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Action Plan for Brown Bear *Ursus arctos* Conservation

Plan is elaborated for the period from 2018 to 2022

Developed by the Latvian State Forest Research Institute “Silava”
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Contents

List of used abbreviations and glossary

Non-consumptive use – activities related primarily to outdoor recreation, nature tourism (such as observation and photography of wild animals, nature trails), excluding the direct use of wildlife or other natural resources.

Biotope (according to the Law on Species and Habitat Conservation and this Action Plan) – natural or semi-natural land or water areas characterized by certain geographic, abiotic (i.e. microclimatic and non-living) and biotic factors (i.e. by presence of living organisms).

Biological (ecological) carrying capacity – the maximum sustainable population size of a given species that can be supported in a habitat without causing significant changes to the ecosystem concerned.

The Baltic population of the brown bear – bears in Europe can be clustered into 10 populations (Boitani et al. 2015) based on the existing data on distribution, as well as a range of geographic, ecological, social and political factors,. Bears living in the territories of Estonia, Latvia, Belarus and the Russian Federation oblasts of Leningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kaliningrad, Kaluzh, Tula, Kursk, Belgorod and Orel belong to the Baltic population.

Habitat (according to the Law on Species and Habitat Conservation and this Action Plan) – a set of specific abiotic and biotic factors in the area where the species exists at every stage of its biological cycle.

Coexistence – the ways and means to reduce and find solutions to the conflict of interests of people with the presence of large carnivores in their commonly inhabited environment.

Methods of non-invasive research wildlife research techniques without the need to kill, capture or even observe animals directly (e.g. observation of animal tracks and other records of activity/evidence of presence, use of automatic cameras, etc.).

Social carrying capacity – the maximum number of individuals affecting society (in terms of both wild and domesticated animals, in the context of this Action Plan – bears or livestock, as well as people, such as tourists or immigrants) in a specific area that does not cause significant dissatisfaction or conflict to local inhabitants, or degradation of quality of life, including psychological stress. See also *Wildlife acceptance capacity*.

CITES – *Convention on International Trade in Endangered Species of Wild Fauna and Flora*
NCA – Nature Conservation Agency
IUCN – *International Union for Conservation of Nature*
SPNA (NP, RA) – Specially protected nature area (national park, restricted area)
LCIE – *Large Carnivore Initiative for Europe, an IUCN Specialist Group*
SFS – State Forest Service

Summary

Today, under favourable legislation and improved ecological conditions, brown bears have begun to return to many European territories after centuries of persecution induced absence. However, there is very limited exchange of individuals among some populations, and some are still critically endangered. Currently there are 10 brown bear populations in Europe, with the brown bears found in Latvia belonging to the so called Baltic population.

The brown bear is an endangered species at the European level, whose protection in Latvia is specified in Annex IV of the Council Directive 92/43/EEC *On the conservation of natural habitats and of wild fauna and flora*. In Latvia, the brown bear is listed among specially protected species. The Action Plan for Brown Bear Conservation, which was first developed and approved by the Minister of the Environment in Latvia in 2003, contains all the requirements for protection of the species specified in this Directive, other binding international and national laws and regulations. According to the report under Article 17 of the Council Directive 92/43/EEC for 2013, the species status (population size, distribution, habitat and future prospects) has currently been considered unfavorable in Latvia. There is no evidence that brown bears breed in the territory of Latvia, and the presence of brown bears in Latvia is dependent upon movement of individuals from neighboring countries. The number and distribution of brown bears in the country has remained unchanged since the 1970s, and only in recent years has their incidence become more frequent.

The purpose of the renewed Action Plan for Brown Bear *(Ursus arctos)* Conservation (referred to hereafter as the Action Plan) is to maintain a favourable status for brown bears in the Baltic population for an unlimited period of time and to achieve it in Latvia without setting a due date or specifying the minimum or maximum numbers of individuals, while ensuring the restoration of their distribution area by natural dispersal and the presence of bears as a united and functional component of the wildlife community in man-made and managed landscapes, respecting and promoting the quality of life, wellbeing and diverse societal interests.

The Action Plan describes actions and measures required to ensure the conservation and management of the species in legislation, species research and data collection, information, education and training, as well as organizational and planning actions.

The Action Plan was developed at the Latvian State Forest Science Institute "Silava" within the project "Renewal of the brown bear *Ursus arctos* conservation plan" (No. 1-20/114) supported by the Latvian Environmental Protection Fund.

Introduction

Despite its rarity in Latvia, the brown bear *Ursus arctos* (referred to hereafter as bear) is a typical mammal species of the Eastern Baltic that arrived in the current territory of Latvia after the last Ice Age, i.e., about 9,000–11,000 years ago (Tauriņš 1982, Timm et al. 1998). At the end of the 19th – beginning of the 20th centuries, the Latvian bear population was totally exterminated and there is no evidence of breeding in the territory of Latvia for more than 100 years. It is mainly due to the rarity of bears that the causes of this have not yet been thoroughly investigated in Latvia. As a major carnivore in Europe, with a relatively long lifespan and seasonally distributed life cycle, the bear has many specific requirements regarding the environment it inhabits. These requirements relate to biotic components of the environment, human activities and non-living environmental factors, such as climate. At the same time, it is possible that the absence of bears in the habitat has a smaller impact on other species compared to other large carnivores – wolves and lynx. The ecological niche of bears is not unique and overlaps with other, more widespread species, such as the badger, the pine marten and the wild boar. Nevertheless, the bear can serve as an umbrella species in the political context of environmental protection, because its conservation is related to the establishment of a system within which human economic activities require consideration of the endangered species' status itself, as well as the habitats and the socioeconomic aspects that must be integrated into a united legal framework, recognized by, and developed with, the public. At the same time, it should be recognized that in the case of successful bear conservation in Latvia and in the Baltic region as a whole, more frequent contacts between bears and people are predicted, which will then also become a decisive factor for the future of bears in our country.

The first Action Plan for Brown Bear Conservation was developed in 2003. This was approved by the Minister of the Environment, and the introduction of measures was gradually initiated. After joining the European Union on the 1st of May 2004, Latvia did not have to change the principles of brown bear management substantially, as the species was specially protected previously, but no measures were anticipated to increases to the population through restoration. Rather, a strategy of fostering a slow natural recovery was adopted. Most of the activities continued until 2008; in 2009 the first renewal of the plan was conducted, and in 2017 it was updated again.

The most current and comprehensive assessment of bear and human coexistence, based both on experience gained locally and from other countries, should be considered as the most important aspect of the renewed Action Plan.

The aim of the renewed Action Plan for Brown Bear Conservation is to maintain a favourable status for brown bears in the Baltic population for an unlimited period of time and to achieve it in Latvia without setting a due date or specifying the minimum or maximum numbers

of individuals, while ensuring the restoration of their distribution area by natural dispersal and the presence of bears as a united and functional component of the wildlife community in man-made and managed landscapes, respecting and promoting the quality of life, wellbeing and diverse societal interests. The updated Action Plan maintains a regional (Baltic) perspective and an emphasis on conservation measures in Latvia in relation to the situation at the Baltic population level, as well as focusing attention on the preparation of society to expect an increase in the number of bears in Latvia in the near future.

1. Species characteristics

1.1. Taxonomy and morphology

The brown bear is a mammal that belongs to the order of carnivores (Carnivora), bear family (Ursidae). There are 8 bear species in the world (Garshelis 2009) and of those, the brown bear along with the polar bear (*Ursus maritimus*) are the largest (Гептнер и.д. 1967, Соколов 1979). The brown bear represents the most characteristic family group or subfamily Ursinae with 6 species. Systematics of the other two species are not entirely agreed, since these species (giant pandas (*Ailuropoda melanoleuca*) and spectacled or Andean bears (*Tremarctos ornatus*)) are morphologically and historically comparatively remote from "typical" bears. Various taxonomists have published very different sub-species classifications. However, according to all of these divisions, it is the Eurasian brown bear *Ursus arctos arctos* that is found in Latvia and the neighbouring countries. The body length of an adult bear male can reach 200 cm, with a weight of 300 kg. Some individuals can even reach up to 480 kg (Новиков 1956). Females are smalleron average: about 70% of the male length (Гептнер и.д. 1967) and about 200 kg (Kojola and Laitala 2001). Sexual dimorphism can also be seen in the growth rate, whereby males typically grow faster, however after 10 years the difference between sexes in the weight growth rate stops. Skull measurements in Sweden indicate that males continue growing in length up to the age of 5–8 years, whereas for females it is usually up to 3–4 years (Iregren et al. 2001). There are no other significant signs of sexual dimorphism amongst bears. According to the body size and especially skull measurements in relation to the age it is possible to judge the geographic origin of an individual (Iregren and Ahlström 1999), which may turn out to be significant when verifying the origin of hunting trophies imported into Latvia. The body is massive, with a big head, long muzzle and short, thick neck (Fig. 1). In poor light conditions, it is possible to mistake a bear for a wild boar, which can be one reason for the accidental (non-premeditated) killing of a bear by hunters. The fur is long and thick. Pelt colour varies from greyish- or yellowish-brown to dark brown or almost black (Tauriņš 1982). In the sunlight the fur gleams (Garshelis 2009). In Belarus, young animals

with a white collar zone or white spots on the chest and shoulders have been reported (Vaisfeld and Chestin 1993). In the Estonian population, bears are mostly dark brown. In the first year of their life, a white patch or an entire collar ring is typical, but later it only differs from the rest of the body with a brighter hue of the primary colour (Männil and Kont 2012).

Figure 1. A silhouette of an adult brown bear (Photo by V. Vītola).

The main indirect signs of bear presence (Clevenger 1994, Sidorovich and Vorobej 2013) are footprints (Fig. 2), scats and claw marks on trees (Пучковский 2011). Russian scientists regard the width of the front paw print to be highly correlated with body weight and it can exceed 13.5 cm in adult specimens (Vaisfeld and Chestin 1993). The relationship between the width of the paw print (i.e. the palm pad behind the toe prints) and the weight of the bear (in autumn) is represented by a linear regression equation (Danilov 2005, Данилов и Тирронен 2011): $y=14.1X - 42.1$, where y is foot width (cm), and X is the weight of the bear (kg).

Figure 2. Prints of the brown bear's front (left) and hind paw (right) (Photo by J. Ozoliņš).

1.2. Species ecology

Bears are not as selective in their preferred habitats as is often believed. The main requirements within the environment are a plentiful food source and safe hibernation and breeding places. In Europe, temperate deciduous forests are considered to be the most suitable habitats for bears (Garshelis 2009). In Latvia, such conditions can be best ensured by non-fragmented forest massifs with little human disturbance with easy access to islands in large peat bogs, e.g., in northern Vidzeme and around the wetlands of lake Lubāns (authors' obs.). However, according to descriptions in classical scientific literature, the most suitable bear habitats in Latvia are boreal forests in particular. These areas are charaterised with Norway spruce as the main species, with mixed stands and a rich undergrowth, within a landscape of many rivers and lakes, raised peat bogs and with sites with restricted access (Новиков 1956, Tauriņš 1982, Vaisfeld and Chestin 1993). Bears do not avoid water and swim well, and they have also been found swimming in the coastal waters of the sea (Garshelis 2009).

Bears are omnivores and feed mainly by picking food from the ground, digging it from the soil, tearing the bark off trees and stumps as well as grazing and browsing on plants. In certain parts of its distribution range and in certain seasons, fishing is also important in sites with high concentrations of fish (Новиков 1956, Гептнер и.д. 1967, Сабанеев 1988, Vaisfeld and Chestin 1993, Hilderbrand et al. 1999). The diet composition varies according to season (Stenset et al. 2016). Plant food constitutes a high proportion of the diet. In Russia, where geo-botanical conditions are similar to Latvia, bears browse on young tree shoots and leaves in early summer, especially aspen shoots. In mid-summer towards the second half, wild berries become a staple food. In the autumn, acorns are consumed. During the second half of the 20th century in the Pskov oblast, bears have often foraged in fields of oats or a mixture of oats and peas (Vaisfeld and Chestin 1993). Unlike herbivores, the bear's digestive system lacks a caecum, therefore plant nutrition is not completely processed (Garshelis 2009). Seasonally, especially in the northern part of the bear distribution range (Новиков 1956), meat plays an important role in the bear diet. Bear can prey on large animals. In northern Scandinavia, the staple food for bears in spring and summer are adult moose and reindeer, whereas in the second half of the summer they switch to wild berries, although they still continue to consume a lot of wild ungulates, which constitutes up to 30% of the energy consumed (Persson et al. 2001). Wild boar, however, is rarely preyed upon. Bears also attack livestock, horses and cattle in particular. Animals that have learned to look for food in human settlements can also attack chickens and other domestic birds. In the NW of Russia, bear attacks on livestock almost ceased when moose density increased, and small farms were destroyed by collectivisation in the second half of the 20th century (Danilov 2005). Livestock damage is very

infrequent in Estonia also, however bears frequently devastate apiaries by breaking hives and destroying bee colonies. In 2007, the number of destroyed beehives in Estonia was 170, for which a total compensation of 20,150 € was paid to the owners. In the next three years, bear damage was significantly less. The amount of damage varies greatly over the years, which is explained by the difference in available food resources in nature (Männil and Kont 2012). In spite of the small number of bears, damages are also caused in Latvia. Increased risk of damage is at the end of the summer and in autumn when bears feed intensively to prepare for winter (Fig. 3).

Figure 3. Bear caused apiary damage in Latvia, Ērģeme county, October 2017 (Photo by J. Ozoliņš).

