

Brown Bear Management Plans in Europe and the continental United States

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To Christina

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II. EXECUTIVE SUMMARY

The brown bear (*Ursus arctos*) was once abundant and widespread all over Europe and the continental United States but has declined to the point where it is now one of the rarest and most limited mammal species in these parts of the world. Brown bears and many other species existing in human-dominated landscapes are often facing a multi-dimensional problem ranging from human-caused mortality to habitat loss and fragmentation. Intensive conservation and recovery efforts need to be undertaken and ideally put into action through the development and implementation of species management plans which can be considered as conceptual frameworks attempting to address serious threats to an endangered species in an organized way in order to ensure its long-term survival.

Species recovery planning takes place at different geographical scales ranging from international, national to regional approaches. The establishment of species management plans originates differently depending on whether or not their development is embodied in national legislation and whether or not the countries have signed international agreements which require the establishment of such documents. A few countries undertake recovery efforts within no legislative context through the work of committed authorities or NGOs. Currently, there are also countries missing species management plans as regulatory conservation tools. However, due to the serious endangerment of many species, it is desirable that well developed and implemented species management plans get a more frequently used tool in wildlife management as they are a crucial element in many conservation efforts for highly endangered species. An analysis of species management plans for brown bears in Europe and the continental United States emphasizes the significance of this kind of documents, and provides additionally a useful insight into the development and implementation process of species management plans, their actual contents and highlights at an international, regional and national scale.

A list of recommendations for preparing and implementing species management plans which may hopefully serve as guidelines for the establishment of future documents

is given at the end of the thesis based on the latest literature on recovery planning and on personal remarks after going through several brown bear management plans. In general, species management plans identifying the major threats to the species and at the same time appropriate recovery measures to address them ideally provide a recovery strategy with clearly defined goals and criteria for achieving recovery, set up an implementation schedule and apply adaptive management in order to rescue highly endangered species from the brink of extinction.

ZUSAMMENFASSUNG

Der Braunbär (*Ursus arctos*) war einst eine weit verbreitete Tierart in Europa sowie auch in den Vereinigten Staaten von Amerika. Heute zählt er besonders in diesen Teilen der Welt mit Ausnahme von Alaska und Russland zu den seltensten und am stärksten zurückgegangenen Säugetieren. In den letzten beiden Jahrhunderten wurde der Braunbär durch direkte Verfolgung und Zerstörung seines Lebensraumes beinahe ausgerottet. Zurückgedrängt in abgelegene Gebiete, Nationalparks und andere Naturschutzgebiete kämpfen heute kleine Bärenpopulationen um ihr Überleben und strenge Artenschutzmaßnahmen sowie ein intensives Management der bedrohten Tierart sind oft die einzige Chance um diese vor dem Aussterben zu bewahren. Viele Faktoren erschweren jedoch diese Bemühungen, sei es die Vielzahl der Gefahren, die den Fortbestand der Tiere bedrohen oder auch der organisatorische oder bürokratische Aufwand, mit denen man im Artenschutz heutzutage konfrontiert wird. Spezielle Artenmanagementpläne, die die wesentlichen Probleme einer besonders bedrohten Tierart identifizieren und analysieren, geeignete Lösungsvorschläge definieren, sowie darauf folgende Aktivitäten koordinieren und organisieren, zielen nun darauf ab, diesen komplizierten Prozess der Erholung und langfristigen Erhaltung eines bedrohten Artenbestandes, zu vereinfachen.

Generell gibt es Artenmanagementpläne auf internationaler, nationaler sowie auch regionaler Ebene. Die Entwicklung dieser Dokumente wird auf unterschiedliche Art und Weise initiiert, abhängig davon, ob die Pläne im Artenschutzgesetz der einzelnen Länder verankert sind, die jeweiligen Länder internationale Abkommen zum Schutz bedrohter Tierarten unterzeichnet haben, welche die Entwicklung solcher Pläne voraussetzen, oder ob engagierte Gruppen, staatlicher oder privater Natur, die Initiative übernehmen und Artenmanagementpläne ohne jegliche gesetzliche Verankerung entwickeln und daraufhin auch ausführen. Dementsprechend vielfältig fällt nun auch die Namensgebung dieser Pläne aus, die in dieser Arbeit allgemein als Artenmanagementpläne bezeichnet werden und dann je nach geographischer und praktischer Anwendung in ein neues terminologisches System eingeteilt werden. Einige wenige Länder in Europa haben sich

trotz vieler bedrohter Tierarten bis zum heutigen Tage nicht entschlossen, die Erhaltung dieser oft schon sehr kleinen Populationen anhand von Artenmanagementplänen zu organisieren. Wünschenswert ist es nun, dass auch diese Länder den Nutzen der Pläne erkennen, deren Erstellung und Durchführung im jeweiligen Naturschutzgesetz festlegen um so die Chance, viele Tierarten vor dem Aussterben zu bewahren, zu erhöhen.

Nicht zu Unrecht haben sich Artenmanagementpläne mittlerweile zu einem wesentlichen Bestandteil, wenn nicht zu dem zentralen Element vieler Artenschutzinitiativen, entwickelt. Um dieser Aufgabe gerecht werden zu können, muss den Plänen jedoch eine sorgfältige Entwicklung vorausgehen, gefolgt von einer gut organisierten Umsetzung der darin beschriebenen Artenschutzmaßnahmen. In meiner Arbeit werden nun am Beispiel der Braunbären in Europa und den Vereinigten Staaten von Amerika, mit Ausnahme von Alaska, für diese Tierart bereits existierende Artenmanagementpläne analysiert um dem Leser einen Einblick in die Entwicklung und Durchführung der Pläne sowie deren Inhalt und Schwerpunkte auf internationaler, regionaler und nationaler Ebene zu gewähren.

Eine Reihe von Empfehlungen am Ende der Arbeit soll die Erstellung und Durchführung zukünftiger Pläne erleichtern. Diese Verbesserungsvorschläge basieren auf aktueller Literatur sowie auch auf persönlichen Beobachtungen nach Lesen und Analysieren vieler verschiedener Artenmanagementpläne. Pläne, die Faktoren, die den Bestand der jeweiligen Tierart gefährden, analysieren, geeignete Maßnahmen um diesen Gefahren entgegenzuwirken definieren, diese dann im Rahmen einer eigens entwickelten Strategie koordinieren, zusätzlich einen Zeit- sowie Kostenplan für die eigentliche Durchführung erstellen, und zu guter Letzt eine gewisse Flexibilität durch Anpassungsmanagement zulassen, leisten mit Sicherheit einen großen Beitrag zur Erhaltung besonders bedrohter Tierarten.

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1 INTRODUCTION TO A PROBLEM

The number and distribution of the brown bear (*Ursus arctos*) worldwide has declined by more than 50% since the mid-1800s (SERVHEEN 1990) due to the advent of firearms, human occupancy of portions of its range, and habitat alteration or destruction (SERVHEEN 1989). Brown bears once common in Europe and the western part of the continental United States have mostly been reduced to small populations, which often occupy highly fragmented and human-dominated landscapes.

The fact that bears still exist in Europe often comes as a surprise to both Europeans and non-Europeans (LINNELL et al. 2002). Nowadays Europe is so crowded with people that it is hard to imagine coexisting with Europe's largest carnivore, the brown bear. Brown bears disappeared from most areas as the human population grew, as suitable habitat was lost due to deforestation and agriculture, and as the species was persecuted by hunting (SWENSON et al. 2000). According to SWENSON et al. (2000), the total number of brown bears in Europe today is about 50,000 bears (ca. 14,000 outside Russia) within an area of more than 2.5 million km² (800,000 km² outside Russia). The European brown bears are currently found in 10 populations (Figure 1) that differ widely in size (LINNELL et al. 2002), thus in some countries the bear population is certainly viable, whereas in other countries it is on the verge of extinction (SWENSON et al. 2000).

The range of the brown, or grizzly bear (*Ursus arctos horribilis*) in the continental United States, which refers to 48 States excluding Alaska and Hawaii, has also contracted considerably, since the first white pioneers pushed west in the 18th century (KEMF et al. 1999). It now occupies less than 2 percent of its original range (KEMF et al. 1999); the rest has been developed so extensively for human uses that grizzly bears no longer survive (HERRERO 1999). Only six disjunctive ecosystems (Yellowstone, Northern Continental Divide, Selkirk and Cabinet-Yaak, North Cascades and Bitterroot) (Figure 2), which, according to SERVHEEN (1990), are mountainous regions, national parks and wilderness areas of Washington, Idaho, Montana, and Wyoming, currently contain either self-perpetuating or remnant populations (U.S. FISH AND WILDLIFE SERVICE 1993).

