European Commission

From conflict to coexistence? Insights from multi-disciplinary research into the relationships between people, large carnivores and institutions.

February 2013

This document has been prepared by the Istituto di Ecologia Applicata with the assistance of the Norwegian Institute for Nature Research and with the contributions of the IUCN/SSC Large Carnivore Initiative for Europe (chair: Luigi Boitani) under contract N°070307/2012/629085/SER/B3 from the European Commission.

From conflict to coexistence: insights from multi-disciplinary research into the relationships between people, large carnivores and institutions.

John D. C. Linnell
Norwegian Institute for Nature Research (NINA), PO Box 5685 Sluppen, NO-7485 Trondheim, NORWAY. Contact: john.linnell@nina.no

Front cover photo composition by Alessandro Montemaggiori

Table of contents

1 Introduction

1.1 The return of the predators.

Biodiversity conservation is always a complex procedure in our modern and crowded world. The existence of a range of international conventions and directives (e.g. Convention on Biological Diversity, Bern Convention, Birds and Habitats Directives, Bonn Convention, CITES) testify to the emergence of a widespread global commitment to conserve biodiversity. Although the overall picture may often be pessimistic, there are some species groups which are doing relatively well in some regions. It often comes as a surprise to people that the large carnivores (brown bear *Ursus arctos*, Eurasian lynx *Lynx lynx*, wolf *Canis lupus* and wolverine *Gulo gulo*), often mistakenly regarded as animals needing wilderness, are among the species that are generally holding their own, and even expanding, across large parts of their former distributions in Europe (Kaczensky et al. 2013). However, this apparent conservation success story has come at a price, as reflected in the wide diversity of conflicts that are emerging surrounding them. This report aims to provide some guidance into understanding these conflicts and exploring some potential avenues for preventing, reducing and managing these conflicts.

1.2 The contract

This report is one of the outputs of contract number 070307/2012/629085/SER/B3 between the Istituto di Ecologia Applicata and the European Commission's DG Environment. As quoted from the call for tenders from 2012: "*The overall objective is to identify practical approaches to help ensure the maintenance or achievement of the favourable conservation status of European large carnivores and to securing their coexistence with humans by reducing conflicts. The large carnivore species for this contract will be the brown bear, the wolf and the Eurasian lynx. The contractor's task will be to support the European Commission in developing elements of an EU Large Carnivore Initiative for the conservation and sustainable management of these species which were not the focus of the earlier Commission guidance document. These elements could in particular help in defining the way forward towards better cooperation of key stakeholders. The recognized successes and the lessons learnt from earlier initiatives should be fully utilized, as well as the experience of other ongoing process (Bern Convention, LCIE) will have to be drawn upon. The novel elements of the current exercise compared to the earlier work will be to explore conservation conflict-resolution mechanisms applicable to human-large carnivore conflicts and to identify 4-6 areas, involving different target species, where the mechanisms may be tried and tested by stakeholders directly involved. This work should take account of, and build on the results of previous work on conflict management and nature protection commissioned by DG Environment*." Because of the fact that wolverines share habitats with lynx and bears and have many overlapping issues we have chosen to also include a focus on them.

The specific objectives of this report is to fulfill Task 4 "*To scope the relevance of conflict resolution/minimization methodologies developed by social scientists and good practices that could be applied to situations of human-large carnivore conflicts, including results of earlier work commissioned by DG ENV*".

The contract also stipulated that the study be built on exploring options within the constraints imposed by existing legal and policy frameworks. Therefore, the underlying premise is the goals for large carnivore conservation as stated in the Habitats Directive and the Bern Convention.

2 Methods and basic rational

This review is based around three major sources of information. Firstly, databases such as the Web of Science have been used to survey the peer-reviewed scientific literature dealing with issues such as large carnivore conflicts, conflict resolution within environmental fields, especially those related to biodiversity conflicts, protected area conflicts, forestry conflicts, and participatory processes where there is a great deal of relevant experience. Secondly, a wide selection of the "grey" literature including technical reports has been included by searching Google and Google Scholar and through snowball sampling (Newing et al. 2011). Finally, recognizing that there is far more experience in practical management that is not published, experience-based knowledge from researchers, managers, stakeholders and practitioners who have worked with large carnivore and related conflict issues in the field has been included. A special effort has been made to include the results from EU funded projects. These include the following projects; HUNT, BIOFORUM, FRAP, GoverNat, EVE, and GoFOR as well as the project "Conflict Management in the Natura 2000 Network" (Bouwman et al. 2010). In addition, the many LIFE projects conducted on large carnivores have contributed to the body of experience (Salvatori 2013). Our study covers most of Europe, both inside and outside the EU.

Our underlying model for exploring methods for preventing, managing or resolving conflicts associated with large carnivores is that the methods must be chosen within specific contexts. There are three elements that are crucial to consider. Firstly, is the conservation context of the various large carnivore populations (Kaczensky et al. 2013). Clearly the size, conservation status and range of threats facing a given population will be central in both setting the background and selecting appropriate methods. From a conservation point of view it is desirable to focus on issues that address the key threats. The size and status of the population will also impose limits on acceptable responses. Secondly, is the exact nature of the conflicts. Conflicts are highly diverse and vary enormously across Europe. It is therefore crucial to target measures to specific conflicts. Thirdly, is the human environment. There are a wide range of stakeholders that can potentially be important actors in large carnivore conflict and conservation issues. There is therefore a need to select the most relevant stakeholders for a given context. Based on this rational the following sections shall briefly summarize what we know about;

(1) The status and threats to large carnivore populations in Europe as of 2012.

(2) The present day knowledge of our understanding of large carnivore – human conflicts.

(3) A brief stakeholder analysis of who is who among the relevant actors in large carnivore conservation and conflict.

(4) Building on this understanding of the situation the report goes on to outline a range of possible mechanisms and instruments that may be useful for engaging with stakeholders and helping to prevent, manage and / or resolve conflicts.

3 Status and threats to large carnivore populations in Europe

Large carnivores are currently found across a significant proportion of the European continent. For wolf, lynx and bear we currently recognize ten functional population units for each species, while wolverines are limited to two populations. Large carnivores occur in a great diversity of conservation contexts in Europe, from the coasts of the Mediterranean in the south to the Barents's Sea in the north, in lowlands and mountains, in farmlands, forests and tundra. There are several very large and robust populations that number in the thousands of animals, and some very small and highly vulnerable populations that only have some tens of animals. Accordingly, IUCN threat assessments for individual populations vary from "Least Concern" to "Critically Endangered". Bears illustrate this diversity well with four populations numbering from 1700 to 7000 individuals, three populations numbering from 200 to 700 individuals, and three with less than 100 individuals. A similar diversity of situation exists for lynx and wolf populations (Kaczensky et al. 2013).

The quality of monitoring systems varies dramatically across Europe. Some countries have state of the art systems, however in several regions and countries the monitoring systems that are in place are inadequate to draw firm conclusions about the size and trend of populations. Based on the data available it appears that most large carnivore populations in Europe are stable or increasing. There are some exceptions, however. The Sierra Morena wolf population in southern Spain is on the edge of disappearing, bears in the population segment in central Austria appear to have become extinct, and wolves in Finland have undergone a dramatic decline, although this seems to have stablised. The situation for many of the reintroduced lynx populations in central Europe (Vosges, Jura, Alps, Dinaric Mountains) also appears to have stagnated. Finally there are some small populations, such as Balkan lynx, Apennine bears, Pyrenean bears that are still very small and isolated. Because many populations cross multiple inter- and intra-national jurisdictional borders there can be a high degree of variability in data quality from different parts of a population's distribution (e.g. for brown bears in the Dinaric-Pindos mountain range that span 9 countries, only two of which are currently in the EU).

Across this diversity of situations there is a similar diversity in the extent to which the populations are believed to be threatened by different factors (Kaczensky et al. 2013). We can broadly group these into several threat categories.

3.1 Infrastructure

This includes issues related to landuse planning of technical infrastructure associated with transport (e.g. road and rail), energy production (e.g. wind and hydro), energy distribution (e.g. power lines), and recreation (e.g. ski-slopes). Infrastructure threatens large carnivore populations primarily through its barrier effect by fragmenting previously continuous habitats and by increasing the risk of individuals being killed in collisions (Kaczensky et al. 1996, 2003; Jędrzejewski et al. 2004;, Niedziałkowska et al. 2006; Huck et al. 2010). Other effects include the direct loss of habitat and an increase in human access and thereby disturbance. Infrastructure influences both the large and the small populations and is an especially important issue in southern and eastern Europe where new development is ongoing at a rapid rate (Jędrzejewski et al. 2009, Huck et al. 2011). Large carnivore populations in Europe have very large scale spatial dynamics, with wolves for example frequently moving over hundreds of kilometers across multiple countries (Linnell et al. 2005; Valière et al. 2003;

Wabakken et al. 2007). Therefore the impacts of infrastructure can be potentially felt over huge areas as infrastructure may limit the dispersal of individuals and so its rescue effect on small and isolated population segments.

3.2 Disturbance

Although all four large carnivore species are generally very tolerant of predictable human activities the disturbance resulting from the presence of humans in carnivore habitats can have negative impacts on carnivores by displacing them from preferred feeding or denning sites (Kaartinen et al. 2011; Naves et al. 2001, Theuerkauf et al. 2001). Bears seem to be most sensitive, and are especially vulnerable in winter denning areas (Linnell et al. 2000). This is certainly one area where more research is needed, especially as populations are being exposed to a variety of new forms of disturbance (e.g. from new forms of recreation like ski slopes and off road vehicles and from new infrastructure projects like roads, railways and wind farms) about which there is little experience.

3.3 Small population issues

Small populations are especially vulnerable to a range of issues that would not normally pose a substantial threat to large populations. In small populations any mortality, whether deliberate (e.g. poaching, poisoning or problem animal removal) or accidental (e.g. vehicle collisions, being caught accidentally in snare or trap set for other species), can have disproportionally high effects on population viability. Small populations are also highly vulnerable to chance (stochastic) events (e.g. a local disease outbreaks, extreme weather events). The other issue that effects small populations is inbreeding. High levels of inbreeding and reduced genetic variability have been documented in many of the small populations and have been identified as a critical issue for several of them (Liberg et al. 2005; Liberg 2006).

3.4 Lack of tolerance

Large carnivores can be very controversial with certain elements of the rural communities with whom they share the landscape. Although this varies widely across Europe, in many areas there is a low tolerance for the presence of these species. The causes of this low tolerance are highly diverse and very situation dependent (see section below on conflicts). Often it is the cumulative effect of many minor issues that combine. The impact of this low tolerance can also vary from heated political debate, to lobbying to undermine conservation goals, to illegal killing of carnivores (Forsberg & Korsell 2005; Reljic et al. 2012). A lack of tolerance has been identified as representing a threat for both large and small populations. Illegal killing is a chronic problem across Europe, and in some cases has been shown to significantly slow population recovery (Liberg et al. 2012) and may in some cases have partially reversed previous gains (Kaczensky et al. 2011; Jansson et al. 2012). Although the extent of the lack of tolerance varies it appears to be a bigger issue in areas where the species return (either via reintroduction or natural recolonisation) after long periods of absence and in areas where protection is imposed on previously hunted populations.

3.5 Institutional issues

A wide range of institutional weaknesses have been identified as threats to large carnivores. These weaknesses include a failure to include the results of natural and social science into management plans, a low degree of public involvement and transparency, poor coordination between the regions within federal states, and between countries, and the absence of robust population monitoring systems. In some countries there may be no clearly identifiable responsible authorities and no

management plans. A lack of law enforcement, and poor functionality of compensation schemes are also widespread issues. A final weakness concerns the often poor coordination between management agencies and sectors such as transport and agriculture with the environment. These issues influence both large and small populations on local, national and European scales. There is a huge need to make progress with developing population level management plans that secure this multi-jurisdictional and multi-sectorial coordination (Blanco 2012; Linnell et al. 2008).

3.6 Prey and forest management

In a few countries, especially in southern and southeastern Europe (e.g. Portugal, Albania, Bulgaria), lynx and wolf conservation may be hampered by a low prey base resulting from poorly developed or non-sustainable wildlife management practices for species like roe deer, red deer, wild boar and chamois. Bears are more dependent on forest management practices, especially with respect to trees that provide fruits, nuts and berries, or allow for a diverse understory that provides a variety of food plants. Different forestry practices can have very different effects on bear food.

3.7 Context

The extent to which any given species or population is subject to these, and other, threats varies greatly across Europe. Both the intensity of a given threat and the range of threats vary. Most populations are exposed to multiple threats. A key consideration is to consider the idea of cumulative impacts where the impacts of multiple threats may act together to have greater impacts than they would have in isolation. It is also important to realize that threats are highly dynamic in time (both between seasons and years) and need to be constantly re-assessed.

3.8 New threats.

The interesting aspect with these new threat assessments is the increased awareness of social (tolerance) and institutional issues as some of the dominant threats. With some few exceptions most European large carnivore populations are stable or growing, so the most immediate priority is to maintain and improve public acceptance (with a special focus on rural areas), address social conflicts, and build stronger institutions for managing large carnivores.

4 Understanding the conflicts surrounding large carnivores

A central logical principle of conflict resolution is that there is a need to have a good understanding of the nature of the specific conflicts that one is trying to resolve. Without this understanding it is much harder to effectively design targeted prevention, mitigation or resolution actions. In the best case such untargeted actions may have little impact, but in the worst case clumsy or untargeted actions may actually increase conflict levels.

4.1 Developments in our understanding of conflict

During the last 20-30 years there has been an enormous amount of research conducted on large carnivores in Europe and the rest of the world, focusing both on the species themselves and on their interactions with humans. The majority of large carnivore research has been ecological in nature. Recently there has been a refreshing increase in the extent to which a diversity of other disciplines have begun studying large carnivores. This is both because they provide interesting case studies for

disciplinary orientated academic research and an as arena where their discipline can make a contribution to real world social and conservation debates. The result is that we can now draw on contributions from fields as diverse as ecology (including aspects like genetics, parasitology, behaviour, community ecology, demography), veterinary science, economy, history, human-dimensions, sociology, anthropology, folklore studies, psychology, philosophy, political science and law. Between them, the contributions from this diversity of points of view have begun to give us a comprehensive picture of the complexity of the relationships and interactions between people and large carnivores. This has led to a dramatic development in our understanding of conflicts, forcing a realization that they are highly complex and very context specific.

A major contribution of the social sciences has been to underline the fact that conflicts may be deeply rooted and often rather indirect, involving many inter-related issues that may actually have less to do with large carnivores themselves than has been previously realized. One central insight has been to try and separate between the "impacts" that large carnivores have on human interests (e.g. when a wolf kills a sheep) and the "conflicts" that are behind this where different groups of human stakeholders have different motives, forms of knowledge, priorities, values, interests or agendas (e.g. between conservationists who want the wolf to live in certain areas and sheep farmers who don't) (Bouwma et al. 2010a,b; Redpath et al. 2013; Skogen et al. 2013).

It is also important to appreciate that this broader understanding of conflicts not only embraces those who experience something negative because of conservation actions that succeed (i.e. the return of the wolf as experienced by a livestock producer); it also embraces those who experience a negative result from the failure of conservation actions (i.e. the failure of wolves to recolonize from the point of view of an environmentalist).

4.2 General classification of conflict types and relevance for large carnivore conflicts in Europe

There have been many different attempts to classify the diversity of conflict types that have been recognized associated with conservation in general and with large carnivores in particular. Among the most useful classifications are those developed by Niemela et al. (2005) and Young et al. (2010) which we have adapted here to represent five different conflict dimensions. Any given conflict (e.g. the wolf that kills a sheep) is likely to contain elements along most of these dimensions, although the relative strength of each dimension will vary hugely with context and situation.

4.2.1 Conflicts about substance

These conflicts concern "how things are", including the material or economic components of the conflict. To return to the wolf and the sheep example this concerns the economic loss of any sheep killed by wolves. In a European context the conflicts with large carnivores that have been shown to have a clear substance dimension include;

● **Depredation on domestic livestock** is one of the universal impacts that large carnivores have on human interests all across Europe. The extent of depredation varies greatly with husbandry form and with livestock species (Kaczensky 1999). Sheep and goats are most exposed, with depredation on horses and cattle being less common. The impacts of depredation go beyond the numbers of animals killed, as many are injured, and there is a widespread claim that the presence of predators also

influences behaviour of livestock. In places where large carnivores return after periods of absence, husbandry methods need to be changed and adapted (often radically) which may require new and additional tasks for the livestock breeders. However, generally only the technical means (e.g. electric fences, livestock guarding dogs), but not the additional workload is acknowledge or supported. The impacts also go beyond a simple economical loss: be it financially compensated or not, the loss is also perceived as an indirect evidence for a lack of respect from the society (usually in favor of large carnivores) towards the farmer's job.

● **Depredation on semi-domestic reindeer** is a major source of conflict in the Nordic countries and causes a real issue for Sami reindeer herders, for whom reindeer herding represents a major cultural symbol and livelihood. Cumulative depredation rates from wolves, bears, lynx, wolverines and golden eagles can be high, and reindeer constitute the only potential prey for these species in arctic areas (Hobbs et al. 2012; Mattisson et al. 2011; Nieminen & Leppäluoto 1988). This creates a very complicated situation as the persistence of species like lynx and wolverine at least requires that they predate reindeer. There are almost no effective measures to prevent depredation on reindeer within the context of the modern husbandry form.

● **Destruction of beehives** by bears trying to forage on honey and larvae is a widespread conflict across Europe.

● **Competition for shared quarry by hunters and carnivores** is one of the components of the conflict between hunters and large carnivores. The extent to which the competition is real or only perceived varies widely with context, but carnivores can certainly lead to reduced hunting bags, especially in marginal areas (Gervasi et al. 2012; Melis et al. 2009, 2010). Furthermore, hunters often claim that the presence of predators also influences behaviour of wild ungulates, making hunting more time consuming. Where game management has resulted in high concentrations of wild ungulates (e.g. around feeding sites), large carnivores may alter distribution and/or have locally high predation impacts. Furthermore the feed often used for supplementary feeding of wild ungulates may attract large carnivores, particularly bears, which consume the food and scare away the ungulates.

● **Killing of dogs by wolves** is a highly variable phenomenon across Europe, and the behavioural and environmental factors that explain why it becomes a problem in some areas but not others is far from clear. Both hunting dogs and dogs kept close to houses and in villages can be targeted (Karlsson & Jaxgård 2004; Kojola & Kuittinen 2002; Kojola et al. 2004; Sidorovich et al. 2003). Wherever it occurs it can be a major source of conflict (Skogen et al. 2006). The often strong emotional bond between a dog owner and his dog as well as the many years of training invested into a good hunting dog make these losses difficult to compensate.

● **Destruction of property by bears** is highly variable, but it can include things as diverse as garbage containers, cans of chainsaw oil, fish ponds, fruit trees, automatic feeders that deliver winter food for wild ungulates and the associated food stores.

● **Vehicle collisions** have a two way impact. While they often cause injury or death for the large carnivore, they may also cause substantial damage to vehicles, and may even endanger drivers and passengers.

● **The danger of injury and death** is so low as to defy quantification, although both bears and wolves have been documented to attack, and even kill, people under special circumstances (Swenson et al. 1996, 1999). Despite the objective risks being low, the perception of this risk and fear is still widespread in many areas, especially where wolves and bears recolonize after long periods of absence. Wolves have the added dimension of being highly aggressive when infected with rabies (Linnell et al. 2002, 2003). The perceived ability of wolves to spread parasites, for example *Echinococcus* sp., has also become an issue of fear in some northern European countries (Romig et al. 2006).