Bears are also scavengers (Garshelis 2009). In the spring, carcasses (especially those of moose) of animals that died due to injuries by hunters or falling through ice are a significant part of their diet (Vaisfeld and Chestin 1993, Garshelis 2009). Often, the tendency of bears to scavange meat is used to supplementally feed them with slaughterhouse waste or other non-natural supplementary food. Such human behaviour is not justified as it can exacerbate or create unforeseeable conflicts (Kavčič et al. 2015). Ants and their larvae play an important role in the bear diet. In order to obtain these, bears actively excavate anthills. In Sweden, it was found that ant remains form up to 16% of scat volume. Ants are especially important to bears in springtime when other food is scarce and ants, due to low temperatures, are sluggish and concentrate in the upper part of the anthill (Swenson et al. 1999). Ants have been found to be an important part of the diet of the Baltic bear population, which was confirmed by studies in Estonia (Männil and Kont 2012). Furthermore, bears actively excavate anthills in Belarus in the spring when the snow melts (Vaisfeld and Chestin 1993). Analysis of bear excrements in Belarus confirms that plants and

insects are predominantly consumed in the summer months, but mostly mammals or remains of dead animals are eaten by bears that are active in late autumn, winter and early spring (Sidorovich 2011).

In situations not associated with self-defence, bears in Europe do not attack because they perceive people as potential dangers to avoid. Even mother bears, when defending their cubs, usually scare a human away with a series of snarls and a short chase rather than a direct attack (Новиков 1956). Some cases are known from Russia when bears have even displayed aggressive behaviour towards tractors and other vehicles, although such situations usually have some explanation related to the animal's health (Корытин 1986). An injured bear can be very dangerous. Attacks on humans are much more common by the North American subspecies of the brown bear – the grizzly bear (*Ursus arctos horribilis*) (Floyd 1999, Kruuk 2002). Daily activity of bears is not particularly cyclic (Гептнер и.д. 1967). Due to human caused disturbance they are more active at night, whereas in normal feeding conditions, bears are active 50–60% of the day's length (Garshelis 2009). In Latvia, bear observations can occur during any time of the day but damage to beehives is usually done during the night.

The brown bear does not truly hibernate. Its body temperature decreases by 3–5˚C only, and bears keep the ability to synthesise all the necessary amino acids (Hissa 1997). Observations from Russia indicate that in the first phase of hibernation the bear can quickly leave the den if disturbed or if it smells food, e.g., a moose approaching (Сабанеев 1988). For hibernation, bears choose undisturbed sites, e.g., windfalls, islands in bogs or even lakes. In NW Russia, 70% of the known bear dens were situated in spruce stands (Vaisfeld and Chestin 1993). According to Swedish data, female bears on average spend 181 days in a den. Females that give birth to cubs during the winter "sleep" about a month longer than single females. The hibernation period starts at the end of October, although before that females attend the den site more often than the rest of their home range. Starting from the 6th week before hibernation, female bears decrease their level of activity and remain close to the den site. If disturbed at the beginning of hibernation, females do not return to the den but choose a new site up to 6 km away from the previous one (Friebe et al. 2001). In Estonia, bears usually start to hibernate in November and leave their dens in the period from March to May (Männil and Kont 2012).

Although there have been several reports on finding bear hibernation dens in Latvia (Pilāts and Ozoliņš 2003), those cases have not been confirmed and site conditions documented. On the 23rd January 2005, during a wild boar driven hunt in the Beja forestry unit (Alūksne district) a big adult male bear was disturbed in its den (Ozoliņš 2005). The bear quickly left the den, did not attack the dogs and ran across a clear-cut. It urinated on the run and the position of urine on both

sides of the track was an indication that it was a male bear. The den was situated about 5 m from the western edge of a clear-cut between small (up to 3 m high) spruce trees. There was a slight depression that was covered by spruce twigs obtained from nearby young spruce trees. The biggest spruce tree (trunk diameter 9 cm) was broken in such a way as to cover the den from the western side. The den was only about 400 m from a frequently used forest road. The clear-cut was wet, with water puddles, overgrown by 2–5 m tall birches, sparce spruce with an unclosed canopy, aspens and goat willows (Fig. 4). A few metres away there was an older den, possibly used by the bear during the previous winter. In the vicinity, there were numerous signs of moose and wild boar. A print of a front paw was found nearby, and its size (17.5 cm) showed that the bear was a big adult bear (according to Danilov 2005). This incident proves that the opinion stated in the Latvian Red Data Book (Andrušaitis 2000), that bears do not hibernate in Latvia, is not correct and sightings of active bears in winter are due to individuals that were distured during hibernation.

Figure 4. The bear winter den and its surroundings in Latvia, from which the hibernating bear was interrupted on the 23rd January 2005 (Photo by J. Ozoliņš in 05.04.2005).

The bear is considered to be one of the least social carnivores, but bears actively communicate, leaving behind markings in their territory (Garshelis 2009). Bears live solitarily, apart from during mating periods and when mother bears are raising cubs. Individual territories of males range from 500 to 1300 km^2, but in some cases they can exceed 4000 km^2. Female territories are smaller, and vary from 130 to 780 km^2. Although individual territories are marked, they often overlap (http://www.pbs.org/wnet/nature/bears-of-the-last-frontier-brown-bear-fact-sheet/6522/). In Estonia, the size of individual bear territories has not been clarified (Männil and Kont 2012).

The brown bear is polygamous. Males live separately and do not take part in raising cubs. The mating season takes place in early summer, from June until the first half of July. Bears are sexually mature at the age of 5–8 years. Females mate only every second year as cubs stay with

the mother up to 2 years (Гептнер и.д. 1967, Tauriņš 1982, Lõhmus 2002). Cubs are born during hibernation in the second half of the winter. The weight of the cub does not exceed 500 g at birth (Новиков 1956). In the Novgorod and Pskov oblast, the average litter size is 2.23 (Vaisfeld and Chestin 1993). In Estonia, the mating period lasts from the end of May until the beginning of July (Männil and Kont 2012). The average litter size was initially found to be 1.8 (Lõhmus 2002), but ten years later it has been found to be 2.1, which, perhaps, is underestimated due to an incomplete registration (Männil and Kont 2012). The potential fecundity of bears can be much higher – up to 6 cubs, but usually such an extreme is not realised (Vaisfeld and Chestin 1993) and 5 cubs is considered as the maximum litter size (Garshelis 2009). Female bears are fertile until the end of their third decade, but after their reproductive period ends they can live for about another ten years (Garshelis 2009). Usually, the mother bear does not defend cubs in the den and abandons them when escaping, but after leaving the den in the spring and summer, it actively defends cubs, including from humans (Vaisfeld and Chestin 1993). The sex ratio at birth is 1:1, though there is a slight male prevalence in the population (Vaisfeld and Chestin 1993). When dispersing from the central part of the population towards the edge of the home range and to new territories, a different demographic structure forms: the proportion of males increases, especially that of sub-adult males 2–4 years old (Swenson et al. 1998). Also, females have smaller litters (Kojola and Laitala 2000). According to the measurements of the front paw prints of more than 5000 bears in Karelia from 1969 to 1997, the population consisted of about 40% of cubs under the age of one and a half years (paw width < 11.5 cm), 10% of old animals (paw width > 17cm) and around 50% of young and middle-aged bears (paw width 12–16.5 cm) (Danilov 2005). When studying the differences in dispersal between male and female grizzly bears, it was concluded that this kind of information is very important. It helps planning protected areas in such a way that facilitates the restoration of the distribution range, and decreases inbreeding and animal mortality outside the protected areas (McLellan and Hovey 2001).

Due to a large body size, bears do not have natural enemies, except for other bears. Bears are relatively aggressive, especially males during the mating period. They also tend to guard and defend uneaten food, for example, the body of a large animal hunted or found dead (Garshelis 2009). Cubs have a high mortality in their first year. It is known that cubs can be killed by other adult bears. It is believed that this is mainly done by immigrant adult males (Swenson et al. 2001). According to Scandinavian research, young bears can be killed up to the age of 3 years. The reasons for this phenomenon are unclear (Swenson et al. 2001a, Swenson et al. 2001c). In Belarus, it is believed that wolves are primarily to be blamed for the mortality of cubs and juveniles (Vaisfeld and Chestin 1993). Bears do not have other natural enemies and their life span may

exceed 30 years (Гептнер и.д. 1967). Under favourable conditions, bear numbers can increase relatively quickly. In Scandinavia, it was found that in 1985–1995, the annual population increase was 10–15% (Zedrosser et al. 2001). It is typical for bears to disperse outside of the main distribution range before the carrying capacity is reached in its central part (Swenson et al. 1998).

Due to a long life span and successful survival of adult individuals, even very small micropopulations can survive for a certain period. In the West Pyrenees, on the border between France and Spain, only 6 bears live in an area of 1000 km², and in the South Alps in Italy, 4 bears live in an area of 240 km². Such isolated populations cannot exist in the long term without artificial measures like introduction of new animals (Zedrosser et al. 2001). Modelling the development of a grizzly bear population, it was concluded that the minimum population size should be 200–250, and the area – 8,556–17,843 km², depending on the possible density in a given area (Wielgus 2002).

1.3. Species distribution and population size

The bear first appeared in the current territory of Latvia in the early Holocene, i.e., around 8000 BCE (Tauriņš 1982, Mugurēvičs un Mugurēvičs 1999). Estonian researchers suggest an even earlier date no later than 11,000 years ago (Valdmann et al. 2001). Excavations show that during the bronze age (1500 BCE) bear remains constituted 5.3% of all hunting remains in Latvian pre-historic settlements (Mugurēvičs un Mugurēvičs 1999). Many bears were hunted in Latvia up to the second half of the 19th century. Between the 19th and early 20th century, only a few bears remained in the eastern part of Latvia, around Lubāna and Gulbene (Grevė 1909). The territory of Latgale was not mentioned in the report on bear distribution at the time but it is believed that the remaining individuals in the eastern part of Vidzeme were not isolated from the Russian population. Therefore, W.L. Lange (1970) mentions in his distribution map a link between the areas of Lubāna and Gulbene and the border with Russia as late as 1900. The last local bears in that area were killed in 1921 – 1926. The bears that periodically came to Latvia in the area where the borders between Latvia, Estonia and Russia meet were promptly shot in the time between the two world wars, due to the fact that the parliament of that time supported the destruction of large carnivores. Due to this reason, the former Forest Department deliberately did not record bear observations reported by forest rangers, hoping that bear sightings would be discounted or ignored unless they attacked livestock (Lange 1970). Therefore, bears were not mentioned in the official Latvian game statistics before WWII (Kalniņš 1943). Bears began entering the territory of Latvia from Russia more often from 1946 onwards (Lange 1970), but it was only in the 1970s, thanks to the information obtained by J. Lipsbergs, that it was confirmed that bears are found in Latvia

regularly (Tauriņš 1982). In the second half of the 20th century, the bear population started recovering throughout Europe (Fig. 5), with the number increasing almost twofold (Mitchell-Jones 1999). In Central Europe, bears have mainly returned to mountainous areas (Kaczensky and Knauer 2001) resulting in a few isolated populations (Fig. 6).

Figure 5. Brown bear distribution in Europe at the end of the 20th/beginning of the 21st century (after Swenson et al. 2000).

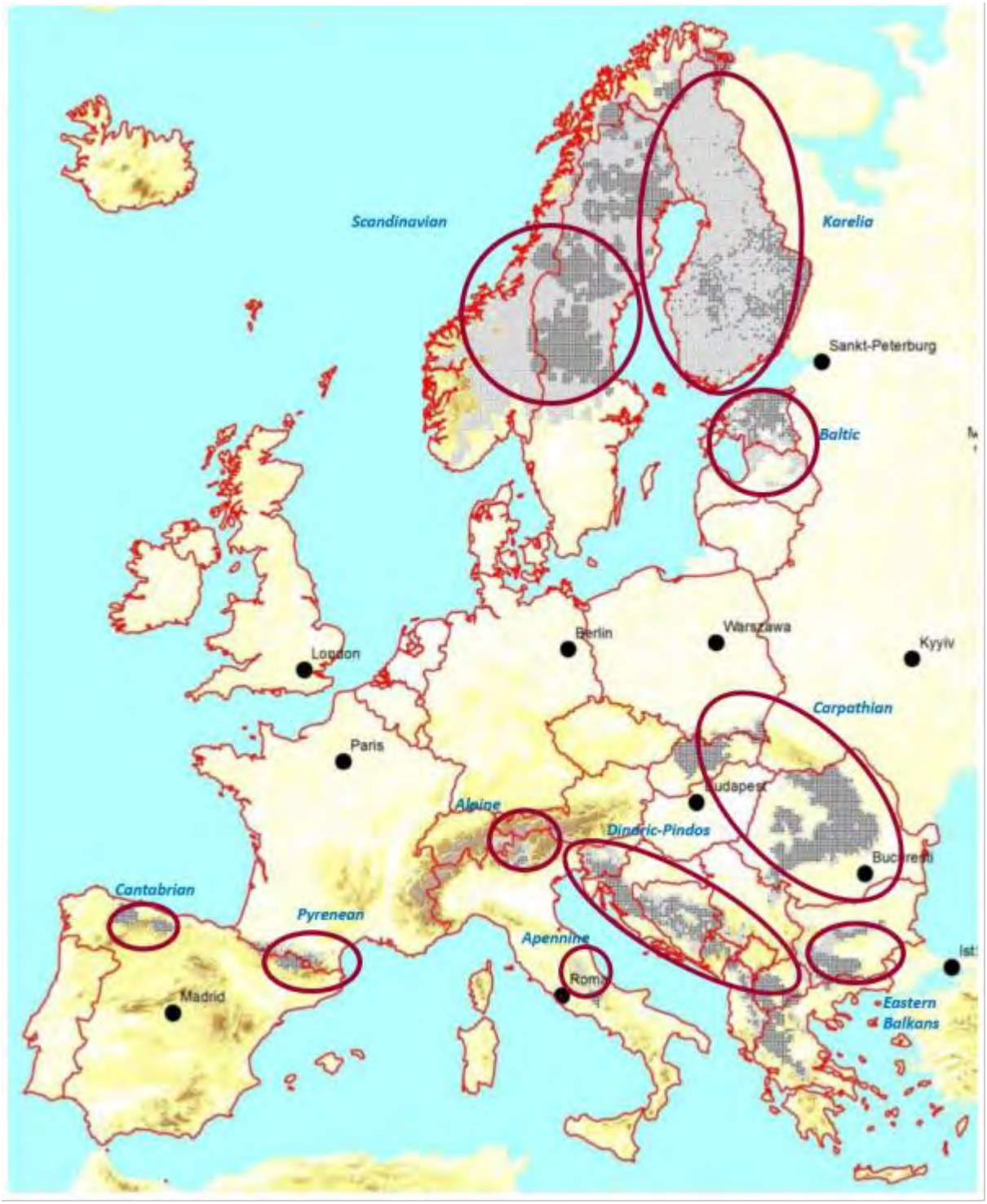

Figure 6. The 10 populations of brown bears in Europe (Boitani et al. 2015).