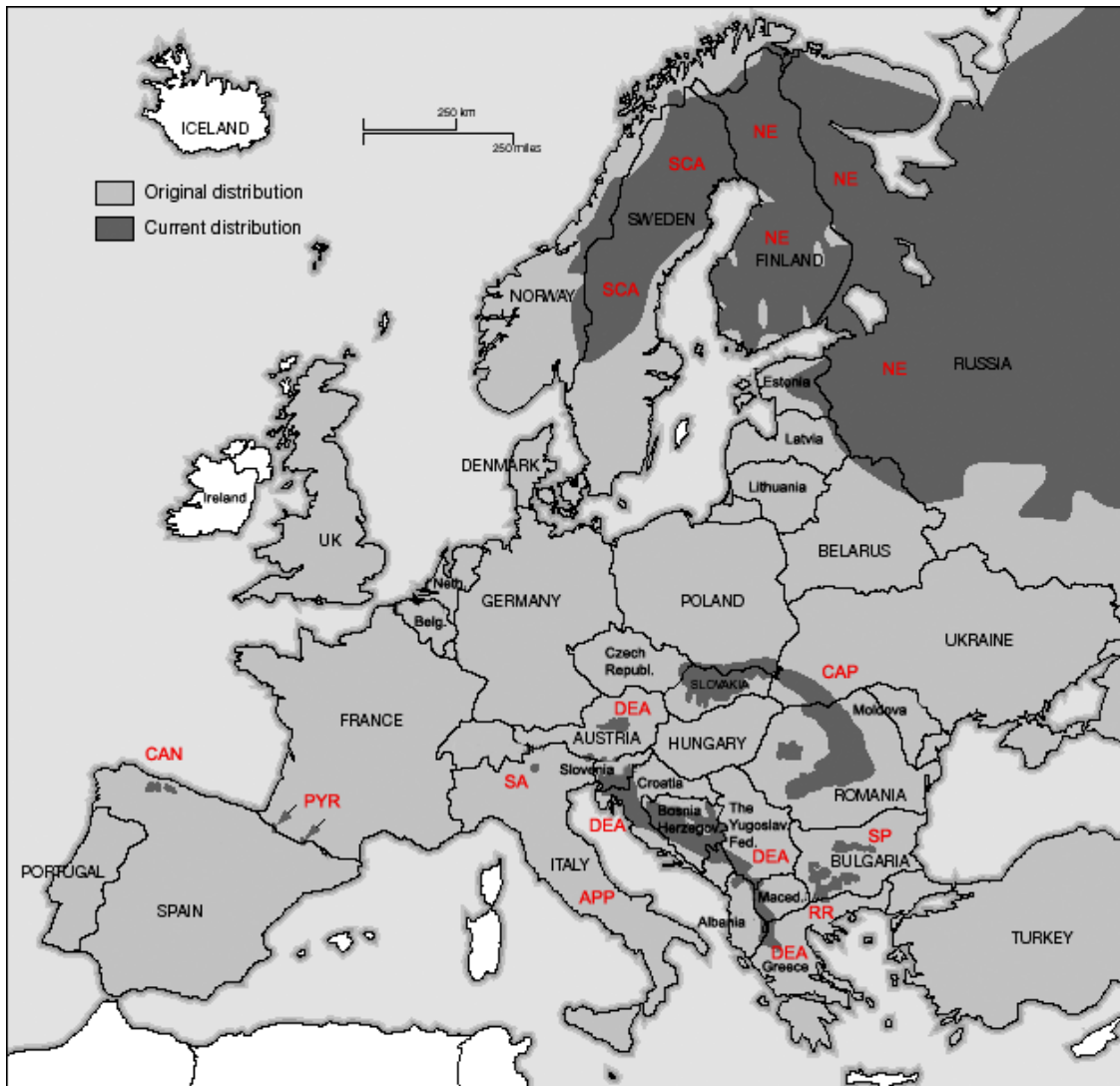


Figure 1. Distribution of brown bears in Europe (SWENSON *et al.* 1998). Brown bear populations added: APP (Apennines), CAN (Cantabrian populations- western and eastern), CAP (Carpathians), DEA (Dinaric-Eastern-Alps), NE (North-eastern), PYR (Pyrenees populations – western and central), RR (Rila-Rhodope Mountains), SA (Southern Alps), SCA (Scandinavian), SP (Stara Planina Mountains).

Understanding and defining the problems of small populations is an important step in recognizing that several brown bear populations are facing the threat of extinction. BEISSINGER and PERRINE (2001) described a general process of endangerment many small populations are experiencing, which is divided into three phases (Figure 3). Typically at some time in its history, the population will be near its carrying capacity (K)



Figure 2. Present grizzly bear distribution in the continental United States, 1990 (U.S. Fish and Wildlife Service 1993)

(BEISSINGER and PERRINE 2001), but it can occur that a once-viable population declines in response to changes in the environment (declining phase) and lingers for a time at a nonviable population size (the endangered phase) (SCOTT et al. 1996), which is also known as the bottleneck phenomenon. The smaller the population becomes and the longer it remains small in size, the greater the loss of genetic variation (NEI et al. 1975) and the risks of stochastic factors will be (Figure 4). Stochasticity can be defined as random variation (DONOVAN and WELDEN 2001), which can be environmental, demographic, and/or genetic in nature (FOOSE et al. 1995). Environmental stochasticity refers to the year-to-year variation in birth and death rates that naturally occurs, often as a result of changes in resources or weather (BEISSINGER and PERRINE 2001). Demographically, small populations may develop intrinsic demographic problems (e.g., biased sex ratios, unstable age distributions, or random failures in survival and fertility) that can fatally disrupt propagation and persistence (GOODMAN 1987). Genetically, the depletion of genetic variability will slow adaptive evolution, and genetic drift can lead to accumulation of maladaptive traits (LACY 1997). Taken together, these concerns are

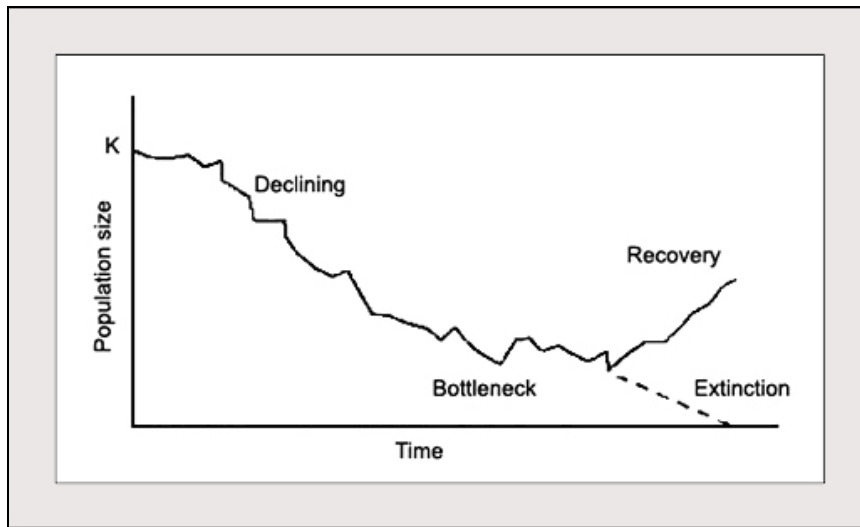


Figure 3. Phases in the process of endangerment (declining, bottleneck, recovery or extinction of the population) (BEISSINGER and PERRINE 2001).

particularly relevant for large mammals such as bears, whose populations often consist of small numbers of individuals distributed at a low density (WAITS et al. 1999), and it will be necessary to manage the bears directly according to the genetic and demographic consequences (SERVHEEN 1989). Ultimately, the population may either increase to recovery (Recovery Phase) or go extinct (BEISSINGER and PERRINE 2001).

Habitat fragmentation seems to be another negative factor as railways and highways create barriers to movement that subdivide populations (JACKSON 2000) into smaller subpopulations, which increases the risk of local extinction, or even isolates entire populations from each other. A brown bear population is viable and self-sustaining only if it is either large enough to overcome the risks of stochastic factors or well-connected such that a decreasing of the population number can be naturally recolonized from elsewhere. Thus, HARRISON and BRUNA (1999) recommend providing a small amount of additional habitat in the form of corridors, which can prevent extinction by increasing rates of dispersal (HARRISON and BRUNA 1999).

Besides small population numbers and habitat fragmentation, human-caused mortality seems to be the major threat to brown bears. Mortality factors are usually related to the presence of garbage and human foods, livestock and agricultural activities, honey production, and fruit trees (SERVHEEN 1999). Further causes of death include

management removal of repeat problem bears, illegal kills, self-defense by people who are threatened by bears, auto and train collisions, and in the United States also mistaken identity kills by black bear (*Ursus americanus*) hunters (SERVHEEN 1999).

