are shot by hunters with center-fire rifles during spring for recreation and the meat provided. No compensation is paid for beaver damage. Landowners who experience damage by beaver can receive permission to remove dams, lodges and nuisance individuals. Few non-lethal methods of damage control are presently employed. Though problems exist, the success of Norwegian beaver management lies in (1) increasing understanding of the species' ecological role, (2) the gradual status transformation from nuisance to valuable game animal, and (3) the ease with which nuisance animals can be dealt with. Presently, beaver management incurs few costs to the public while beaver hunting is increasing in popularity, along with income to landowners.

Keywords: beaver, *Castor canadensis*, *Castor fiber*, hunting, trapping, Norway, population control, wildlife management.

Introduction

The European beaver (*Castor fiber*) was extirpated from most of its former range in Europe and Asia between 1000-1870 (Halley & Rosell 2002). Following numerous reintroductions and natural dispersion during the 20th century, many countries in Europe and Asia now have viable and expanding beaver populations. Population status and management experience, however, vary considerably between nations. Whereas many countries in northern Europe and northern Asia have been managing beaver for decades, most central European countries have had far less experience. Currently, little detailed information regarding beaver management in Europe is available (but see: Balodis et al. 1999, Härkönen 1999, and Hartman 1999).

As human-wildlife associations go our relationship with the beaver is rather unique. Because of their importance for clothing, food, and castoreum for medicine, both the European and American beaver (*Castor canadensis*) were nearly hunted and trapped to extinction (Martin 1978, Todd & Boggess 1987, Nolet & Rosell 1998). With the advent of modern ecosystem management we now recognize the beaver's importance as a keystone riparian species (Naiman et al. 1986, Novak 1987, Naiman et al. 1988, Collen & Gibson 2001). However, its return to landscapes now highly modified by man for agriculture, forestry and housing has led to considerable conflict (Müller-Schwarze & Sun 2003). While many landowners and managers prefer the use of traditional lethal methods such as kill-trapping or hunting to control nuisance individuals and limit population size, others more concerned with animal welfare and wetland management would prefer to see all exploitation cease and nuisance animals

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controlled non-lethally. Needless-to-say, modern beaver management is highly controversial.

Norway is one of the few countries in Eurasia where beaver were not extirpated (Nolet & Rosell 1998). From its initial total protection in 1845 to the present spans 157 years of management experience. Our goal here is to (1) review the ecological, cultural, social and economic roots of Norwegian beaver management, (2) describe present key elements of Norwegian beaver management, and (3) discuss strengths and weaknesses of beaver management practices in hopes that this experience might benefit those countries presently developing beaver management strategies.

Organization of wildlife management in Norway

The hierarchy of governmental wildlife management in Norway includes from top to bottom the Department of Environment, the Directorate for Nature Management, the county conservation commissions and the municipal game boards, or their equivalent, found in each of the 434 townships of the country. The private sector includes landowners and non-governmental organizations (NGO's). The top 3 governmental levels determine national policy, create and enforce laws, initiate applied research and distribute information. The main responsibility for practical beaver management, however, resides with the municipal game boards in close cooperation with landowners. NGO's are primarily concerned with the development of beaver management policy.

Beaver habitat and population development in Norway

Most of Norway is mountainous with a high density of streams and lakes. Approximately 48% lies below tree line and is potential beaver habitat, comprised of 37% forest, 4% cultivated, 6% bog/wetland, and 1% urban landscapes. Collet

(1897) stated that beaver were common throughout most of Norway around mid-18th century and almost extirpated 100 years later. A small remnant population survived in the southeast. Many of the best habitats in southeast and central Norway have since been repopulated and the beaver's range is presently expanding both west and north (Rosell & Parker 1995). Present national population size is believed to be about 70,000 animals. The autumn density of occupied colonies in well-established populations in southeast Norway has been shown to be about 0.25 colony per km² (Parker et al. 2002a, Bergan 2003), which seems to be typical for populations near ecological carrying capacity in south and mid-Scandinavia (Hartman 1994). Mature boreal forests in Norway contain about 15% broadleaf species dominated by birch (*Betula pubescens*) with lesser amounts of primarily aspen (*Populus tremula*), willow (*Salix* spp.), rowan (*Sorbus aucuparia*) and grey alder (*Alnus incana*). Early successional stage forests typically contain more broadleaves and are preferred by beaver to older stands (Parker et al. 2001a).