In Estonia from the mid-19th to the beginning of the 20th century the number of bears sharply decreased, and in the first half of the 20th century they were found only in the north-east of the country (Männil and Kont 2012). However, the number of bears in the official statistics exceeded 100 already by the 1950s. The maximum number of bears (more than 800) was registered in the late 1980s and today the population is estimated to be around 700. It should be noted that in the second part of the 1980s, about 60 bears were harvested annually for a few years in a row.

Currently bears are found throughout the country, except the islands, but in recent years their reproduction has not been registered in Valga and Võru counties. Data on bear density in the Pskov oblast in Russia confirm that bears are relatively scarce in that area, while around lake Peipsi and the Estonian border zone the bear density is 2–3 times higher (Vaisfeld and Chestin 1993). However, in absolute numbers, the bear population in Pskov oblast is large (>1000 ind.) and is growing in recent years (Gubarj 2007, Gubar 2011 after Männil and Kont 2012). It is recognized that the situation for bears in Estonia is affected by processes in the 5 nearest administrative regions of the Russian Federation (Männil and Kont 2012). In Belarus, bears are most common in the north, especially in the Berezin nature reserve. In Lithuania, bears are occasional immigrants and from the end of the 20th century they are not regarded as a part of the local fauna (Prūsaitė et al. 1988).

In Latvia, unfragmented forests are considered as bear habitats, because the pattern of bear observations indicates their occurrence in, and adjacent to, the most wooded areas of the country. In both the 1970s and recent years, bears were mostly observed in the eastern part of Latvia. Their distribution is at least partly correlated with areas of contiguous forest massifs (Figs. 7, 8). Insufficient forest cover could be an explanation for the lack of bear observations in the central part of Latgale. One, or at most, two individuals may have entered Kurzeme (western region) in the 1980s, which in terms of forest cover does not differ from north Vidzeme or Sēlija (eastern regions). According to information collected by J. Lipsbergs, two bears (one larger and one smaller) were mentioned in 1983 in the Vandzene forestry unit and in 1984 – in the vicinity of Babīte. In the beginning of 1990s, the bears left Kurzeme or died, and have re-appeared only in 2006. Therefore, the occurrence of bears is more dependent on the location of the particular area at the eastern or western part of the country – i.e. the distance from their main distribution area beyond the borders of Latvia – than solely on forest cover.

Between March and September 1999, surveys on the occurrence of bears were conducted in all Latvian regional forest districts, with the exception of the Bauska forest district (central region southwards from Riga), as well as in state reserves. In total, 220 questionnaires were distributed, 104 of which were returned (47.3%). To confirm the latest observations, in the summer of 1999, expeditions to 9 places were organized where bears were officially registered, or their tracks reported during the previous six months. During the expeditions, additional interviews were conducted with forest workers and local people about bear sightings and damages, in addition to searching for fresh tracks on forest roads. Most of the observations in the questionnaires were older than 3 years. In all of the 66 questionnaires, in which the presence of bears was confirmed, the respondents had also indicated the signs according to which the bears were found. In 57 cases bear

traces were reported, and in 37 cases bears were observed directly. Bears with cubs were reported only in 3 cases, but, in 3 other cases, bear winter dens were detected. In the mentioned 66 questionnaires, reports of 5 bears which had died in the territory of Latvia were also included. After 1999, two additional bear losses were known from the Alūksne district, and one bear was deliberately killed in the Valmiera district to prevent a dangerous situation for the community (both in eastern region).

The distribution of bears in a range of years, based on the data by J. Lipsbergs, combined with a map indicating the location forested areas in Latviais shown in Figure 7. The map based on the 1999 surveys is shown in Figure 8. Since the beginning of the 2000s, the situation has not changed significantly (Fig. 9), although in the last few years bears are less often observed on the left bank of the Daugava river along the Lithuanian border. This may be due to the fact that one bear, which had previously wandered into a vast area south of the Daugava, was rumoured to have been shot at the end of the 20th century in Lithuania not far from the Latvian border (P. Blūzma, pers. com.). The most recent distribution data can be seen in Figure 10, which was compiled based on bear monitoring results from 2015 and 2016 (https://www.daba.gov.lv/public/lat/dati1/valsts_monitoringa_dati/#F_mon).

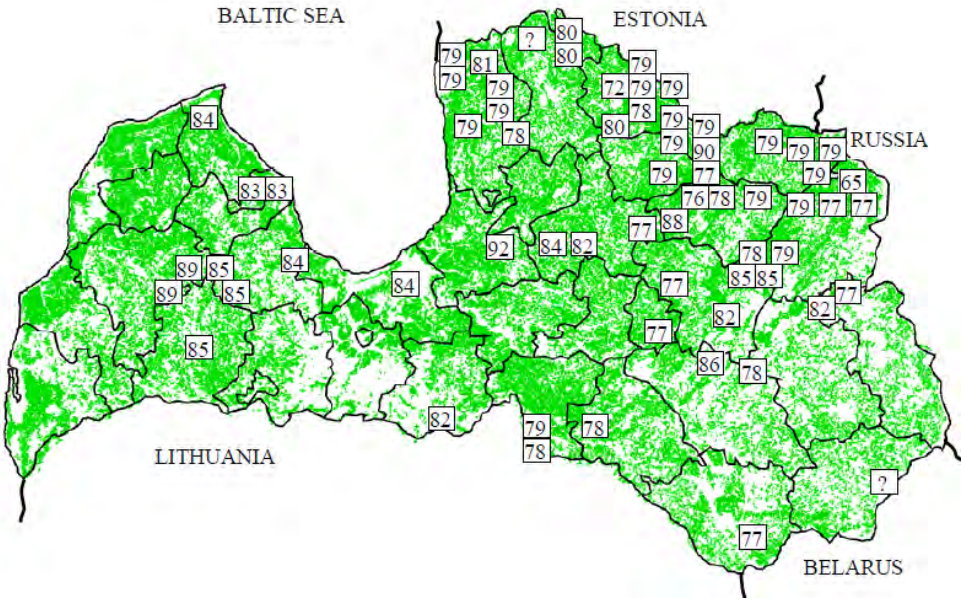

Figure 7. Bear observation sites and years (according to the data by J. Lipsbergs). The background shows forest cover and borders of regional forest districts in 1990–1999.

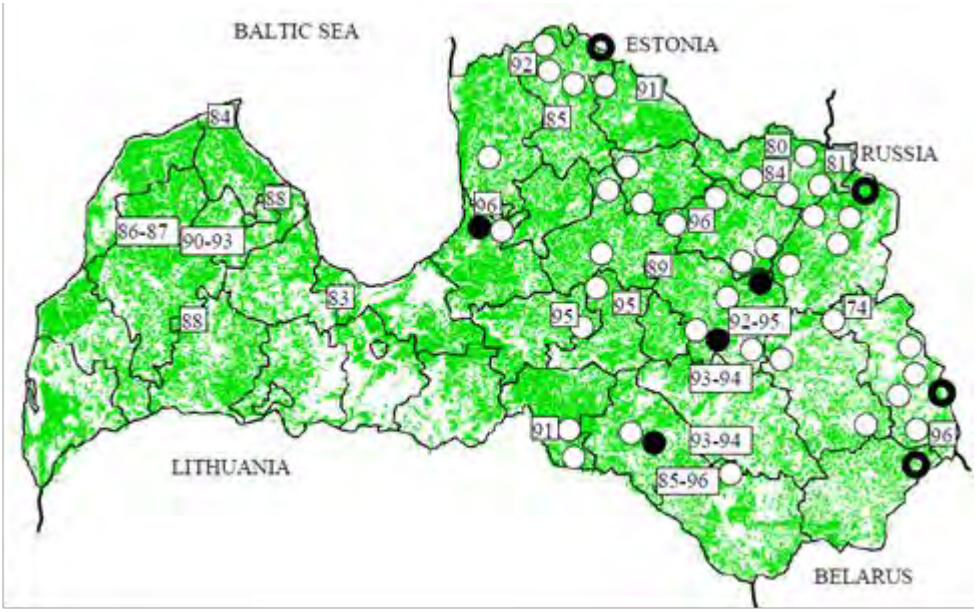

Figure 8. Bear distribution in Latvia based on the surveys in 1999. The background shows forest cover and borders of regional forest districts in 1990–1999.

● bears that were present in Latvia in 1999

⊙ bears that are periodically present in Latvia, as well as in neighbouring countries

○ bear observations in 1997 or 1998

🖂 previous bear observations until 1997 (observation time indicated by abbreviated year)

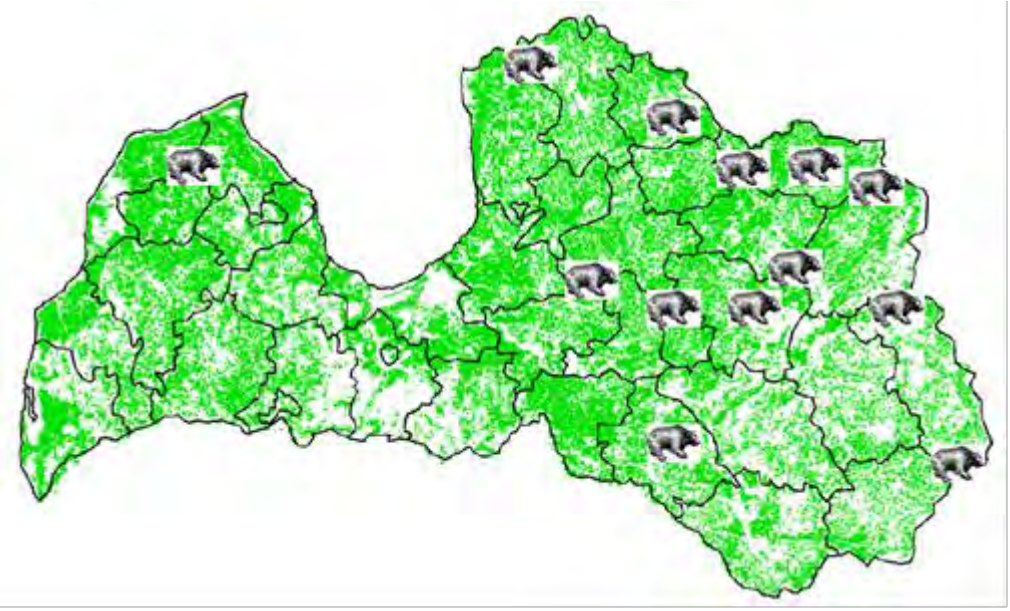

Figure 9. Sites where bears were observed most frequently between 2000 and 2012 (primarily based on data from the State Forest Service).

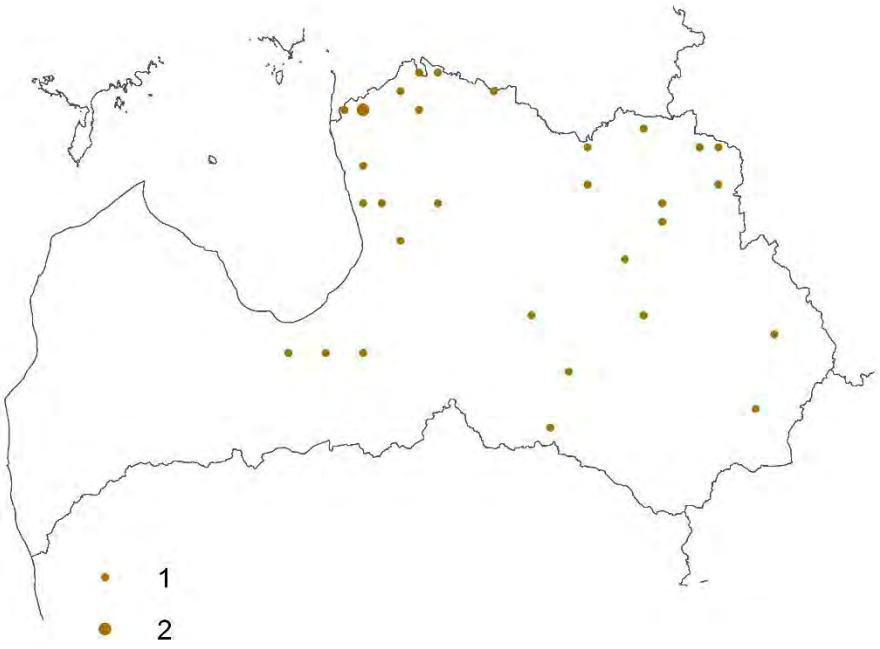

Figure 10. Sites where bear presence was confirmed during monitoring in 2015 and 2016. 1 – traces were detected in one of the years, 2 – traces were found in both years within the borders of a 10x10 km square.

When assessing bear distribution data, it should be taken into account that bears cover long distances in spring after hibernation in order to find food as well as during the mating season when looking for a mate. Such a high mobility caused by low population density or lack of food can give a false impression of an increase in bear numbers and distribution (Vaisfeld and Chestin 1993). Even though the distribution of bears in Latvia in the last 20 years can be regarded as stable, it is unclear how their distribution is related to the number of individuals, i.e., whether the number of resident bears in Latvia has remained stable. The areas where bears are most often observed are in the vicinity of Aizkraukle, Alūksne, Balvi, Gulbene, Jēkabpils, Limbaži, Ludza, Madona, Ogre, Rīga, Valka and Valmiera (towns in central and eastern Latvia). According to the State Forest Service (SFS) data, bear numbers in Latvia fluctuate around 3–15 (on average, no more than 10) individuals (Fig. 11). It is still unknown whether bear observations in the central and western part of the country are related to an increase in bear density within the country or whether these bears are immigrants from neighbouring countries that have entered these regions via eastern Latvia.