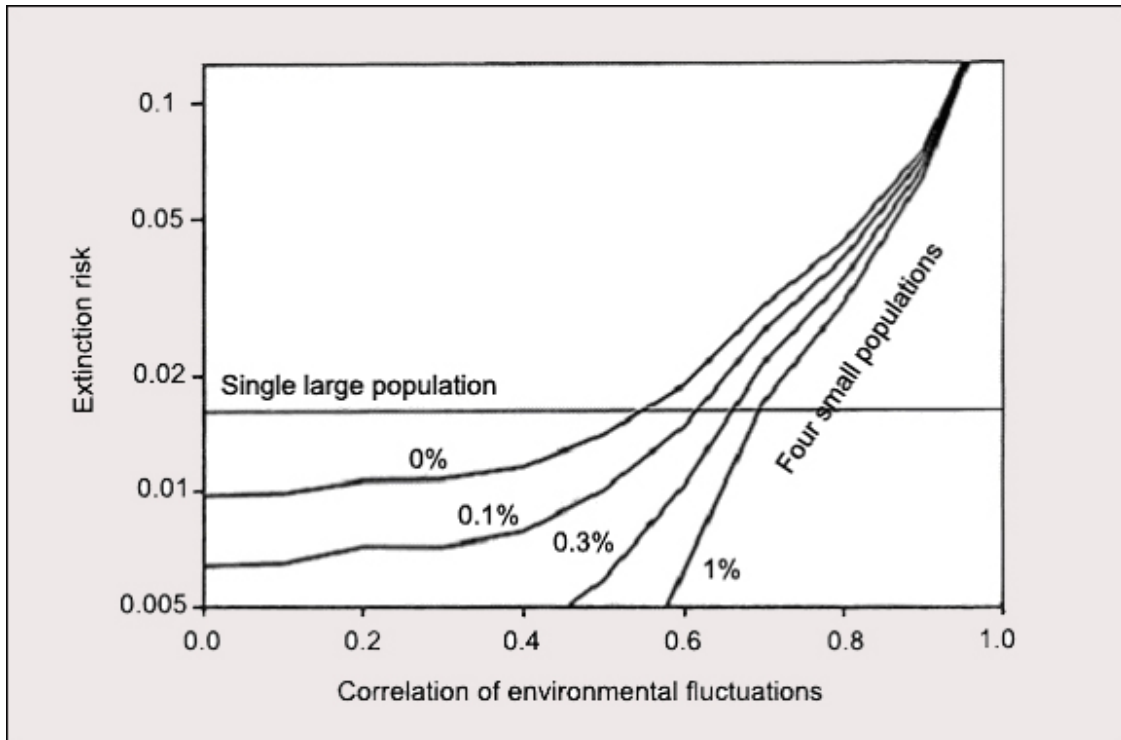


Figure 4. Extinction of a single large population, and four small populations as a function of the correlation of environmental fluctuations. Each curve represents a different simulation of the four-population model with different dispersal rates (0% to 1%) (Akçakaya and Ginzburg 1991; Akçakaya et al. 1999).

Coexisting of humans with bears or other large carnivores also causes conflicts and often results in a negative attitude toward these animals. Generally, people are fascinated by bears (HERRERO 1999), but in some regions the public is still opposed to the bears' recovery. Not surprisingly, such attitudes are often found in groups whose economic interests are provoked by the bears (BJERKE and KALTENBORN 1999), which are sometimes involved in livestock depredation or other human-bear conflicts. In the United States, residents of small, rural communities in or adjacent to grizzly habitat are usually the least willing to modify their behavior to benefit grizzly bears (KELLERT 1994). Besides these conflicts, in some regions especially in Europe, people are no longer

accustomed to coexisting with bears. They have forgotten how to live with bears and often exaggerate the dangers associated with them (RAUER 1999).

Biologically, brown bears are also a challenge for wildlife managers. Brown bear populations usually require large areas of land to survive (HERRERO 1999). According to the U.S. FISH AND WILDLIFE SERVICE (1993), their low densities, low reproductive rates, individualistic behavior, and association with riparian habitat that is also used extensively by man cause grizzlies to be more vulnerable to extirpation than many other species.

In summary, it may be said that brown bear populations, especially in Central and Western Europe and the continental United States, are threatened by a multi-dimensional problem; which is a function of myriad, site-specific human and ecological forces (CLARK et al. 1996) ranging from human-caused mortality to habitat loss and fragmentation. This problem requires broad thinking as well as quick and organized responses through intensive planning and the execution of problem-solving efforts. According to PRIMM (1996), the key to successful grizzly bear conservation will be finding manageable segments of this multi-dimensional problem and establishing workable problem-solving processes (Figure 5) at appropriate scales.

Generally, a problem can be defined as an accumulation of ideas that includes, at least implicitly, an account of the causes and consequences of undesirable circumstances and a theory about how to improve those (WEISS 1989). First, it is necessary to understand and accurately define the problems that the endangered species is facing. CLARK et al. (1996) recommends developing a broad, systematic understanding of the problems and the many constituencies framing them. Furthermore, a problem definition should provide a powerful analytical framework that guides, frames, and shapes all subsequent actions (CLARK et al. 1996) to achieve the desired state of the species. It is likely that vaguely defined problems may lead to management actions that intensify rather than ease the original problem(s) (BREWER and DELEON 1983). However, it is recommended to take all these steps in a problem-solving process before finalizing goals, identifying and choosing alternatives, committing resources, and implementing solutions (CLARK et al. 1996) in order to finally achieve a successful and promising outcome.

The problem-solving process seems to be very complex and presents special challenges to all parties involved in managing the endangered species. Besides the defining and understanding of problems, sufficient funding needs to be raised as management efforts to conserve small bear populations are often costly and may require significant changes in human use of bear habitat (SERVHEEN 1998a). In order to conduct any changes, it is necessary to organize public education programs to increase the knowledge and support for bear conservation, especially in rural areas adjacent to bear habitat; where public understanding of scientific concepts and methods of inquiry is limited (PEYTON et al. 1999). It is also essential to time the entire process accurately through an implementation schedule, which helps to organize all the activities by putting them into a time frame.

Taken together, a general framework needs to be set up to organize all these involved factors effectively, ranging from the initial analysis of problems the endangered species is facing to the actual implementation of conservation actions. SERVHEEN (1998a) recommends that local wildlife managers use strategic planning to help focusing their conservation efforts by defining conditions necessary to sustain a threatened population in terms of habitat needs, public support for conservation, and mortality limitation. LEHMAN (1990) emphasizes setting up a plan, which is primarily the process undertaken and the conceptual framework (organized set of ideas) developed to solve a problem. This plan must be put into action through the development and implementation of a planning document; which is simply the representation (in verbal and pictorial form) of the guiding ideas, principles, purposes and intended processes of the plan (LEHMAN 1999). It aims at achieving the desired results in a rational, orderly, comprehensible and effective manner (LEHMAN 1990). Regarding to single species conservation and/or restoration, wildlife managers and other responsible parties can use these “Species Management Plans” as comprehensive and promising instruments to manage the survival and recovery of endangered species.

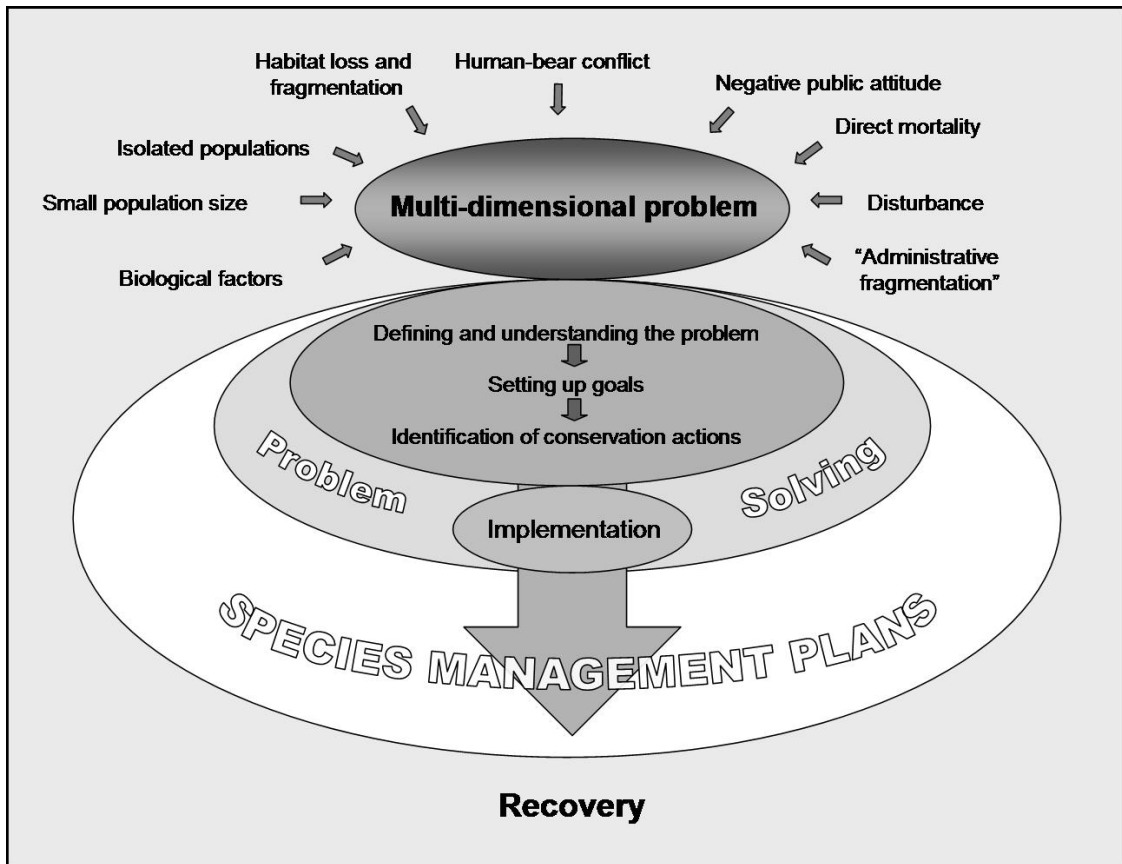


Figure 5. Species Management Plans as problem solving tools. Most brown bears are facing a multi-dimensional problem, which may be solved in the framework of a species management plan