● **Landuse restrictions** are often a part of protected area / Natura 2000 site management (Grodzinska-Jurczak & Cent 2011;Hiedanpää 2002), and although it is not widespread to impose these restrictions because of large carnivores, there are some examples of controversy surrounding potential restrictions in landuse and permissible human activity. The potential to impose landuse restrictions for large carnivore conservation outside protected areas is particularly controversial.

● **Conflicts between different conservation goals** may also occur. In several areas predation by wolves and / or lynx has been implicated as an additional factor threatening endangered ungulate populations, such as wild forest reindeer in Finland (Kojola et al. 2004) and some of the small chamois populations in Italy and the Balkans. Furthermore, a large proportion of threatened European habitats and their associated species are linked with systems where livestock grazing and mowing are important to maintain an open landscape. To the extent that carnivore depredation on livestock serves as a driver to decrease grazing they may lead to a decrease in the biological and cultural values of these traditional / cultural landscapes (Macdonald et al. 2000). Another issue can also be the conflict between conserving large carnivores and the genetic diversity represented by rare livestock breeds (Hall & Bradley 1995). Rare breeds tend to be associated with small scale production in marginal areas, exactly the areas where large carnivores often have the greatest impacts.

4.2.2 Conflicts about knowledge and information

These are conflicts over "how things are perceived" by the different stakeholders. Certainly some parts of this conflict dimension are due to a simple lack of information and knowledge about a certain topic. The progress of scientific research has been rapid and it takes a long time before new scientific knowledge becomes general knowledge (information deficit). Likewise, international, national and regional laws and policies have changed dramatically within the last few decades and there is in general rather poor knowledge about governance among many segments of society. There is also the challenge of communicating the local experience of living with large carnivores to other stakeholders at larger spatial scales. Europe is also a diverse place, and there is not always a good mutual understanding of how different things are in different areas.

However deeper issues are also touched upon. Knowledge is a complex topic as different people will build their knowledge in different ways. While scientists may construct their knowledge through field studies or by reading the works of many other scientists, lay people often build their knowledge through a compilation of personal and local experience, or the experience of personal acquaintances. While scientific knowledge tends to disfavor the individual observation in favor of means and trends, lay knowledge will to a far greater degree focus on the accumulation of anecdotes on which

individual experience is based. In the absence of direct experience based knowledge, myths and other culturally transmitted forms of knowledge will appear (Lescureux & Linnell 2010, Lescureux et al. 2011). Scientific knowledge is often based on principles and generalization to areas beyond where it was produced, whereas lay knowledge is usually acquired in a specific place. Because knowledge is a source of power, with management agencies often giving greater weight to scientific knowledge, conflicts over whose knowledge counts the most often become entangled in struggles for power (Skogen et al. 2013). Large and charismatic species like large carnivores are also species where many people will feel that they have valid knowledge. Following our wolf example, knowledge conflicts might include disagreements about how many sheep wolves kill, about how many wolves exist, about how wolves came to be living in the area, and about the relative value that should be attached to the advice of external scientific experts versus local people.

The legitimacy and value of a diversity of knowledge forms, (scientific knowledge, local, lay and traditional knowledge, citizen science) has been widely recognized within the context of most major international conservation agreements during the last 20 years, however, there remain many practical obstacles to integrating diverse knowledge systems and building on the relative strengths of each.

In a European context the conflicts with large carnivores that have been shown to have a clear knowledge and information dimension include:

● **The status of large carnivores** is diverse in Europe, although public perceptions of the numbers, densities and trends of the populations vary widely. There is a need to communicate both how large and robust some populations are, and how small and endangered other populations are (Kaczensky et al. 2013).

● The extent to which the **modern European landscape** provides potentially suitable habitat for large carnivores is often underappreciated (Boitani et al. 1999; Corsi et al. 1998, 1999; Huck et al. 2010; Jędrzejewski et al. 2008; Schadt et al. 2002; Wiegand et al. 2004). All research shows that the modern, highly modified, cultural landscape has the capacity to provide habitat for large populations of large carnivores over very large areas, although the public often has the perception that these species require wilderness.

● The extent to which wolves and bears pose **a risk to human safety** is often contested. A great deal of research from examining historical archives and from modern day forensics, veterinary and medical research has produced many new insights into the issue that are not yet widely known by the public. This mainly concerns knowledge of the historical extent of the problem and the circumstances with which man-killing is associated (Alleau 2011; Linnell et al. 2002; Moriceau 2007; Swenson et al. 1996).

● The **extent of depredation** of large carnivores on livestock is often a source of debate, being either greatly exaggerated or totally down-played by various actors. The impact of other mechanisms such as density and climate to cause mortality is also contested, as is the extent to which predator mortality is compensatory or adaptive (Tveraa et al. 2003, 2007). The **functionality of various mitigation measures** is also often contested when they are introduced, or reintroduced, into areas that have not had to use them before.

● The **impacts that large carnivores have on hunting practices and hunting bags** is also hotly debated (Melis et al. 2010). Although a great deal of research conducted in recent years is now available and needs to be disseminated, more research is needed to document the impact of large carnivores on large ungulates numbers, behaviour and distribution as well as efficiency of human hunting under the various hunting management regimes throughout Europe.

● The **impact of targeted culling or harvest** of large carnivores is also much debated. This both concerns the ability of harvest to be regulated and monitored (Linnell et al. 2010), and about the direct and indirect impacts on demographics, social behaviour and ecological function (e.g. Brainerd et al. 2008; Swenson et al. 1997; Swenson 1999, 2003).

● **The ecological role of large carnivores** has become a topic of great interest to researchers and conservationists with recent research indicating that they can have cause changes on community structure among multiple trophic levels through cascades (Ray et al. 2005; Terborgh & Estes 2010 – but see also Mech 2012). The extent to which the results obtained from North American protected areas can be transferred to the multi-use landscapes of Europe remains unclear because of the different ecological and social conditions (Linnell et al. 2005, Jedrzejewska & Jedrzejewski 2005) however the topic is becoming increasingly discussed in Europe with the emergence of the "rewilding" and "wilderness" discussions in recent years.

● **The role of different management levels** in setting and influencing legislation is often misunderstood, and there is a clear need to communicate information about European governance structures to many stakeholders, and also to inform them about state responsibilities regarding their own use of subsidiarity and derogation principles. Some of the stakeholders who are impacted by large carnivores are marginalized, and as we have seen a part of the conflict is about perceptions of disempowerment, making it extra important to how the formal power structures work.

● **Misinformation**. It is important to note that the deliberate spreading of rumours and misinformation has become a central part of the politics of large carnivore conservation in Europe today. For example, rumours that exaggerate (or downplay) the risks that wolves pose to human safety, or about how wolves have been secretly and illegally reintroduced (as opposed to have recolonized an area naturally) are widespread. These “demonic rumours” are not simply due to a lack of information, but are rather due to complex social process where the misinformation is used as a key weapon in a struggle for power and legitimacy (Blanco & Cortes 2002; Skogen & Krange 2003).

4.2.3 Values and norms

These are conflicts about the different things that people “believe to be good or bad, or right or wrong”. This can touch on some fundamental issues and produce intense social conflicts, including in connection to large carnivore conservation. This is because the carnivores themselves often trigger strong direct emotions, ranging from extreme love, admiration and respect to fear and hatred. Some values and norms are slow to change in society, so it is important to remember that the modern biodiversity agenda is relatively recent. There are people living today who grew up in a world where they were paid by the state through bounties to exterminate these species “in the name of progress”, whereas now they would be jailed for doing the same thing. Likewise, some rural people grew up in a world where these species were valued game species, whereas now they are strictly

protected. Others grew up without them, but now are being asked to live with them, and yet others live without them, but want to know they are there and on occasion experience them. This more than anything else illustrates the dramatic U-turn that society has taken with respect to large carnivores and at least goes part of the way in explaining why there are so many contrasting normative positions concerning these species.

Some people appear to believe that conserving these species in our modern landscape is simply "wrong", while others believe that it is "right". This is also linked to perceptions of carnivores being "useful" as opposed to "useless". This also touches on another major moral dichotomy that exists between stakeholders. For many people with a traditional rural background there is no opposition between concepts of "using nature" and "conserving nature". In fact it is frequently argued that nature can only be "conserved through being used". The assumption behind this view is that the types of (or elements within) nature that are valued as deserving of conservation are dependent on human activity, such as meadows and pastures. This view also underlines the fact that human interactions with nature are also often regarded as being of conservation value from a social and heritage point of view (Campbell 2005). The opposing view, most dramatically presented in the emerging European wilderness discourse, puts "using nature" and "conserving nature" into opposition and would like to see a widespread return of ecological processes where humans are not the dominant actor. This diversity in ways that a landscape can be viewed can be illustrated with an example from the Lapponia World Heritage Site in northern Sweden which for many outsiders is regarded as one of Europe's last wilderness, but to the indigenous Sami it is both a production landscape and a cultural heritage landscape (Nilsson-Dahlström 2003).

These diverse views reflect the extent to which people see humans as a part of nature versus something apart from nature, as interactive agents within natural processes or as observers, and to the extent that they believe that nature needs to be managed as opposed to left alone (Campbell 2005). These touch on very fundamental and deeply rooted perspectives and values. It is however important to point out that there is a wide diversity of views within and between different stakeholder groups and many moderate and balanced views also exist that recognise the existence of nuances between extreme points of view and the benefits and needs for compromise. Research frequently shows the existence of a wide platform of common ground concerning environmental and social values.

The other aspect which is important to remember is that large carnivores have become symbolic of many other wider issues with which they are only partly connected (Skogen & Krange 2003; Skogen et al. 2013). Rural areas are undergoing rapid changes which are often perceived as threatening to rural people. On one hand rural depopulation threatens the viability of many communities, while on the other hand the influx of newcomers to conservative rural areas is perceived as a threat to traditional lifestyles. The emergence of a conservation agenda for large carnivore, and their resulting return to areas from which they were absent (or the strict protection of once hunted populations), has happened at the same time as these threats have emerged. As a result some rural people have focused on the carnivores as symbols of the wider changes to their landscapes and communities. This has led to conflicts centering on species like wolves, even though the real issues affecting the viability of rural communities are largely independent of them. Examples of such symbolic conflicts include:

● **The changing physical landscape** with shrub encroachment and afforestation of previously grazed open areas has become highly symbolic of the changes in the way the landscape is used, especially linked to the decline of extensive grazing and hay cutting. Associated with this visual change is also the loss of many species that benefited from these modified habitats. The return of large carnivores has occurred at the same time as the closing of these landscapes began to become visible, leading many to blame the carnivores for the changes in landuse. Cultural landscapes are now recognized as important symbols of, and monuments to, European cultural heritage. The ways that people interact with the landscape are as important as the physical structure of the landscape. Perceptions of heritage are, however, generation-dependent; the decision-makers of current days have grown up surrounded by open landscapes from extensive grazing, which were not used in the same way a hundred years ago. Future generations of decision-makers may not have the same backgrounds, so that the image of desired landscapes will constantly change.

● With this change in the visual appearance and structure of landscape has come a shift in the way people view **the purpose of the landscape**. The shift has gone from the traditional **production landscapes** with their focus on producing agricultural products, to a combination of **recreation landscapes** and **conservation landscapes** where the purpose is people's pleasure and species survival respectively. Even though many of these elements are compatible, and even dependent, on each other, there is great symbolism in the primary view of the landscape (Skuland & Skogen 2009).

● **The decline of traditional rural economic activities** has been ongoing for many decades in Europe, although at different rates and in different periods in different regions. Many villages have become totally abandoned in marginal areas, especially in the mountains.

● **The involvement of outsiders and newcomers in rural affairs** has been controversial in rural areas that are closer to urban centers. So while this reverse migration has maintained the economic viability of some rural areas, it has changed their social fabric (Moore 1994).

● **The shift from traditional lifestyles to modern lifestyles** has been dramatic in recent decades and is at the heart of many political controversies as modernity clashes with conservative views. The tension between rural and urban lifestyles is also intertwined into this complex (Krange & Skogen 2007, 2011).

● The threats facing the **survival of indigenous people's lifestyles** in a modern world are very diverse and often beyond the control of local people. Issues as diverse as transport and energy infrastructure, mining, recreation and forestry are all having impacts on reindeer herding (Jernsletten & Klokhov 2003). However, large carnivores can be very potent and proximate symbols of these wider issues, as well as a significant cause of reindeer mortality (Hobbs et al. 2012; Mattisson et al. 2011; Nieminen & Leppäluoto 1988).

● **The lack of respect for local knowledge** compared to external scientific knowledge can become a central conflict as discussed above.

● Large carnivores are often viewed by environmentalists as **a test case of society's commitment to biodiversity conservation**. These are very charismatic species that potentially can play important roles within ecological systems. Many people and organisations actively support their conservation both because of their attachment of value to the species, and because there conservation symbolises

a move towards a new way of valuing biodiversity at large and reshaping the way that humans and non-humans share space on the planet.

These symbolic issues may have unexpected effects. In some cases the opposition to large carnivores may serve as a factor to bring a sense of unity and common purpose to rural communities (Sjölander-Lindqvist 2009). In other cases the symbolism of conflict may be utilized by alliances of interests groups to fight for wider political goals (Benhammou & Mermet 2003; Skogen & Krange 2003).

4.2.4 Procedure

These conflicts concern disagreement or dissatisfaction with the "way things are done". This is triggered by the establishment of legislation or administrative procedures and reflects the relative distribution of power among actors and the perception of justice. Various actors clearly disagree with issues related to the content of conservation legislation, the process by which it was developed or the way it is interpreted and implemented (or not implemented). While it is obvious that not all actors will ever like or agree with all legislation and procedures, it is important that they are perceived as being legitimate. This places great demands on ensuring that the process of developing procedures is conducted in an open and transparent manner, and that implementation is ensured in a logical and consistent manner with the understanding of all stakeholders (see the Aarhus Convention). European conservation legislation and conservation procedures have been documented as being highly controversial in some settings among some stakeholder groups (e.g. Grozinska-Jurczak & Cent 2011; Hiedenpää 2002, 2011). This controversy is both about the substance of the new procedures (e.g. species protection and landuse restrictions) and the fact that it comes from far away, from a level that many rural people feel powerless to influence. Furthermore, a failure to recognise the legitimacy of the procedures lies behind the justification of engaging in illegal acts such as poaching of large carnivores. The widespread failure of law enforcement to invest resources in investigating or prosecuting such crimes further undermines the popular perception of legitimacy. The large carnivore related conflicts which have been identified as controversial are related to the following aspects:

- **The degree of protection** afforded to large carnivores in large populations is highly controversial. The central issue concerns to what extent protection (from killing) is necessary as a goal to achieve conservation. Hunting large carnivores has a long tradition in many countries, and under various contexts is regarded as being an effective means to (1) give large carnivores a positive image as a valuable resource, (2) enable wildlife managers to regulate the size and distribution of the populations and remove individuals with problematic behaviour, and (3) increase acceptance among rural people (Liukkonen et al. 2009; Majic et al. 2011). In many countries some stakeholders have the perception that modern legislation is over-protecting large carnivores. The claim is often made that there is confusion between the goals of conservation and the means used to achieve these goals, with hunters for example fearing that strict protection is being viewed as a goal in itself. Hunters also express the fear that a ban on hunting the carnivores will just be the start of a process that will lead to the protection of other game species. The introduction of protection has the potential to transform an interactive, technical and merely competitive relationship (carnivore impacts balanced with technical measures and lethal control) into a social and political conflict, and also creates a sense of disempowerment among some stakeholders. However, the killing of carnivores, especially in

smaller populations, is also often highly controversial with other stakeholders, both because of concerns over the impact of killing and from the point of view of a moral objection.

● **The failure to take law enforcement with respect to illegal killing seriously** is viewed as a major problem by many (Forsberg & Korsell 2005). Illegal killing has been shown to be widespread and to have a significant population impact in some situations, but very few cases are ever prosecuted (Caniglia et al. 2010). Failing to enforce the laws on illegal killing can slow down the recovery rate of small carnivore populations and sometimes even threaten their persistence ,and greatly diminishes the public's perception of the legitimacy of the legislation and of the authorities commitment to large carnivore conservation (Andrén et al. 2006; Bell et al. 2007; Dahle 2000; Huber et al. 2002; Kaczensky et al. 2011; Liberg et al. 2012).

● The extent to which large carnivores are used **to justify landuse restrictions**, both inside and outside the Natura 2000 network, is a potential controversy, where European level institutions often get blamed for local level decisions. The management of Natura 2000 sites is purely a national level issue although the European Commission has set in place a process for exchanging experiences. As discussed above there is still a great deal of uncertainty as to which landuses threaten large carnivores, although they are generally tolerant of many forms of traditional landuse. Small carnivore populations that are vulnerable to many threats may be more sensitive than larger populations and may therefore benefit more from habitat management.

● There is a general lack of understanding of which **management authority** rests with which level of governance. European governance is complex, with multiple levels existing from European, to national, regional and municipal. Different levels have different authority over different policy areas. There is often a great deal of confusion among stakeholders over which level of governance is actually responsible for which decisions and which actions.

● Modern ideas of **participatory governance** mandate a high degree of public and stakeholder engagement in many policy areas. Conflicts can arise if decision making processes are regarded as being too top-down and failing to engage in sufficient consultation, dialogue or participation with local communities or stakeholder groups (Maser & Pollio 2012; Sidaway 2005). On the other hand, insufficient conservation actions may result from a too much bottom-up approach (Keulartz 2009). An appropriate balance has to be defined to achieve both social acceptance (that needs bottom up approaches) and implementing of efficient conservation policies (that needs some top-down directives).

● **Issues of scale** are very controversial. In addition to the formal laws and institutions that regulate human activity there are a range of local **informal institutions**, or customs, that govern how people act. There is often a perception among local communities, and even entire countries, that legislation produced at one scale is not appropriate at the local scale to which it is applied, that it does not respect the informal institutions that they respect, and that there is not enough flexibility in choice of means to account for local situations. However, when considering the intrinsic constraints imposed by large carnivore ecology it is apparent that large carnivores need to have their management coordinated over large areas that correspond to biological populations (Linnell et al. 2008).

● Among environmentalists there is a perception that many authorities are not **fulfilling their obligations** under conservation legislation. This is particularly obvious in countries where large

carnivores are recovering after long periods of absence. This **conflict of obligation** is also felt by Sami reindeer herders who feel that the way that carnivore conservation legislation is enacted conflicts with other international agreements on indigenous people's rights. Similar issues appear when small scale farmers and livestock breeders are on one hand encouraged by European agricultural subsidies, but encounter difficulties imposed by wolf conservation which is driven by EU environmental policies (Sjölander-Lindqvist 2009)

4.2.5 Relationships

This conflict dimension concerns "how people behave " and is really focused on the behaviour of individual people or organisations in their interaction with each other. Many groups perceive that they are not treated with sufficient respect by other groups. It is an unavoidable fact that even in the most professional organisations the outcome of a great deal of interactions depends on individual personality and social skills. Trust is a key factor in influencing the outcome of any interaction between stakeholders. Trust takes time and stability to build, but can easily be lost. The historical relationship between individuals and organisations is also important. One unfortunate tendency is for individuals within organisations engaged in a conflict to tend to adopt ever more polarized positions in an effort to raise their status within an organisation. This process of schismogensis (Brox 2000) can in principle explain a great deal of the escalation that occurs. In the later sections of this report on stakeholder engagement and participatory processes it is made clear that central elements of the processes, and indeed many of the potential actions, are designed to explicitly help build better relationships between individuals and organisations.

4.3 Conflicts in context - studies of attitudes

Our understanding of the details and mechanisms of conflicts have emerged from qualitative studies (the results of which are described above) that tend to use in depth interviews or focus group discussions to study a relatively small sample of individuals in depth. However, more quantitative methods are suitable for surveying how widespread these views are among larger samples, be it within a stakeholder group or across a representative sample of the general public. Clearly a combination of methodological approaches is crucial in such conflict studies as it is important for decision makers to both understand the real complexity of issues and the extent to which the wider public share the different views. It is also possible to tease apart factors affecting attitudes with large sample sizes and statistical methods. There is also an emerging foundation of theory which may be useful in improving our ability to predict haw attitudes will vary.