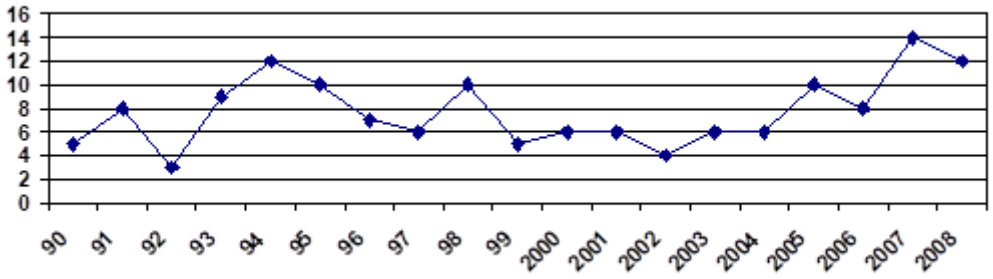

Figure 11. Bear dynamics in Latvia in 1990 – 2008 according to the official statistics of the State Forest Service). In 2009, the State Forest Service stopped registering bear observations.

Recent observations in Latvia indicate a possible increase in the number of bears after the 2015 (monitoring results), however, in comparison with the Baltic bear population in general, a very small part of it is located in Latvia (Table 1).

Table 1.
Brown bear population status in Latvia and neighbouring countries

	Estonia	**Latvia**	**Lithuania**	**Pskov oblast**	**Belarus**
Area (th. km^2)	45227	64589	65200	55300	207600
Human population (million)	1.31	1.97	2.87	0.7	9.7
Forest cover (%)	51	52	33	>35	34
Number of bears according to expert opinion	700	20-50	0	1100	50-70
Annual harvest of bears	20-50	-	-	>20	-
Hunting season	01.08.-31.10.	-	-	01.08.-28.02.	-
Estimate basis	Census of mother bears with cubs	State monitoring	-	State monitoring	Expert estimate

1.4. Threats and conservation status

Bears have been protected in Latvia since 1977. The status of the bear in Latvia remains as described in the Lavian Red Data Book of 1980 (Andrušaitis 1985): “Category 2 – rare species” which are not endangered but occur in such low numbers or in such a restricted and specific area that they can go extinct rapidly; legislative protection is necessary. In the subsequent Latvian Red Data Book (Andrušaitis 2000) the bear is included in Category 3 with the same definition as in the former Category 2.

The Baltic population of the bear overall can be regarded as “of least concern” (Linnell et al. 2008). Also on the global scale, the species is not endangered (“of least concern” – The IUCN Red List of Threatened Species, 2017).

Assessment of the species conservation status in Latvia in accordance with the report under Article 17 of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora for the period 2007–2012, it is generally considered unfavourable. Only the distribution of potential areas and habitat availability were favourably assessed. However, the size of the population is considered to be insufficient, as a result of which bear reproduction does not occur, which makes the overall situation poor and future perspectives unpredictable. Positive changes could be fostered by the fact that it has been planned to maintain a brown bear population of 600 individuals in Estonia between 2012 and 2021, including 60 females that reproduce annually, and to promote the dispersal of the population southwards (Männil and Kont 2012), implemented by a bear hunting ban in territories closer than 50 km to the border with Latvia.

1.5. Previous research

Looking at the criteria for the bear population status in Latvia superficially, it is unclear why in a country where natural diversity has persisted and regenerated, which is exceptional for Europe, there are still very few bears, while in neighbouring Estonia their numbers need to be regulated through hunting.

A study on the species has been conducted through a survey of SFS employees within the framework of a project by the Danish Environmental Protection Agency (1999–2000), the results of which are reported in a scientific publication (Pilāts and Ozoliņš 2003).

In 1999, a joint project of the Estonian and Latvian Nature Funds “Conservation planning of wolves in the Estonian – Latvian cross-border region”, in co-operation with Latvian and Estonian border guards, was started and for two years a study of large carnivore movements, including bears, was initiated in the Estonian – Latvian and Latvian – Russian border areas. The study was mainly based on the detection of carnivore tracks and their direction in snow conditions, and significant data on bears were not obtained due to lack of their activity in winter. Territorial assessment and accumulation of information on bear occurrence in the north-western border area also occurred during 2003–2005 within the project “Integrated Wetland and Forest Management in the Transborder Area of North Livonia” funded by PIN-Matra (Ozoliņš et al. 2005). The north-eastern part of the Latvian – Estonian border area as a “green corridor” has been evaluated in a similar way during 2012–2013 within the EU-supported project “Tuned nature management in the transboundary area of Estonia and Latvia” (No. EU 38806).

Public opinion on bears was studied three times – once in 2001 (Andersone and Ozoliņš 2004) and again in 2004 within a project "Large Carnivores in the Landscapes of Northern Europe: an Interdisciplinary Approach for Regional Species Conservation" funded by the Norwegian Council of Science (Jaunbirze 2006, Linnell et al. 2006). At the time of renewal of the Action Plan, a new inquiry of public opinion was conducted (A. Žunna et al., unpublished data).

The Large Carnivore Initiative for Europe (LCIE) of the International Union for Conservation of Nature (IUCN) joins and co-ordinates large carnivore experts in all of the European countries and regions. Information about projects, international co-operation and results can be obtained on their website: http://www.lcie.org.

The Action Plan for conservation of the brown bear in Latvia has been developed and updated since 2003.

In 2016, a PhD student, Edgars Bojārs of the Estonian University of Life Sciences began a study on the impact of abiotic habitat and landscape factors on brown bear distribution and population size. The aim of the research is to investigate which environmental and landscape conditions affect the differences in the brown bear population in the territory of Estonia and Latvia, paying particular attention to the importance of the landscape structure and continuity.

Bear monitoring in Latvia started in the 1970s, when collecting data for the first issue of the Latvian Red Data Book (Andrušaitis 1985). The main role here was played by the zoologist J. Lipsbergs (Pilāts and Ozoliņš 2003). Since 2015, researchers at the LSFRI "Silava" have been monitoring bears following methodology approved by the Nature Conservation Agency (NCA) (http://biodiv.daba.gov.lv/fol302307/fol634754/fona-monitoringa-metodics/ziditajdzivnieki-brunais-lacis/mon_met_fona_2013_ziditaji_lacis.doc).

The best monitoring experiences and traditions are in the countries where bear populations have always been present or have been successfully restored, namely Russia, Northern Europe, and in the Carpathians and the Balkans (Mitchell-Jones et al. 1999, Zedrosser et al. 2001). On the 16th and 17th of May 2002, an international workshop on monitoring systems of large carnivores was held in Helsinki. Carnivore experts from Northern Europe – Finland, Sweden, Norway and the Baltics – participated in the workshop. In Scandinavia, the following information is used for bear monitoring: attacks on livestock and reindeer, occasional observations, harvested or unintentionally killed individuals, genetic sample database, hunters' observations, capture-recapture method and radio-telemetry. In Finland, additional information comes from bear sightings during driven moose hunts, which are registered by hunt participaints in special census forms (Management Plan 2007). Information on the Russian bear population and monitoring methods is summarised in a detailed monograph (Vaisfeld and Chestin 1993), while the most

recent information can be found in special periodic issues devoted to the assessment of hunting resources (Gubarj 2007). In Russian Karelia, the following parameters of the front paw print are used for determining the age structure of the population: sub-adult cubs up to 1 year – 6–9 cm, 1–2 year old cubs – 9.5–11.5 cm, older than 2 years – ≥12 cm. In Estonia, the bear population structure is also determined by footprints of the front paws. Additionally, information on winter dens (Lõhmus 2002) and the number and spatial distribution of mother bears (Männil and Kont 2012) is an important part of bear monitoring in Estonia. A large amount of useful information is provided by the bear research and monitoring experience from Austria (Kaczensky and Knauer 2001, Proschek 2005, Rauer 2008). The territory of Austria is 25% larger than Latvia (83,858 km^2) and the bear population was also totally eradicated in the 19th century. In Austria, there are similar problems as to those in Latvia. No more than 15–20 bears have been found in the last few years and they belong to the so called Alpine population (30–50 bears in total). In 2008, the population in Austria collapsed to only two individuals. The first bear immigrated to Austria from Slovenia only in 1972. In the 1990s, WWF in Austria arranged a re-introduction of 4 animals of both sexes from Slovenia and Croatia. These animals were fitted with radio-collars and were carefully monitored. These animals (3 of which were females) had in total 31 offspring by 2008. Most litters had 3 cubs. An action plan for bear conservation was developed for Austria. However, all these efforts have not helped the bears to return to the country, and in 2012 only 5 bears were listed in Austria (Chapron et al. 2014). The monitoring is conducted in several directions: registering direct observations and tracks, investigating conflict situations, telemetry, DNA sampling and analysis. During this period, the state and the municipality budgets have covered the expense of employing a "bear manager" Dr. Georg Rauer. He determined that bears in Austria "disappear" after reaching the age of 1–2 years. There have been some conflict situations during the research period, but only two "problematic bears" had to be killed. Clear evidence for only one case of poaching was found. Potential motivations for bear poaching could be: a desire to get a trophy, removal of a disturbance for game management, or mistakenly taking a bear for a wild boar. The interaction between bear conservation and game management interests is a very delicate issue in Austria as mass media and a part of society use the problem of bear killing as an argument against hunting in general. In turn, hunters and foresters are the main sources of information for monitoring.

Methods of bear monitoring, including those applied in Latvia, are summarised in an international publication by Linnell et al. (1998). The majority of the methods described were devloped and tested in North America. From a range of known methods, the approach used in Estonia could be the most appropriate method for Latvia in the future, in which, in addition to the age structure of the population according to the size of footprints, mother bears with cubs are

recorded, counting the cubs as well. It is also recommended to collect bear hair using specially designed devices that remove the hair with the root (so called “hair traps”) or the hair found at sites where bears have damaged apiaries (Fig. 12). This material (hair and fresh faeces) is used for DNA analysis in order to distinguish individual bears. To evaluate the impact of hunting on the bear population in Latvia and the Baltic region more accurately, there is a lack of regular information on hunting loads, i.e. how many hunters participate and how many days a year are devoted to driven hunting, during which it is possible to disturb bears.

Figure 12. Bear hair stuck in a wax cell frame during damage to an apiary (Photo by A. Šmits).

2. Key factors affecting species status

2.1. Factors affecting species survival

The IUCN LCIE has identified 4 main threats to the European populations of the brown bear (http://www.lcie.org/Large-carnivores/Brown-bear):

1. some populations are too small and isolated to ensure long-term existence;
2. there is some concern that in the countries where bear hunting is legal, hunting quotas may be too high to allow a self-sustainable population;
3. bears cause damage to livestock and conflict mitigation is not ensured;
4. transport infrastructure fragments bear habitats and is an additional mortality factor.

The fact that there are so few bears in Latvia and that most of them belong to one sex (monitoring data) is probably the main limiting factor and the primary reason for a slow

recolonization process of the bear population in Latvia. Considering that Latvia is on the periphery of the Baltic bear population of almost 7000 individuals (Linnell et al. 2008), the factors that prevent bears from remaining in Latvia after arriving from elsewhere are most relevant. Intensive logging, hunting with beaters and dogs at bear wintering sites, transport and building infrastructure are common factors that threaten the existing bear populations in Europe and there is no doubt that these factors will hinder the restoration of the bear population in Latvia as well. Particularly worrying is the perspective that Latvia as a transport transit country will develop its transport infrastructure significantly. In landscapes created and used by humans, the factors influencing bear mortality and impacting population status differ significantly from those operating in an intact environment (Steyaert et al 2016). It is difficult to give a clear assessment of the impact of recreation and tourism. For bears, the proper storage and regular collection of anthropogenic food (food waste, uncollected fruit, etc.) near farms is particularly important. Special attention should also be paid when planning motorsport-related recreation sites. More relevant activities could be the direct disturbance by humans involved in mushroom and berry picking, which is facilitated by an improved network of forest roads. As bear numbers increase, it is likely that they will be more often killed during hunting for other species, and not only due to mistakes but also using human safety as an argument. Such situations are not uncommon in Estonia (P. Männil pers. com.). Unlike for hunting of other large carnivores, bear hunting is selective and therefore leaves an impact on the demographic structure of the population. In Estonia, 63% of hunted bears are sub-adults from 1 to 2 years of age (Männil and Kont 2012).

While the bear population is recovering, it is very important to find solutions to previous conflicts that have been experienced, extensively studied and described in regions where bears have been living in man-made and maintained landscapes for a long time. Losses to apiculture (Bautista et al. 2017) is just one of the predictable areas where human interest comes into conflict with bears. It is more complicated to create a favourable attitude in a society influenced by fear and unwarranted beliefs about large carnivores (Ambarli 2016, Johannson et al. 2016), while also creating a safe system for preventing dangerous situations, including informing people about adequate behaviour that does not provoke carnivore aggression (Penteriani et al. 2016). In Latvia, it should be taken into account that the inhabitants will not be ready to accept a rapid increase in the bear population without special preparation, and the so-called social capacity of a small area can become a serious threat to a favourable population status.

Natural factors in the Baltic region bring no threat to bears, although their impact has been poorly studied. Regarding diseases and parasites, more precise information can be found only on trichinellosis. In the first half of the 1990s, 38.5% of tested bears were diagnosed with

trichinellosis. Parasite intensity in bears, as compared with other wild carnivores, was the lowest (Pozio et al. 1998). In the beginning of the 2000s, the bears tested had a relatively small number of these parasites, while the proportion of bears with trichinellosis was even lower – 13.6% (Järvis and Miller 2004).