2 POLICY AND LEGAL FRAMEWORK

Internationally, brown bears are protected under several conservation agreements. They are a “strictly protected fauna species” (Bern Convention), “potentially endangered species” in Europe (Convention on International Trade in Endangered Species of Wild Fauna and Flora), or a “species, which needs specially protected areas” (EU Habitats Directive). Nationally, European brown bears are either protected or a game species (with some exceptions). In the continental United States, the grizzly bear is listed as a threatened species under the Endangered Species Act (SERVHEEN 1999). In addition, the grizzly bear receives protection against unregulated killing as a game species in Montana and Wyoming (U.S. FISH AND WILDLIFE SERVICE 1993). In Colorado, Idaho, and Washington, the grizzly bear is included on State threatened or endangered species lists (U.S. FISH AND WILDLIFE SERVICE 1993).

However, legal protection is often no longer sufficient enough to ensure the survival of brown bears. Additionally to national legislation, a variety of agreements at an international, European or regional level have urged directly or indirectly responsible authorities in the countries to conduct comprehensive species conservation measures through the development and implementation of species management plans. The establishment of these management documents originates differently and varies from country to country depending on whether or not the development of such plans is embodied in national legislation and whether or not the countries prefer to undertake recovery efforts within a more loose and global policy context (MACHADO 1997). It is also possible that species management plans have arisen with no specific legislative background; but with committed authorities or strongly dedicated voluntary groups (conservation organizations) (MACHADO 1997).

Generally, large-scale conservation agreements do not relate exclusively to single species (with a few exceptions); they cover a variety of species and introduce innovatory conservation techniques and approaches. However, it is a welcome trend that species management plans are included in far-reaching conservation agreements as so many countries do not take a more active role in developing comprehensive national

endangered species legislation, which requires species-oriented planning documents as a “road map to recovery”. This chapter examines various conservation agreements as well as legislative instruments relevant to brown bear management plans ranging in scope from international treaties to endangered species legislation on a country-level.

2.1 *International*

2.1.1 Biological Diversity Convention

The Biological Diversity Convention, the first global agreement on the conservation and sustainable use of biological diversity, was adopted in May 1992 in Nairobi, Kenya, and opened for signature in June 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. About 150 governments signed the document in 1992, and since then more than 180 countries have ratified it. The convention covers a broad range of conservation issues, but the three main objectives as mentioned in Article 1 are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits that arise from the utilization of genetic resources. By defining these main objectives, the convention creates a new philosophy that urges humans to learn how to use biological resources in a way that minimizes their depletion. This is an essential step toward ensuring a long-term viability of species and ecosystems that depend on the ability to be free to evolve in natural conditions (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY 2000).

The Convention on Biological Diversity identifies common problems, sets overall goals and policies as well as general obligations, and organizes technical and financial cooperation (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY 2000). Among its conservation obligations, the convention calls upon Parties to establish a system of protected areas where special measures need to be taken to conserve biological diversity and also to regulate or manage biological resources important for biological diversity whether within or outside protected areas with the vision of ensuring their conservation and sustainable use (BRAGDON 1996). Furthermore, it is recommended to identify components of biological diversity important

for its conservation and sustainable use (BRAGDON 1996), which is provided in Annex I in form of a list of categories for species and communities such as threatened; of medicinal, agricultural or other economic value; social, scientific or cultural importance; or importance for research into the conservation and sustainable use of biological diversity. Brown bears, for instance, can be considered as a threatened species of cultural importance and high symbolic value.

Under the Convention, governments are also required to develop national strategies, plans or programs for the conservation and sustainable use of biological diversity [Article 6], which offers an important role to conservation biology by bringing scientific expertise into planning (MILLER and LANOU 1995). Related to the species-oriented approach, it is not unlikely that these national strategies, plans or programs consider species management plans as necessity. The Contracting Parties are urged to include in their national plans, strategies or legislation measures for in-situ and ex-situ conservation (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY 2003). "In-situ" conservation focuses related to threatened animals on conserving genes and species, for example by developing and implementing plans or other management strategies for the recovery of threatened species [Article 8(f)]. "Ex-situ" conservation uses zoos and gene banks to conserve species and adopts measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats under appropriate conditions [Article 9(c)].

Conservation of threatened species is further enhanced by the obligation to develop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations.

2.1.2 Agenda 21

Agenda 21 was also adopted in June 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. Signed by 179 Heads of Government, it is generally a broad action program (LANGEWEG 1998) for sustainable development, which also covers the conservation of biological diversity (Chapter 15). Within chapter 15, the main goals are to improve the conservation of biological diversity and the sustainable use of biological resources and also to support the Convention on

Biological Diversity [Article 15(1)]. The action program promotes the recovery of threatened and endangered species [Article 15(5)(h)] and urges governments at appropriate levels, intergovernmental and non-governmental organizations and also other groups to develop or strengthen already existing strategies, plans or programs of action for the conservation of biological diversity and the sustainable use of biological resources [Article 15(5)(a)]. Agenda 21 recommends taking further action where necessary for the maintenance and recovery of viable populations of species in their natural surroundings [Article 15(5)(g)]. Species management plans are not mentioned directly in the document but they could be involved in conservation programs or strategies to manage and organize all of the actions that have to be undertaken in order to ensure the conservation of biological diversity on the species level.

2.1.3 International non-governmental organizations

The International Union for the Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund for Nature (WWF) are the main non-governmental organizations (NGOs) involved in the preservation of threatened bear species through conservation planning. IUCN is probably the organization most influential in constructing international conservation doctrines (MACHADO 1997). It carries out its activities through several Commissions. A Species Survival Commission (SCC) was initiated in 1947 and has developed since then from a small group of individuals who pioneered the concept of the Red Data Book into a large network of some 7,000 volunteer members working in almost every country in the world and including scientific experts on just about every major higher taxa of plants and animals, government officials, wildlife veterinarians, zoo employees, marine biologists, and managers of wildlife parks and protected areas (SPECIES SURVIVAL COMMISSION 2000). Generally, SCC provides information on the conservation status of species, assesses conservation priorities for species and its habitats (MACHADO 1997), and develops “Conservation Action Plans” based on entire species groups.

WWF has traditionally concentrated on charismatic species and has produced or financed global conservation programs on its own or sometimes in close collaboration with governments (MACHADO 1997). WWF is also responsible for the development of

species-oriented conservation plans on an international level. In response to the challenge of conserving Europe's large carnivores, WWF International launched together with partner organizations and experts in 17 European countries a Large Carnivore Initiative for Europe (LCIE) in June 1995 (SWENSON et al. 2000). The aim of the initiative is to create a wide co-operation network for large carnivore conservation, including governments, international organizations, conventions' councils, landowners and managers, scientists and the general public (ZEDROSSER et al. 2001). In 2000, a Baltic Large Carnivore Initiative (BLCI) was founded, which intends to create a conservation strategy as well as to coordinate the large carnivore research within the Baltic States. The Baltic Large Carnivore Initiative represents a crucial network of scientists, conservationists, state officials and other stakeholder representatives from the Baltic States, which provides the necessary framework for information exchange and for approaching large carnivores' research management issues from the population and regional level (ESTONIAN FUND FOR NATURE 2001). Both initiatives were the initiators of multi-species-oriented management plans for large carnivores.

Generally, NGOs can play a very important role as an information pool, instructor, educator, reflector of public opinion, comrade-in-arms, co-operator, coordinator of voluntary participation, target group of individual interests, mirror for society and policy or additionally in shaping up, appealing, recommending, urging, demanding, demonstrating, acting as a powerful lobby, accusing or admonishing (INDEN-HEINRICH 2002). PEYTON et al. (1999) describes NGOs as catalysts and facilitators of projects and indicates furthermore, that their management information combined with flexible organizational structure allows them to explore innovative solutions to problems that are not forthcoming from more rigid bureaucracies (e.g., government, lending institutions, and for-profit businesses).

2.2 European

Most endangered vertebrate species in Europe are protected by a number of different regional and trans-boundary conventions, which are constantly evolving (TERRY and CHRISTOPHERSEN 2003). The level of protection is highest in Western European countries that have signed the majority of international agreements. This is set

to change for those countries joining the European Union (EU) in 2004 as they fall under the EU's environmental directives, which offers potential benefits for biodiversity conservation (TERRY and CHRISTOPHERSEN 2003).