Goals of the Wildlife Act

According to the Wildlife Act of 1981 (Lov om viltet, 1981) and its accompanying bylaw for beaver (Forskrift om forvaltning av hjortevilt og bever, 2002), the main goal of beaver management is to maintain populations at levels sufficient to enhance biodiversity, produce a harvestable surplus, and reduce beaver-human conflicts. In addition, beaver management should optimize recreational opportunities for the public and economic opportunities for landowners, e.g. through the lease of beaver hunting.

Norwegian beaver management is better understood in light of two basic fundamentals of Norwegian wildlife management. (1) All wildlife is publicly owned, and therefore wildlife management should seek to maximize public enjoyment and utilization of wildlife resources. (2) The hunting privilege, however, belongs to

the landowner. Once government officials have determined when, where and how much game can be harvested, landowners can either harvest their proportion of the quota themselves or lease the hunting rights to others (albeit temporarily). In the later case, the wildlife resource becomes a source of income to landowners while providing hunting opportunities for others.

Some basic elements of Norwegian beaver management

The bulk of Norwegian beaver legislation deals with when and where beaver can be harvested, the organizing of landowners into practical hunting units, how hunting quotas are determined and distributed among landowners, and how beaver damage is to be dealt with.

Establishment and distribution of harvest quotas

The municipal game boards decide when beaver hunting and trapping shall begin in a township based on their impression of population development and levels of damage. A census of occupied lodges is sometimes conducted, though more often a rough estimate is made from various information sources including e.g. landowners and hunters. Based on this information, a harvest quota for the entire township is then established. In order to distribute this quota among landowners, the area of beaver habitat or the length of stream and lake shoreline used by beaver in the township is first calculated. The minimum area required for landowners to receive one beaver permit is determined by dividing the total area of beaver habitat by the harvest quota. Alternatively, a minimum shoreline length is determined by dividing the total beaver-used shoreline length by the harvest quota. Municipal game boards can choose between the two alternatives, though the minimum shore length method has been found to be more accurate at predicting colony density on a smaller scale (Steifetten & Uren 1997).

Landowners, either alone or in groups, then establish beaver management units that must be approved by the municipal game board. As Norwegian forest properties average small, most beaver management units usually consist of mergers of many landowners.

Each beaver management unit within the township is then allotted its portion of the total quota based on the relative amount of beaver habitat or beaver shoreline within respective units. Management units not meeting the required minimum area or minimum shoreline length receive no quota, which serves to motivate landowners to merge into larger units. Once beaver management units are approved, they automatically receive their quota from the game board each year. Township quotas may vary annually with changes in population size or management objectives. At the end of each hunting season, units are required to report the number of beaver harvested that year.

Harvest methods

The traditional harvest method for beaver worldwide is trapping (Baker & Dwyer 1987, Novak 1987). Shooting is illegal in much of North America where beaver have traditionally been managed primarily as a furbearer, and until just recently in most of the former Soviet Union as well (D. Gorshkov, personal communication). Beaver trapping was prohibited in Norway in 1932 seemingly to stimulate population growth, though hunting with firearms during autumn was still allowed. Forty years later in 1972, with beaver populations rapidly expanding and the quick-killing Conibear trap now available, trapping was again allowed (Parker & Rosell 2001). In the interim, however, beaver hunting with firearms had become entrenched as the main harvest form for this species. Hunting in spring, when shooting is most effective, was first allowed in 1981. Presently an estimated 80-90% of all beaver harvested in Norway are shot then. Most beaver harvested in Sweden and Finland are also shot in spring (Hartman 1999). Thus, with the exception of Norway, Sweden

and Finland, trapping is the prime harvest method for beaver worldwide.