2.2. Factors affecting species habitat

At the beginning of the 20th century K. Grevė (1909) wrote that the main reason for the rapid decline of bears in the 1860s in Livonia was not so much due to direct persecution by humans as the introduction of modern forestry. Along with the increase in forestry activities, the total forested area also decreased. Before WWII, only 25% of the Latvian territory was forested, however, the forested area in Latvia has been gradually increasing in the last 50 years (Matīss 1987, Priedītis 1999). Modern forestry techniques ensure forest restoration after clear-cuts, therefore modern forestry can be regarded as less of a disturbance factor than the total clearing of forests as practiced in the late 19th – early 20th century. Until we have more precise data on the impact of Latvian forest characteristicson bear distribution, there is no reason to believe that bear habitats are endangered.

In several cases, bear presence in Latvia was detected near decomposing animal carcasses in the forest. Carcasses of wild animals are an important food source for bears in winter (disturbed from hibernation) and in spring. In Latvia, those animal species that can at least theoretically be trophic competitors with bears have increased in number (Priednieks et al. 1989, Ozoliņš and Pilāts 1995, SFS official game census data). These include other carnivores and corvids that can also quickly consume the carcasses of animals that died during winter, and wild boar that destroys anthills, consumes carrion, acorns and other important bear food. An increase in the number of trophic competitors (wild boars, foxes, racoon dogs) decreases the environmental carrying capacity and theoretically could hinder the settling of immigrant bears in Latvia.

3. The present conservation of the species, effectiveness of the actions

3.1. Legislation

International obligations:

Convention on Biological Diversity (Rio, 1992). Latvia took part in signing the document and ratified it in 1995. Rather than containing any species lists or annexes, it provides general guidelines on the conservation and use of biological diversity, research and public awareness, which the parties within the agreement follow according to their capabilities and needs. Conservation of the brown bear is considered under Article 8 '*In-situ* Conservation'. Its

enforcement in Latvia is implemented by the Law on the Convention on Biological Diversity (Rio, 5 June 1992) (adopted on the 31st of August 1995, enforced since the 8th of September 1995).

Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979). The brown bear is listed under Annex II as a 'Specially protected fauna species'. This means that signatory parties of this convention must stipulate strict protection, and therefore restrict species exploitation. Its enforcement in Latvia is implemented by the Law on the Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979) (adopted on the 17th of December 1996, enforced since the 3rd of January 1997).

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; Washington, 1973, in force since the 1st of July 1975). Bears are listed under Appendix II as potentially threatened. This means that international trade with this species is limited and may only occur under strict control. Its enforcement in Latvia is implemented by the Law *On the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)*, adopted on the 17th of December 1996, enforced since the 3rd of January 1997, and by the European Council regulations, which are directly enforced in Latvia.

The bear is included in Annex A of the Council's Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein, and its actual wording is decreed by the Commission Regulation (EU) No 2017/160 amending Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein. This regulation decrees a strict process, implemented by a system of special permits and certificates, on how individual bears or their products can be imported or exported to or from the European Community and used within the borders of the European Community or in local trade.

European Council's Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora. The bear is listed under Annex II (species of Community interest whose conservation requires the designation of special areas of conservation) and Annex IV (need of strict protection). The Directive's claims are implemented by all national legislation (laws, regulations issued by the Cabinet of Ministers, decisions of responsible institutions, decrees) concerning the conservation and exploitation of wild species and natural habitats. Upon joining the EU, binding decisions of the European Parliament are also applicable to Latvia (Swenson et al. 2001b).

The role of international obligations in securing the legislation:

The international obligations which the state has undertaken during the previous 20 years, play a substantial role in maintaining a species' favourable conservation status. There are,

however, additional recent requirements not covered by legal acts. These requirements are related to population recovery, preservation of current status or sustainable exploitation in situations where one biological population extends over the borders of two or more countries. The Baltic population of brown bears meets such conditions. Scientists and species conservation experts have developed conceptual guidelines, which meet the requirements of international obligations as well as enhance collaboration between countries in practical population level conservation and management of large carnivores (Linnell et al. 2008, Boitani et al. 2015). They serve as explanatory and recommendatory documents for the achievement and conservation of a favourable bear population status. Compliance with the guidelines will depend on the future ability of the Member States to cooperate at the international level and the desire to reconcile their national interests with the requirements of species conservation. The documents will also serve as a basis for assessing good practices in the management of large carnivores, including bears.

National legislation:

In Latvia, according to the Law on the Conservation of Species and Biotopes (16/03/2000, latest amendments 08/10/2015) and Annex 2 of the Regulation No. 396 *List of the Specially Protected Species and the Specially Protected Species Whose Use is Limited* (Cabinet of Ministers, 14/11/2000, amended by Regulation No. 627, 27/07/2004), the bear is classified as a specially protected species.

In accordance with Regulation No. 1055 *Regulations for the list of animal and plant species of importance in the European Community requiring protection and the list of individuals of animals and plants that may be subject to conditions of restricted exploitation in the wild* (Cabinet of Ministers, 15/09/2009), issued according to Paragraphs 15 and 16 of Article 4 of the Law on the Conservation of Species and Biotopes, the bear is listed among the animal and plant species of importance to the European Community which require protection.

The Animal Protection Law (09/12/1999, last amendments on 15/06/2017) determines general requirements for wildlife conservation, including Article 27 – "It is prohibited to capture and keep in captivity wild amphibians, reptiles, birds and mammals, except for the cases specified in this Law and the laws and regulations governing nature protection and hunting"; and Article 27 [1] – "It is prohibited to train and use a wild animal (both captured wild or raised in captivity) as an amusement animal and display publicly as an amusement animal". This law prohibits cruel treatment of all animal species, as well purchasing, keeping in captivity, expropriating and keeping for trade, exchange or offering for trade carnivore species of wildlife, except for zoos and registered holdings of wild animals.

According to Paragraph 18 of Article 5 of the Law on the Conservation of Species and Biotopes, promotion of education and access to information are provided for, based on the need to protect wild fauna and flora and preserve biotopes, species and their habitats. In addition, Section (1) of Article 6 states that the Ministry of Education and Science promotes the research and development of scientific studies necessary for the implementation of this Law. Section (1) of Article 10) of this Law entitles land owners and permanent users with the right to receive compensation from the state budget in case of significant damages caused by animals of specially protected non-huntable and migratory species (and therefore by bears), if necessary protective measures and cautious ecological methods have been taken and introduced to prevent or reduce loss, using knowledge, skills and practical capabilities. The land owner or user is not entitled to receive compensation, if they have deliberately furthered the damage or increased its amount in order to receive compensation. By contrast, Article 11 of the Law prohibits deliberate killing and disturbance of specially protected species, particularly during breeding and hibernation periods, as well as transport and trade of these species and products derived from them.

Since the 10th of June 2016, Cabinet Regulation No. 353 (07/06/2016) *Procedure for determining the amount of losses caused to land owners or users, related to significant damage by specially protected non-game or migratory species, and requirements of minimum protection measures for prevention of damage* has come into effect. Article 2 of these Regulations determines that compensation for losses (hereinafter referred to as compensation) are to be paid from funds provided for this purpose of the state budget after it has been established that damage was caused by animals of specially protected non-game or migratory species, the damage is significant and the land owner or user at the site of damage has conducted the protection measures for prevention of damage specified in this Regulation.

On the basis of Paragraph 3 of Article 4 of the Law on the Conservation of Species and Biotopes and Paragraph 39 and 40.1 of Cabinet Regulation No. 281 (24/04/2007) *Regulations on preventive and sanitary measures and procedure for damage assessment to environment and calculation of costs related to preventive, emergency and sanitary measures*, the damage to the environment, caused by killing or wounding a bear, must be refunded by 40–120 minimum monthly wages per each individual, depending on whether the individual was killed or injured outside the specially protected nature area or in the nature reserve, restricted area, national park or in the nature reserve area of biosphere reserve, as well as in the territory of the micro-reserve or special protection forest district.

The procedure for bear registration for keeping in captivity is determined by Regulation No. 1139 *Procedure for the storage, registration, keeping in captivity, marking, trade and*

certificate issuance for international trade of endangered species (Cabinet of Ministers, 06/10/2009).

Application of Latvian legislation in species protection and management

The legal protection of bears in national legislation provides for practically all aspects related to maintaining a favourable species conservation status:

- population status assessment;
- procedures concerning individuals that have been accidentally killed or found dead;
- keeping and breeding conditions in captivity;
- trade, import / export, storage and transportation of individuals and products;
- penalties for unlawful killing;
- liability for damage to agriculture and procedures for determining their extent thereof;
- promotion of education and professional competence.

However, it should be acknowledged that specific guidelines for bears and other carnivore conservation would be useful in legislation. These should clarify and facilitate the adoption of administrative decisions and future legislative initiatives in cases which involve conflict situations, such as preventive measures to reduce the risk of damage, actions towards dangerous individuals and animal involvement in traffic accidents etc.

3.2. The role of specially protected nature areas and micro-reserves in species conservation

A survey of territories with the aim to facilitate bear occurrence has begun within the framework of an initial inventory project (EMERALD) of Specially Protected Nature Areas (SPNAs) within the establishment of the NATURA 2000 territory network in Latvia. Bears are stationary animals that live in a habitual environment. However, current knowledge does not support the claim that there are SPNAs in Latvia where at least one bear lives permanently. However, there are known SPNAs, including the Restricted Areas (RAs) “Vecumu meži”, “Stompaku purvi”, “Ziemeļu purvi”, “Lielais Pelēčāres purvs”, Teiči Nature Reserve (NR), in which bears, or signs of their activities, are regularly observed. The presence of such signs in spring suggests that bears are likely to have hibernated in the nearby vicinity. In these areas, bears occur regularly at least when wandering in search of food. Specific conservation measures, other than prohibitions or restrictions of hunting any game species, are not anticipated in these areas.

The potential significance of SPNAs is related to the protection of areas with less disturbed bear occurrence and, to a lesser extent, of bear foraging sites. Although bear hunting is

prohibited in Latvia, the hunt for other wild game is conducted according to hunting regulations in almost all SPNAs, including driven hunts that can disturb bears. In some SPNAs, hunting with beaters and hunting with disturbance are prohibited throughout their territory. Hunting prohibitions and restrictions usually do not apply to all specially protected areas, but just to one of the functional zones. For example, in Gauja National Park (NP), such hunting may not occur more than twice a calendar month within the same area, except in the case of significant damages caused by game animals. In Ķemeri NP, hunting with beaters or with disturbance is prohibited from the 1st of February to the 15th of October, except for when it is necessary to combat outbreaks of epizootic diseases or prevent threats of their transmission. In both SPNAs, hunting is prohibited within the severe regime zone and areas of restricted hunting. Hunting for birds and specially protected mammals of limited exploitation is prohibited throughout the Teiči NR. Hunting for other mammalian species in the territory of the NR is permissible in accordance with the plan of the hunting district. In the severe regime zone of the Restricted Area (RA) "Jaunanna", the hunting of carnivores with beaters is forbidden from the 1st of March to the 31st of August. In the restricted area of the nature park "Vecumu meži", hunting is prohibited from the 1st of March to the 15th of August. Currently, due to limited bear distribution and habitat usage, hunting prohibition from the 1st of February to the 1st of August in the controlled regime zone of RA "Ovīši" is of lesser significance.

3.3. Previous species conservation actions and measures

In Latvia, the Action Plan for bear conservation was first developed and approved in 2003 by the order of the Minister of the Environment and renewed in 2009. Representatives of responsible institutions and stakeholders, who were invited to attend a joint meeting on the renewal of the *brown bear Action Plan* on the 17th of January 2017, were involved in the evaluation of activities and measures proposed in the previous Action Plan. The evaluation was conducted by 35 persons who were asked to evaluate each of the previous planned activities of the Action Plan in a 10-point scale, taking into account their current utility and accomplishments, and the need to maintain them in the renewed plan. It was also possible to use a negative score (-1) if the evaluator did not support the activity at all. The results were summarised and an average rating was calculated for each activity (Fig. 13). Monitoring of the population status as well as promoting research results and raising awareness received the highest evaluation of the accomplishments and the greatest support for continuation. The unrealized telemetry project with the aim of ascertaining

home range and movement regularities of bears in Latvian, as well as an anonymous survey of hunters on the number of bears and unregistered cases of bear mortality received the lowest rating.

In general, it can be concluded that all activities received a high level of support as their average score exceeds 5 points. Activities that have not been fully implemented so far were also positively rated, which can be explained as the view that these measures should be implemented as soon as sufficient funding and capability for their implementation is available.

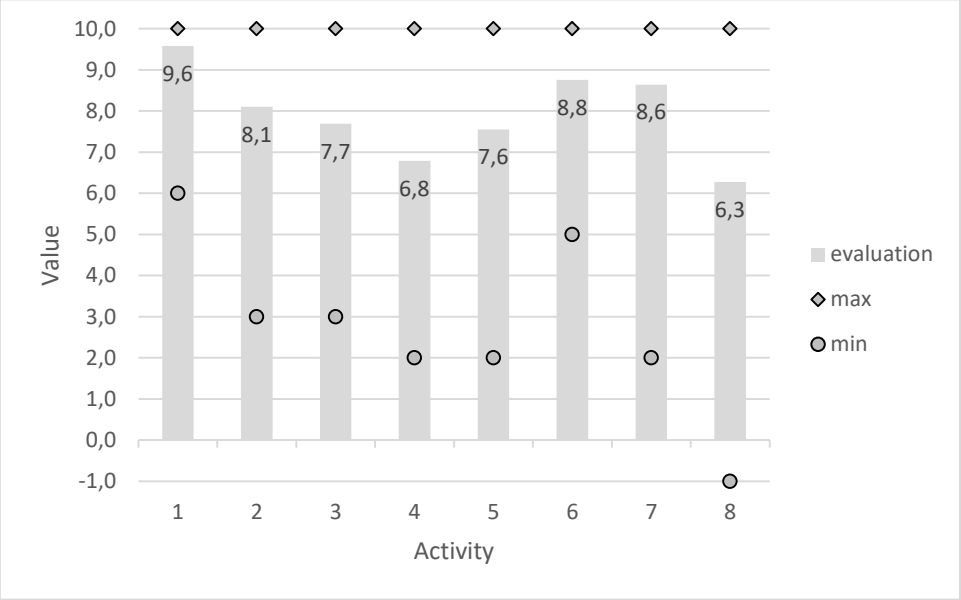

Figure 13. Evaluation of bear conservation activities by the 35 representatives of the responsible institutions and stakeholders. List of activities as numbered in the graph:

1. *Monitoring of population status*
2. *Raising awareness about apiary and livestock protection from bear attacks, based on the experience from other countries*
3. *Education events for schoolchildren regarding brown bears and their conservation in Latvia*
4. *Anonymous survey of hunters on bear number and non-registered cases of bear mortality*
5. *Seminars for specialists and representatives from relevant fields on bear conservation events in the country*
6. *Public education and raising awareness on research results*
7. *Agreement on the procedure of how to solve situations in relation to "problem bears" and bears that are killed or injured illegally*
8. *Telemetry project with the aim of investigating the home range and territorial behaviour of bears*

Theoretically, brown bear expansion in Latvia is facilitated by any conservation measures towards forest and peat bog habitats that are implemented on a sufficiently large scale in eastern Latvia. The most visible projects are as follows: Restoration of the hydrological regime of the Teiči bog (Bergmanis et al. 2002), LIFE project proposal for the North Gauja valley, and development of a management plan for the Gruzdova forests, PIN-Matra project "Integrated

Wetland and Forest Management in the Transborder Area of North Livonia", inventory of forest key habitats etc.