The EU and the Council of Europe (CoE) are both principal initiators of transboundary legislation and conventions for safeguarding Europe's endangered species. The European Commission (EC), based in Brussels, Belgium, and the European Parliament, based in Strasbourg, France, are the political institutions of the EU, and regulations and directives are the instruments through which measures are enacted (MCLEAN et al. 1999). Membership in the European Community (EC) means that European Community law has an effect on many aspects of species protection law in all member states. A complementary role is played by the Council of Europe (also based in Strasbourg, France) which comprises 40 member states, including Russia and the east European countries not yet included in the EU (MCLEAN et al. 1999). The CoE has greater influence outside the EU, and through its role with the Bern Convention, it supports wildlife conservation by making recommendations, organizing colloquia, and producing advisory and reference publications, including Red Data Books and Red Lists (MCLEAN et al. 1999). Generally, the increase in international legislation and obligations (conventions, directives, and agreements) for conserving species is a welcome trend that will hopefully continue in Europe and elsewhere (MCLEAN et al. 1999).

2.2.1 Bern Convention

The Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats) was adopted in Bern, Switzerland, in September 1979. It has a broad geographic scope and coordinates as a binding international legal instrument the development of policy and action in nature conservation in 40 member States of the Council of Europe as well as Burkina Faso, Monaco, Morocco, Senegal, Tunisia and the European Community.

According to the DIRECTORATE OF CULTURE AND CULTURAL AND NATURAL HERITAGE (2003), the convention establishes obligations for its Parties to the protection of natural habitats and to the protection of a large number of species mentioned in three appendices (strictly protected flora species in Appendix I, strictly

protected fauna species in Appendix II, protected fauna species in Appendix III) and also to prohibited means and methods of killing, capture and other forms of exploitation in Appendix IV. Brown bears are listed in Appendix II of the Bern Convention, which is based on the lists of mammals, birds, amphibians and reptiles threatened in Europe drawn up by the European Committee for the conservation for Nature and Natural Resources.

The Bern Convention does not provide detailed information concerning management actions for single species; it rather contains a framework of general measures each contracting party should take in order to manage nature in a sustainable way. In Article 1, paragraph 1, the Convention urges the conservation of wild flora and fauna and their natural habitats, especially of those species and habitats whose conservation requires the cooperation of several States (COUNCIL OF EUROPE 1979), whereas each party should lay its emphasis especially on endangered and vulnerable species. In Article 2, all contracting parties are expected to take requisite measures to maintain the population of the wild flora and fauna at - or adapt it - to a level which corresponds in particular to ecological, scientific and cultural requirements and the needs of sub-species, varieties or forms at risk locally (COUNCIL OF EUROPE 1979). Article 3 of the Convention recommends furthermore that all contracting parties promote national policies for the conservation of wild flora, wild fauna and natural habitats, with particular attention to endangered and vulnerable species (COUNCIL OF EUROPE 1979).

The institutional framework of the Bern Convention is comprised of the Standing Committee and its Bureau, the Groups of Experts and the Secretariat (JEN 1999). The Standing Committee meets once a year and brings together representatives of the contracting Parties and observers (NATURAL HERITAGE AND BIOLOGICAL DIVERSITY DIVISION 2002). As noted by the DIRECTORATE OF CULTURE AND CULTURAL AND NATURAL HERITAGE (2003), the Standing Committee is responsible for the application of the Bern Convention, reviews the provisions of the Convention, including its appendices, and examines necessary modifications. The Standing Committee has also adopted several recommendations to the contracting Parties; some of them are directly oriented towards species recovery (MACHADO 1997)

and describe measures to be taken for the conservation of threatened species such as the European brown bear.

In 1988, the recommendation No. 10 concerning the protection of the brown bear pointed out that brown bears are seriously endangered throughout Western Europe, as they have become extinct in the countries of ten contracting Parties and are being reduced to relic populations in some others. Furthermore, the brown bear is defined as a fundamental part of the European natural heritage for its symbolic, scientific, educational, cultural, recreational, aesthetic and intrinsic value (COUNCIL OF EUROPE 1997). Thus, the Standing Committee expects Member States to strengthen the basis of legal protection of the brown bear by making or enforcing specific legal instruments to enable the improvement of the status of the species and a more efficient treatment of the details of its conservation (COUNCIL OF EUROPE 1997). Species Management Plans were not mentioned in this recommendation, but the Standing Committee expects contracting Parties to pay particular attention to the conservation of bear habitat, the establishment of funds to be used for financing conservation work or payment of compensation for damages caused by bears, new management practices and research on all aspects of bear biology.

In 1992, the Standing Committee adopted recommendation No. 37 on the conservation of the Cantabrian bear. According to the COUNCIL OF EUROPE (1997), the Standing Committee urges Spain to maintain and reinforce existing recovery plans for the Cantabrian bear.

In 1995, recommendation No.43 on the conservation of threatened mammals in Europe was published by the Council of Europe. This recommendation is not species oriented, but the Standing Committee indicates again that the design and the implementation of recovery plans may be a useful tool to redress the situation of threatened mammals (COUNCIL OF EUROPE 1997). The recommendation provides furthermore some sort of guidelines for species recovery plans. The Standing Committee requests from all Member States to consider (or, if appropriate, reinforce) recovery plans for the list of populations or species listed in Appendix A of the proposal (COUNCIL OF EUROPE 1997). Appendix A stands for taxa needing conservation or recovery plans. The brown bear populations of Austria, France, Greece, Italy and Spain are listed under

Appendix A and are considered to require conservation or recovery plans. The brown bears in Czech Republic, Norway, Poland and Sweden are listed under Appendix B which includes taxa to be evaluated as candidates for conservation or recovery plans. These Member States are urged to evaluate whether the species or populations listed in Appendix B of this proposal require recovery plans, and also to monitor populations of those species of which the conservation status may not be satisfactory, so that the decline of populations may be known before they become too threatened (COUNCIL OF EUROPE 1997). Furthermore, the Standing Committee encouraged cooperation at a national and international level and suggested, if appropriate and relevant, to design conservation and recovery plans for the entire regional population involved, which are to be coordinated with neighboring states containing a part of the population concerned (COUNCIL OF EUROPE 1997). Special attention should be paid to the co-ordination of conservation efforts in the main European mountain ranges (Pyrenees, Alps, Balkans, Carpathians etc.), especially regarding the protection of large carnivores (bear, wolf, lynx), trying to co-ordinate national strategies for those species (COUNCIL OF EUROPE 1997). While drafting the documents the Member States are supposed to bear in mind the setting of clear and measurable goals for the conservation or recovery plans (COUNCIL OF EUROPE 1997). For a successful completion of these documents, the Standing Committee also suggests providing adequate long-term administrative, legal and financial means for their implementation, re-evaluating the plans as they are being implemented with the knowledge obtained in their environment and basing conservation plans on sound studies on the biology of the population concerned (COUNCIL OF EUROPE 1997). Other administrative departments, local authorities, people responsible for economic activities which may be affected by a plan, and other social groups (hunters, game managers, anglers, visitors, foresters, livestock raisers, voluntary conservation groups, etc.) with an interest in the species or population to be preserved should be involved in the design and implementation of conservation or recovery plans.

In 1997, the Standing Committee adopted an entire recommendation on the drafting and implementation of action plans of wild fauna species. First of all, recommendation No. 59 indicates that Species Action Plans (of which Species Recovery Plans are a particular case) may be appropriate conservation tools to restore threatened

populations in some circumstances (COUNCIL OF EUROPE 2001). It is important to mention that in the framework of this recommendation the term “species” also covers subspecies and populations, as Species Action Plans may be designed for a whole species, a subspecies, a meta-population or a population, depending on the biological characteristics of the species concerned and the geographic range where it applies (COUNCIL OF EUROPE 2001). The recommendation provides furthermore useful guidelines for designing a Species Action Plan, its implementation, monitoring, update and follow-up. The Standing Committee urges all Member States again to improve international co-operation and to consult relevant neighboring states while planning and carrying out Species Action Plans of transboundary populations (COUNCIL OF EUROPE 2001), which is especially important for species with large home ranges like those of brown bears. NGOs should also participate in the process of recovery planning as they play a catalytic role (COUNCIL OF EUROPE 2001) in the implementation, follow-up and the drafting of Species Action Plans. In addition, the Member States are supposed to lay emphasis on public information and education. According to MACHADO (1997) it is not infrequent that the fate of highly conflictive species such as large carnivores are, rely more on effective public awareness than on strict biological management.

In 1999, the Standing Committee adopted recommendation No. 74 on the conservation of large carnivores. As noted by the Standing Committee, a few populations of large carnivores in some mountain ranges are isolated and due to a dramatic decline of these populations, the drafting and implementation of Action Plans may be a useful tool to redress this situation (COUNCIL OF EUROPE 2001). Furthermore, the recommendation referred to the Action Plans on large carnivores presented by the Large Carnivore Initiative for Europe and sponsored by the World Wide Fund for Nature (COUNCIL OF EUROPE 2001). These Actions Plans are considered as guidelines for competent national authorities (COUNCIL OF EUROPE 2001). Observer states are also invited to consider drafting and implementing (or, if appropriate, reinforcing) national Action Plans for the species listed in the Appendix of this recommendation (COUNCIL OF EUROPE 2001).