As harvest forms, hunting and trapping have quite different attributes with respect to beaver. Trapping is usually more time efficient than hunting and is more readily practiced at any time of year, particularly below the ice during mid-winter when pelts are prime. In addition, trapping does not leave bullet holes in the pelt. Trapping is also quieter and less conspicuous than shooting in populated areas. Hunting, however, is more species selective than trapping, e.g. underwater beaver sets with Conibear traps are known to take non-target species such as the otter (*Lutra lutra*), that presently is a threatened species in much of Europe (Hartman 1999). Selectively harvesting beaver by size may also be possible by hunting (Parker et al. 2001b). Additionally, hunters far outnumber trappers, and hunting is more publicly acceptable than trapping. Therefore beaver hunting should provide recreational opportunities to far more individuals than trapping.

Because beaver are primarily nocturnal, hunting at northern latitudes is most effective during spring when nights are short and winter-weary beaver increase their activity outside the lodge during daylight hours (Parker & Rosell 2001). Hunting at other times of the hunting season when nights are longer is far less effective. Thus in Norway, most beaver are shot during the last 2-3 weeks of the hunting season in late April and early May, despite the fact that the season opens on 1 October (Parker & Rosell 2001, Parker et al. 2002a.) Spring beaver hunting is also popular because few other species can be hunted then.

Two valid criticisms of beaver shooting are that projectiles puncture the pelt, thereby reducing pelt quality, and that wounded beaver may escape to deep water and be lost. H. Parker, J. Danielsen and F. Rosell (unpublished data), however, found that pelt damage from shooting can be considerably reduced through the proper selection of caliber and projectile and that the incidence of wounding can be kept to a minimum. A goal of beaver management in Norway is to create recreational opportunities for the general

public. As most beaver hunters are not land-owners (Parker et al. 2002a), this goal has in part been realized.

Resource use and economic value

Though studies are lacking, the prime motivation for hunting beaver in Norway appears to be for recreation and the meat provided. This contrasts with North America (Todd & Boggess 1987) and the former Soviet Union (Ozolins & Baumanis 2001, Ulevičius 2001, Y. Gorshkov, personal communication) where the main motivation for beaver trapping is income from the sale of pelts, though the recreation provided is also important for many. An exception is the importance of spring-shot beaver as food for indigenous Americans in parts of northern Canada (Todd & Boggess 1987). As beaver have a wide distribution in the Nordic countries, beaver hunting is potentially available to many. Beaver hunting is also comparatively inexpensive which makes it a popular game species among younger hunters. Indeed, many landowners offer free hunting in an attempt to control damage.

Wild game can be legally sold in Norway. Beaver meat is prized by many and increasing in popularity as witnessed by the increasing number of butcher shops selling beaver meat, restaurants with beaver periodically on their menus, and cookbooks containing beaver recipes (Rosell & Pedersen 1999). Hunters currently can sell dressed and skinned beaver carcasses for about 50 Norwegian crowns/kg, comparable to about 6.0 Euro or 6.5 American dollars/kg (B. Hovde, personal communication). Shops and restaurants, however, often are unable to obtain beaver in desired quantities as most hunters eat the meat themselves.

As most beaver are shot in late spring when pelt quality is poor, their potential commercial value is low (Obbard 1987). In addition, few hunters are skilled in pelt handling, and holes in the pelt from shooting can reduce pelt value (Hall & Obbard 1987). Nevertheless many hunters have their pelts dressed for private use. At present the only fur auction in Norway (Oslo

Fur Auction) does not buy beaver pelts from Norwegian hunters and trappers because both the volume and quality are low (C. Fjeld, personal communication). Though income from the lease of beaver hunting is minor compared to hunting leases of e.g. red deer (*Cervus elaphus*) and moose (*Alces alces*), it is increasing (Parker et al. 2001a). Landowners who sell package hunts that include lodging, and in some cases guiding, seem to be profiting most.