The strategy for species conservation is determined on the international level. The IUCN Bear specialist group and the International Bear Association (IBA) are the main international organisations dealing with bear conservation worldwide (Zedrosser et al. 2001). Additionally, there is the LCIE. This initiative was started in 1995 in Italy. It is supported by the WWF, its partners and individual experts from European countries. The aim of the initiative is to create a wide cooperation network for large carnivore conservation, including governments, international organisations, convention councils, land owners and managers, scientists and the general public. Specifically, LCIE works to achieve co-existence of brown bears, lynx, wolves, wolverines and humans in Europe today and in the future.

In co-operation with the EC, the above-mentioned organisations have developed the "Brown bear action plan for Europe" (Swenson et al. 2001b). This plan also includes measures relevant to Latvia as a result of consultations with the zoologist Valdis Pilāts. These tasks were taken into account when elaborating the national species action plan.

Implementation measures from other Action Plans for species conservation in Latvia, namely the Action Plan for Latvian capercaillie (Hofmanis and Strazds 2004) and black stork conservation (Strazds 2005), can improve hibernation conditions for bears, as both these plans include forestry bans in the relevant lek and breeding micro-sanctuaries. In relation to brown bear conservation, capercaillie conservation may also have a negative impact if some biotechnical habitat management measures at lek sites are conducted during the winter.

4. Assessment of the requirements and capabilities for species conservation

In accordance with the criteria under paragraphs e) – i) of Article 1 of the Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and Article 7 of the National Law on the conservation of species and biotopes, the current conservation status of the brown bear in Latvia cannot be considered as favourable. However, this is not related to insufficient legal protection or the lack of suitable habitats. For almost two hundred years, Latvia has been at the edge of the species distribution range (Pilāts and Ozoliņš 2003). The probability of an increase in the number of bears was foreseen in the 1970s–1980s (Tauriņš 1982). Although the most recent information presented in the previous chapters does not exclude the restoration of bear distribution across the whole country, one should consider that for a very long time Latvia did not have a functional and self-sustaining bear population. At the same time however, the bear

population status is assessed as favourable at the Baltic scale (Linnell et al. 2008). Therefore, the measures discussed in this action plan are required mainly as a preparation for when the distribution range expands naturally. An important obstacle in the process of preserving the bear population and restoring its vitality in the Baltic States would be a continuous fence along the external border of the European Union. At the same time, it would be unnecessary to conduct measures in order to artificially improve bear habitats or attract individuals from neighbouring territories. The Institute of Applied Ecology in Rome, with the involvement of experts from the LCIE, has developed an action plan and submitted a technical report to the European Commission (Boitani et al. 2015), which lists and prioritises the activities required to ensure the conservation of carnivores at the European scale and at the level of populations. The report is based on the latest available information, collegially involving experts from all European countries and regions. In this document, 11 crucial tasks up to 2020 have been set for the conservation of large carnivores, including bears. It is expected that most of these tasks will not lose their relevance in Latvia after this period.

Cross cutting actions – across species and populations:

1. Preventing habitat fragmentation and reducing disturbance associated with infrastructure development.
2. Reducing large carnivore depredation on livestock.
3. Integrating large carnivore management needs into wildlife and forest management structures.
4. Evaluating the social and economic impacts of large carnivores.
5. Improved transboundary coordination of large carnivore management.
6. Standardisation of monitoring methods.
7. Managing free-ranging and feral dogs to reduce hybridisation with wolves and other conflicts related to this problem (the impact also affects bears, especially cubs and young animals).
8. Law enforcement with respect to illegal killing of large carnivores.
9. Genetic reinforcement of small populations of lynx and bears.
10. Institutional capacity-building in wildlife management agencies.
11. Developing best practice for ecotourism based on non-consumptive use of large carnivores.

This report mentions eight specific actions for bear conservation at the population level:

1. Protection of bear habitats and enhancement of connectivity within each population and between populations.
2. Economic use of the intrinsic (inherent) and extrinsic (utilitarian) value of bears.
3. Management of bear populations based on monitoring trends, sizes and total mortality.
4. Implementation of comprehensive protective measures to prevent damage by bears.

5. Preparation and implementation of a management strategy (plan) for each trans-boundary bear population.
6. Reduction of conflicts regarding population sizes by providing genetically determined population size estimates using data collected with public participation.
7. Establishment and training of bear management bodies: A bear management committee and bear emergency team in each country where bears are present.
8. Prevention of bear access to garbage and anthropogenic food.

In addition, specific actions are defined for each of the bear populations, taking into account the status of the particular population and the factors influencing it. For the Baltic bear population, two measures are essential:

1. Establishment and implementation of measures to facilitate the expansion of the population range to the south. This involves identifying transboundary dispersal routes, comparing habitat suitability and community tolerance between Estonia and Latvia, reducing the hunting load along the southern border of Estonia, as well as taking into account the possible return of bears to the territory of Lithuania.

2. Monitoring of bear occurrences outside their permanent range: GIS data base, suitability of possible habitats in expanded range. Execution of this measure is related to making the information system easily accessible for the public to input data and in addition to functioning as a tool for responsible state agencies to manage and analyse the data and disseminate the results.

The support for conservation measures within Latvian society has been evaluated by several surveys. In 2001, with the financial support from WWF-Denmark, a study was carried out in Latvia "Investigation of the public opinion about three large carnivore species in Latvia – brown bear *Ursus arctos*, wolf *Canis lupus* and lynx *Lynx lynx*" (Andersone and Ozoliņš 2004). The results obtained confirmed that more than a half of the Latvian population supports the conservation of these species (Fig. 14). Young people were most supportive towards bear protection (79.6%). In 2005, a repeated public survey opinion with slightly different questions was conducted in 2005 (Jaunbirze 2006). The survey showed that respondents with a higher level of education and young people were more positive towards bear conservation.

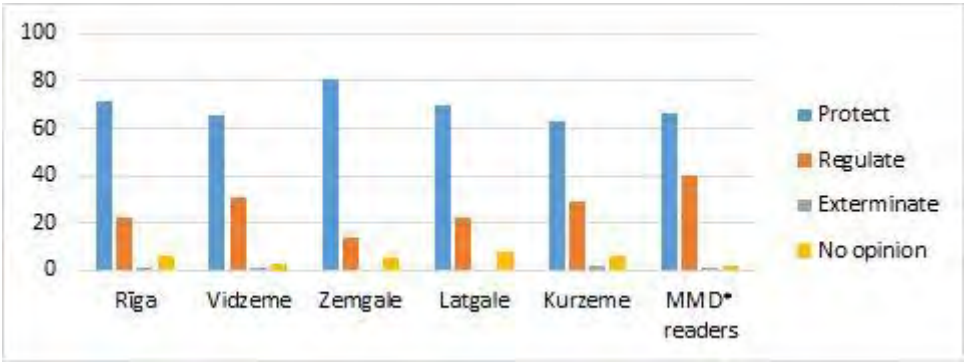

Figure 14. Answers to the question "What to do with bears in Latvia?" in the 2001 survey (Andersone and Ozoliņš 2004). * MMD – magazine "Hunting, Fishing, Nature".

The latest survey (A. Žunna et al., unpubl. data) was conducted within the framework of this Action Plan renewal, distributing 1,000 questionnaires among families of Latvian residents in accordance with repeatedly used methods (Andersone and Ozoliņš 2004). The questionnaire was also electronically distributed among hunters, involving hunting organizations (Latvian Hunters Society, Latvian Hunters Association), and the editorial personnel of the magazine "Hunting, Fishing, Nature" in the selection of recipients. The electronic questionnaire was also sent to 13 farmer organizations and associations. As a result, responses were obtained from 595 respondents that represent the domestic part of society, as well as from 510 hunters and 17 cattle-breeders. Of the respondents that represented families, 60.4% stated that they live in cities. Among the surveyed hunters this proportion was 54.9%.

Due to a low level of responsiveness, the opinion of farmers was represented by a very small number of respondents. However, surveys received from families and hunters indicate that some of these respondents are engaged in livestock farming. Therefore, some specific issues related to livestock protection and wolf conservation were examined by selecting relevant questionnaires from the all the respondents, bringing together 127 responses from farmers, i.e. 67 from the group of hunter organizations, 43 from the families and 17 from the farmer organizations.

In the survey of 2017 (A. Žunna et al., unpublished data), almost 48% of the respondents from the family group were satisfied with the current number of bears, but for members of hunter organizations this proportion was almost 40%. In turn, 1/4 of the family members and hunters (Fig. 15) and even 27% of farmers would like slightly more bears in Latvia. Almost twice as many hunters than family members that do not participate in hunting support the increase in the number of bears – 10.1% and 5.6%, respectively.

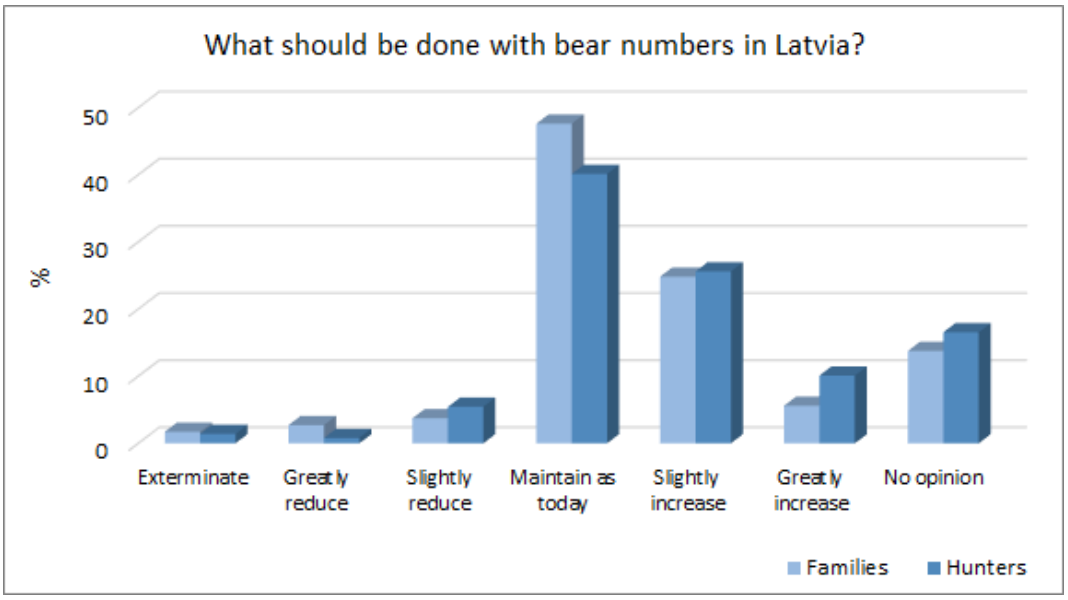

Figure 15. The opinion of the respondents on the desirable number of bears in Latvia in 2017.

The most influential media for informing the public on large carnivores is TV and radio (Fig. 16). Also, articles in newspapers and magazines are of great importance, especially among hunters' circles, and many respondents favoured the internet as a source of information.

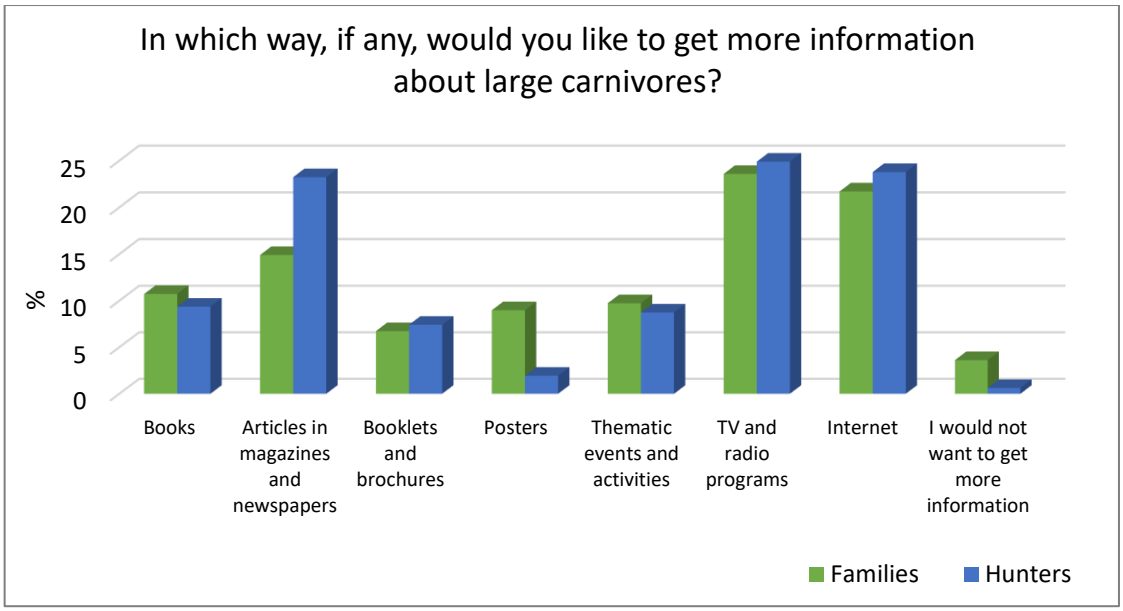

Figure 16. The preferred source of information on large carnivores, expressed by the families and hunter organizations in a survey in 2017.