There have been many quantitative surveys of the attitudes of the public and of key stakeholder groups with respect to large carnivores. They have been conducted in countries as diverse as Norway (Røskaft et al. 2007), Sweden (Ericsson & Heberlein 2003), Finland (Liukkonen et al. 2009), Latvia (Andersone & Ozolins 2004), Italy (Glikman et al. 2010), Austria (Wechselberger & Leizinger 2005), Germany (Kaczensky 2006), Slovenia (Kaczensky et al. 2004), Croatia (Majic & Bath 2010; Majic et al. 2011), Slovakia (Wechselberger et al. 2006), Poland (Bath et al. 2008; Olszanska 2012), Switzerland (Hunziker et al. 2001), and France (Bath 2001). These surveys show that a clear majority of both rural and urban publics support the underlying principle of large carnivore conservation in Europe. A wide

range of factors influence attitudes under different contexts. However, factors such as age, gender, occupation, political orientation, and general values towards nature have all been shown to influence attitudes in at least some studies (e.g. Skogen & Thrane 2008). Unsurprisingly, livestock owners and hunters often have more negative attitudes than others because they expect direct negative impacts of large carnivores on their livelihoods and activities (Kaltenborn et al. 1999; Andersone and Ozolinš, 2004; Wechselberger et al., 2005; Bisi et al. 2007; Nilsen et al., 2007; Bath et al.2008; Liukkonen et al. 2009). Being male, having more education, and being young tend to be associated with more positive attitudes (Andersone & Ozolins 2004; Balciauskiene & Balciauskas 2001; Kleiven et al. 2004; Røskaft et al. 2007), although these trends are not universal (Bath 2009; Kaczensky et al. 2004). Experience of living close to carnivores is noteworthy as it seems to operate in different directions in different settings; in some cases experience leads to more positive attitudes, whereas in other cases it leads to more negative attitudes (Ericsson & Heberlein 2003; Heberlein & Ericsson 2008). It should be noted that not insignificant proportions of respondents mention having some level of fear towards large carnivore presence (Røskaft et al. 2003), although it does not influence the overall clear support for their conservation. The importance of having a sense of control over situations emerges as a common factor in supporting more positive attitudes (e.g. Bisi et al. 2007; Bjerke et al. 2000; Liukkonen et al. 2009). Also the perception of how much damage is caused emerges as a relevant factor in studies (e.g. Andersone & Ozolins 2004). Attitudes have also been shown to change over time in both directions (Ericsson & Heberlein 2003; Majic & Bath 2010; Majic et al. 2011). It should also be noted that in studies which have looked at multiple species in the same survey, wolves emerge as being associated with less positive attitudes (Andersone & Ozolins 2004; Kleiven et al. 2004; Røskaft et al. 2007; Wechselberger et al. 2006). A good summary of these studies comes from the recent review of Trajce (2010); "*In summary, the general findings of human dimensions research in Europe so far show that the majority of human populations are favour large carnivore conservation and have positive attitudes towards them. However, it is usually the case that the support for large carnivores comes from a majority that is not directly affected by the damages that carnivores cause (e.g.. urban population) and the costs for having carnivores in the landscape are carried by a small minority of the population (farmers, livestock breeders, hunters). This calls for careful considerations and the need for broad compromises when shaping conservation and management strategies for large predators. Public attitudes towards carnivores are unambiguously complex and are linked with various local and individual attributes such as place of habitation, age, education, gender, proximity to large carnivore populations, and species of carnivore concerned and might vary considerably through time. Hence, human dimensions studies often suggest that conservation and management strategies for carnivores should be defined on a species by species and case by case approach, according to the existing particulars in place*". Although the main point is one of complexity, we now have a very well developed tool-kit to explore these issues within different settings and to monitor how they change over time.

4.4 Majorities and minorities

This principle support for large carnivore conservation among the general public is also often found in rural areas and among many of the stakeholder groups who are most negatively impacted by large carnivores, although this support may well be conditional on the way large carnivores are managed, by the forms of conflicts that they cause, and by their numbers (e.g. Tangeland et al. 2010). The implication is that it is a minority of the public who perceive the presence of large carnivores as being negative or conflictful, and a minority who experience the negative impacts that their presence

causes. A lot of the research described in the previous sections has been focused on understanding and articulating the views of these minorities. Because these minorities are hard to detect in general quantitative surveys social scientists have mainly used qualitative methods to access these groups. Such a situation of majority support for conservation with negative impacts experienced by a minority creates a democratic dilemma as it concerns the way that the interests of majorities and minorities balance their respective interests (Arblaster 2002). It also explains why issues of perceived power and influence are so central to the understandings of the social and political conflicts with which large carnivores are so often associated. It is important to note though that perceptions of damage caused by large carnivores to other stakeholders frequently emerges as an issue in representative surveys, implying that the general public is sensitive to the impacts that carnivores have on specific groups. It is also crucial to understand that those who experience the most negative impacts of large carnivores are those with economic interests and livelihoods that are impacted and who often have formal property rights or resource use rights that are impacted.

5 Identification of stakeholders

One of the main trends of recent decades within environmental management (including coastal zone, forestry, wildlife, biodiversity and fisheries management) has been the recognition of the diversity of stakeholders who have a legitimate say in the way resources are managed. This broadening of the constituency has paralleled the development in thinking among ecologists of the need to go from single species to ecosystem level management, and to move from local to wider spatial scales of consideration. The result is that there is now an understanding of the need to involve a wide range of actors that often operate on a variety of spatial scales in the coordinated management of biodiversity and natural resources. These duel motivations are currently enshrined in European policy, for example through the EU's ratification of the Aarhus Convention (Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters). The motivation for many of the processes that nowadays seek to engage with stakeholders within the field of conservation conflicts aim to improve both conservation outcomes and social / political interactions. It is important that stakeholder processes are informed by an understanding of mutual interests, conflicts and the threats which the species or habitats in question are exposed to (Bouwma et al. 2010a,b; Chase et al. 2000; Maser & Pollio 2012; Reed 2008; Sidaway 2005).

It is therefore very important to define the appropriate range of stakeholders in any process. In the short term this may initially lead to an increase in conflict with some traditional stakeholder groups who may be uncomfortable with these "outsiders" being involved in "their" issue. However, as we recognise that social conflicts between different groups of actors lie at the heart of many conservation conflicts it is essential that the most relevant actors are present. One cannot call a process participatory or engage in conflict resolution if some important actors are not invited into the process. That being said, the exact range of stakeholders with whom engagement is necessary will vary from case to case. In some situations where very technical issues are being discussed it may be enough with a few, however, in other cases that touch on wide ranging principle issues the list may be very long indeed.

Stakeholder processes should ideally involve (1) those who are influenced by large carnivores, (2) those who influence large carnivores, and (3) those who have an interest in large carnivores. While many stakeholders may fall into two or three of these categories, there are many who only fall into

only one. For example, landuse planners or road construction engineers may not realize it, but they are key stakeholders in large carnivore conservation from the perspective that their activities can have a dramatic impact on these species habitat.

Stakeholders can be organized into three categories based on their spatial arrangement and interest in the issue. Primary stakeholders are local and have a direct economic or livelihood stake in the issue. Secondary stakeholders live in the same area as the issue of concern, but without the economic or livelihood connection. Tertiary stakeholders occur at a larger spatial scale and include national publics and national authorities. Some authors also explicitly mention the need to consider future generations as stakeholders, especially in issues concerning sustainability discussions (Maser & Pollio 2012).

5.1 Who is a stakeholder in large carnivore conservation?

Based on our constantly maturing understanding of conflicts associated with large carnivores and the threats to their survival it is possible to identify the following stakeholders as being central. Because different countries have different patterns of land management and different social-economic situations these categories of stakeholder may vary in the exclusivity. For example, in some countries some landowners may be foresters, farmers and hunters at the same time on their own property, whereas in other countries these activities may be completely separated. The legal status of species according to the landowners' property rights (depending whether it is *res nullius* or *res propria* for example) is also a key parameter when identifying stakeholders. The following list (in alphabetic order) covers some of the stakeholders who are likely to be important for large carnivore conservation in various contexts:

● **Animal welfare**. Although the line between environmentalism, conservation, and welfare is often blurry, there are many issues concerning the way humans treat large carnivores that are direct concerns of people with animal welfare concerns. These people may, or may not, be organized into advocacy groups. It is important to differentiate between animal welfare and animal rights movements. While animal welfare interests are often unproblematic to integrate into conservation discussions, animal rights agendas are largely incompatible with conservation discourses (The Wildlife Society 2011).

● **Domestic animal production**. These are one of the major stakeholders because of the extent of large carnivore depredation on livestock. Traditionally the focus has been on sheep (and goat) producers, however it is clearly important to also include horse and cattle producers who use extensive, free-grazing production systems. A final form of domestic animal production that frequently comes into conflict with bears is bee-keeping. Depending on density, livestock grazing can have both positive and negative impacts on habitat from a carnivore point of view.

● **Ecotourism operators**. Ecotourism, nature-based tourism and rural tourism are rapidly developing fields. The presence of large carnivores in an area may serve as an important marketing attraction, even though the chances of any visitors seeing them are slight simply knowing that they are out there may be a positive experience to many tourists. Because of the ongoing policy of diversifying rural incomes these are likely to be a key stakeholder group for the future. Their activities (bringing more visitors to the area) may be seen by locals as beneficial and may help raise the profile of large

carnivores in local minds. For others it may mean disturbance on their property or the need to share their own nature experience with "outsiders", e.g. hunters may feel that tourists spook the game. If not properly managed and controlled, this may potentially increase the disturbance of large carnivores, or may influence their behaviour (e.g. when use baits at viewing sites; Kojola & Heikkinen 2012).

● **Environmentalists**. There are many NGOs concerned with the conservation of biodiversity who are engaged with large carnivore issues. These NGOs represent their memberships' desires to see large carnivores survive and thrive in modern-day Europe. Motivations are diverse but reflect both their members desire to conserve carnivores because they feel it enriches their lives and because of an ethical belief in the intrinsic rights of large carnivores to exist. In this latter context conservation groups may perceive themselves as both representatives of their human membership and the closest possible thing to a representative for the species themselves.

● **Farmers**. Bears are frequently involved in damage to fruit trees in orchards, and occasionally may damage some crops.

● **Foresters**. Because foresters directly affect the structure of large carnivores' primary habitat they can be very influential in carnivore conservation. For lynx and wolves who are habitat generalists the main impact is via the direct (culling regime influenced by levels of damage) and indirect (forage availability influenced by opening of canopy and choice of tree species and diversity of species planted) effects of forestry on wild ungulates. Bears are more directly influenced by choice of tree species (mast is important bear food in central and southern Europe) and disturbance of winter dens. Bears may also in some situations cause some damage to trees due to bark stripping of conifers, although their impact may be small compared to wild ungulates.

● **Hunters**. Hunting is a very widespread activity that occurs over most of the European continent. Many of the most valued game species (wild ungulates) are the staple prey of large carnivores. Because of this there is often a conflict over real and perceived competition for game, and wolf depredation on hunting dogs in some places. In addition, there are a diversity of social conflicts between hunters and other stakeholders and institutions. It is only recently that the importance of involving the hunters as a key stakeholder in large carnivore conservation has been recognized. Large carnivores depend on being able to prey on wild ungulates, so that their survival depends on healthy populations of these game species.

● **Landowners**. Europe varies in the extent to which farmland and forest are owned privately or by the state. However, because of the legal importance of property rights and the potential economic impacts of large carnivores it is obvious that landowners should be considered as central stakeholders, especially in situations where their interests are not covered by domestic animal production, hunting or forestry interests. In countries where access to land requires landowner permission, landowner cooperation is essential for conducting monitoring, research and other conservation activities.

● **Media**. Although there have been few studies of the role of media in large carnivore issues in Europe (Frafjord 1988; Kaczensky et al. 2001) the media are obviously a very important stakeholder in any policy arena as they are both the public's main source of information and a major shaper of attitudes and perceptions. Media are very diverse (print, internet, TV, radio) and exist at many scales

(from local to national and international) making it complicated to identify the appropriate representatives to at different scales.

● **Outdoor recreationists**. Many people engage in recreation in the mountain and forested habitats where large carnivores live. Forms of recreation are as diverse as walking, fishing, gathering berries and mushrooms and a range of modern activities such as mountain biking and skiing. These activities may well influence some large carnivores because of disturbance, and the presence of carnivores may enhance or diminish their nature experiences. There may also be some constraints placed on their recreational activities because of large carnivore conservation concerns. Including these groups, for example via some of the many hiking and other recreation associations, may also provide a route of access to a wider, but otherwise unstructured, groups of stakeholders representing the wider public, both rural and urban.

● **Policy makers / decision makers**. The various political and bureaucratic institutions that make and administer decisions and policies are without doubt a crucial stakeholder in just about any biodiversity conservation context. No other stakeholder group has more formal power and influence over the issue. For any process to have real lasting impact it is crucial that it is endorsed and enabled by the formal institutions who are the holders of formal authority. However, the extent to which these stakeholders should be actively involved in engagement processes varies with context. In some cases their involvement may be crucial, whereas in others it may actually be counterproductive.

● **Reindeer herders**. The case of semi-domestic reindeer herding, by both Sami and non-Sami, is a very special case that is increasingly coming into focus in the Nordic countries because of the high level of conflict and the complexity brought to it by the indigenous peoples status of the Sami. Carnivores negatively impact reindeer herding through depredation, however across much of arctic Europe, semi-domestic reindeer are the main prey of wolverines and lync.

● **Rural residents**. Because they are wide ranging large carnivore home ranges include the areas where many people live, work and engage in recreation. Carnivore presence therefore touches on the lives of many people who are not engaged in any of the above mentioned activities. Rural residents are diverse, and have been shown to have diverse attitudes towards large carnivores, ranging from the very positive to fear. Although they are a crucial stakeholder group and will almost always outnumber the number of farmers, hunters, foresters or landowners in any given area occupied by large carnivores, they are typically very difficult to engage with because of a general lack of any umbrella organisations at a large scale. Substantial efforts to engage with them could greatly benefit any stakeholder process. The extent to which their local elected representatives reflect the subtle views of the wider public or the louder voices of special interest groups is an issue that is often discussed.

● **Scientists**. Scientists are a multi-faceted stakeholder. To the extent that many scientists define themselves as conservation biologists (an openly mission-driven science) they clearly have overlapping interests with the conservationists. However, in addition they possess unique knowledge and experience which is vital to the success of any process. This includes knowledge about human society, legislation and politics from social scientists and knowledge about the ecology of the species that are involved in the discussion. Because the ecology of the species is one of the externalities that places some constraints on the range of viable outcomes it is crucial that all available scientific knowledge is made available to any process to ensure that it can be science-based.

● **Spatial planners and engineers**. Their activities have direct impacts on large carnivore habitat through the infrastructure they create, and any requirements that are made on them to consider the interests of large carnivores (i.e. such as building crossing structures or rerouting roads or railways) will have serious economic and technical impacts on their activities. Because of the cumulative impacts of infrastructure projects, it is becoming increasingly important to engage with this group of stakeholders.

● **Wider public**. The very existence of pan-European legislation like the Habitats Directive and the Bern Convention reflect the idea that biodiversity, including large carnivores, is a matter of shared public interest for the whole of Europe whether they live in the proximity of large carnivores or not. This is also reflected in the national legislation of many European countries where wildlife is technically the property of the public or the state. It has been frequently pointed out that involving the interests of this wider public is crucial for a process to be truly democratic, although the challenges of doing so are great. Some authors even insist on the recognition of future generations as stakeholders (Maser & Pollio 2012).

● **Zoos.** European zoos have shown an interest in large carnivore conservation in recent years and have a number of ways to contribute. The major contribution that zoos can make is in their potential for delivering information to wide segments of the public. In addition, there are some very limited cases where zoos may be a source of animals for reintroductions in the context of Europe. This is mainly just the case for Iberian lynx (not covered by this report), although Eurasian lynx from captive origins have been used in reintroductions in the recent past. Zoos can also be useful in cases where wild free-living animals are injured and need to be confined for rehabilitation for short periods.

6 From conflict to coexistence

Conflicts are common in all areas of life. As a result, methods to deal with conflicts have been developed in many fields as diverse as marriage counseling and corporate personnel management as well as natural resource management and biodiversity conservation issues. Massive efforts have also been placed into conducting research into understanding conflicts and in applying a wide range of conflict reduction techniques in the field with biodiversity and natural resource conflicts (Webler et al. 2001; Young et al. 2007, 2010; Chase et al. 2004; Maser & Pollio 2012; Redpath et al. 2013; Sidaway 2005; Thompson et al. 2005; Newig & Fritsch 2009). The literature on the topic has exploded in recent years. Unfortunately, there has been very little systematic research into evaluating the relative success of different approaches. In other words there is a lot of theory and a lot of practice, but generally there is a disconnect between these two parts (Maser & Polio 2012; Rauschmayer et al. 2009; Reed 2008; Sidaway 2005). The attempts that have been made to evaluate various approaches have indicated that stakeholder engagement helps in many cases, but not all, and that things are very situation dependent making it impossible to offer an off-the-shelf tool-kit. Approaches will therefore need to be tailor made to suit each specific set of circumstances, even though there are many common elements that have been identified as contributing to success. As a result we use this section to offer a combination of basic principles that have consistently been shown to be crucial in successful conflict reduction, some conceptual insights into the specific case of large carnivore conservation, and a list of recommendations for potential activities that are based on a wide range of experience from the field.

6.1 What does coexistence look like?

"Coexistence" between large carnivores and rural communities is widely stated as the goal of large carnivore conservation policies. However, it is often unclear what coexistence means in practice. In the naïve representation it is often hoped that rural people will hold positive attitudes towards large carnivores, value their presence and live in an absence of conflict. It is also sometimes claimed that the attitudes of rural people are more positive in areas where they have shared space for a long time with carnivores in contrast to areas where they have recently returned. Although a majority of the public, both urban and rural, in areas where carnivores have long existed and where they have just returned, clearly supports the idea of large carnivore conservation, the reality on the ground at the local level is very complex. When looking at areas where people have had a long term or continuous experience of living with large carnivores there is still a diversity of attitudes, with many rural stakeholders being negative towards large carnivores and experiencing a range of conflicts with them. This is especially true for wolves, who are usually associated with the most negative attitudes (compared to bears, lynx and wolverines), and who are responsible for the most conflicts (per capita) with livestock, and additionally with dogs (Andersone & Ozolins 2004). Conflict can best be viewed as something competitive in nature, with the main focus on immediate, economic and practical impacts of carnivores (Treves et al. 2006). In such areas "coexistence" can be best described as a state where conflict exists but where interactions are kept within acceptable limits (both material and perceptional and behavioural on the part of the human population and biologically on the part of the wolf). This is often achieved through a process of interaction (e.g. carnivore hunting) and mutual adaptation (e.g. adapting livestock husbandry methods and tolerating a chronic, but low level of depredation). This idea of the need for reciprocity in the relationship and the need to empower rural people to take some form of action is emerging as a crucial issue to understand the human – carnivore relationship (Campbell 2005; Lescureux & Linnell 2010; Lescureux et al. 2011b). The important thing about attitudes in such a state is not so much that all people like the carnivores, but that they accept that they have a right to be there as long as their impact and behaviour can be kept within tolerable limits and that they regard the system of governance that controls their relationship with carnivores as being fair. Fear may well be present in such areas, but tends to be placed in a more objective context (Lescureux et al. 2011a). Large carnivores also tend to be regarded as real animals and less as political or social symbols. In areas with this long term cohabitation it is clearly important to maintain the existing mechanisms by which rural people and large carnivores have managed to "negotiate" their dynamically balanced "coexistence". However, it is also crucial that effective monitoring is in place to ensure that these interactions occur within the limits of what a population can tolerate without its viability being jeopardized.