Beaver provide income from non-consumptive recreation as well. Guided evening canoe "safaris" to observe beaver and other wildlife are becoming a popular form for eco-tourism (Rosell & Pedersen 1999). In our experience, both spring hunting and subsequent summer safaris may be conducted along the same stretches of shoreline.

Beaver damage management

Initially, all beaver dams and lodges are protected by law. In cases where beaver cause "considerable" damage to property, crops, fruit trees or forest, landowners can apply to their municipal game board for permission to remove dams and lodges, and to trap or shoot damage individuals outside the normal hunting season. Local game boards decide what constitutes considerable damage. Dead animals either become the property of the municipal game board or are given to the landowner and subtracted from his hunting quota.

Once permission has been granted, the landowners themselves are responsible for removing dams, lodges and nuisance beaver from their own property. However, local trappers or hunters often are willing to remove nuisance animals free of charge in exchange for the carcass. Trapping is usually more efficient than shooting for removing nuisance beaver in acute situations (Hammerson 1994). No governmental or private compensation for damage caused by beaver is paid to landowners. Thus the cost of beaver management to government agencies in Norway is negligible.

A major goal of Norwegian beaver manage-

ment has been to transform the status of beaver from nuisance animal to valuable game species. This goal can partly be accomplished by concentrating the hunting effort to nuisance colonies and by limiting population density in general through trapping and hunting. Landowners, however, must first be motivated to cooperate on creating beaver management units large enough to receive a harvest quota. Beaver hunting can then be leased to hunters, thus providing income to landowners that will partly or wholly compensate for damage experienced (Parker et al. 2001a). Ironically, many interested hunters are unable to obtain beaver hunting because landowners are not well enough organized to receive quotas.

Damage from flooding and tree-felling in Norway (Parker et al. 2001a) is minor compared to that experienced in parts of North America (Arner & Dubose 1982, Wigley & Garner 1987) and Finland (Härkönen 1999). This is primarily because dams built in mountainous landscapes usually result in small impoundments and because birch, the dominating species felled by beaver in Norway, has limited commercial value. Thus the negative economic effects of beaver damage in Norway may be easier to compensate for through the lease of hunting rights than would be possible in countries experiencing more extensive damage.

The relative economic loss that beaver inflict on forest owners is also dependant upon property size. Parker et al. (2001a) demonstrated that in typical Norwegian landscapes, large forest owners, in the long run, would lose only about 0.1% of their conifer production from flooding by beaver. For a forester, this is a negligible loss compared to the combined losses from e.g. insect damage, windfall, moose grazing, and fungus. Owners of small forest properties, however, may occasionally by chance experience considerable beaver damage. In Norway, forest properties are relatively small averaging only 47 ha for those >2.5 ha (Nedkvitne et al. 1990). Thus Norwegian wildlife managers must deal with relatively many complaints from small landowners. Beaver activity occurring in agricultural, urban

and suburban landscapes can be particularly damaging and solutions to conflicts controversial (De Almeida 1987, Conover 2002). In Norway the total incidence of nuisance beaver in these landscapes is minor as only a small proportion of the country is farmed (4%) or residential (1%).

Aside from the removal of dams and lodges in acute cases of flooding and the use of protective sheathing around tree trunks to prevent felling, non-lethal methods to alleviate or prevent beaver damage are seldom employed in Norway. In many instances however, non-lethal control methods, in the long run, might provide less costly solutions for landowners than lethal methods. For instance, where road flooding is a problem and wetland maintenance desirable, the installation of a flow control device may prove more cost effective in the long run than the continual removal of nuisance individuals (Lisle 2001).