In 2000, recommendation No. 82 on urgent measures concerning the implementation of action plans for large carnivores in Europe was adopted by the Standing Committee. Some contracting Parties are invited to take urgent measures concerning their large carnivore populations. For instance, Poland, Romania, Slovakia and Ukraine should establish a framework for technical and political co-operation on large carnivores in the Carpathians that may lead to a coordinated management of transboundary populations and to their maintenance in a favorable status (COUNCIL OF EUROPE 2001).

It is worth mentioning that the Standing Committee also provides for a follow-up of all developed Species Action Plans through a Group of Experts working on large carnivores. The Standing Committee expects them to meet on an ad hoc basis in conjunction with the Large Carnivore Initiative for Europe (LCIE) in order to monitor the implementation of the Actions Plans for large carnivores (DIRECTORATE OF SUSTAINABLE DEVELOPMENT 2000). The Large Carnivore Expert Group is expected to follow-up the drafting and implementation of national or regional Action Plans on the species, collaborating as necessary with the states on the technical matters involved (DIRECTORATE OF SUSTAINABLE DEVELOPMENT 2000). Additionally, they are instructed to direct the update of LCIE Action Plans and their enlargement to new territories not yet covered.

2.2.2 The Pan-European Biological and Landscape Diversity Strategy

The Pan-European Biological and Landscape Diversity Strategy (PEBLDS) was adopted by the Council of Europe, the United Nations Environmental Programme (UNEP) and the European Centre for Nature Conservation (ECNC) at the third Ministerial Conference “Environment for Europe” in October 1995 in Sofia, Bulgaria. The Strategy has no legal binding force, it is just a rational policy framework, established and agreed upon 55 European countries, with the participation of major governmental and non-governmental organizations. Its implementation is based on the willingness of the actors involved (MACHADO 1997). The principle aim of the Strategy is to find a consistent response to the decline of biological and landscape diversity in Europe and to

ensure the sustainability of the natural environment (THE NATURAL HERITAGE AND BIOLOGICAL DIVERSITY DIVISION 2002).

The Strategy seeks to achieve its aim by introducing a coordinating and unifying framework for strengthening and building upon existing initiatives (COUNCIL OF EUROPE 1996). It is not planned to introduce new legislation, but to fill gaps where these initiatives are not implemented to their full potential or fail to achieve desired objectives (COUNCIL OF EUROPE 1996). Actions are to be implemented by dividing the Strategy into five year Action Plans, which provide a framework that contributes to the Convention on Biological Diversity and in particular to the National Biodiversity Strategies (COUNCIL OF EUROPE 1996). The Action Plan 1996-2000 is divided into 11 action themes to be fully elaborated into projects during this period (MACHADO 1997). Action theme 11 “Action for threatened species” suggests developing species action plans for all species and their genetic diversity being threatened at the Pan-European level, but also targeting threatened species with popular appeal, negative appeal, cultural relevance and economic relevance (COUNCIL OF EUROPE 1996). The brown bear, for instance, can be considered as a threatened species with popular appeal as well as cultural relevance.

2.2.3 The EU Directive 92/43/EEC

The EU Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) is one of the principal mechanisms for protecting endangered species in Europe. The Habitats Directive aims to maintain and restore habitats and species of EU importance “to favorable conservation status” (MCLEAN et al. 1999). The EU member states are required to identify sites of European importance and draw up management measures for them, combining wildlife preservation with economic and social activities, as part of a sustainable development Strategy (EUROPEAN COMMISSION 2002). Thus, a series of special areas of conservation (SACs) – part of the Natura 2000 network - is being established (MCLEAN et al. 1999), and habitats and species of community interest are listed in several Annexes (BENNETT 2002). The European brown bear is listed as a strictly protected species (Annex IV)

requiring special protected areas (Annex II), whereas the Finish and Swedish brown bear populations are excluded from Annex II.

The Habitats Directive does not directly urge the development of species management plans. It is recommended rather for Member States to make provision for management measures towards certain species, if their conservation status so warrants. A central element concerning species conservation relates to the establishment and management of SACs. It protects the species indirectly by saving valuable habitat upon which, for instance, many of European's brown bears depend. In Article 6, Member States are expected to involve conservation measures, if need be, appropriate management plans specifically designed for the sites, and appropriate statutory, administrative or contractual measures that correspond to the ecological requirements of the species in Annex II present on the sites. Member States are furthermore obliged to set up a system of strict conservation for species of community interest, which guarantees direct protection, for instance, through prohibition of deliberate capture, killing or disturbance of the species in the wild [Article 12]. Provision should be also made for supplementary measures governing the reintroduction of certain native species.

2.3 Regional

2.3.1 The Carpathian Convention

The Carpathian Mountains extend into six Central and Eastern European countries - the Czech Republic, Hungary, Poland, Romania, Slovakia and the Ukraine - and are considered to be the last remaining major ecosystem in Europe that is in almost pristine condition (BENNETT 2000), and thus it is especially valuable for large carnivores such as brown bears. In fact the Carpathians are the main source of large predators for the European continent (BENNETT 2000). The brown bear population, for instance, is estimated at about 8,100 individuals and represents the second largest in Europe (SWENSON et al. 2000). It is not surprising that a regional agreement, the Carpathian Convention, was set up to ensure the conservation of a region; this is, in European terms, unique in harboring a virtually complete megafauna (BENNETT 2000).

The Carpathian Convention is a far-reaching, innovative legal framework and with its signing in Kiev, Ukraine, in May 2003, the countries of the Czech Republic, Hungary, Romania, Serbia and Montenegro, the Slovak Republic and Ukraine committed to the protection and sustainable development of an area covering more than 200,000 square kilometers (WWF 2003). Regarding to threatened and endangered species conservation, Article 4 of the convention on conservation and sustainable use of biological and landscape diversity provides some general recommendations in order to enhance direct or indirect protection of the species. All Contracting Parties are urged to take appropriate measures to ensure a high level of protection and sustainable use of natural and semi-natural habitats, their continuity and connectivity, and species of flora and fauna being characteristic to the Carpathians, in particular the protection of endangered species, endemic species and large carnivores [Article 4(1)]. Species management plans are not mentioned directly but can be considered as one of the appropriate measures recommended to be taken.

2.4 National

Country-level legislation in Europe concerning endangered species is diverse and government involvement in wildlife conservation, via legislation, is a relatively recent phenomenon in most countries (MCLEAN et al. 1999). Most states provide a basic framework to protect species from overexploitation or to protect important sites (MCLEAN et al. 1999) but in most countries it is not required to develop and implement species management plans because they are not mentioned directly in existing laws, even though it would be an important step toward the recovery of many endangered species. Legislation sometimes provides additional sections dealing with the coordination of responsible authorities and their obligations in conservation programs. Concerning to species management plans, this would be extremely helpful in order to implement all important aspects of the plan. Species management plans are sometimes not implemented because putting their conservation measures into action would be too costly. As soon as the development and implementation of species management plans are embodied in the national legislation, responsible authorities are obliged to conduct the conservation measures listed in these management documents. However, there are only a few countries

within Europe that include the development and implementation of species management plans in their national legislation. The following analysis only refers to those European countries that still inhabit brown bear populations.

The United States has a history of more than twenty years of professional recovery (MACHADO 1997) and incorporates detailed directives for development and implementation of species management plans in its federal legislation, the Endangered Species Act. However, the federal protection for threatened and endangered species provides a 'floor' that limits inconsistent state action (GOBLE et al. 1999). State endangered species legislation does not urge the development of appropriate species management documents in most states. Endangered species legislation in only 4 states, California, Hawaii, New Mexico and Oregon, contains detailed requirements that the wildlife management agency engage in recovery planning processes (GOBLE et al. 1999).

However, the role of national legislation will continue to remain important for delivering species protection and species recovery within each European country (MCLEAN et al. 1999), and every other country worldwide. Thus, for the future, countries are called up to take a more active role in establishing national endangered species legislation in order to simplify the development and implementation process of species management plans resulting in an improvement of the endangered species' conservation status.

2.4.1 Finland

The Nature Conservation Act (1096/1996), which was brought up to date at the beginning of 1997 (KANGAS et al. 1997), is one of the most important legislative measures concerning endangered species conservation in Finland. Generally, the main goals of the Act are to "maintain biological diversity; conserve nature's beauty and scenic value; promote the sustainable use of natural resources and the natural environment; promote awareness of and general interest in the environment; and promote scientific research" (KANGAS et a. 1997). In regard to endangered species conservation, the Act demands that the Ministers of the Environment and of Agriculture and Forestry monitor the status of threatened species and prepare Conservation Plans for specially protected

species (MACHADO 1997) that contain proposals for the management and protection of both the species itself and its habitat (KANGAS et al. 1997).