In areas where large carnivores recolonize after periods of absence the question becomes more one of defining a new relationship that can be termed "coexistence". The conflict situation is more complex because in addition to the "competitive" (economic and practical) impacts of carnivores, one must also deal with the emergence of the wider social and political conflicts (Figari & Skogen 2011). Adapting to externally imposed change and building new relationships is often painful and controversial. The key issues here again are to find technical means to balance the mutual impacts so that they are acceptable (ensure that carnivore populations achieve viability and that the carnivores do not represent an unacceptably large added threat to already vulnerable rural livelihoods). It also requires that the social and political conflicts are channeled into legal (i.e. combat illegal killing) and constructive directions as society tries to do for other political issues. In other words we should not

expect an absence of conflict, but we should endeavor to achieve what is termed a "bounded conflict" – or a conflict constrained within limits and played out according to rules that stakeholders and wider society regard as being acceptable (Cuppen 2012; Peterson et al. 2004; McShane et al. 2011). We cannot hope for universally positive attitudes towards carnivores and agreement with the goals of conservation policy, but we should strive to achieve a widespread acceptance of the legitimacy of carnivore governance and an acceptance that a wider society has the right to pursue a conservation agenda which has been developed through democratic institutions. This, however, requires the definition of management rules that make the presence of carnivores acceptable to those stakeholders who are experiencing most of the conflicts. Increasing the mutual understanding of different standpoints and building trust between different stakeholder groups should also be a target. This process would be greatly facilitated if it was possible to remove some of the symbolism associated with the carnivores such that each issue (those linked to the animal and those linked to wider social issues) can be addressed independently. However, it would be naïve to imagine that all aspects of large carnivore conflicts can be resolved or solved in these very political contexts where the species have come to symbolize deeply held values. In such contexts, large carnivores represent a truly "wicked problem" (Cuppen 2012).

It is also important to note the difference between attitudes and behaviours. Within a context of coexistence it is therefore most crucial that people's behaviour adapts to large carnivores and that their behaviour does not have non-sustainable impacts on carnivore populations. When viewing coexistence as an interactive process, and where there should be a certain degree of reciprocity between people and carnivores, it is also important to consider to what extent carnivores can adapt their behaviour to humans, and explore mechanisms that can promote this co-adaptation.

6.2 Prevention, resolution and management of conflicts

Strategies to deal with conflicts fall into three broad categories, depending on the nature of the conflict. These three approaches are technical (practical solutions to practical conflicts), political (policy and legal issues) and cultural (how people and institutions interact with each other). Strategies also need to be applied in three different contexts. Firstly, there is the proactive strategy of preventing the development of conflicts in the first case. Awareness of the potential for conflict should strongly motivate efforts to avoid starting them. Secondly, is the strategy of resolving conflicts. Resolution implies dealing with the underlying causes and finding a peaceful end to the conflict. Thirdly, some conflicts are so fundamental and involve such deeply rooted values that they cannot be resolved. In such cases the goal must be to manage the conflict such that it is bounded within acceptable limits.

Despite the diversity of conflicts associated with large carnivores and the diversity of approaches that exist to reducing these conflicts, there is one common feature that appears to be central to a successful approach. And this is the need to engage with a diversity of stakeholders in a targeted, context dependent and meaningful manner.

7 Special challenges with respect to stakeholder engagement in the context of large carnivores

Every case where stakeholder engagement is utilized in an attempt to resolve conflicts offers its own unique challenges. However, large carnivores offer a special set of challenges that make the process even harder, from both principle and practical points of view (Maser & Pollio 2012).

7.1 Scale

Large carnivores occur at low densities and roam over large areas. This implies that their conservation requires coordinated actions over massive scales that will frequently stretch over many sub-national and international administrative borders. Each individual large carnivore will typically have many hundreds or thousands of people living within or adjacent to its home range. When multiplied up to the scales of habitat that carnivores occupy the numbers become huge. For examples, bears, wolves and lynx have regular or permanent presence in ~800.000 km^2 of the European continent (10-20% of the area of Europe). This implies that there are a huge number of people who can potentially be viewed as legitimate stakeholders. Wolves especially are expanding to new areas, such that the area under influence is constantly expanding.

7.2 Intensity and diversity of conflicts

While large carnivores can live with low to medium levels of conflict in many areas, there are some flashpoints where conflicts can be very intense. This intensity is of both an economic nature, in areas where livestock are killed, and a social / political nature. Some of these conflicts can touch on rather fundamental values that people are very reluctant to change or compromise, and emotions can often run high.

7.3 Symbolism and cultural values

Large carnivores are, and always have been, highly symbolic for a diversity of wider issues. This implies that any conflict surrounding large carnivores will also often contain a wide range of other issues that have little to do with the carnivores directly, but which can carry into the conflict.

7.4 Species differences

Although the four species of large carnivores share many features in terms of ecology and habitat there are important species specific differences in terms of conflicts. Wolves, for example, are almost universally subject to the most polarized points of view and associated with the most intense conflicts, both of material and social natures. The relative placement of the other species depends very much on context. For example, wolverines are associated with many reindeer herding conflicts but few hunter conflicts. Fear is mainly displayed towards wolves and bears, rather than lynx and wolverines. Although there is added value to dealing with the collective idea of “large carnivores” in many issues it is important to not let this grouping obscure the species specific challenges and opportunities.

7.5 Trade-offs

It is also important to realize that there will often be trade-offs required between the diversity of conflicts and the diversity of potential measures to address conflicts. A measure that will address one conflict may enhance another. For example, the introduction of fencing or livestock guarding dogs may interfere with recreational activities or with hunters. While using hunting as a management tool

for large carnivores will probably be popular among hunters it may be perceived as a source of conflict by many environmentalists.

8 Preventing the development of conflicts

Although large carnivores are often associated with a diversity of conflicts, the relative extent to which the different conflicts appear, and the intensity with which they develop, are both highly variable across Europe (Blanco & Cortes 2009; Kaczensky 1999). There are in fact many areas where the species coexist with people with remarkably little conflict, including many of the areas covered by the largest populations of large carnivores in eastern, southeastern and southwestern Europe. Ensuring that conflicts do not grow is an important part of any large carnivore conservation strategy. This requires maintaining the existing structures and institutions that seem to work and being proactive with respect to any emerging conflict issues. Although far from being a universal factor, many of the low conflict areas are where large carnivores are managed within the conventional wildlife management frameworks. Wildlife management institutions are found throughout most of Europe and have a considerable track record at preserving sustainable populations of game species and balancing conflicts of interest between multiple stakeholders (especially the farmer - livestock producer – forester - hunter grouping). Over many decades they have developed routines and structures that work remarkably well and enjoy a high degree of popular legitimacy. In many parts of northern and eastern Europe large carnivores have been managed within this framework in the same way that their western European counterparts have managed wild ungulates.

Bears especially have been well managed within these systems because of the positive economic and symbolic values associated with them. The fate of lynx and wolves has been more variable in the past, but in recent decades many countries have shown an ability to integrate them into these traditional wildlife management structures. In the countries where these systems exist and function well it would be considered highly advisable to work with these structures and institutional frameworks rather than try and create new structures. It is therefore important to identify the elements of these structures that are crucial to their success and proactively identify threats to these elements. For example, hunting of large carnivores has often been a part of this system in northern and Eastern Europe, allowing rural communities to feel both a sense of control over the situation and to obtain a benefit (recreational and / or economic through sales of trophy hunting) from the carnivores. Any regulatory or legislative change to the ability to hunt will therefore potentially destabilize these functional systems. Another example is the success of the traditional sheep husbandry system in eastern and southern Europe with the shepherd /livestock guarding dog /night-time enclosure components. This system permits the grazing of sheep with acceptable losses in areas that have very high densities of large carnivores. Any changes to the economics of sheep production, such as rising labour costs or the relative focus on producing milk vs meat risk stressing the system by motivating the adoption of less carnivore compatible husbandry systems. The fact that European agriculture is increasingly governed by complex subsidy systems provides a lot of opportunities for influencing conflict potential provided that there is effective coordination between environmental, agricultural and development sectors.

When it comes to the areas where large carnivores are recovering the emergence of conflicts is somewhat inevitable, although the intensity of the conflicts and the extent to which they will become political is hard to foresee. However, at this stage there is so much accumulated experience

that it is possible to predict the issues that will emerge. Although large carnivore recolonisation is difficult to predict there are some obvious areas where the probability is greatest. In these areas there should be some proactive planning on how to deal with issues when they emerge, permitting rapid responses.

9 Suggestions for concrete activities for stakeholder engagement and reduction of conflicts with large carnivores

Across Europe a wide range of initiatives and activities have been launched during recent decades to try and reduce conservation conflicts in Europe and beyond (Bouwma et al. 2010a,b; Newig & Fritsch 2009; Rauschmayer et al. 2009; Reed 2008). Virtually all modern approaches to conflict reduction involve some degree of stakeholder engagement (Maser & Pollio 2012; Sidaway 2005). While there has been little systematic evaluation of these activities, there is an accumulating body of case studies and experience which allows the listing of a range of activities that could be potentially deployed under different contexts to address different dimensions of the diverse conflicts associated with large carnivores. There is no magic bullet method that solves all issues in all contexts, and in some contexts stakeholder engagement and participation may not resolve conflicts (Young et al. 2013). What we have learned is that it takes targeted methods to address concrete issues in specific contexts. Among the range of forms of stakeholder engagement that exist, it is useful to consider that a wide range of participatory tools exist that cover a diversity of approaches from consultation, to decision making and action.

The outcome of a process also needs to be evaluated in multiple currencies, not just the number of large carnivores in a population for example. This implies that improving the interaction between stakeholders and institutions and social learning are as desirable outcomes as the conservation status of carnivores, and the ideal process should lead to benefits in both. The modern day commitment to increased stakeholder participation and dialogue in democracy and a strong civil society requires a high degree of stakeholder engagement. These principles are enshrined in a range of EU policies, including the Aarhus Convention (Rauschmayer et al. 2009). So not having engagement with stakeholders is not a valid option. The question therefore remains about how best to structure it. Therefore, the issues that need to be considered include;

- What type of process is needed?

- Who should initiate or facilitate the process?

- At what scale (European, national, regional or local)?

- Where and when should it be conducted?

- Who should be involved?

- How should the effects be evaluated?

9.1 Information

There are many conflicts which are genuinely associated with a lack of information and misunderstandings about issues as diverse as large carnivore ecology, legal frameworks, policy, practical methods for conflict mitigation, and the impacts of human activities on carnivores. There is a huge amount of ongoing research in the field leading to a constant production of new knowledge. In addition, there is a constant turnover of people – both with new generations being born and within the employees of various institutions. This implies that there is an almost endless and recurring need for information. Access to information is one of the fundaments of the democratic process and is a prerequisite for informed discussion. A desire for information is often expressed in interviews and questionnaires (e.g. Wechselberger et al. 2006).

It is important to consider however, what messages are being communicated, which media are used to transmit the message, to whom the messages are addressed, and who is used as the messenger. Because of the importance of these issues it is important to do some baseline investigations into these issues before investing in any actions. There is clear scope for using the distribution networks and resources of stakeholder groups to disseminate important messages in a targeted manner to those who most need to receive them. It is especially important that information is balanced and honest, ideally allowing the perspectives and experiences from multiple interest groups to be expressed to promote a higher degree of mutual insight. One strategy that appears to be successful is to get a number of stakeholders to work with researchers and other relevant experts to produce common information products that all sign off on. This greatly increases the legitimacy of the products and helps dampen the conflicts over knowledge that frequently appear in connection with large carnivore conservation. It also transforms information from being a one way, top-down, activity into a collaborative process.

However, it is crucial to realize that information has its limits (Brainerd & Bjerke 2003; Heberlein & Ericsson 2008). There are some actors in conflicts who are not interested in information, wide segments of the public are not interested in the issue at all, and there is little evidence that information changes attitudes, let alone fundamental values. In fact there is evidence that information can actually serve to strengthen values through selective filtering of content among people with strong views on an issue. Therefore, it is unlikely that information will dramatically change the attitudes of those people who are already strongly opposed to carnivores, but it may change the way the conflicts are played out and conducted. Ready access to well balanced and authoritative information may also help to lessen the impact of some of the misinformation campaigns that are emerging. Information may also be very important for maintaining positive attitudes among the wider public who have no strong opinions on the topic, although reaching groups who have insufficient interest to actively search for information represents a challenge and requires creative approaches. Despite these caveats, access to information is an underlying prerequisite for all other actions. The main point is that information on its own is rarely enough to transform a conflict.

9.2 Technical working groups

In some areas where knowledge is contested it may be productive to establish a working group composed of scientists and expert stakeholders who use a series of meetings or workshops to review existing knowledge and experience and try and come to a common understanding on specific issues. Areas of agreement can be identified, and if there are areas of disagreement it may be possible to

identify approaches to gathering new data to resolve the uncertainty. The output of such processes can be very authoritative with high degrees of legitimacy and can provide the content for information campaigns. The process also fosters a collaborative atmosphere among stakeholders. Working groups tend to be very focused and technical in nature and usually involve a limited range of experts rather than a broad stakeholder participation. Working groups can be used for just about any issue, ranging from exploring the extent and nature of conflicts to identifying solutions. In several areas there is a need to clarify legislative and administrative rules and procedures. This especially concerns the operationalization of general concepts within the specific context of large carnivores. It would have been very useful for expert groups to clarify some Europe wide issues related to defining favourable conservation status, the acceptable use of derogations (Darpö 2011; Hiedanpää & Bromley 2011; Mickanek 2012; Trouwborst 2010), the need for landuse restrictions in Natura 2000 sites because of large carnivores and the eligibility of mitigation measures to receive funds from the diverse funding mechanisms within Europe. Other areas that would be fruitful would be best practice guidelines for population monitoring and livestock depredation mitigation.

9.3 Outreach educational programs

In areas where carnivores return after long periods of absence rural people often find it hard to readjust to living with these species again. Fear is often cited as a major factor, with carnivores being perceived as an issue that reduces the quality of rural life (Linnell et al. 2002). Although wolves and bears have been documented to kill people under certain circumstances the objective risk of being harmed by a large carnivore is too low to quantify. However, the perceived risk is a very real issue to many people, and simply sending out information materials is rarely enough to reassure people (Linnell & Bjerke 2002). In a number of areas there have been projects that have tried to help people readjust to living with carnivores again by organizing outdoor activities that take people into carnivore habitat to demonstrate that life can go on as before, even if wolves and bears have returned. These activities provide a perfect arena for different stakeholders to meet with a wide segment of the rural public in a practical and positive setting. Such trips can be especially valuable if combined with research or monitoring activities in the field.

The range of actions also includes employing carnivore advocates, or local contact people, who can function as a contact point for rural people to gain access to information about carnivores, mitigation methods, economic incentives and other issues. Having a predictable and accessible contact person can be very conflict reducing as it provides a local face that can serve as an intermediary with the administrators of a conservation policy that is often determined far away and perceived as being faceless.

9.4 Economic and practical assistance

For the conflicts that have an economic and material nature, such as depredation on livestock or destruction of beehives for example, there are a number of technical solutions. These include actions like the introduction of electric fences, or the use of livestock guarding dogs and other shepherding systems (Linnell et al. 1996, 2012; Smith et al. 2000; Rigg 2001). The introduction of these measures by a user who is unfamiliar with them can be facilitated by technical assistance to ensure that the methods are applied correctly. Practical help both ensures their effective adoption and an opportunity for meaningful face to face contacts and dialogue with individual users. In order to up-scale from pilot projects to widespread use this form of outreach should ideally be institutionalized within the agricultural sectors own support structures. Given the marginal economics in sheep

farming in many countries there will be a practical need to provide some economic assistance to help the user adopt the new measures – either through providing funding or free materials. This being said, experience has also shown that it is crucial that the user also provides some own contribution, both in terms of money and labour, in order to ensure a sense of ownership.

The amount of change needed to adopt carnivore compatible husbandry methods varies hugely. In systems where sheep are already kept on fields and fenced pastures it is not much effort to upgrade from a conventional fence to an electric fence or introduce a livestock guarding dog (Kaartinen et al. 2009; Karlsson & Johansson 2010). If sheep are already herded (for example in connection with milking or grazing areas among croplands) it is not such a dramatic change to introduce a livestock guarding dog or upgrade the standards of a night-time enclosure (Mertens & Promberger 2000; Mertens et al. 2002; Smith et al. 2000). However, for the extensive free-ranging systems that have emerged in areas like the Alps and Norway (for sheep), throughout the Nordic countries (for reindeer) or in northern Iberia (for horses) in the temporary absence of large carnivores adopting carnivore compatible husbandry methods requires an almost total restructuring of the production system (Espuno et al. 2004). In these cases the costs of adjustment can be very high. In places where flocks are split over many different and small pastures, gathering them at night is often a big constraint, whereas having one guarding dog per pasture may be an economically speaking unsustainable option. Guarding dogs may also be not that well accepted by other parts of society.

Although no methods offer 100% protection from depredation, there is now a considerable body of experience from both traditional and modern applications, and best-practice guidelines are now readily available. The challenge is to create a will to adopt them, which at least in part will be aided by developing the funding mechanisms and the practical assistance needed to implement them. However, the scale of the challenge should not be underestimated, and neither should the cost (in terms of conflict, economics and animal welfare) of not doing so.

Dealing with garbage is another practical issue of great importance in areas with bears, as having well designed bins and dumps that prevent bear access can be crucial in preventing the development of problem behaviour.

9.5 Emergency teams

There are a variety of situations where large carnivores end up in situations where there is a need for a fine-tuned response. These include situations where specific individuals need to be rescued (e.g. when accidentally trapped in a snare), treated (e.g. after a vehicle collision), discouraged (e.g. if bears begin to frequent human food sources) or killed (e.g. following unacceptable levels of depredation on livestock or an attack on a person). These are highly specialized tasks that require experts with knowledge of specialist techniques for tracking, trapping, immobilizing, euthanizing, and treating wild animals. These teams will typically require a diversity of members that can be drawn from a range of stakeholder groups (e.g. field biologists, veterinarians, hunters). These teams need to have a clear working protocol and to be regularly trained to perform their tasks. Continuous exchange of experience should be used in upgrading protocols and further training. These teams can be very conflict reducing in that they allow a graded and targeted response to situations that can become conflictful, they convey an impression that the authorities are reacting to local acute situations and they provide a forum for collabourative work where mutual exchange of knowledge is crucial.

9.6 Economic instruments – compensation and incentives

Paying a monetary compensation (ex post facto) for livestock killed by predators has become an increasingly common strategy across Europe. The systems vary from country to country, with some paying more than market value, others paying less than market value, some systems paying for all animals lost while others only pay for animals that are documented as being lost, some paying only for direct loss (dead and wounded animals) other for indirect costs too (e.g. less fattening and induced abortion due to repeated attacks to flocks). There is also a huge variation in who pays. In some countries compensation is paid by the government while in others it is paid by the hunters with the lease for a specific area. Despite their widespread adoption the only function of these systems seems to be to protect livestock producers from economic loss. Research has frequently shown that compensation does little to increase acceptance of large carnivores. The existence of compensation provides a disincentive for producers to adapt their methods to the presence of large carnivores, and in the worst cases compensation can destabilize the whole livestock production system. How far such differences in compensating mechanisms may translate into unfair economical concurrency between countries should be assessed too. There are also many problems associated with the operation of a compensation system. Documentation of the cause of death of livestock requires careful examination and is not always possible, resulting in many conflicts over the basic facts of the events. Some of the existing compensation systems are associated with inefficiency and corruption leading to dissatisfaction among users. The transaction costs of documenting losses and processing claims can be high, and the amounts needed to be paid out can become very high (Agarwala et al. 2010; Boitani et al. 2010; Bulte & Rondeau 2006; Naughton-Treves et al. 2003; Naess et al. 2011; Nyhus et al. 2005; Schwerdtner &.Gruberb 2007).