Does beaver hunting limit population density?

Although there may be no direct one-to-one relationship between an increasing wildlife population and the severity of a specific wildlife problem, human-wildlife conflicts usually tend to increase with increasing population density (Conover 2002). An implicit goal of Norwegian beaver management is damage reduction through population limitation. But does mortality from beaver hunting add to or merely compensate for natural mortality? Though precise data are lacking, our experience suggests that present mortality rates from hunting and trapping in most Norwegian townships are insufficient to significantly reduce beaver density. The national beaver harvest for the years 2000–2003 averaged 3100 ± 507 (standard deviation) individuals (T. Rundtom, personal communication). Assuming a population size of 70,000 gives an annual harvest of 4–5%, which would predictably have only a minor effect on population growth and density (Parker et al. 2002b). The

present main deterrent to damage therefore appears to be site-specific control of nuisance individuals.

There is however, evidence that spring hunting can effectively reduce population density. Parker et al. (2002b) shot 22–26% of the estimated spring population of beaver in late April and early May on 242 km² and experienced a 47% fall in the number of occupied colonies after only three years. One reason for this dramatic decline was the apparent susceptibility of adults, and particularly pregnant females, to being shot first in colonies. Following several years of little or no hunting, the population is rebounding quickly (H. Parker & F. Rosell, unpublished data). In southwest Finland, hunting has apparently slowed the expected rate of increase of both North American and European beaver over many years (Ermala 1997, Ermala 2001, Lathi 1997). In Sweden, however, the take-off from spring hunting seems to have had no additive effect on natural mortality (Hartman 1999).

In general, lethal methods are usually more effective at suppressing populations if conducted after they have passed through a mortality bottleneck, that being late winter or early spring in the north (Conover 2002). Spring hunting, because it occurs late and tends to select for adults (Ermala 1997, Lahti 1997, Parker et al. 2002b) has particular potential for controlling population density at more northerly latitudes.

Can beaver be satisfactorily managed without lethal control?

Harvesting has been, and still is, a cornerstone of beaver management in most countries, states and provinces with extensive beaver populations. Present exceptions are France, Germany and Poland with estimated populations of 10,000–20,000 animals each (Halley & Rosell 2002) and the American states of Colorado where beaver trapping was recently prohibited (Manfredo et al. 1997) and Massachusetts where beaver trapping is highly restricted (Deblinger et al. 1999, Siemer et al. 2003). Increasingly, wildlife

management institutions, both governmental and NGO's, are seeking new, non-lethal methods to limit beaver damage in order to maximize the species' positive ecological contribution to riparian and wetland habitats and to achieve animal rights and welfare goals (Conover 2002). Non-lethal methods presently used in beaver management or undergoing development include e.g. live capture and relocation, water level control, chemical repellants and protective sheathing to inhibit tree felling, habitat alteration, and fertility control (Hammerson 1994). Though non-lethal control methods do not involve killing animals directly, they may cause suffering and are often expensive (Conover 2002). The acceptability of lethal control by the public tends to increase with an increase in beaver-related problems (Siemer et al. 2003). It remains to be seen whether beaver can be adequately managed on large temporal and spatial scales using only non-lethal control methods.

Problems facing Norwegian beaver management

In our experience there are two major and closely related problems facing Norwegian beaver management. The first involves a willingness to accept the beaver as a legitimate member of the ecosystem, a process termed reconciliation-ecology (Busher & Dzieciolowski 1999). If we are to coexist with the beaver and increase our tolerance level we must first learn to appreciate its role as a keystone species, particularly in habitats highly modified by humans. The greater value beaver have for us, the more damage will be tolerated. Increased tolerance will likely develop with increased knowledge through more education at all age levels, from primary school to adult education (Nielsen & Knuth 2001). An example of the later is the course recently offered to Norwegian forest owners by the Norwegian Federation of Foresters on ways to increase biodiversity in managed forests, including the beaver's role (Aanderaa et al. 1996). A management problem that could be lessened

through more education is the common practice among landowners of illegally removing the dams and lodges of nuisance beaver without permission. In our experience many landowners are not aware that permission, in fact, is necessary, suggesting that better information to the public would reduce this practice.