In general, a very similar proportion of respondents who would like to maintain the current number of bears in 2017 has shown that their attitude towards these animals is neutral (Fig. 17). This suggests that changes in the number of bears might also change society's attitude towards them.

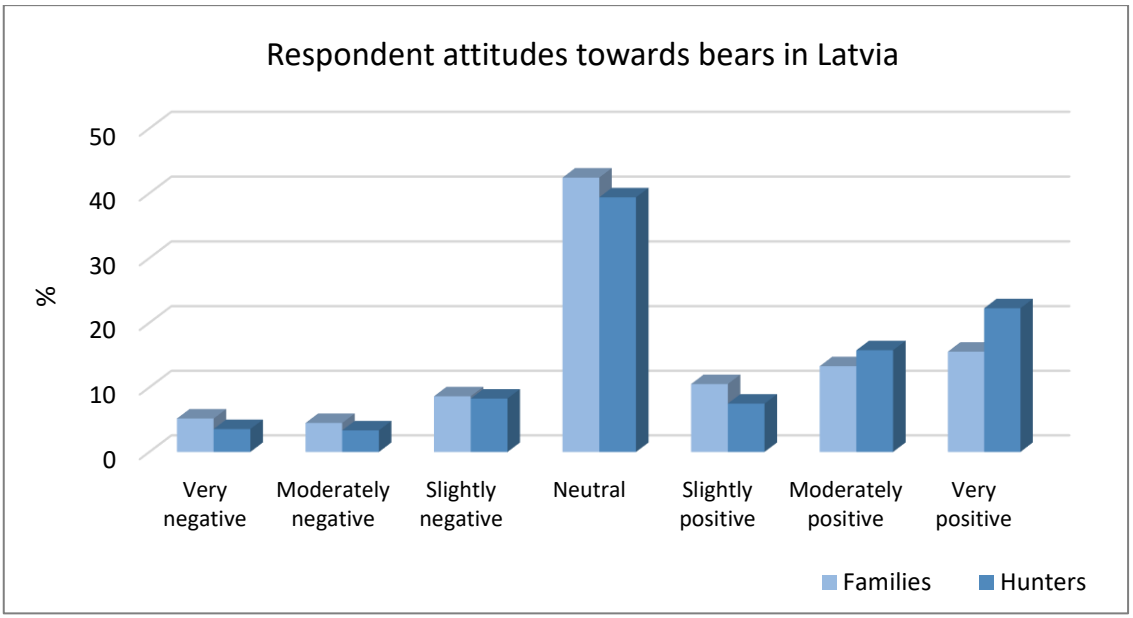

Figure 17. Results of the family and hunter survey on attitudes towards bears in 2017.

A positive attitude towards bears has been shown by a surprising number of respondents involved in agriculture – 43%, which is more than the positive attitude expressed by the family representatives – 39.3%. This is especially surprising considering that 44.9% of these farmers are engaged in apiculture. On the one hand, the amount of damage caused by the bears to the economy is negligible. 92.5% of the respondents claim that they have never suffered damage caused by bears, and 71.4% believe that such damages are rare. On the other hand, there is a risk of loss at the level of individual farms, and 65.1% believe that bear damage would be totally unacceptable for them. At the same time, 73.4% do not use any remedies to prevent or mitigate damage. The common feature is that farmers do not choose to secure themselves against large carnivore damage until they have suffered the loss personally. This opinion could be improved through informative, financial and organizational support, since such a desire is expressed both in response to the questions formulated in the questionnaire as well as by providing additional replies in free text. 52.4% of farmers would also take their responsibility for measures against damages if the state supported them.

It must be concluded that, in general, the system of bear conservation maintains a favourable background in Latvian society, but it depends on the experience gained in practice, which can change, as the number of bears increases, if no supportive measures are conducted to reduce damages caused by bears.

5. The aim and tasks of the species conservation plan

The purpose of the renewed Action Plan is to maintain a favourable status for brown bears in the Baltic population for an unlimited period of time and to achieve it in Latvia without setting a due date or specifying the minimum or maximum numbers of individuals, while ensuring the restoration of their distribution area by natural dispersal and the presence of bears as a united and functional component of the wildlife community in man-made and managed landscapes, respecting and promoting the quality of life, wellbeing and diverse societal interests.

For defining this objective, the previously described situation analysis for the scale of the Latvian and Baltic region was used as well as the concept of coexistence of large carnivores and humans, described extensively in the IUCN manifesto for large carnivore conservation in Europe (2013) (Annex).

To achieve this goal, general long-term tasks that have been initiated in the previous Action Plan should be undertaken or are to be initiated and continued throughout the future conservation process (I), as well as short-term tasks must be carried out in the nearest future, which, once implemented, will ensure long-term conservation measures (II).

I. Long-term tasks that constitute the system of species conservation and management.

- Informing politicians, legislators, representatives of the research sector and leading economic sectors about the most important requirements of environmental resources for bears, emphasising the importance of wintering conditions for facilitating permanent bear habitation.
- When planning infrastructure for economic and recreational purposes in the landscape, there is a need to establish movement corridors for large carnivores and other wild mammals that would maintain dispersal and prevent severe fragmentation of the area, which would support formation and consolidation of the range by natural dispersal.
- Promotion of a positive public attitude towards the presence of bears at the landscape level and within a context of wildlife diversity, including outside of the SPNAs; to reduce the attitude towards this species as an unwanted competitor or an unacceptable obstacle to economic activity; the possibility of sighting bears in the wild and evidence of their presence should be positively perceived and information on the bear population status should be more widely available.
- Conflicts involving attacks of large carnivores on livestock, apiary damages and public safety are to be reduced by providing advisory and financial support, as well as by a convenient system and procedures for reporting, investigating and recording cases of damage. At the same

time, objective information on bears and related events in mass media is to be disseminated without promoting myths and exaggeration.

- Management of other wildlife species and forests is conducted in a way that bear functional activities in the ecosystem (foraging, selection of winter dens and dispersal possibilities) are kept as close to natural as possible.
- Bear conservation requirements are to be considered whenever further changes and additions to the legislation regarding hunting, forestry and environmental conservation are introduced.
- Population status is assessed by applying a monitoring system based on unified methods for collection of mutually comparable data, as well as by implementing and maintaining a common database that is accessible to all interested users in the three Baltic States within the limits of information security requirements. The monitoring system should provide data obtained by non-invasive methods on species distribution, sex, litter size and kinship structure, estimated population dynamics and proportion of reproductive females.
- A convenient damage registration, support and advisory system is to be established and maintained for apiary owners who have suffered losses from damages caused by bears. Advisory and financial support is to be focussed on reducing the risk of damage rather than compensating for losses.
- Consumptive and non-consumptive exploitation of the species should be organized according to the population status, taking into account the environmental, economic and social needs of local inhabitants (at the county scale).
- Scientific research on bears is to be enhanced, with particular emphasis on diet, breeding, site selection for winter dens and genetic diversity status of the population.
- Public education and raising awareness on bear conservation issues is to be continued. The target audience consists of professionals from state administration authorities, environmental NGOs, education and tourism sectors, as well as hunters and farmers.
- Changes in public attitude are to be monitored, e.g. by surveys on tolerance to large carnivores after the implementation of the planned measures and before the next renewal of the Action Plan.

II. Short-term tasks that serve to support the conservation and management system of the species.

- To develop recommendatory guidelines for administrative decision makers that facilitate site inspection of damages caused by bears.

- To evaluate procedures for applying for inspection of damage sites and compensation for losses, paying particular attention to reducing the administrative burden and costs for the institutions involved in the inspection, deciding on appropriate preventive measures to avoid damages to apiculture and proportionality of the compensation amounts. As a result of the evaluation, if necessary, proposals for amendments in Regulations No. 353 *Procedure for determining amount of losses for land owners or users related to significant damages caused by specially protected non-game and migratory animal species, and minimum requirements for preventive measures to avoid damages* (Cabinet of Ministers, 07/06/2016) are to be prepared.
- Information regarding damage risk mitigation is to be provided to beekeepers and livestock farmers.
- To participate in the establishment of a working group and the associated rules of procedure for the management of Baltic large carnivores in order to maintain a regular exchange of information and decide on actions for bear conservation at the population level.
- To improve and upgrade the cooperation framework among institutions that supervise the fulfilment of CITES requirements and conduct scientific research. As bear hunting is permitted in neighbouring countries – Russia and Estonia – a strict surveillance on the legality of importing hunting trophies and products from these countries must be conducted.

6. Recommendations for species conservation

All recommended actions are evaluated by a three-step scale of importance/priorities, where: I – indicates crucial actions: their non-fulfilment could lead to species extinction from current range and habitats or jeopardize international obligations;

II – indicates important actions: their fulfilment helps to achieve conservation goals within the current reference period of the Action Plan, however omitting these does not endanger species survival within current range or habitats;

III – indicates significant actions that are recommended, yet do not crucially impact population survival at national level.

6.1. Changes in legislation

Priority II

In order to clarify the impact of hunting with beaters on the hibernation and breeding possibilities of bears in Latvia, technical improvements in documentation of hunting activities and circulation of information among hunters should be made, which would allow easily analysable

information on hunting pressure in specific hunting grounds (number of hunters, type of hunting and hunting duration during the season) to be obtained. Exchange of information between authorities managing hunting activities and hunters (submission of "Hunting report" to SFS according to Annex 1 of the Hunting Regulations) is to be provided electronically, replacing paper forms with data transmission by mobile networks

6.2. Establishment of specially protected nature areas and/or micro-reserves

Not required.

6.3. Measures for population renewal

Not required.

6.4. Measures for species habitat management

Priority III

It is essential to take into account the opportunity for movement of bears and other large mammal species when planning and building linear infrastructures in the landscape – not creating fences without interruption for more than 5 kilometres, building green bridges or tunnels where animals can cross motorways, etc. (Hlaváč and Anděl 2002, Jędrzejewski et al. 2004). Particular attention should be paid to the progress of the *Rail Baltica* project and impact assessments.

Priority I

Retaining corridors for bear dispersal is to be monitored on the Latvian-Russian and Latvian-Belarusian border, where fencing has already begun. Exchange of individuals between these countries plays a crucial role in achieving a favourable conservation status of bear population.

6.5. Research and data collection

6.5.1. *(Priority I)* Bear monitoring is to be continued. Information necessary for species conservation should be obtained according to methodology included in the Biodiversity Monitoring Program as background monitoring within the framework of game mammal monitoring. Current methods need to be complemented so that the obtained information could be used for the local requirements and at the transboundary level. Users of hunting rights, the SFS, scientific institutions and volunteers are to be involved in the data collection. The results of the monitoring should include reports on observed tracks with precise location and date. In addition, collection and analysis of data from automatic camera traps and eye-witness photographs and

DNA samples from fur/hair and faeces found in nature or acquired by non-invasive methods is to be used. In agreement with the research authority responsible for bear monitoring, entire carcasses of bears killed in the wild or found dead, are to be collected for precise age determination, parasitological examination and diet studies. Updating of monitoring methods and procedures for compiling the results and publishing them in accordance with the National Monitoring Program is determined by the NCA.

6.5.2. *(Priority II)* Ecological research of the species should be initiated. Obtained data collection should be compared with existing data from studies in Estonia, Scandinavia and the European part of Russia, with particular attention being paid to the relationship between utilised and available habitats, diet studies, interaction with other carnivores (wolves, lynx) and indicators of population vitality (genetics, breeding, parasitology).

6.5.3. *(Priority II)* Data collected during inspections of bear caused damages are to be standardised and analysed in order to gather information on species distribution, seasonal feeding cycle, age and kinship structure of the population.

6.5.4. *(Priority III)* Survey of societal needs and attitudes. This should be conducted on two levels: involving a comprehensive situation survey at the end of the planned period and prior to the renewal of the next Action Plan, the results of which are at least partially comparable to the results of the 3 previous surveys, and the assessment of particular conservation measures and performance of their implementation (e.g., evaluation of the system for informing beekeepers of damage mitigation methods and evaluation of the support system for conservation measures). The questionnaires should be as user-friendly as possible and should be conducted with the most appropriate technical means for the target audience.

6.6. Information and education, improvement of professional qualifications

6.6.1. *(Priority II)* A joint training exercise for predator species identification in cases of damage to apiaries and livestock should be organized among the responsible specialists (NCA, SFS, Rural Support Service, Food and Veterinary Service), including both identification of traces in the field and hair sampling for DNA analysis.

6.6.2. *(Priority II)* In cooperation between the Latvian Apiculture Association and specialists of bear research and monitoring, a practical tool for information analysis is to be developed to predict the damage risk while launching or expanding apiculture as economic activity. In areas of high risk, informative support is to be provided on damage mitigation measures.

6.6.3. (Priority *II)* Involvement of the public in bear monitoring is to be expanded, including data collection on incidental observations and acquisition and implementation of non-invasive monitoring methods.

6.6.4. *(Priority I)* Species identification skills from bear body parts (for monitoring of CITES requirements) and traces in the wild (for population monitoring, nature tourism guides) should be improved and propagated among the staff of institutions involved and other associated organizations.

6.6.5. *(Priority III)* The public is to be regularly informed about species status, management strategies and scientific research. The most influential forms of information dissemination should be chosen, that are appropriate to the target audience and follow trends in information technologies.

6.6.6. *(Priority III)* The training of volunteers in the use of non-invasive monitoring methods should be organized.

6.6.7. *(Priority II)* Public relations and conflict resolution training workshops are to be organised for interest groups involved in bear conservation and management actions (hunters, beekeepers, farmers, representatives from government and non-governmental institutions etc.).