There is now a broad consensus that if compensation is used at all it should generally be conditional on the adoption and effective use of preventative measures, and that compensation should not be so large as to remove all incentives to prevent depredation. In some situations, for example in areas where carnivores are only just colonizing or when an individual carnivore appears in a place where it could not be expected, it may well be appropriate to pay unconditional compensation during the process of transition. It is crucial that any compensation system should involve a careful and standardized inspection of killed livestock to protect against fraud and efficient payment. On the other hand, because no one prevention measure can warrant a zero level predation risk, compensation should not be fully dependent on the implementation of prevention. Confirmed records of livestock killed by carnivores can also serve as useful monitoring data, often very useful for detecting recent colonization of new areas.

In areas where depredation on livestock is regular and predictable it appears to be far better to pay a risk based incentive (i.e. pay for carnivore presence) or invest heavily in preventative measures rather than pay depredation based compensation (Zabel & Holm-Müller 2008). This greatly reduces transaction costs associated with documentation losses and processing claims and switches the focus to documenting carnivore presence (useful for monitoring) and adapting husbandry to minimize losses (Schwerdtner &.Gruberb 2007). To date this is only used for reindeer losses, but the approach shows potential (Zabel & Holm-Müller 2008). On the other hand, such an approach requires that a consensus has been reached between stakeholders and decision-makers, so that the risk based incentive is not perceived by the former as a disengagement of the latter.

9.7 Branding

One potential approach to minimizing the economic impact and maximizing the economic benefits of large carnivores involves the idea of branding, where consumers are asked to pay higher prices for livestock produce that has been produced within large carnivore range using carnivore compatible methods. While there have been several local scale attempts to launch such a product it has never been up-scaled to significant levels. Given the success of similar campaigns for other products there is considerable scope for exploring its utility with European livestock or honey production. However, it is also important to consider that there may be some opposition to this strategy from stakeholders who may be fundamentally opposed to the presence of these species in their landscape. Large carnivores could also be used to increase the perceived value of a range of other tourism products, including rural tourism, agri-tourism, ecotourism and trophy hunting if conducted in areas where the large carnivores are present.

9.8 Joint activity

The idea of engaging in joint activity is gaining ground as a mechanism to bring about constructive engagement between different stakeholders (Skogen 2003). It promotes face to face contact and mutual understanding as well as conveying an admission of shared responsibility to reach common goals. There are three areas where such activity could be especially useful in the context of large carnivore conservation.

A large part of the conflict around large carnivores concerns uncertainty or disagreement about the size and distribution of the populations. It would be highly desirable to obtain better data about carnivore populations, and to come to a better degree of agreement about these results. Throughout the Nordic, Baltic and many eastern European countries (e.g. Romania, Slovenia, Poland and Croatia) hunters and / or foresters have long been the main providers of data about all wildlife species. This cooperation between wildlife managers, researchers, foresters and hunters has been most developed in the Nordic / Baltic countries where hunters engage in highly organized data collection that is provided to managers and researchers (Braa et al. 2000; Kindberg et al. 2011; Lindén et al. 1996; Linnell et al. 2010; Solberg & Sæther 1999). The result is a unique access to data for the researchers and managers and a greater degree of buy-in and understanding from the hunters and foresters because they have taken part in the process (e.g. Skogen 2003). It also means that their contribution is much more easily visualized and appreciated. The Alpine countries also use networks of observers to collect data within the frames of the French wolf-lynx network and the international SCALP project (Molinari-Jobin et al. 2012). This model could be easily expanded to many parts of Europe, especially with the present access to camera-traps and DNA methods that permit the quality control of data provided, and it could be expanded beyond hunters and foresters to all those who spend time in the outdoors as well as landowners. Such an approach could be conceptually organized in a way similar to the ever expanding network of citizen science initiatives that are constantly showing their value for monitoring the state of European nature (Roy et al. 2012). The difference in this case is that the desired outputs would be both the data provided and the resultant reduction in conflict resulting from the co-production of knowledge.

A second area of joint activity lies within the area of livestock husbandry. Adapting to, and operating, carnivore-compatible husbandry methods often involves an increase in labour. There is great potential for conservation volunteers for example to take part in this work. Such programs have been piloted, especially in North America, and while volunteers will never have the full set of skills of

shepherds they can certainly assist in many tasks. For example, a French NGO (Ferus) provides shepherds facing wolf predation with specially trained volunteers to help take care of the flocks and managing the prevention tools locally (such as electric fences).

A third area concerns the involvement of stakeholders in field research projects. A lot of ecological field data collection is labour intensive and requires a detailed knowledge of the landscape. For this reason, local people, be they hunters, foresters, herders, naturalists or simply outdoorsmen are ideal partners for researchers. Given some basic training, local people can collect valuable data from the field, often more cheaply and more efficiently than researchers. The fact that they live in the study area also reduces travel costs. The co-production of knowledge provides opportunities for scientific and local knowledge to interact and build on their mutual strengths. At its best local knowledge provides detailed and intimate insights into local ecosystems and landscapes, while scientific knowledge can provide modern tools (GPS-telemetry, DNA methods etc) that allow insights that are impossible for local observers. This combination results in the production of an integrated knowledge which has a greater legitimacy than knowledge produced in isolation.

9.9 Study visits and experience-transfer

Trust and legitimacy are key issues in stakeholder engagement. In many cases there is likely to be a high degree of trust within stakeholder groups as they presumably have common values, goals and experiences. There is therefore a lot to be gained by bringing members of a given stakeholder group from different areas together to exchange experience. For example, sheep farmers in eastern and southern Europe have generations of continuous experience at farming sheep in the presence of large carnivores. These farmers are probably the best communicators to discuss the potential for change with their western European counterparts who have to relearn all the old methods. The same potential benefits exist in all directions for almost all stakeholder groups to learn from their peers with contrasting experiences, although each may need to adapt the experience to local situations.

9.10 Structured decision making

In some cases conflicts are mainly of a technical nature, for example when discussing the impact of hunting quotas or the impact of removing certain numbers of problem animals, or evaluating the most cost effective way to reach a certain goal. For these cases there are a number of statistical approaches that can be used to model the impact of different strategies. The ability to produce a series of mathematical scenarios allows the exploration of different strategies. Although the internal mathematics of these models is often complex, it is rarely problematic to engage stakeholders in the process of using them, collabouratively coming up with different scenarios and input parameters and discussing the meanings of the outputs (Redpath et al. 2004; Westly & Miller 2003). These approaches can be applied in technical conflicts over details rather than broad value based conflicts. Potential areas of application can concern cases where the impact of hunting quotas are controversial or in cases of landuse planning where the impacts of infrastructure routing or placement is being explored. Questions concerning the optimal impact of various economic instruments can also be modeled.

9.11 Contact forums

A common measure to facilitate the distribution of information and improved dialogue has been the establishment of contact forums. These usually consist of regular (annual or bi-annual) meetings where responsible management agencies, a diversity of stakeholders, and scientists meet to discuss issues related to large carnivores and conflicts. Benefits include providing a structured forum for the presentation of information, such as the latest research results, two-way discussions about management issues and the opportunity for the development of trust between stakeholders. Such forums represent a formal institutionalization of participation and dialogue and have a high degree of symbolic as well as practical value.

9.12 Institution building

The weakness of many public (formal) institutions involved in large carnivore conservation has been identified as both a threat to the survival of large carnivores and a cause of conflict with many stakeholder groups. It is therefore possible to imagine a widespread capacity building program to help institutions build capacity in a diversity of relevant issues including; population monitoring, stakeholder engagement, law enforcement and damage mitigation.

While institution building is needed at many levels and in many different systems, it could be highly advantageous to build on the existing wildlife management structures, with their existing networks among hunters, farmers and foresters. These structures provide tried and trusted frameworks for managing wildlife and are deeply imbedded within rural communities. Although these structures may require some modernization and adaptation to live up to present day requirements when it concerns large carnivore conservation they represent a potentially efficient and irreplaceable resource. However, in some countries these structures do not exist, or do not function, and therefore need to be built up from the ground.

One of the clear challenges facing large carnivore conservation is the need for transboundary cooperation. This requires the development of new institutional arrangement at both national (for federal countries) and international levels to facilitate cross-jurisdictional communication. The challenges here are great because it does not only involve communication between EU (commonly bound by the Habitats Directive) and Council of Europe (joined by the Bern Convention) members, but depends very heavily on what occurs in a number of other states like Russia and Belarus.

9.13 Hunting and lethal control of large carnivores

When trying to integrate large predatory mammals into a crowded continent like Europe it is inevitable that some individuals that demonstrate problematic behaviour will need to be killed. Bears in particular show a tendency to develop potentially dangerous behaviour when they become food-conditioned (Linnell et al. 1999). Non-lethal forms of removal such as translocation or removal to captivity are basically non-viable as large scale sustainable strategies in Europe (Linnell et al. 1997), although there may be some potential for small scale actions (e.g. the translocation of lynx within the Alps; Ryser et al. 2004). It is important that well thought out and well communicated protocols exist for how to deal with specific individuals who display specific and unwanted behavior, such as food conditioning, boldness or attacks on people. These protocols should be followed up rapidly when the triggering circumstances are present. While the use of lethal methods to selectively remove specific individuals is relatively uncontroversial from both social and legal points of view (although see Tosen & Bath 2009 for an exception) there are other more controversial cases (Treves 2009).

One case concerns the large populations of large carnivores that occur in some parts of Europe (Kaczensky et al. 2013). These populations number in the hundreds or thousands of individuals and there is little doubt about their current viability. Some of these populations show considerable potential for growth. While there is considerable variation in the relationship between carnivore density and conflict when comparing between areas with different social and ecological contexts (e.g. Blanco & Cortes 2009; Kaczensky 1999), there is often a link between the level of conflict and the size and distribution of the population within a given context (e.g. Gervasi et al. 2012; Herfindal et al. 2005) and the limit of public tolerance will often be reached before the carnivores reach the habitat's biological carrying capacity or before density dependent processes begin to effectively regulate population size. In many cases there is therefore a practical desire expressed by some stakeholders to limit the size of these populations to maintain them at their present levels (or at least to prevent endless growth). Stabilisation is currently the management goal in many of the countries with large numbers of carnivores which can be seen as a consequence of success in conservation (Swenson et al. 1998; Ring et al. 2008). From a biological point of view stabilising large populations with rapid potential growth rates requires the killing of a significant proportion of the population each year, depending on species demographics and ecological context. As well as limiting the size of the population hunting can also give rural people a sense that they have some personal control over the carnivores with which they share their rural landscapes (Andersone & Ozolins 2004; Bisi et al. 2007; Liukkonen et al. 2009; Majic et al. 2011) and create the potential opportunity for using carnivores as a resource (Knot et al. in press). In many of these areas with large populations lynx, bears and wolves have been routinely hunted as official or de facto game species (Salvatori et al. 2002; Kaczensky et al. 2013), and conflicts are currently not that high. Experience has shown that major restrictions on these practices may be potentially perceived (depending on context) as a loss of power, a loss of control, the loss of a valued activity and a loss of a resource, all imposed by an external authority (Bisi et al. 2007; Liukkonen et al. 2009; Hiedenpää 2011; Majic et al. 2011), factors which can potentially increase levels of conflict. In the absence of widespread illegal killing, restrictions on legal harvest will also inevitably lead to population growth unless there are other external factors limiting the population. Increasing density beyond certain points will potentially result in an increase in conflicts. In these cases allowing the continuation of hunting of carnivores may be regarded as important to contain conflicts and ensure that the relatively high degree of public tolerance of carnivores in these large populations is maintained, provided its impact is adequately monitored and does not affect the long-term viability of populations. It is also important that hunting in one country must not negatively influence populations in neighbouring countries through source-sink dynamics and not hamper an expansion of the population's range into suitable habitats officially declared/considered as a part of the favourable reference range of the species, both within the country and in neighbouring countries (Linnell et al. 2008).

The other situation concerns the possibility to allow limited hunting in smaller populations or in areas with no recent tradition of carnivore hunting. The dynamics of many populations show positive growth and models indicate that low levels of regulated harvest may not prevent even relatively small populations from continuing to grow provided that harvest is limited, well regulated and the population closely monitored (Chapron et al. 2003; Linnell et al. 2010; Nilsen et al. 2012; Sæther et al. 2005, 2010; Tufto et al. 1999). It is claimed by hunters that allowing even a limited harvest will reduce some social conflicts by giving them an opportunity to have some influence over carnivore populations, as well as allowing them to exploit carnivores as a resource for recreational or trophy

hunting. The social and economic effects that this will have on wider rural communities will depend very much on how the hunting system is organized (local hunters versus outside hunters) and the general standing of hunting in the specific communities. Worth noticing is that opening for hunting may however cause environmentalists and segments of the wider public to feel disempowered and lead to an increase in litigation and therefore an escalation of conflict, as illustrated by the Swedish wolf example (Darpö 2011, Michanek 2012). Also the process of slowing population growth may potentially provide more time to adapt to their reappearance. Finally, the claim is made that allowing legal harvest will reduce rates of illegal killing. Many of these claims are often controversial (Treves 2009; Treves & Martin 2011). On the one hand, there is some evidence to support the idea that hunting might in certain contexts increase trust towards authorities and acceptance of large carnivores (Bisi et al. 2007; Ericsson et al. 2004; Liukkonen et al. 2009; Skogen et al. 2003; Sjölander-Lindqvist et al. 2010), on the other hand, it is not clear if hunting in such situations may not ultimately be detrimental to the recovery of small carnivore populations by reinforcing intolerance towards population growth. It also appears that in some contexts illegal hunting may have been facilitated by poorly organised legal harvest. This is therefore an area that urgently needs more research and where it may be possible to try out certain culling regimes and document their impact on tolerance and the level of illegal killing (Andrén et al. 2006).

It must be borne in mind that the killing of charismatic species like large carnivores is often very controversial with environmentalists, animal welfare advocates and many scientists, as well as elements among the wider public. This returns us to the central dilemma associated with large carnivore conflicts – that while the wider public is generally very positive to their conservation, the conflict is disproportionately felt by a minority in society. Thus it becomes a question of to what extent concessions should be given to these minorities, which strikes at the debate about democracy should balance majorities and minorities (Arblaster 2002). From a conservation policy point of view it is also important to consider that while hunting is controversial, it is regarded as a legitimate activity, as highlighted by the endorsement of the European Charter on Hunting and Biodiversity by all signatories of the Bern Convention, which includes all EU member states. This implies that within existing policy frameworks discussions about hunting carnivores should not focus on the moral principle of killing carnivores, but instead should be focused on issues of legality concerning the way it is organized (Darpö 2011; Hiedanpää & Bromley 2011; Mickanek 2012; Shine 2005) and biological issues concerning how it impacts population function, structure and viability). Under this consideration the key issues are linked to (1) the quality of the monitoring system (e.g. Caniglini et al. 2012; Flagstad et al. 2004; Linnell et al. 1998, 2007; Solberg et al. 2006), (2) knowledge about the demographics of the species / population in question (e.g. Chapron et al. 2003, 2009; Nilsen et al. 2012a,b), (3) the ability of the decision making processes to respond to observed population changes and handle uncertainties (e.g. Milner-Gulland et al. 2010; Bunnefeld et al. 2011), and (4) the extent to which hunter behaviour can be predicted (Bischof et al. 2008, 2012) and regulated (Rowcliffe et al. 2004; St Johns et al. 2012), and to which illegal killing can be minimised.

9.14 Delegation of power to local levels

At the same time as Europe has undergone a process of building pan-European structures there has been another trend within countries to delegate decision making, or decision implementing, authority to lower, more local levels. This is formally endorsed by the EU under the principle of subsidiarity. The theory behind delegation and decentralization is that local level decisions will enjoy greater legitimacy and be more adapted to local needs. The global experience with such structures is

mixed and it is far from automatic that local structures deliver the benefits they are meant to deliver (see Linnell 2005 for a review). It is especially challenging for large carnivores because their conservation requires large scale (i.e. international) coordination of effort to manage whole populations (Linnell et al. 2008; Linnell & Boitani 2012). Another issue is that so much of their management is constrained by international agreements that there is relatively little decision making authority that can be delegated. The Fennoscandian countries have tried a variety of structures with decentralized and delegated authority, although the experience is mixed and no real conclusions about their success are available yet (Guldvik & Arnesen 2001; Sandström et al. 2009).

Many European countries have formal federal structures where responsibility for environmental and biodiversity issues is often delegated to autonomous regions or federal states. Experience with this is mixed, and many cases of lack of coordination and institutional failures are apparent, while there is little indication that the greater proximity to local people serves to reduce conflicts.

9.15 Developing inclusive visions for the European landscape

Many conflicts are associated with perceived fundamental differences in how stakeholders value the landscape and view their place and role within these landscapes. However, experience has shown that there is usually a huge amount of unrecognized common ground between many stakeholders that needs to be visualized and capitalized on. Collaborative visioning is a participatory process where areas of common ground and areas of real dissent can be identified. Because these exercises are future orientated it is also possible to use scenario methods to help minimize discussions about differences or disagreements from the past.

Europe offers a very specific conservation context that strongly differs from the more widespread wilderness models that are well developed in North America, Africa and Asia. The European focus has always been much more based on an integration of humans and nature and the interweaving of natural and cultural heritage. The needs to integrate human culture and nature are clearly enshrined in the preambles and texts of the Habitats Directive, the Bern Convention and the European Landscape Convention. This model potentially offers a place for most stakeholders' interests in a multi-functional landscape. While this vision has been implicit for many decades it has rarely been well articulated. However, large carnivore conservation, and the emergence of a European wilderness discourse are challenging these traditional visions. In effect, these two issues are perceived as being threats to the continuation of traditional forms of landuse, lifestyle and livelihoods that involve production (grazing, hunting, forestry), and conflict is very often derived from fear (Maser & Pollio 2012).

It would have been very beneficial for a group of stakeholders to work together to articulate a large scale and broad vision for how they think their various interests could be integrated within a shared European landscape. This process could especially be useful to identify to what extent any conflicts are actually about matters of rhetoric or language and confusions of scale rather than issues of substance. If an integrative vision of how large carnivores, biodiversity, and human interests can be developed and agreed upon by a diversity of stakeholders it could serve as a powerful communicative tool to reduce conflicts associated with feelings of threat and serve as a constructive driving force to motivate positive social and ecological outcomes.

9.16 Participatory development of action plans

Having detailed action plans or management plans is a key component for conservation. Not only does such a plan ensure that the biological needs of the species are formally taken into account, but it also provides a structured way to provide predictability for stakeholders who may be impacted by this conservation. Issues of concern can be explicitly addressed and firmly anchored within formal policy frameworks. Clear statements of goals and means provide a foundation for adaptation.

Traditionally, action plans have been written by experts or bureaucrats and have proven to be sources of conflict in some cases. In recent decades there has been a widespread acceptance of the need to involve stakeholders in the process. This can be achieved in a number of ways.