Another way to increase acceptance for beaver is through increased economic returns to landowners. Presently, though interest in beaver hunting and profits from hunting lease are gradually increasing (Parker et al. 2001a), many landowners are still reluctant to organize beaver management units. The result is that too few quotas are issued and many beaver must therefore be removed as nuisance animals, often outside the normal hunting season. Beaver management is reduced to damage control and few get to hunt. Harvests are small, populations and conflicts increase, and management goals go unattained. Thus the beaver's value for landowners is a key driving force behind effective beaver management in Norway (Parker et al. 2001a).

The other major problem involves recent resistance among animal welfare advocates, and hunters alike, to hunting in late spring when many adult females are shot in the late stages of pregnancy (Parker et al. 2001b, Parker & Rosell 2001). In Norway, the hunting of all wildlife is prohibited during the breeding season after females have given birth. This prompted Solheim (1991) and Frafjord (1991) to question whether mothers were being shot from new-born beaver young in late April and early May. Experience from both Norway (Parker & Rosell 2001) and Sweden (Mörner 1990) however has shown that post-parturition females are not shot within the normal hunting season. Parker & Rosell (2001) demonstrated that this was primarily because few births occur before hunting stops in early May. In addition, females are seldom seen outside the lodge during the first 1-2 weeks following parturition (F. Rosell, personal observation). As spring hunting is most effective during the last 2-3 weeks of the season, it seems likely that this practice will continue in the near future.

Is the Norwegian model likely to be adopted in central Europe?

The control of nuisance individuals and the exploitation of populations through trapping and hunting long have been essential aspects of beaver management in Norway and many other countries. In contrast, no country in central Europe is presently harvesting beaver as part of their management strategy, despite large and rapidly expanding populations.

There appears to be several reasons for this. First, the traditions associated with exploiting beaver gradually disappeared as populations disappeared over the past millennium. For the past 400-500 years most beaver pelts used in central Europe have been imported from North America (Shieff & Baker 1987). Though hunting is still widespread in Europe, fur trapping is not and has even been banned in some central European countries (J. Sieber, personal communication). This is despite the fact that Europeans are still major producers and consumers of fur garments (Shieff & Baker 1987). The hunting of beaver with firearms, as presently performed in the Nordic countries, has never been practiced in central Europe. Neither is beaver eaten by central Europeans. Thus, with the exception of damage control, no reason for harvesting beaver exists here any longer.

In addition, the prime impetus for reintroducing beaver to Europe has been the restoration of native fauna and improvement of riparian habitats and not the reintroduction of a harvestable game species or furbearer (Nolet & Rosell 1998). Beaver are also perceived by many to possess human-like qualities including e.g. strong family bonds, industriousness and intelligence, and therefore should be protected. Even among central European hunters there seems to be little interest in establishing the beaver as a game species. One reason for this is the practice in many countries, e.g. Poland, Germany, Austria and Switzerland whereby hunters must compensate landowners for the damage done by the game species they hunt. Beaver apparently

are not considered to be worth the expense this might entail. Neither is there any particular trophy associated with beaver. In short, most Europeans, hunters and non-hunters alike, at the moment see little reason why beaver should be harvested.