2.4.2 France

In France, rare, threatened and endangered species of wild consistent with the EC “Birds” and “Habitats” Directives are legally protected. In addition to this legislative protection, France has established Action Plans - depending on the species concerned - for biodiversity conservation and conservation and/or restoration plans (THE FRENCH REPUBLIC 1997). The Action Plans - also called “biodiversity conservation action plans” - have been implemented by the Ministry of Environment since 1988 without any further regional or local consultation as these are national plans (THE FRENCH REPUBLIC 1997). They cover groups of species, ensure monitoring of certain protected or sensitive animal populations and conduct a critical assessment of information and management measures already implemented (THE FRENCH REPUBLIC 1997). Expert groups will be involved in the elaboration of Action Plans, as needed, and a Validation Team is also foreseen (MACHADO 1997).

Based on the Action Plans and the findings that they show, it has been necessary to implement restoration or conservation plans on a species-by-species basis (THE FRENCH REPUBLIC 1997). Both plans aim to increase numbers of especially threatened populations through the implementation of specific conservation measures and to set up additionally desired population levels as recovery goals. Most of the conservation and/or restoration plans are drawn up by the Regional Office of the Environment (DIREN) concerned, and in the specific case of plans requiring extensive local involvement for their implementation, other local actors (regional department, local authorities and NGOs) are also involved (THE FRENCH REPUBLIC 1997). Generally, conservation and/or restoration plans describe the situation of the species at the national and international level and specify the threats to their well-being; above all, they set out the goal sought (HERRENSCHMIDT 1998).

2.4.3 Latvia

Latvian legislation provides a legal basis for the creation of management plans for all protected territories of different conservational purposes (KABUCIS et al. 1998). According to KABUCIS et al. (1998), smaller territories are usually created for the protection of certain species. In this case, these plans can be considered also as Action Plans for certain species preservation. KABUCIS et al. (1998) reports furthermore that larger sites are usually concerned with the protection of non-fragmented habitats and ecosystems which are also very crucial for different species and communities.

2.4.4 Spain

There are two types of legislation that protect Spain's endangered species through the development of species plans: the 1989 declaration on the Conservation of Natural Areas and of Wild Flora and Fauna, and also the National Catalogue of Threatened Species.

In 1989, the necessary legal framework for conservation in the new autonomous Spain was established by a statutory law 4/1989 on the Conservation of Natural Areas and of Wild Flora and Fauna (MACHADO 1997), which set up a new strategy to conserve Spain's endangered species. Until the passage of Act 4/1989, Spanish fauna only received indirect protection under hunting and fishing laws (ANONYMOUS 2000). Instead of merely banning the hunting and possession of live or dead specimens, this law proactively required the development of plans to protect species and their habitat (PALOMERO et al. 1997).

Species at risk are also listed in the National Catalogue of Threatened Species, which was established under the Act 4/1989 and is further regulated under the Royal Decree 439/1990. The National Catalogue of Threatened Species includes species in four categories: In danger of extinction (E), sensible to habitat alteration (SH), vulnerable (V), and of special interest (Ie) (MACHADO 1997). There is a general obligation of the Autonomous governments to undertake active conservation measures for species listed in the National Catalogue (MACHADO 1997). If a species or population is included in the National List, measures must be drafted for the return of the species or populations to a

favorable state (ANONYMOUS 2000). The Autonomous governments have to prepare and approve Recovery Plans for endangered species (E), Habitat Conservation Plans for species sensible to habitat alterations (SH), Conservation Plans for vulnerable species (V), and Management Plans for species of special interest (Ie) (MACHADO 1997). When preparing such plans, regional governments are obliged to include coordination and financial measures required to set the plans in motion. Regional coordination for species distributed over more than one Autonomous region is regulated under the Royal Decree 439/1990. The National Nature Protection Commission is empowered to add guiding criteria to Recovery Plans for species or groups of species with an inter-regional presence (ANONYMOUS 2000).

2.4.5 Sweden

The Swedish Environmental Protection Agency (SEPA) is the responsible authority concerning the preservation of threatened species in Sweden (MACHADO 1997). Action programmes for particular species have been drawn up as a tool for recovering some species in numbers and distribution (MACHADO 1997), which define goals relating to species and populations. Objectives are stated in terms of population sizes or distribution areas required to regard the species as assured or saved (MACHADO 1997).

2.4.6 United States of America

The Endangered Species Act of 1973 (ESA) is arguably the most important legislation passed by the United States Congress to protect species and their habitats (FOIN et al. 1998). It focuses on species of fish, wildlife, and plants that have been so depleted in numbers that they are in danger of or threatened with extinction [ESA Section 2 (a)(2)] and/or are of esthetic, ecological, educational, historical, recreational, or scientific value to the Nation and its people [ESA Section 2 (a)(3)]. Under the law, species may be listed as either “endangered” or “threatened” (U.S. Fish and Wildlife Service 2002a). An endangered species is any species in danger of extinction throughout all or a significant portion of its range; a threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a

significant portion of its range (U.S. FISH AND WILDLIFE SERVICE 1988). It is also noteworthy that species, subspecies, and distinct populations may be listed under the ESA as needed [ESA Section 3(15)]. This allows a species to receive different levels of protection in different portions of its range (BEISSINGER and PERRINE 2001).

The Endangered Species Act strives not only to prevent endangered and threatened species from becoming extinct, but also to restore these species to the point at which they no longer require special legal protection (ROHLF 1989) because they have become secure, self-sustaining components of their ecosystems (SCOTT 1999). Among other things, the Act requires the development of species recovery plans for listed endangered or threatened species, which serve as an important tool to organize and guide the recovery process and ensure that recovery is achieved (U.S. FISH AND WILDLIFE SERVICE 1996), unless the plan would not promote the conservation of the certain species [ESA Section 4(f)(1)].

Recovery plans are prepared using one of two methods: (1) Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) personnel supervise the preparation of the plan, which is actually written by an outside group or individuals under contract, or (2) FWS or NMFS establishes its own “recovery team” to prepare the plan (ROHLF 1989). The recovery team, which is appointed by the appropriate Regional Director with lead authority for those species (SCOTT 1999), usually consists of representatives from agencies that will be charged with the implementation of the plan, scientists with expertise about the species involved, representatives from industries that may be affected by the plan, and FWS/NMFS personnel (ROHLF 1989). The Service’s policy is to develop draft recovery plans within one-and-a-half years of the date of species listing and to complete the development of final recovery plans within two and half years of listing (SCOTT 1999).

The Service also emphasizes the participation by landowners and other effected stakeholders on recovery teams (SCOTT 1999). An essential part of the recovery planning process involves identifying these parties and developing partnerships so that creative ways of implementing recovery actions can be accomplished (SCOTT 1999). Thus, it is also recommended to provide, prior to final approval of a new or revised

recovery plan, public notice and an opportunity for public review and comment on such plan [ESA Section 4(f)(4)].

Furthermore, the ESA provides useful recommendations that should be incorporated into each recovery plan. Plans must contain site-specific management actions such as the life history of the species, all natural and human-related factors affecting the species and its supporting habitat, objective measurable criteria which, when met, would result in a determination that the species be removed from the list, and an estimate of the time required and the cost to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal [ESA Section 4(f)(1)].

ESA also requires Federal agencies to ensure that their activities will not jeopardize the continued existence of listed species or adversely modify designated critical habitats [ESA Section 7 (a)(2)]. This activity is called a consultation process, which urges Federal agencies to consult with the FWS to ensure that the actions they fund, authorize, permit, or otherwise carry out (U.S. FISH AND WILDLIFE SERVICE 2002b) will not harm the listed species and its habitat. Before initiating an action, the Federal action agency (the agency planning a specific action), or its non-Federal permit applicant, must ask the FWS to provide a list of threatened, endangered, proposed, and candidate species and designated critical habitats that may be present in the project area (U.S. FISH AND WILDLIFE SERVICE 2002b).

Restoring species to self-sustaining, functioning components of their ecosystems is normally a highly interactive, methodical, and expensive process (SCOTT 1999) that requires substantial amounts of money and resources (ROHLF 1989). Funding may be provided to State agencies through the Cooperative Endangered Species Conservation Fund [ESA Section 6(d)] if the State legislation enables that possibility and if cooperation agreements are fixed (MACHADO 1997).

3 SIGNIFICANCE AND TERMINOLOGY OF SPECIES MANAGEMENT PLANS

Conservation has traditionally concentrated on ecosystems and on protection (FOOSE et al. 1995), and not on the management of single endangered species. According to CADE and TEMPLE (1995), there is a general agreement that the ecosystem oriented and habitat conservation approaches are more far-reaching and cost-effective for the continuance of biodiversity than species-by-species conservation approaches. However, the processes that jeopardize species are increasing rather than diminishing (ROHLF 1989) and the time for conservation action is growing short for many species (SERVHEEN et al. 1999).