6.6.8. *(Priority III)* Voluntary participation campaigns are to be organised to improve the safety of local inhabitants and their attitude towards bears, creating direct communication opportunities among species specialists and stakeholders. Forest visitors (including hunters, berry and mushroom pickers, professionals employed in forestry, forest owners, nature tourists etc.) are to be invited to the event "I have seen a bear", organized by a species and environmental education specialist, during which experience of both animal and human (eyewitness) behaviour would be exchanged. The obtained information is to be gathered and used for informing the public and promoting a positive attitude.

6.7. Organizational, planning and other activities

6.7.1. *(Priority II)* A quick response team of specialists is to be established and rules of procedure are to be developed for practical action of repellence, displacement or elimination of bears, in cases where human security is threatened. It is recommended that the team would include a representative of the State Fire and Rescue Service, a certified veterinarian, a specialist in animal behaviour and a hunting specialist with appropriate licence to use a weapon (each one must also have at least one substitute), who can perform other duties on a daily basis and, if necessary, the team should be able to respond within 2 hours of a request for action. Team training is to be organised in one of the countries that has accumulated relevant experience (e.g. Finland, Sweden,

Croatia). Risk-prevention measures are conducted in accordance with generally recognized ethical values that are relevant to the public.

6.7.2. (*Priority II)* Engaging in the establishment of an international working group and work on the protection and management of bears at the Baltic population level. Group establishment is undertaken by representatives of the Baltic States at the IUCN LCIE.

6.7.3. *(Priority II)* Labelling of bear game trophies imported from abroad (including those previously legally acquired) according to CITES certificates issued by the NCA. With the help of a unique marking (skull mark or electronically readable code on the skin), bear game trophies are to be linked with their corresponding CITES certificate numbers and registration data base. The possibility of legalizing previous legally acquired trophies is to be organised in accordance with CITES requirements.

6.7.4. *(Priority III)* Developing and supporting non-consumptive initiatives for the use of the species. The Department of Tourism of the Investment and Development Agency of Latvia, in co-operation with the competent authorities, specialists and competent tourism associations, creates opportunities for observing large carnivores and their habitats in Latvia without causing unacceptable impact on the species.

6.7.5. *(Priority II)* An exhibit is to be created for correct and effective apiary protection against bear damages. Financial support indirectly aimed at introducing preventive measures may be requested from Latvian Rural Development Program 2014–2020, in the framework of the program "Investments in tangible assets", when it is possible to obtain financial support for installation of agricultural fences or lighting fixtures as a component of various building works, etc., as well as by submitting a project to the Latvian Environmental Protection Fund and EU funded programs.

6.7.6. *(Priority I)* Renewal of the Action Plan. Upon expiration of the planned term of Action Plan activities, performance of the tasks and achievements of the conservation aims are to be assessed. The current requirements of the species conservation are to be considered at the time of the plan renewal.

7. Review of planned actions and events

The actions are arranged in the sequence used in Chapter 6, indicating the order number of the event, the scheduled time for execution and the assessment of the required resources.

Action/event	**Priority**	**Due term (necessary time)**	**Estimated cost (EUR)**
6.1. Submission of hunting report to SFS, replacing paper forms with data transmission on mobile networks	II	18 months for converting to the electronic system	Within the budget of the responsible authorities, 10,000 for pilot project for voluntary system verification in cooperation with users of hunting rights
6.4. Evaluation of the progress and impact of the *Rail Baltica* project on the bear population status and monitoring of retaining corridors for bear dispersal in relation to the fence along the eastern border.	III I	Continual	Within the expenses for species monitoring, additional analyses of the obtained data - 1000 per year
6.5.1. Monitoring of the population status: • complementing the methodology with genetic research (DNA analysis) and data analysis of the influence of driven hunts; • within the framework of current background monitoring of bears • complementing the methodology with a network of automatic camera traps and annual collection of information	 I I I	 Continual Continual Continual	 5000 per year 10 000 per year 4000 per year and involving volunteers
6.5.2. Research on species ecology	II	Continual	10 000 per year
6.5.3. Analysis of data collected during inspections of damages caused by bears	II	1 month per year	1000 per year
6.5.4. Survey of the societal needs and attitudes on bear conservation issues	III	2 years	30 000 - within the framework of funding available for the study of all three large carnivore species
6.6.1. Joint training for the identification of carnivore species among the responsible specialists in cases of damage, including both field identification capabilities for traces in nature and sampling for DNA analyses.	II	2 years for improving the system and continual thereafter	3000 for workshops and training, maintenance of the procedure within the budget of responsible authorities
6.6.2. Development of tools for information analysis in order to predict damage risk while initiating or expanding economic activity in apiculture	II	1 year	5000
6.6.3. Societal involvement in bear monitoring, including data collection on incidental observations and acquisition and implementation of monitoring methods.	II	Continual	Within the framework of funding available for the study of all three large carnivore species
6.6.4. Acquiring species identification skills of bear body parts (for monitoring of CITES requirements) among the staff of the	I	2 years for launching and continual thereafter	5000 for development of the procedure and thereafter within the budget of responsible authorities and funding from

responsible and involved institutions.			projects available for the conservation measures of all three large carnivore species
6.6.5. Informing society on the species status, the course of management and scientific research.	III	Continual	1000 per year
6.6.6. Training of volunteers in the use of monitoring methods.	III	1 year and continual thereafter	5000 for initial co-ordination measures and 1000 thereafter for funding annual feedback events
6.6.7. Workshop for public relations and conflict resolution (human dimension) training for interest groups involved in conducting bear conservation and management actions (hunters, beekeepers, farmers, representatives from government and non-governmental institutions etc.)	II	1 event within the planning period for the Action Plan	2000 (funding from projects available for the conservation measures of all three large carnivore species)
6.6.8. Organisation of the event „Esmu redzējis lāci" [I have seen a bear]	III	2 weeks, depending on response of the participants, to be repeated once a year	3000 per year
6.7.1. Establishment of a quick response team	II	1 month for training	8000 for training, 5000 for maintenance per year
6.7.2. Engaging in the establishment and work of an international working group on bear conservation at the Baltic population level.	II	2 days per year	2000 per year
6.7.3. Labelling of bear game trophies imported into Latvia (including previously legally acquired) according to CITES certificates issued by the NCA.	II	2 years for introducing the system and continual thereafter	Within the framework of funding from projects available for the conservation measures of all three large carnivore species
6.7.4. Support for non-consumptive exploitation initiatives of the species	III	1 year	Within the framework of funding available for the conservation measures of all three large carnivore species
6.7.5. Creation of an exhibit for correct and effective apiary protection against bear damages	II	1,5 years	5000 for creation, 500 for maintenance per year
6.7.6. Renewal of the Action Plan.	I	1 year	15 000

8. Assessment of the effectiveness of population restoration of the species, habitat management and implementation of other measures

The planned activities are related to the fulfilment of requirements demanded by national and international legislation. The establishment of a working group on Baltic large carnivore management, promotion of protection measures against damages caused by large carnivores, as well as standardization of the monitoring methods and involving the public in data collection and reporting of the results will form the basis for maintenance of a favourable species conservation status at the Latvian scale and within the Baltic population. Implementation of the Action Plan will help to realise the measures foreseen in the EU "Platform on Coexistence Between People and

Large Carnivores" developed by representatives of European Union Member States and signed on the 10th of June 2014 in Brussels, which aims to support the ways and means of minimising and, as far as possible, resolving conflicts between people's interests and the presence of large carnivores through the exchange of knowledge and cooperation in an open and constructive form and with reciprocal dignity. The agreement was signed by the Commissioner for Environment of the European Commission and leading representatives of nature conservation, farmer and land owner and hunting organizations. The success of the Action Plan implementation will be confirmed by the fact that bear conservation will not have a negativeimpact on the economy and the government will not be required to provide additional funding for the continuation of species conservation measures, as the majority of them are part of the functions already provided for in legislation and in the main duties of the responsible institutions.

9. Implementation of species conservation plan

The main activities are arranged in the sequence used in Chapter 6, indicating the year of launch, the institutions involved (the responsible institution underlined), interest groups and type of cooperation.

Action/event	**Start of execution***	**Involved institutions**	**Form of cooperation**
Change of procedure for submission of hunting reports at the SFS, replacing paper forms with data transmission on mobile networks	2018	State Forest Service, Ministry of Agriculture, provider of IT services selected by tender, users of hunting rights	Pilot project for voluntary system verification, complete implementation within 3 years
Evaluation of the progress and impact of the *Rail Baltica* project on the bear population status and monitoring of retaining corridors for bear dispersal in relation to the fence along the eastern border.	Not predictable	Nature Conservation Agency, State Forest Service, Ministry of Traffic, scientific institution responsible for monitoring, users of hunting rights	In the framework of the functions by the supervisory authority and contractual work
Monitoring of population status	To be continued	Nature Conservation Agency, scientific institution responsible for monitoring, administrators of the website http://www.dabasdati.lv, volunteers, users of hunting rights	In the framework of the functions by the supervisory authority and contractual work
Research on species ecology	2019	Scientific institution responsible for monitoring, university students and PhD students	Within contractual works as well as MSc and PhD theses
Analysis of data collected during inspections of damages caused by bears	2018	Nature Conservation Agency, scientific institution responsible for monitoring, users of hunting rights	Functions of the supervisory authority, exchange of information within the framework of the contractual work
Survey of the needs and attitudes of society on bear conservation issues	2021-2022	Scientific institution responsible for monitoring, university students and PhD students	Within contractual works as well as MSc and PhD theses
Training of responsible specialists for species identification in cases of damage caused by large carnivores	2018-2020	Nature Conservation Agency, State Forest Service, Rural Support Service, Food and Veterinary Service, LSFRI "Silava"	Functions of the supervisory authority, interinstitutional collaboration
Development of tools for information analysis to predict the risk of damage	2019-2020	Nature Conservation Agency, scientific institution responsible for monitoring, Latvian Apicultural Society	Projects within framework of Latvian (including Latvian Environmental Protection Fund, Rural Support Service) or international fund programs (including LIFE, ERDF)
Societal involvement in bear monitoring	2019	Nature Conservation Agency, scientific institution responsible for monitoring, administrators of the website www.dabasdati.lv, voluntary informers, users of hunting rights	Projects within framework of Latvian (including Latvian Environmental Protection Fund, Rural Support Service) or international fund programs (including LIFE, ERDF)
Developing species identification skills of bear	2019	Nature Conservation Agency, State Forest Service, State Border Guard,	Inter-institutional collaboration within the

body parts (for monitoring of CITES requirements) among the staff of the responsible and involved institutions		Customs Administration of State Revenue Service, LSFRI "Silava"	framework of functions by supervisory authorities
Informing society on the species status, the course of management and scientific research.	2018	Nature Conservation Agency, LSFRI "Silava", all the involved institutions and organizations	Within the framework of functions by the supervisory institution, science promotion activities, regular information on websites, information to the press services
Training for volunteer information providers	2018	Nature Conservation Agency, State Forest Service, scientific institution responsible for monitoring, public organizations representing users of hunting rights	Projects within framework of Latvian (including Latvian Environmental Protection Fund, Rural Support Service) or international fund programs (including LIFE, ERDF)
Workshop for public relations and conflict resolution (human dimensions) skills	2019	LSFRI "Silava", all the involved institutions and stakeholders	Projects within framework of Latvian (including Latvian Environmental Protection Fund, Rural Support Service) or international fund programs (including LIFE, ERDF)
Event „Esmu redzējis lāci" [I have seen a bear]	2019	Regional departments of the Nature Conservation Agency, LSFRI "Silava", wide public	Forum for eyewitnesses of bear encounters, documentation, analysis and dissemination of information
Establishment of a rapid response team	2019-2020	Nature Conservation Agency, State Fire and Rescue Service, Latvian Veterinarian Society, public organizations representing users of hunting rights	Interinstitutional collaboration, Projects within framework of Latvian (including Latvian Environmental Protection Fund, Rural Support Service) or international fund programs (including LIFE, ERDF)
Engaging in the establishment and work of an international workgroup on the protection and management of bears at the Baltic population level	2019	Nature Protection Agency, Ministry of Environment and Regional Development, organisations representing farmer concerns, LSFRI "Silava"	Seminar for representatives, Projects within framework of Latvian (including Latvian Environmental Protection Fund, Rural Support Service) or international fund programs (including LIFE, ERDF)
Marking of bear game trophies imported into Latvia	2018	Nature Conservation Agency, State Forest Service, public organizations representing users of hunting rights	Within the framework of the functions by supervisory authorities and projects within framework of Latvian

			(including LVAFA, LAD) or international fund programs (including LIFE, ERDF)
Support for non-consumptive exploitation initiatives of the species	2019	Department of Tourism of the Investment and Development Agency of Latvia	Consultations, information exchange
Creation of an exhibit for correct and effective apiary protection against bear damages	2019-2020	Latvian Apiculture Society, Nature Conservation Agency, organisations representing farmer concerns, municipalities, LSFRI "Silava"	Projects within framework of Latvian (including LVAFA, LAD) or international fund programs (including LIFE, ERDF)

* On the initiative of the responsible institution and in agreement with the cooperation partners, the implementation of the measure can be initiated more quickly if possible and necessary.

10. Deadlines for the implementation and review/evaluation of the species conservation plan

The Action Plan is developed for implementation of bear conservation and management measures for the next five years (2018–2022). It is advisable to start the assessment of the implementation of the current Action Plan in 2021 to prepare tasks and plan the necessary funding for the renewal of the Action Plan. These deadlines were chosen due to the fact that the results of the bear monitoring in Latvia indicate a possibly faster increase in bear distribution and number of individuals, compared to the previous period and other large carnivore species; and secondly that the planned management period of large carnivores in Estonia will end in 2021. This takes into consideration the fact that the bear population status, as well as conservation and management measures in Estonia, can also have a significant impact on the bear population status in Latvia.

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Appendices

John Linnell Review of Latvian “Action Plan for Brown Bear *Ursus arctos* Conservation 2018 to 2022”