Presently, most nuisance animals throughout much of central Europe are being live-trapped and relocated to establish new populations when non-lethal methods of control prove impractical (Schwab & Schmidbauer 2001, Halley & Rosell 2002). Eventually, as habitats become saturated with beaver, this practice will become a less suitable solution and nuisance colonies will have to be dealt with in other ways. Alternatives to hunting or trapping might be the increased use of non-lethal methods of control, along with increased damage compensation. It is also conceivable that professional trappers using either live-traps and euthanasia, or quick-killing, body-gripping traps could be employed to regulate population density and remove nuisance individuals. Sale of the pelt and meat might constitute part of the trappers pay. Indeed, a system analogous to the registered trapline system practiced in Canada might be desirable. Regardless of the management solutions eventually employed, it is difficult to envision large-scale beaver management in central Europe without some use of lethal control. Though hunters are highly conservative and new traditions take time to develop, recreational hunting could eventually constitute a major portion of that control, and at little governmental cost.

Conclusions

The Norwegian experience suggests that successful beaver management must incorporate certain elements. First, landowners and other stakeholders experiencing conflicts with beaver must be provided with a quick and efficient means of solving the problem. If not, public tolerance for beaver may decrease and support for beaver and beaver management will likely suffer (Bishop et al. 1992). It is also important that all stakeholders

be allowed to participate in the development of local beaver management plans.

Secondly, beaver must increasingly be perceived as a valuable resource; as income for landowners, game for hunters, and as a fascinating keystone species for everyone. Finally, beaver are here to stay and we must learn to live with them. Increased knowledge of their ecological importance and recreational value should lead to increased tolerance.

For those countries contemplating the use of hunting and trapping to remove nuisance animals and exploit populations we would suggest that managers, long before populations and conflicts peak, begin planning on how hunting and trapping should be organized to realize management goals. For those countries where hunting and trapping are not management alternatives, serious thought should be given early on to other methods of controlling populations and individuals. The need to limit conflicts will inevitably occur where humans and beaver coexist.

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Samenvatting

Beverbeheer in Noorwegen: een aanpak die ook elders in Europa kan worden gevolgd?

Terwijl men in Noorwegen al meer dan 150 jaar ervaring heeft met het beheer van bevers, is daarmee in de meeste landen in Midden-Europa nog nauwelijks ervaring opgedaan. Ondanks de snel groeiende populaties en toenemende conflicten worden er in deze landen geen bevers geoogst. Als een voorbeeld voor de wijze waarop in de toekomst met bevers zou kunnen worden omgegaan, presenteren wij hier de wijze waarop bevers worden beheerd in Noorwegen. De belangrijkste doelen van dit beheer zijn het vergroten van de biodiversiteit, het produceren van een oogstbaar surplus en het terugdringen van conflicten tussen de mens en bevers. Het beverbeheer zou zich moeten richten op het maximaliseren van de recreatiemogelijkheden en zou het landeigenaren mogelijk moeten maken te profiteren van de bever als inkomstenbron, namelijk door de verkoop van jachtrechten. De gemeenten bepalen het aantal dieren dat jaarlijks geschoten mag worden, waarbij de toewijzing aan de landeigenaren gebeurt op basis van de hoeveelheid beverbiootop die zij bezitten. Het aantal landeigenaren dat zelf jaagt is overigens gering. De meeste bevers worden in de lente geschoten door jagers, als vorm van recreatie en voor het vlees. Schade veroorzaakt door bevers wordt niet financieel vergoed. Landeigenaren die substantiële schade ondervinden kunnen een vergunning krijgen voor het verwijderen van dammen, burchten en dieren die schade veroorzaken. De inzet van niet-dodelijke bestrijdingsmethoden is beperkt. Alhoewel er nog problemen zijn, is het beverbeheer in Noorwegen succesvol gebleken, omdat (1) er meer kennis

beschikbaar komt over de ecologische rol van de soort, (2) er sprake is van een langzame verandering in de beleving; van een plaagdier naar een waardevolle soort voor de jacht, en (3) deze aanpak van plaagdieren zo eenvoudig is. Op dit moment kost het beverbeheer de overheid nauwe-

lijks geld; tegelijkertijd wordt de beverjacht steeds populairder en neemt het inkomen van de landeigenaren toe.

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