Firstly, stakeholders can be consulted at various stages of the process during which an action is developed. This can be done in a range of ways, including allowing for written comments on drafts, to holding public meetings, to constituting formal advisory groups of stakeholders to give input into a process (Andersen et al. 2004; Anonymous 2007; Bisi et al. 2007; Bouwma et al. 2010a,b; Liukkonen et al. 2004). All these processes serve to allow people with interests in the case to communicate their concerns to the policy makers in structured manners. It is also common to accompany these processes with the commissioning of a diversity of research and technical reports that summarise the state of knowledge on various relevant topics. Original research can also be commissioned to fill knowledge gaps. If the stakeholder involvement is conducted well and throughout the whole process (especially starting early in the process) it is possible for such consultative processes to influence the contents of action plans and convey a sense of legitimacy to the plans. However, no real power is ever given to the stakeholders. Most existing European action plans for large carnivores have been drawn up using these consultative processes.

A second approach is to convene a group of stakeholders, with expert facilitators, and delegate the formal power of drawing up an action plan to this group. This requires that decision makers have the authority to delegate power, and if so that they agree to abide by whatever the group comes up with at the end of the process, although they will naturally be constrained by national and international legal frameworks. This requires a high degree of trust. It also requires that stakeholders have good internal communication so that their delegates have the mandate to speak for the members of their organisations. Such processes tend to take a long time, especially if there is a desire to achieve full consensus, and require major investments of time. If they succeed, such processes have the potential to have a high degree of legitimacy and greatly reduce conflicts. They have so far only been applied in the less conflictive context of bear management in Bulgaria and Croatia (Bath 2009).

A key challenge for running such processes for large carnivores concerns scale. The need to coordinate manage at the population scale is now well recognized (Linnell et al. 2008; Linnell & Boitani 2012) and almost always requires coordination of management between different jurisdictional units, be they autonomous regions, federal states or countries. While planning on these scales is essential for the long term survival of large carnivores, and to effectively deal with many to the material and practical conflicts, it poses challenges for widespread participation. There will be a need to experiment with new approaches to integrate stakeholders into these processes.

9.17 Co-management.

This form of collaborative management has become quite common in natural resource management and wildlife management (Decker et al. 2000; Borrini-Feyerabend et al. 2004; Zachrisson 2004) although it has not yet been formally used within a large carnivore management context. In its classical sense co-management involves making decisions via a committee that consists of representatives of the authorities that hold formal power and representatives of some of the main stakeholders. Scientists or other external experts may also be included as members of the committees or called upon as external advisors. This committee is then delegated the authority to make management decisions. The fact that these committees are small and meet regularly over prolonged periods permits the development of trust, mutual understanding and co-learning, and have shown themselves to be especially valuable in cases involving indigenous peoples and natural resource management. In many ways co-management represents a formalized perpetuation of participatory action planning, although the frames tend to be set over long time scales, with annual decisions being taken on things like harvest quotas. The model has great potential for wider use.

10 Key elements of stakeholder engagement and public participation

10.1 Advantages and disadvantages

Although the body of knowledge on such processes is largely experience based, the literature on public participation consistently contains very similar lists of claimed advantages and disadvantages of participatory processes. These can be summarized as:

Benefits for democratic society, citizenship and equity:

- More relevant stakeholders to be included in decisions that affect them.
- May increase trust in decisions and civil society if transparent and considering conflicting claims and views.
- Can empower stakeholders through the co-generation of knowledge.
- Increase likelihood that decisions are perceived to be holistic and fair accounting for a diversity of values and needs, recognising complexity.
- May promote social learning.
- New relationships, building on existing relationships and transforming adversial relationships as individuals to learn about others' trustworthiness and learn to appreciate the legitimacy of each other's view.

Benefits for the quality and durability of decisions:

- Enables interventions and technologies better adapted to local sociocultural and environmental decisions.
- May enhance rate of adoption and diffusion among target groups
- Meet local needs and priorities.
- Make research more robust, providing higher quality information input.
- Higher quality decisions, anticipating and ameliorating unexpected outcomes.
- Sense of ownership over process and outcomes.

• Long-term support and active implementation of decisions might be enhanced.

Potential disadvantages
• Costly in time and resources in short to medium term.
• Difficult to apply at large scales.
• There may be risks of democratic deficits if processes are dominated by some powerful lobby groups, and it is hard to involve the wider public who are also stakeholders.
• May lead to a reduction in the use of scientific knowledge.
• May be outcome deficits (from an environmental point of view) due to the nature of compromises.

10.2 Characteristics of a good process

There are many different methodological approaches that vary widely in format, from the very structured to the very open and unstructured (Owen 2008; UNEP 2007a,b). However they have a number of things in common. Based on the experience of many practitioners it is possible to identify a set of criteria that describe a good participatory process (Bouwma et al. 2010b; Webler et al. 2001; Sidaway 2005; Maser & Pollio 2012).

• Managing expectations so that goals are realistic. A central issue here lies in being very open about how much influence the process can have and about what legal or policy constraints are imposed on the group. It is also often pointed out that the biological and ecological constraints on the species or ecosystems being discussed need to be clearly identified.

• Ensuring popular legitimacy which requires that stakeholder representatives should be empowered by their constituents to negotiate on their behalf.

• The process should facilitate a broad and open dialogue which allows ideologies and values to be openly communicated. However, the focus should be very much on exploring common interests rather than divergent positions.

• The process should be fair, giving all participants an equal chance to speak, and conducted in a manner that allows trust to develop and dignity to be maintained.

• The process needs clear leadership with trusted and experienced facilitators.

10.3 Consensus vs consent

The ideal goal of any participatory process is to achieve full consensus where all participants agree on the final product (Sidaway 2005). Such consensus documents are very powerful tools and reflect a good outcome from an effective process. While this can be realistically achieved in some cases (Bath 2009) there are many cases where it may not be possible to reach it. This concerns cases where the issues being discussed touch onto some fundamental values that participants are not willing to compromise on or negotiate. It may also occur in processes where one or more participants are unwilling to compromise for strategic reasons because they feel that they can actually “win” outright if they keep their veto position. While consensus should be hoped for in any process, failure to reach it does not reflect a failure of the process. Other outcomes such as near consensus where areas of dissent are explicitly mentioned are also valuable. In fact, there is a large body of literature which argues that consensus may not even be such a desirable goal (e.g. Hiedanpää 2005; Niemelä et al.

2005; McShane et al. 2011; Peterson et al. 2004, 2005). These authors argue that the most important goal of a process is to provide mutual insight between different stakeholders' values and interests. They argue that it is more important for these views to be presented clearly and honestly, and if there is real disagreement that it is better to have this in the open rather than to focus on achieving an illusion of agreement on things that different stakeholders don't really agree on. These argument based approaches seek to make the necessary compromises and trade-offs associated with any decision making process explicit and open (Cuppen 2012). It is still possible for stakeholders to accept the outcome of a process that they perceive as having been fair and legitimate even if they don't agree with all of the content. This is termed informed consent. When the process is regarded as being as important as the goal these differences may seem somewhat academic. The point is however that it is important to be prepared for different outcomes depending on each process as it is not ever possible to know in advance where a given process will end up. If it was, then there would be no need for a participatory process.

10.4 When it doesn't work

There are some conflict situations that are unsuited to participatory approaches. These include conflicts that involve large scales where it is difficult to gather the affected stakeholders, in cases where stakeholders do not want to take part, or in cases where some very fundamental values are at stake. The literature also contains examples where badly run processes actually make the conflicts worse (Rauschmayer et al. 2009). The implication is that participation is not a magic bullet for all conflicts (Young et al. 2013). Some conflicts may remain chronic or unresolvable and will require clear top-down decision making (Redpath et al. 2013). Some stakeholder processes have actually led to clear expressions of a need for external decision makers to make clear decisions in order to get past an impasse (Andersen et al. 2004).In such cases it may be possible to lower the level of conflict to acceptable levels through dialogue and discussion, and at least channel the conflict into acceptable levels (Peterson et al. 2004).

11 Conclusions

The basic conclusion from this review is one of diversity. The ecological situation and conservation status of large carnivore populations is diverse across Europe, from critically endangered populations to large and robust ones. All these populations are exposed to a wide diversity of threats, although there is a growing realization that low social acceptance and / or poor institutional capacity are emerging as key issues. The relationships the large carnivores have with the human communities with which they share space are also highly diverse. In some contexts the relationship is calm and conflicts basically involve minor issues of occasional material damage. In other contexts conflicts are extreme, touching on a range of social and political issues. Because of this diversity of situation there is obviously no "one-size-fits-all" solution. Neither are there any "magic bullets". There are a range of potential actions and strategies that can be taken to prevent, resolve, reduce or manage conflicts. These actions include some technical measures that can be taken, while others are more procedural. Among these is a need to expand the scale of management planning to embrace the population level, which almost always requires some form of transboundary, multi-jurisdictional approach. For all actions there are many benefits to be gained from ensuring that a diversity of stakeholders are involved in the actions. The ways of engaging with stakeholders are diverse and need to be tailored to the specific situation. However, the extent to which large carnivore conservation touches onto

some deeply held values in some contexts implies that some conflicts are likely to remain no matter what is attempted. Overall the main objective to which we can hope to aspire is tolerance; tolerance for the presence of carnivores, mutual tolerance for diverse human values, and tolerance for a diversity of locally adapted ways to build a sustainable relationship between and among people, institutions and large carnivores.

Acknowledgements: Many people have provided valuable input to various drafts of this report. From the stakeholder side I would like to thank Gabor von Bethlenfalvy, Anne Ollila, Eva-Lisa Myntti, Yves Lecocq, Angus Middleton, Tania Runge, Tamas Marghescu, Luis Suarez, Amelie Villette, Delphine Dupeux, and Simo Tianinen for input received in writing and during workshop discussions. My colleagues at the Norwegian Institute for Nature Research, the Large Carnivore Initiative for Europe and other cooperation partners have provided invaluable discussions over the years which have allowed this review to be possible. I would especially like to thank the following for commenting directly onto various aspects of this report; Guillaume Chapron, Djuro Huber, Petra Kaczensky, Luigi Boitani, Sabina Nowak, Valeria Salvatori, Aleksandra Majic, Jenny Glikman, Aleksander Trajce, Jørn Thomassen, Nicolas Lescureux, Manuela von Arx, Eric Marboutin, and Slaven Rejic.

Literature cited

Agarwala, M., Kumar, S., Treves, A. & Naughton-Treves, L. (2010) Paying for wolves in Solapur, India and Wisconsin, USA: comparing compensation rules and practice to understand the goals and politics of wolf conservation. *Biological Conservation,* 143, 2945-2955.

Alleau, J. (2011) *Garder ses distances : une histoire des relations homes-loups dans les Alpes occidentales (XVIe-XVIIIe siècle)*. PhD Thesis, Caen University, France.

Andersen, R., Linnell, J.D.C., Hustad, H. & Brainerd, S. (2004) Large carnivores and human communities: a guide to coexistence in the 21st century. *Norwegian Institute for Nature Research Temahefte,* 25, 1-48.

Andersone, Z. & Ozolins, J. (2004) Public perception of large carnivores in Latvia. *Ursus,* 15, 181-197.

Andrén, H., Linnell, J.D.C., Liberg, O., Andersen, R., Danell, A., Karlsson, J., Odden, J., Moa, P.F., Ahlqvist, P., Kvam, T., Franzén, R. & Segerström, P. (2006) Survival rates and causes of mortality in Eurasian lynx (Lynx lynx) in multi-use landscapes. *Biological Conservation,* 131, 23-32.

Anonymous (2007) *Rovdjuren och deras förvaltning: betänkande av utredingen om de stora rovdjuren*. Statens Offentliga Utredningar SOU 207:89, Stockholm.

Arblaster, A. (2002) *Democracy*. Open University Press, Buckingham, UK.

Balciauskiene, L. & Balciauskas, L. (2001) Threat perception of large carnivores: are there sexual differences? *Human dimensions of large carnivores in the Baltic States*, pp. 64-77. Baltic Large Carnivore Initiative, Vilnius.

Bath, A. (2009) Working with people to achieve wolf conservation in Europe and North America. *A new era for wolves and people: wolf recovery, human attitudes, and policy* (eds M. Musiani, L. Boitani & P.C. Paquet), pp. 173-200. University of Calgary Press, Calgary.

Bath, A., Olszanska, A. & Okarma, H. (2008) From a human dimensions perspective, the unknown large carnivore: public attitudes toward Eurasian lynx in Poland. *Human Dimensions of Wildlife,* 13, 31-46.

Bath, A.J. (2001) *Human dimensions in wolf management in Savoie and Des Alpes Maritimes, France: Results targeted toward designing a more effective communication campaign and building better public awareness materials*. Large Carnivore Initiative for Europe www.large-carnivores-lcie.org.

Bell, S., Hampshire, K. & Topalidou, S. (2007) The political culture of poaching: a case study from northern Greece. *Biodiversity and Conservation,* 16, 399-418.

Benhammou, F. & Mermet, L. (2003) Strategy and geopolitics of the opposition against the preservation of nature: the bear in the Pyrenees. *Natures Sciences Sociétes,* 11, 381-393.

Bischof, R., Fujita, R., Zedrosser, A., Söderberg, A. & Swenson, J.E. (2008) Hunting patterns, ban on baiting, and harvest demographics of brown bears in Sweden. *Journal of Wildlife Management,* 72, 79-88.

Bischof, R., Nilsen, E.B., Brøseth, H., Männil, P., Ozolins, J. & Linnell, J.D.C. (2012) Implementation uncertainty when using recreational hunting to manage carnivores. *Journal of Applied Ecology,* 49, 824-832.

Bisi, J., Kurki, S., Svensberg, M. & Liukkonen, T. (2007) Human dimensions of wolf (Canis lupus) conflicts in Finland. *European Journal of Wildlife Research,* 53, 304-314.

Bjerke, T., Vittersø, J. & Kaltenborn, B.P. (2000) Locus of control and attitudes toward large carnivores. *Psychological Reports,* 86, 37-46.

Blanco, J.C. & Cortés, Y. (2002) *Ecology, census, perception and development of wolves in Spain: an analysis of a conflict [Ecología, censos, percepción y evolución del lobos en España: análisis de un conflicto]*. Sociedad Española para la Conservación y Estudio de los Mamíferos (SECEM), Málaga, Spain.

Boitani, L., Ciucci, P., Corsi, F. & Dupre, E. (1999) Potential range and corridors for brown bears in the eastern Alps, Italy. *Ursus,* 11, 123-130.

Boitani, L., Ciucci, P. & Raganella-Pelliccioni, E. (2010) Ex-post compensation payments for wolf predation on livestock in Italy: a tool for conservation? *Wildlife Research,* 37, 722-730.

Borrini-Feyerabend, G., Pimbert, M., Farvar, M.T., Kothari, A. & Renard, Y. (2004) *Sharing power. learning by doing in co-management of natural resources throughout the world.* International Institute for Environment and Development and the Collaborative Management Working Group, Tehran.

Bouwma, I.M., van Apeldoorn, R., Cil, A., Snethlage, M., McIntosh, N., Nowicki, N. & Braat, L.C. (2010a) *Natura 2000 - adressing conflicts and promoting benefits*. Alterra, Wageningen, The Netherlands.

Bouwma, I.M., Van Apeldoorn, R. & Kamphorst, D. (2010b) *Current practices in solving multiple use issues of Natura 2000 sites: conflict management strategies and participatory approaches*. Alterra, Wageningen, The Netherlands.

Braa, J.T., Brainerd, S., Brøseth, H., Knutsen, E. & Linnell, J.D.C. (2000) Proposal for a national monitoring program for large carnivores [Forslag til Nasjonalt overvåkingsprogram for store rovdyr]. *Utredning for Directoretet for naturforvaltning,* 2000-1, 1-31.

Brainerd, S.M., Andrén, H., Bangs, E.E., Bradley, E.H., DFontaine, J.A., Hall, W., Iliopoulos, Y., Jimenez, M.D., Jozwiak, E.A., Liberg, O., Mack, C.M., Meier, T.J., Niemeyer, C.C., Pedersen, H.C., Sand, H., Schultz, R.N., Smith, D.W., Wabakken, P. & Wydeven, A.P. (2008) The effects of breeder loss on wolves. *Journal of Wildlife Management,* **72,** 89-98.

Brainerd, S.M. & Bjerke, T. (2003) Information strategies for large carnivores in Norway [Informasjonstiltak om store rovdyr i Norge]. *Norwegian Institute for Nature Research Fagrapport,* 069, 1-71.

Brox, O. (2000) Schismogenesis in the wilderness: the reintroduction of predators in Norwegian forests. *Ethnos,* 65, 387-404.

Bulte, E.H. & Rondeau, D. (2006) Why compensating wildlife damages may be bad for conservation. *Journal of Wildlife Management,* 69, 14-19.

Bunnefeld, N., Hoshino, E. & Milner-Gulland, E.J. (2011) Management strategy evaluation: a powerful tool for conservation? *Trends in Ecology and Evolution,* 26, 441-447.

Campbell, B. (2005) Changing protection policies and ethnographies of environmental engagement. *Conservation & Society,* 3, 280-332.

Caniglia, R., Fabbri, E., Cubaynes, S., Gimenez, O., Lebreton, J.D. & Randi, E. (2012) An improved procedure to estimate wolf abundance using non-invasive genetic sampling and capture-recapture mixture models. *Conservation Genetics,* 13, 53-64.

Caniglia, R., Fabbri, E., Greco, C., Galaverni, M. & Randi, E. (2010) Forensic DNA against wildlife poaching: identification of a serial wolf killing in Italy. *Forensic Science International - Genetics,* 4, 334-338.

Chapron, G., Legendre, S., Ferrière, R., Clobert, J. & Haight, R.G. (2003) Conservation and control strategies for the wolf (Canis lupus) in western Europe based on demographic models. *Comptes Rendus Biologies,* 326, 575-587.

Chapron, G., Wielgus, R., Wuenette, P.-Y. & Camarra, J.-J. (2009) Diagnosing mechanisms of decline and planning for recovery of an endangered brown bear (Ursus arctos) population. *Plos One,* 4, e7568.

Chase, L.C., Decker, D.J. & Lauber, T.B. (2004) Public participation in wildlife management: what do stakeholders want? *Society and Natural Resources,* 17, 629-639.

Chase, L.C., Schusler, T.M. & Decker, D.J. (2000) Innovations in stakeholder involvement: what's the next step? *Wildlife Society Bulletin,* 28, 208-217.

Corsi, F., Dupre, E. & Boitani, L. (1999) A large-scale model of wolf distribution in Italy for conservation planning. *Conservation Biology,* 13, 150-159.

Corsi, F., Sinibaldi, I. & Boitani, L. (1998) *Large carnivore conservation areas in Europe: discussion paper for the Large Carnivore Initiative*. Istituto Ecologia Applicata, Rome.

Cuppen, E. (2012) Diversity and constructive conflict in stakeholder dialogue: considerations for design and methods. *Policy Science,* 45, 23-46.

Dahle, B. (2000) Extensive illegal killing of brown bears in Sweden. *International Bear News,* 9.

Darpö, J. (2011) Brussels advocates Swedish grey wolves: on the encounter between species protection according to Union law and the Swedish wolf policy. *Sieps European Policy Analysis,* 8, 1-20.

Decker, D.J., Schusler, T.M., Brown, T.L. & Mattfeld, G.F. (2000) Co-management: an evolving process for the future of wildlife management. *Transaction of the North American Wildlife and Natural Resources Conference,* 65, 262-277.

Ericsson, G. & Heberlein, T.A. (2003) Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation,* 111, 149-159.

Ericsson, G., Heberlein, T.A., Karlsson, J., Bjärvall, A. & Lundvall, A. (2004) Support for hunting as a means of wolf Canis lupus population control in Sweden. *Wildlife Biology,* 10, 260-276.

Espuno, N., Lequette, B., Poulle, M.L., Migot, P. & Lebreton, J.D. (2004) Heterogeneous response to preventive sheep husbandry during wolf recolonization of the French Alps. *Wildlife Society Bulletin,* 32, 1195-1208.

Figari, H. & Skogen, K. (2011) Social representations of the wolf. *Acta Sociologica,* 54, 317-332.

Flagstad, Ø., Hedmark, E., Landa, A., Brøseth, H., Persson, J., Andersen, R., Segerstrom, P. & Ellegren, H. (2004) Colonization history and non-invasive monitoring of a restablished wolverine population. *Conservation Biology,* 18, 676-688.

Forsberg, J. & Korsell, L. (2005) Illegal jakt på rovdjur: en förstudie. pp. 58. Brå - centrum för kunnskap om brott och åtgärder mot brott, Stockholm, Sweden.

Frafjord, K. (1988) The attitude of Norwegian newspapers to large carnivores [Noen norske avisers holdning til store rovdyr]. *Fauna,* 41, 101-103.

Gervasi, V., Nilsen, E.B., Sand, H., Panzacchi, M., Rauset, G.R., Pedersen, H.C., Kindberg, J., Wabakken, P., Zimmermann, B., Odden, J., Liberg, O., Swenson, J.E. & Linnell, J.D.C. (2012) Predicting the potential demographic impact of predators on their prey: a comåarative analysis of two carnivore-ungulate systems in Scandinavia. *Journal of Animal Ecology,* 81, 443-454.

Glikman, J.A., Bath, A. & Vaske, J.J. (2010) Segmenting normative beliefs regarding wolf management in central Italy. *Human Dimensions of Wildlife,* 15, 347-358.

Grodzinska-Jurczak, M. & Cent, J. (2011) Expansion of nature conservation areas: problems with Natura 2000 implementation in Poland? *Environmental Management,* 47, 11-27.

Guldvik, I. & Arnesen, T. (2001) *With carnivores and politics in the wild lands: evaluating the advisor committee for carnivore management and the trial with local management committees [Med rovdyr og politikk i utmarka: evaluering av rådgivende utvalg for rovviltforvaltning og forsøk med rovviltnemnder]*. Østlandsforskning rapport nr 02/2001, Lillehammer, Norway.

Heberlein, T. & Ericsson, G. (2008) Public attitudes and the future of wolves Canis lupus in Sweden. *Wildlife Biology,* 14, 391-394.

Herfindal, I., Linnell, J.D.C., Moa, P.F., Odden, J., Austmo, L.B. & Andersen, R. (2005) Does recreational hunting of lynx reduce depredation losses of domestic sheep. *Journal of Wildlife Management,* 69, 1034-1042.

Hiedanpää, J. (2002) European-wide concervation versus local well-being: the reception of the Natura 2000 reserve network in Karvia, SW Finland. *Landscape and Urban Planning,* 61, 113-123.

Hiedanpää, J. & Bromley, D.W. (2011) The harmonization game: reasons and rules in European biodiversity policy. *Environmental Policy and Governance,* 21, 99-111.

Hobbs, N.T., Andrén, H., Persson, J., Aronsson, M. & Chapron, G. (2012) Native predators reduce harvest of reindeer by Sami pastoralists. *Ecological Applications,* 22, 1640-1654.

Huber, D., Kusak, J., Frkovic, A., Gužvica, G. & Gomercic, T. (2002) Causes of wolf mortality in Croatia in the period 1986-2001. *Veterinarski Arhiv,* 72, 131-139.

Huck, M., Jedrzejewski, W., Borowik, T., Jedrzejewska, B., Nowak, S. & Myslajek, R.W. (2011) Analyses of least cost paths for determining effects of habitat types on landscape permeability: wolves in Poland. *Acta Theriologica,* 56, 91-101.

Huck, M., Jedrzejewski, W., Borowik, T., Milosz-Cielma, M., Schmidt, K., Jedrzejewska, B., Nowak, S. & Myslajek, R. (2010) Habitat suitability, corridors and dispersal barriers for large carnivores in Poland. *Acta Theriologica,* 55, 177-192.

Hunziker, M., Hoffmann, C.W. & Wild-Eck, S. (2001) Acceptance of the wolf, lynx and urban fox: results of a representative survey in Switzerland [Die Akzeptanz vin Wolf, Luchs und "Stadsfuchs" - Ergebnisse einer gesamtschweizerisch-repräsentativen Umfrage]. *Forest Snow and Landscape Research,* 76, 301-326.

Jansson, E., Ruokonen, M., Kojola, I. & Aspi, J. (2012) Rise and fall of a wolf population: genetic diversity and structure during recovery, rapid expansion and drastic decline. *Molecular Ecology,* 21, 5178-5193.

Jedrzejewski, W., Jedrzejewska, B., Zawadzka, B., Borowik, T., Nowak, S. & Myslajek, R. (2008) Habitat suitability model for Polish wolves based on long term national census. *Animal Conservation,* 11, 377-390.

Jedrzejewski, W., Niedzialkowska, M., Nowak, S. & Jedrzejewska, B. (2004) Habitat variables associated with wolf (Canis lupus) distribution and abundance in northern Poland. *Diversity and Distributions,* 10, 225-233.

Jedrzejewski, W., Nowak, S., Kurek, R., Myslajek, R., Stachura, K., Zawadzka, B. & Pchalek, M. (2009) *Animals and roads: methods of mitigating the negative impact of roads on wildlife*. Mammal Research Institute, Polish Academy of Sciences, Bialowieza, Poland.

Jernsletten, J.L. & Klokov, K. (2003) *Sustainable reindeer herding.* Report to the Arctic Council, Tromsø, Norway.

Kaartinen, S., Kojola, I. & Colpaert, A. (2005) Finnish wolves avoid roads and settlements. *Annales Zoologica Fennici,* 42, 523-532.

Kaartinen, S., Luoto, M. & Kojola, I. (2009) Carnivore-livestock conflicts: determinants of wolf (Canis lupus) depredation on sheep farms in Finland. *Biodiversity and Conservation,* online early.

Kaczensky, P. (1999) Large carnivore depredation on livestock in Europe. *Ursus,* 11, 59-72.

Kaczensky, P. (2006) *Werkvertrag "Medienpräsenz-und akseptanzstudie Wolfe in Deutschland*". Report, University of Freiburg, Freiburg, Germany.

Kaczensky, P., Blazic, M. & Gossow, H. (2001) Content analysis of articles on brown bears in the Slovenian press, 1991-1998. *Forest Snow and Landscape Research,* 76, 121-135.
Kaczensky, P., Blazic, M. & Gossow, H. (2004) Public attitudes towards brown bears (Ursus arctos) in Slovenia. *Biological Conservation,* 118, 661-674.
Kaczensky, P., Chapron, G., Von Arx, M., Huber, D., Andrén, H. & Linnell, J. (2013) *Status, management and distribution of large carnivores - bear, lynx, wolf and wolverine - in Europe*. Istituto di Ecologia Applicata, Rome, Italy.
Kaczensky, P., Jerina, K., Jonozovic, M., Krofel, M., Skrbinsek, T., Rauer, G., Kos, I. & Gutleb, B. (2011) Illegal killings may hamper brown bear recovery in the eastern Alps. *Ursus,* 22, 37-36.
Kaczensky, P., Knauer, F., Huber, T., Jonozovic, M. & Adamic, M. (1996) The Ljubljana-Postojna highway -a deadly barrier for brown bears in Slovenia? *Journal of Wildlife Research,* 1, 263-267.
Kaczensky, P., Knauer, F., Krze, B., Jonozovic, M., Adamic, M. & Grossow, H. (2003) The impact of high speed, high volume traffic axes on brown bears in Slovenia. *Biological Conservation,* 111, 191-204.
Kaltenborn, B.P., Bjerke, T. & Vittersø, J. (1999) Attitudes towards large carnivores among sheep farmers, wildlife managers, and research biologists in Norway. *Human Dimensions of Wildlife,* 4**,** 57-63.
Karlsson, J. & Jaxgård, P. (2004) Wolf attacks on dogs [Vargangrepp på hundar]. *Skogsvilt III: vilt och landskap i förändring* (eds G. Jansson, C. Seiler & H. Andrén), pp. 243-248. Grimsö Wildlife Research Station, Swedish University of Agricultural Science.
Karlsson, J. & Johansson, O. (2010) Predictability of repeated carnivore attacks on livestock favours reactive use of mitigation measures. *Journal of Applied Ecology,* 47, 166-171.
Keulartz, J. (2009) European nature conservation and restoration policy - problems and perspectives. *Restoration Ecology,* 17, 446-450.
Kindberg, J., Swenson, J.E., Ericsson, G., Bellemain, E., Miquel, C. & Taberlet, P. (2011) Estimating size and trends of the Swedish brown bear Ursus arctos population. *Wildlife Biology,* 17, 114-123.
Kleiven, J., Bjerke, T. & Kaltenborn, B.P. (2004) Factors influencing the social acceptability of large carnivore behaviours. *Biodiversity and Conservation,* 13, 1647-1658.
Knott, E., Bunnefeld, N., Huber, D., Reljic, S., Kerezi, V. & Milner-Gulland, E.J. (in press) Changes in bear hunting policy in Croatia: who bears the cost? *European Journal of Wildlife Research*.
Kojola, I. & Heikkinen, S. (2012) Problem brown bears Ursus arctos in Finland in relation to bear feeding for tourism purposes and the density of bears and humans. *Wildlife Biology,* 18, 258-263.
Kojola, I., Huitu, O., Toppinen, K., Heikura, K., Heikkinen, S. & Ronkainen, S. (2004) Predation on European forest reindeer (Rangifer tarandus) by wolves (Canis lupus) in Finland. *Journal of Zoology,* 263, 229-236.
Kojola, I. & Kuittinen, J. (2002) Wolf attacks on dogs in Finland. *Wildlife Society Bulletin,* 30, 498-501.
Kojola, I., Ronkainen, S., Hakala, A., Heikkinen, S. & Kokko, S. (2004) Interactions between wolves Canis lupus and dogs C. familiaris in Finland. *Wildlife Biology,* 10, 101-106.
Krange, O. & Skogen, K. (2007) Reflexive tradition. Young Working-Class Hunters between Wolves and Modernity. *Young - Nordic Journal of Youth Research,* 15, 215-233.
Krange, O. & Skogen, K. (2011) When the lads go hunting: the "Hammertown mechanism" and the conflict over wolves in Norway *Ethnography,* 12, 466-489.
Lescureux, N. & Linnell, J.D.C. (2010) Species specific ecology influences the perceptions and local knowledge of Macedonian hunters and livestock breeders towards bears, wolves and lynx. *Human Ecology,* 38, 389-399.
Lescureux, N., Linnell, J.D.C., Mustafa, S., Melovski, D., Stojanov, A., Ivanov, G. & Avukatov, V. (2011) The king of the forest: local knowledge about European brown bears (Ursus arctos) and implications for their conservation in contemporary western Macedonia. *Conservation & Society,* 9, 189-201.

Lescureux, N., Linnell, J.D.C., Mustafa, S., Melovski, D., Stojanov, A., Ivanov, G., Avukatov, V., Von Arx, M. & Breitenmoser, U. (2011) Fear of the unknown: local knowledge and perceptions of the Eurasian lynx Lynx lynx in western Macedonia. *Oryx,* 45, 600-607.

Liberg, O. (2006) *Genetic aspects of viability in small wolf populations with special emphasis on the Scandinavian wolf population. Report from an international expert workshop at Färna Herrgård, Sweden 1st-3rd May 2002.* . Swedish Environmental Protection Agency, Stockholm. Rapport 5436.

Liberg, O., Andrén, H., Pedersen, H.C., Sand, H., Sejberg, D., Wabakken, P., Åkesson, M. & Bensch, S. (2005) Severe inbreeding depression in a wild wolf (Canis lupus) population. *Biology Letters,* 1, 17-20.

Liberg, O., Chapron, G., Wabakken, P., Pedersen, H.C., Hobbs, N.T. & Sand, H. (2012) Shoot, shovel and shut up: cryptic poaching slows restoration of a large carnivore in Europe. *Proceedings of the Royal Society of London B,* 279, 910-915.

Lindén, H., Helle, E., Helle, P. & Wikman, M. (1996) Wildlife triangle scheme in Finland: methods and aims for monitoring wildlife populations. *Finnish Game Research,* 49, 4-11.

Linnell, J.D.C. (2005) Spatial aspects of managing natural resources and conserving biodiversity: integrating the global and the local. *Norwegian Institute for Nature Research Report,* 62, 1-42.

Linnell, J.D.C., Aanes, R., Swenson, J.E., Odden, J. & Smith, M.E. (1997) Translocation of carnivores as a method for managing problem animals: a review. *Biodiversity and Conservation,* 6, 1245-1257.

Linnell, J.D.C., Barnes, B., Swenson, J.E. & Andersen, R. (2000) How vulnerable are denning bears to disturbance? *Wildlife Society Bulletin,* 28, 400-413.

Linnell, J.D.C. & Bjerke, T. (2002) The fear of wolves: an interdisciplinary study [Frykten for ulven: en tverrfaglig utredning]. *Norwegian Institute for Nature Research Oppdragsmelding,* 722, 1-109.

Linnell, J.D.C. & Boitani, L. (2012) Building biological realism into wolf management policy: the development of the population approach in Europe. *Hystrix - Italian Journal of Mammalogy,* 23, 80-91.

Linnell, J.D.C., Brøseth, H., Odden, J. & Nilsen, E.B. (2010) Sustainably harvesting a large carnivore? Development of Eurasian lynx populations in Norway during 160 years of shifting policy. *Environmental Management,* 45, 1142-1154.

Linnell, J.D.C., Brøseth, H., Solberg, E.J. & Brainerd, S. (2005) The origins of the southern Scandinavian wolf Canis lupus population: potential for natural immigration in relation to dispersal distances, geography and Baltic ice. *Wildlife Biology,* 11, 383-391.

Linnell, J.D.C., Løe, J., Okarma, H., Blancos, J.C., Andersone, Z., Valdmann, H., Balciauskas, L., Promberger, C., Brainerd, S., Wabakken, P., Kojola, I., Andersen, R., Liberg, O., Sand, H., Solberg, E.J., Pedersen, H.C., Boitani, L. & Breitenmoser, U. (2002) The fear of wolves: a review of wolf attacks on humans. *Norwegian Institute for Nature Research Oppdragsmelding,* 731, 1-65.

Linnell, J.D.C., Odden, J., Andrén, H., Liberg, O., Andersen, R., Moa, P.F., Kvam, T., Segerström, P., Schmidt, K., Jedrzejewski, W. & Okarma, H. (2007) Distance rules for minimum counts of Eurasian lynx *Lynx lynx* family groups under different ecological conditions. *Wildlife Biology,* 13, 447-455.

Linnell, J.D.C., Odden, J. & Mertens, A. (2012) Mitigation methods for conflicts associated with carnivore depredation on livestock. *Carnivore ecology and conservation: a handbook of techniques* (eds L. Boitani & R.A. Powell), pp. 314-332. Oxford University Press, Oxford.

Linnell, J.D.C., Odden, J., Smith, M.E., Aanes, R. & Swenson, J.E. (1999) Large carnivores that kill livestock: do "problem individuals" really exist? *Wildlife Society Bulletin,* 27, 698-705.

Linnell, J.D.C., Promberger, C., Boitani, L., Swenson, J.E., Breitenmoser, U. & Andersen, R. (2005) The linkage between conservation strategies for large carnivores and biodiversity: the view from the "half-full"forests of Europe. *Carnivorous animals and biodiversity: does conserving one*

save the other? (eds J.C. Ray, K.H. Redford, R.S. Steneck & J. Berger), pp. 381-398. Island Press, Washington.

Linnell, J., Salvatori, V. & Boitani, L. (2008) *Guidelines for population level management plans for large carnivores in Europe*. A Large Carnivore Initiative for Europe report prepared for the European Commission (contract 070501/2005/424162/MAR/B2).

Linnell, J.D.C., Smith, M.E., Odden, J., Kaczensky, P. & Swenson, J.E. (1996) Strategies for the reduction of carnivore - livestock conflicts: a review. *Norwegian Institute for Nature Research Oppdragsmelding,* 443, 1-118.

Linnell, J.D.C., Solberg, E.J., Brainerd, S.M., Liberg, O., Sand, H., Wabakken, P. & Kojola, I. (2003) Is the fear of wolves justified? A Fennoscandian perspective. *Acta Zoologica Lituanica,* 13, 34-40.

Linnell, J.D.C., Swenson, J.E., Landa, A. & Kvam, T. (1998) Methods for monitoring European large carnivores - a worldwide review of relevant experience. *Norwegian Institute for Nature Research Oppdragsmelding,* 549, 1-38.

Liukkonen, T., Mykrä, S., Bisi, J. & Kurki, S. (2009) Conflicts and compromises in lynx Lynx lynx conservation and management in Finland. *Wildlife Biology,* 15, 165-174.

Macdonald, D., Crabtree, J.R., Wiesinger, G., Dax, T., Stamou, N., Fleury, P., Gutierrez Lazpita, J. & Gibon, A. (2000) Agricultural abandonment in mountain areas of Europe: environmental consequences and policy response. *Journal of Environmental Management,* 59, 47-69.

Majic, A. & Bath, A. (2010) Changes in attitudes toward wolves in Croatia. *Biological Conservation,* 143, 255-260.

Majic, A., de Bodonia, A.M.T., Huber, D. & Bunnefeld, N. (2011) Dynamics of public attitudes toward bears and the role of bear hunting in Croatia. *Biological Conservation,* 144, 3018-3027.

Maser, C. & Polio, C.A. (2012) *Resolving environmental conflicts*. CRC Press, London.

Mattisson, J., Odden, J., Nilsen, E.B., Linnell, J.D.C., Persson, J. & Andrén, H. (2011) Factors affecting Eurasian lynx kill rates on semi-domestic reindeer in northern Scandinavia: can ecological research contribute to the development of a fair compensation system? *Biological Conservation,* 144, 3009-3017.

McShane, T.O., Hirsch, P.D., Trung, T.C., Songorwa, A.N., Kinzig, A., Monteferri, B., Mutekanga, D., Van Thang, H., Dammert, J.L., Pulgar-Vidal, M., Welch-Devine, M., Brosius, J.P., Coppolillo, P. & O'Conner, S. (2011) Hard choices: making trade offs between biodiversity conservation and human well-being. *Biological Conservation,* 144, 966-972.

Mech, L.D. (2012) Is science in danger of sanctifying the wolf? *Biological Conservation,* 150, 143-149.

Melis, C., Jedrzejewska, B., Apollonio, M., Barton, K., Jedrzejewski, W., Linnell, J.D.C., Kojola, I., Kusak, J., Adamic, M., Ciuti, S., Delehan, I., Dykyy, I., Krapine, K., Mattioli, L., Sagaydak, A., Samchuk, N., Schmidt, K., Shkvyrya, M., Sidorovich, V.E., Zawadzka, B. & Zhyla, S. (2009) Predation has a greater impact in less productive environments: variation in roe deer, Capreolus capreolus, population density across Europe. *Global Ecology and Biogeography,* 18, 724-734.

Melis, C., M., B., Herfindal, I., Linnell, J.D.C., Odden, J., Gaillard, J.M., Høgda, K.A. & Andersen, R. (2010) Roe deer population growth and lynx predation along a gradient of environmental productivity and climate in Norway. *Ecoscience,* 17, 166-174.

Mertens, A. & Promberger, C. (2000) Electric fences and flaries in Romania. *Carnivore Damage Prevention News,* 1, 4.

Mertens, A., Promberger, C. & Gheorghe, P. (2002) Testing and implementing the use of electric fences for night corrals in Romania. *Carnivore Damage Prevention News,* 5, 2-4.

Michanek, G. (2012) Strictly protected European wolf meets Swedish hunter with license to kill. *Pro Natura - Festskrift till Hans Christian Bugge*, 323-345.

Milner-Gulland, E.J., Arroyo, B., Bellard, C., Blanchard, J., Bunnefeld, N., Delibes-Mateos, M., Edwards, C., Nuno, A., Palazy, L., Reljic, S., Riera, P. & Skrbinsek, T. (2010) New directions in management strategy evaluation through cross-fertilisation between fisheries science and terrestrial conservation. *Biology Letters,* 6, 719-722.

Molinari-Jobin, A., Wölfl, S., Marboutin, E., Molinari, P., Wölfl, M., Kos, I., Fasel, M., Koren, I., Fuxjäger, C., Breitenmoser-Würsten, C., Huber, T., Blazic, M. & Breitenmoser, U. (2012) Monitoring the lynx in the Alps. *Hystrix - Italian Journal of Mammalogy,* 23, 49-53.

Moore, R.S. (1994) Metaphors of encroachment: hunting for wolves on a central Greek Mountain. *Anthropology Quarterly,* 67, 81-88.

Moriceau, J.M. (2007) *Histoire du méchant loup : 3000 attaques sur l'homme en France (XVe-XXe siècle)*. Fayard, Paris.

Naess, M.W., Bardsen, B.J., Pedersen, E. & Tveraa, T. (2011) Pastoral herding strategies and governmental manageemnt objectives: predation compensation as a risk buffering strategy in the Saami reindeer husbandry. *Human Ecology,* 39, 489-508.

Naughton-Treves, L., Grossberg, R. & Treves, A. (2003) Paying for tolerance: rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology,* 17, 1500-1511.

Naves, J., Fernandez-Gil, A. & Delibes, M. (2001) Effects of recreation activities on a brown bear family group in Spain. *Ursus,* 12, 135-140.

Newig, J. & Fritsch, O. (2009) Environmental governance: participatory, multi-level - and effective? *Environmental Policy and Governance,* 19, 197-214.

Newing, H., Eagle, C., Puri, R. & Watson, C.W. (2011) *Conducting research in conservation: a social science perspective*. Routledge, London.

Niedzialkowska, M., Jedrzejewski, W., Mysiajek, R.W., Nowak, M.C., Jedrzejewska, B. & Schmidt, K. (2006) Environmenral correlates of Eurasian lynx occurence in Poland - large scale census and GIS mapping. *Biological Conservation,* 133, 63-69.

Niemelä, J., Young, J., Alard, D., Askasibar, M., Hemle, K., Johnson, R., Kurttila, M., Larsson, T.B., Matouch, S., Nowicki, P., Paiva, R., Portoghesi, L., Smulders, R., Stevenson, A., Tartes, U. & Watt, A. (2005) Identifying, managing and monitoring conflicts between forest biodiversity conservation and other human interests in Europe. *Forest Policy and Economics,* 7, 877-890.

Nieminen, M. & Leppäluoto, J. (1988) Predation in the reindeer husbandry area in Finland during 1976-1986. *Rangifer,* 8, 25-34.

Nilsen, E.B., Milner-Gulland, E.J., Schofield, L., Mysterud, A., Stenseth, N.C. & Coulson, T. (2007) Wolf reintroduction to Scotland: public attitudes and consequences for red deer management. *Proceedings of the Royal Society of London B,* 1612, 995-1002

Nilsen, E.B., Brøseth, H., Odden, J. & Linnell, J.D.C. (2012) Quota hunting of Eurasian lynx in Norway: patterns of hunter selection, hunter efficiency and monitoring accuracy. *European Journal of Wildlife Research,* 58, 325-333.

Nilsen, E.B., Linnell, J.D.C., Odden, J., Samelius, G. & Andrén, H. (2012) Patterns of variation in reproductive parameters in Eurasian lynx (Lynx lynx). *Acta Theriologica,* 57, 217-223.

Nilsson-Dahlström, A. (2003) *Negotiating Wilderness in a Cultural Landscape: Predators & Saami Reindeer Herding in the Laponian World Heritage Area*. Uppsala University Press, Uppsala, Sweden.

Nyhus, P.J., Osofsky, S.A., Ferraro, P., Madden, F. & Fischer, H. (2005) Bearing the costs of human-wildlife conflict: the challenges of compensation schemes. *People & Wildlife: conflict or co-existence* (eds R. Woodroffe, S. Thirgood & A. Rabinowitz), pp. 107-121. Cambridge University Press, Cambridge.

Olszanska, A. (2012) *Comparison of attitudes of the key interest groups toward the wolf (Canis lupus) and the Eurasian lynx (Lynx lynx) conservation in Poland*. PhD Thesis, Institute of Nature Conservation, Polish Academy of Sciences, Krakow, Poland.

Owen, H. (2008) *Open space technology: a user's guide*. Berrett-Koehler Publishers, San Francisco.

Peterson, M.N., Allison, S.A., Peterson, M.J., Peterson, T.R. & Lopez, R.R. (2004) A tale of two species: habitat conservation plans as bounded conflict. *Journal of Wildlife Management,* 68, 743-761.

Peterson, N.M., Peterson, M.J. & Peterson, T.R. (2005) Conservation and the myth of consensus. *Conservation Biology,* 19, 762-767.

Rauschmayer, F., van der Hove, S. & Koetz, T. (2009) Participation in EU biodiversity governance: how far beyond rhetoric? *Environment and Planning C: Government and Policy,* 27, 42-58.

Ray, J.C., Redford, K.H., Berger, J. & Steneck, R.S. (2005) Conclusion: Is large carnivore conservation equivalent to biodiversity conservation and how can we achieve both? *Large carnivores and the conservation of biodiversity* (eds J.C. Ray, K.H. Redford, R.S. Steneck & J. Berger), pp. 400-428. Island Press, Washington.

Redpath, S., Arroyo, B.E., Leckie, F.M., Bacon, P.J., Bayfield, N., Gutierrez, R.J. & Thirgood, S. (2004) Using decision modeling with stakeholders to reduce human-wildlife conflict: a raptor-grouse case study. *Conservation Biology,* 18, 350-359.

Redpath, S.M., Young, J., Evely, A., Adams, W.M., Sutherland, W.J., Whitehouse, A., Amar, A., Lambert, R.A., Linnell, J.D.C., Watt, A. & Gutiérrez, R.J. (2013) Understanding and managing conservation conflicts. *Trends in Ecology and Evolution,* 28(2), 100-109.

Reed, M.S. (2008) Stakeholder participation for environmental management: a literature review. *Biological Conservation,* 141, 2417-2431.

Reljic, S., Srebocan, E., Huber, D., Kusak, J., Suran, J., Brzica, S., Cukrov, S. & Crnic, A.P. (2012) A case of a brown bear poisoning with carbofuran in Croatia. *Ursus,* 23, 86-90.

Rigg, R. (2001) *Livestock guarding dogs: their current use world wide*. IUCN / SSC Canid Specialist Group Occasional Paper No.1 [online], URL: http://www.canids.org/occasionalpapers/.

Ring, I., Henle, K., Klenke, R., Nesshöver, C. & Arnhold, T. (2008) What to do when nature conservation is successful and humans face competition again? *Journal of International Wildlife Law and Policy,* 11, 207-210.

Romig, T., Dinkel, A. & Mackenstedt, U. (2006) The present situation of echinococcosis in Europe. *Parasitology International,* 55, S187-S191.

Rowcliffe, J.M., de Merode, E. & Cowlishaw, G. (2004) Do wildlife laws work? Species protection and the application of a prey choice model to poaching decisions. *Proceedings of the Royal Society of London B,* 271, 2631-2636.

Roy, H.E., Pocock, M.J.O., Preston, C.D., Roy, D.B., Tweddle, J.C. & Robinson, L.D. (2012) *Understanding citizen science and environmental monitoring*. Final Report on behalf of UK-EOF, NERC Centre for Ecology and Hydrology and Natural History Museum.

Ryser, A., von Wattenwyl, K., Ryser-Degiorgis, M.P., Zimmermann, F. & Breitenmoser, U. (2004) Luchsumsiedlung Nordostschweiz 2001-2003. Schlussbericht modul luchs des Projektes LUNO. *KORA Bericht Nr,* 22, 1-60.

Røskaft, E., Bjerke, T., Kaltenborn, B.P. & Linnell, J.D.C. (2003) Patterns of self reported fear towards large carnivores among the Norwegian public. *Evolution and Human Behaviour,* 24, 184-198.

Røskaft, E., Handel, B., Bjerke, B. & Kaltenbon, B.P. (2007) Human attitudes towards large carnivores in Norway. *Wildlife Biology,* 13, 172-185.

Salvatori, V. (2013) Large carnivore conservation and management in Europe: the contribution of EC co-funded LIFE projects. Istituto di Ecologia Applicata, Rome, Italy.

Salvatori, V., Okarma, H., Ionescu, O., Dovhanych, Y., Findo, S. & Boitani, L. (2002) Hunting legislation in the Carpathian Mountains: implications for the conservation and management of large carnivores. *Wildlife Biology,* 8, 3-10.

Sandström, C., Pellikka, J., Ratamäki, O. & Sande, A. (2009) Management of large carnivores in Fennoscandia: new patterns of regional participation. *Human Dimensions of Wildlife,* 14, 37-50.

Schadt, S., Revilla, E., Wiegand, T., Knauer, F., Kaczensky, P., Breitenmoser, U., Bufka, L., Cerveny, J., Koubek, P., Huber, T., Stanisa, C. & Trepl, L. (2002) Assessing the suitability of central European landscapes for the reintroduction of Eurasian lynx. *Journal of Applied Ecology,* 39, 189-203.

Schwerdtner, K. & Gruberb, B. (2007) A conceptual framework for damage compensation schemes. *Biological Conservation,* 134, 354 –360.

Shine, C. (2005) *Legal report on the possible need to amend Appendix II of the convention for the wolf*. Council of Europe Report T-PVS/Inf (2005) 18, Strasbourg.

Sidaway, R. (2005) *Resolving environmental disputes: from conflict to consensus*. Earthscan, London.
Sidorovich, V.E., Tikhomirova, L.L. & Jedrzejewska, B. (2003) Wolf Canis lupus numbers, diet and damage to livestock in relation to hunting and ungulate abundance in northeastern Belarus during 1990-2000. *Wildlife Biology,* 9, 103-112.
Sjölander-Lindqvist, A. (2009) Social-natural landscape reorganised: Swedish-edge farmers and wolf recovery. *Conservation & Society,* 7, 130-140.
Sjölander-Lindqvist, A., Karlsson, M. & Cinque, S. (2010) *Att jaga varg: en studie av 2010 års licensjakt i Sverige*. CEFOS Rapport 2010:2.
Skogen, K. (2003) Adapting adaptive management to a cultural understanding of landuse conflicts. *Society and Natural Resources,* 16, 435-450.
Skogen, K., Haaland, H., Brainerd, S. & Hustad, H. (2003) Local views on large carnivores and their management: a study in four municipalities [Lokale syn på rovvilt og rovviltforvaltning. En undersøkelse i fire kommuner: Aurskog-Høland, Lesja, Lierne og Porsanger]. *Norwegian Institute for Nature Research Fagrapport,* 070, 1-30.
Skogen, K. & Krange, O. (2003) A wolf at the gate: The anti-carnivore alliance and the symbolic construction of community. *Sociologia Ruralis,* 43, 309-325.
Skogen, K., Krange, O. & Figari, H. (2013) *Ulvekonflikter: en sosiologisk studie*. Akademika forlag, Oslo.
Skogen, K., Mauz, I. & Krange, O. (2006) Wolves and Eco-power. A French-Norwegian Analysis of the Narratives of the Return of Large Carnivores. *Journal of Alpine Research,* 94, 78-87.
Skuland, S. & Skogen, K. (2009) *Carnivores and landscape: carnivores location within different visions of the landscape [Rovdyr og landskap: rovdyras plass i ulike landskapsforståelser]*. Norwegian Institute for Nature Research Rapport 491.
Smith, M.E., Linnell, J.D.C., Odden, J. & E., S.J. (2000) Methods for reducing livestock losses to predators. A: Livestock guardian animals. *Acta Agriculturæ Scandinavica,* 50, 279-290.
Solberg, E.J. & Sæther, B.E. (1999) Hunter observations of moose Alces alces as a management tool. *Wildlife Biology,* 5, 107-117.
Solberg, K.H., Bellemain, E., Drageset, O.M., Taberlet, P. & Swenson, J.E. (2006) An evaluation of field and non-invasive genetic methods to estimate brown bear (Ursus arctos) population size *Biological Conservation,* 128, 158-168.
St John, F.A.V., Keane, A.M., Edwards-Jones, G., Jones, L., Yarnell, R.W. & Jones, J.P.G. (2012) Identifying indicators of illegal behaviour: carnivore killing in human-managed landscapes. *Proceedings of the Royal Society of London B,* 279, 804-812.
Swenson, J.E. (1999) Does hunting affect the behavior of brown bears in Eurasia? *Ursus,* 11, 157-162.
Swenson, J.E. (2003) Implications of sexually selected infanticide for the hunting of large carnivores. *Animal behavior and wildlife conservation* (eds M. Festa-Bianchet & M. Apollonio), pp. 171-190. Island Press, Washington, DC.
Swenson, J.E., Sandegren, F., Bjärvall, A. & Wabakken, P. (1998) Living with success: research needs for an expanding brown bear population. *Ursus, International Conference on Bear Reserach and Management,* 10, 17-23.
Swenson, J.E., Sandegren, F., Söderberg, A., Bjärvall, A., Franzén, R. & Wabakken, P. (1997) Infanticide caused by hunting of male bears. *Nature,* 386, 450-451.
Sæther, B.E., Engen, S., Odden, J., Linnell, J.D.C., Grøtan, V. & Andrén, H. (2010) Sustainable harvest strategies for age-structured Eurasian lynx populations: the use of reproductive value. *Biological Conservation,* 143, 1970-1979.
Sæther, B.E., Engen, S., Persson, J., Brøseth, H., Landa, A. & Willebrand, T. (2005) Management strategies for the wolverine in Scandinavia. *Journal of Wildlife Management,* 69, 1001-1014.
Tangeland, T., Skogen, K. & Krange, O. (2010) *Carnivores in the countryside and in the city: the urban-rural dimension in the Norwegian large cranivore conflict. [Om rovdyr på landet og i byen: den urban-rurale dimensjonen i de norske rovviltkonflktene]*. Norwegian Institute for Nature Research Rapport 650.
Terborgh, J. & Estes, J.A. (2010) *Trophic cascades: predators, prey, and the changing dynamics of nature*. Island Press, London.

Theuerkauf, J., Jedrzejewski, W., Schmidt, K. & Gula, R. (2001) Spationtemporal segregation of wolves from humans in the Bialowieza forest (Poland). *Journal of Wildlife Management,* 67, 706-716.
Thompson, J.R., Elmendorf, W.F., McDonough, M.H. & Burban, L.L. (2005) Participation and conflict: lessons learned from community forestry. *Journal of Forestry,* June 2005, 174-178.
Tosen, T. & Bath, A. (2009) Transboundary management of large carnivores in Europe: from incident to opportunity. *Conservation Letters,* 2, 109-114.
Trajce, A. (2010) *Conservation planning for guilds or individual species? The relative perceptions of wolves, bears and lynx among the rural Albanian public*. MSc thesis, University of Oxford.
Treves, A. (2009) Hunting for large carnivore conservation. *Journal of Applied Ecology,* 46, 1350-1356.
Treves, A. & Martin, K.A. (2011) Hunters as stewards of wolves in Wisconsin and the northern Rocky Mountains, USA. *Society and Natural Resources,* 24, 984-994.
Treves, A. & Naughton-Treves, L. (2005) Evaluating lethal control in the management of human-wildlife conflict. *People and wildlife: conflict or coexistence?* (eds R. Woodroffe, S. Thirgood & A. Rabinowitz), pp. 86-106. Cambridge University Press, Cambridge.
Treves, A., Wallace, R.B., Naughton-Treves, L. & Morales, A. (2006) Co-managing human-wildlife conflicts: a review. *Human Dimensions of Wildlife,* 11, 383-396.
Trouwborst, A. (2010) Managing the carnivore comeback: international and EU species protection law and the return of lynx, wolf and bear to western Europe. *Journal of Environmental Law,* 22, 347-372.
Tufto, J., Sæther, B.E., Engen, S., Swenson, J.E. & Sandegren, F. (1999) Harvesting strategies for conserving minimum viable populations based on World Conservation Union criteria: brown bears in Norway. *Proceedings of the Royal Society of London B,* 266, 961-967.
Tveraa, T., Fauchald, P., Henaug, C. & Yoccoz, N.G. (2003) An examination of a compensatory relationship between food limitation and predation in semi-domestic reindeer. *Oecologia,* 137, 370-376.
Tveraa, T., Fauchald, P., Yoccoz, N., Ims, R.A., Aanes, R. & Høgda, K.A. (2007) What regulates and limits reindeer populations in Norway. *Oikos,* 116, 706-715.
UNEP (2007) *GEO Resource Book: A training manual on integrated environmental assessment and reporting.* http://www.unep.org/geo
UNEP (2007) *Resource Book. Training Module 6. Scenario development and analysis*. http://www.unep.org/geo
Valière, N., Fumagalli, L., Gielly, L., Miquel, C., Lequette, B., Poulle, M.L., Weber, J.M., Arlettaz, R. & Taberlet, P. (2003) Long-distance wolf recolonization of France and Switzerland inferred from non-invasive genetic sampling of a period of 10 years. *Animal Conservation,* 6, 83-92.
Wabakken, P., Sand, H., Kojola, I., Zimmermann, B., Arnemo, J.M., Pedersen, C. & Liberg, O. (2007) Multistage, long-range natal dispersal by a Global Positioning System–collared Scandinavian wolf. *Journal of Wildlife Management,* 71, 1631-1634.
Webler, T., Tuler, S. & Krueger, R. (2001) What is a good public participation process? Five perspectives from the public. *Environmental Management,* 27, 435-450.
Wechselberger, M. & Leizinger, D. (2005) *Die akseptanz von bär, wolf und luchs in Österreich*. WWF Austria, Vienna, Austria.
Wechselberger, M., Rigg, R. & Betkova, S. (2006) *An investigation of public opinion about the three species of large carnivore in Slovakia: brown bear (Ursus actos), wolf (Canis lupus) and lynx (Lynx lynx)*. Slovak Wildlife Society, Liptovsky Hradok, Slovalia.
Westley, F.R. & Miller, P.S. (2003) *Experiments in consilience: integrating social and scientific responses to save endangered species*. Island Press, London.
Wiegand, T., Knauer, F., Kaczensky, P. & Naves, J. (2004) Expansion of brown bears (Ursus arctos) into the eastern Alps: a spatially explicit population model. *Biodiversity and Conservation,* 13, 79-114.
Young, J., Richards, C., Fischer, A., Halada, L., Kull, T., Kuzniar, A., Tartes, U., Uzunov, Y. & Watt, A. (2007) Conflicts between biodiversity conservation and human activities in the central and eastern European countries. *Ambio,* 36, 545-550.

Young, J.C., Jordan, A., Searle, K.R., Butler, A., Chapman, D.S., Simmons, P. & Watt, A.D. (2013) Does stakeholder involvement really benefit biodiversity conservation? *Biological Conservation,* 158, 359-370.

Young, J.C., Marzano, M., White, R.M., McCracken, D.L., Redpath, S.M., Carss, D.N., Quine, C.P. & Watt, A.D. (2010) The emergence of biodiversity conflicts from biodiversity impacts: characteristics and management strategies. *Biodiversity and Conservation,* 19, 3973-3990.

Zabel, A. & Holm-Müller, K. (2008) Conservation performance payments for carnivore conservation in Sweden. *Conservation Biology,* 22, 247–251.

Zachrisson, A. (2004) *Co-management of natural resources: paradigm shifts, key concepts and cases*. Mountain Mistra Programme Report no. 1.