Protection, while necessary, is sometimes no longer sufficient and the habitat approach alone is often too broad to address the diverse and complex threats to species survival successfully. Therefore, wildlife managers and conservation biologists have recognized a need to conduct intensive management as well as organized planning of endangered species in order to ensure their survival and recovery. The key instrument of endangered species management and planning is the use of “Species Management Plans”. These are generally species-oriented documents that provide besides biological and ecological basics of the species, information on the major problems and threats as well as guidance through the complex problem-solving process (Figure 5). In order to be successful, the plan does not only focus on the species itself. It also integrates the habitat conservation approach as well as the preservation of genetic diversity within the species, which is especially important since it allows species to adapt to new conditions (LANDE and SHANNON 1996). Besides these biological factors, it is also necessary to understand and effectively address all non-biological limitations to species survival including political, social, and organizational obstacles (PEYTON et al. 1999). Ideally, species management plans identify appropriate conservation measures and actions to address all these factors, responsible agencies to undertake the measures, and a time framework and cost analysis for all steps of the implementation process. These action and conservation

measures are usually applied on a smaller geographical scale based on the distribution of populations and sub-populations of the species and thus they often vary depending on the threats each population has to face.

The terminology concerning species-oriented plans often causes confusion. In the framework of this master thesis, the general term of “Species Management Plans” is used as so many different terms for species-oriented management documents exist such as “Species Action Plans”, “Species Recovery Plans” or “Conservation Action Plans”. The reason is that the plans have been enacted through various international agreements or national legislation and often non-governmental organizations have also been the initiators (Table 1). Thus, species management plans are also implemented on various geographical scales (international, national, or regional level; ecosystem or habitat-oriented), which has an influence on the contents of the plans. Species management plans are usually divided in two parts - a theoretical one, which provides basic information on the species (biology, ecology, distribution, status, protection etc.), and a more management-oriented one, which identifies threats to the survival of the species, appropriate conservation measures to address the threats, a time frame for accomplishing recovery and also a cost analysis of the complete recovery process. Internationally oriented species management plans are often very valuable in providing comprehensive theoretical information on the species, whereas plans based on a country, region, ecosystem or habitat level are more likely to incorporate an action-oriented approach as these kind of plans usually have to manage small populations in order to prevent them from extinction. The COUNCIL OF EUROPE (1998) described “Species Recovery Plans” as specifically linked to precise implementation, whereas “Species Action Plans” are more general documents aiming to improve the situation of a species or a series of species throughout a continent. The U.S. ESA species recovery plans may be a good example for more implementation-oriented documents. These plans are often described as central documents available to decision makers responsible for the management and recovery of threatened and endangered species (O’CONNOR et al. 2000). If well implemented, high-quality recovery plans are able to shift the focus of recovery efforts beyond stopgap measures meant to prevent extinction, toward systematic and strategically coordinated actions aimed at alleviating threats and restoring natural

ecosystems to a state in which populations are self-sustaining (CLARK et al. 2002). Regardless of what species management plans are currently called, a uniform terminology is needed since it would improve international cooperation and facilitate an exchange of experiences between countries and regions, which is clearly in the interest of the species concerned.

Table 1. Species Management Plans and their initiators relevant to large carnivore conservation		
Initiator	Terminology (geographical scale of plans)	Species of interest
<i>International</i>		
Convention on Biological Diversity	Plans or management strategies (national)	Threatened species
<i>NGOs</i>		
IUCN	Conservation Action Plans (worldwide)	Threatened species groups
WWF	Conservation plans (worldwide)	Mainly charismatic species (e.g. Giant Panda)
LCIE (Large Carnivore Initiative for Europe)	Species Action plans (Europe)	Large carnivores (brown bear, Eurasian lynx, Iberian lynx, wolf and wolverine)
BLCI (Baltic Large Carnivore Initiative)	Action plan (multi-species approach within Baltic States)	Large carnivores (brown bear, lynx, and wolf)
<i>European</i>		
Bern Convention		
Recommendation No. 37	Recovery plan (Regional)	Cantabrian brown bear
Recommendation No. 43	Species Recovery plans (Europe)	Threatened mammals Appendix A (taxa needing conservation or recovery plans) Appendix B (taxa to be evaluated as candidates for conservation or recovery plans)
Recommendation No. 59	Species Action plans (Europe)	Wild fauna species
Recommendation No. 74	Species Action plans (Europe)	Large carnivores
Pan-European Biological and Landscape Diversity Strategy	Species Action plans (Europe)	Threatened species with popular or negative appeal, and cultural or economic relevance
<i>National</i>		
<i>Finland</i>		

Brown Bear Management Plans in Europe and the continental United States

The Nature Conservation Act (1096/1996)	Conservation plans (National)	Specially protected species
<i>France</i>	Biodiversity conservation action plans (National)	Groups of species Sensitive animal populations
	Restoration or recovery plans (National)	Specially threatened species
<i>Spain</i>		
Declaration on the Conservation of Natural Areas and of Wild Flora and Fauna	Recovery plans (National)	Endangered species
	Habitat Conservation plans (Habitat oriented)	Species sensible to habitat alterations
	Conservation plans (National)	Vulnerable species
	Management plans (National)	Species of special interest
<i>USA</i>		
Endangered Species Act	Recovery plans (Nationwide single or multi-species approach)	Endangered or threatened species
	Conservation Strategy (Ecosystem/recovery zone)	Endangered or threatened species
	State management plans (Federal states)	Endangered or threatened species

Species management plans focus mostly on a single species, but throughout the last decade wildlife managers have also relied on “multi-species” approaches. Multi-species plans, if well coordinated, have the potential to preserve several species simultaneously (BOYER 2001). Species within the same ecosystem or taxonomic order with similar biological and ecological requirements and nearly the same threats to their survival are often integrated into a multi-species management plan. For instance, large carnivores such as the brown bear, lynx, wolf and wolverine existing in the same areas and being threatened by a similar multi-dimensional problem may be an appropriate taxonomic order for a multi-species approach. Although there are also disadvantages - multi-species plans, for example, often seem to be too complex and an inappropriate approach to ensure the survival of endangered species – it depends mainly on the

situation, the species and of course on the quality of the actual document. CLARK and HARVEY (2001) indicate that multi-species plans reflect a poorer understanding of species-specific biology, are less likely to include adaptive management provisions, and are revised less frequently. For all the complexity involved in developing such expanded plans, there are also many advantages (JEWELL 2000). According to BOYER (2001) multi-species plans often reflect a better understanding of species and their relationship to the ecosystem. A multi-species plan can also streamline the public comment process and save time by reducing the need to describe habitats and threats separately for each species. However, each type of plan has its strengths and weaknesses, and if well developed and implemented, both can be recommended in order to secure the survival and recovery of endangered species.

All in all, experience has shown that species management plans make real contribution to species conservation and seem to play a crucial role in recovery planning of highly endangered species such as many large carnivores. They are, if properly developed and implemented, a powerful tool to secure endangered species' future survival and recovery for many reasons (Figure 6).

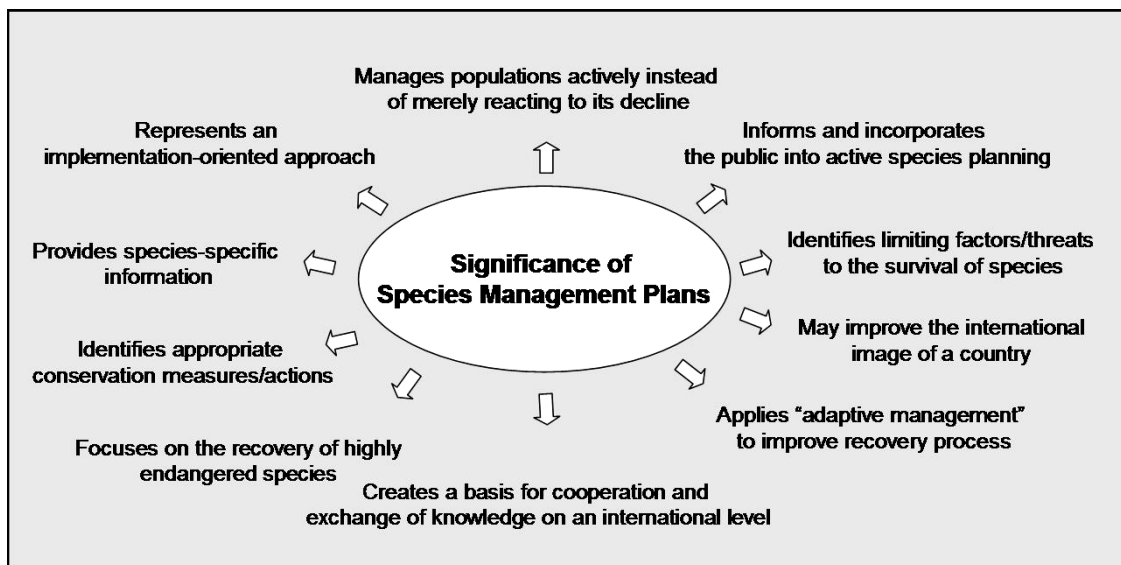


Figure 6. Significance of species management plans

4 ANALYSIS OF EXISTING BROWN BEAR MANAGEMENT PLANS

Large carnivores such as brown bears quite often seem to be the target species in species management plans. A serious decline in population numbers, the escalating human-carnivore conflict, and a cultural and scientific significance of the species may be responsible for this trend. Bears, for example, are highly valuable in the research of the conservation and sustainable use of biological diversity because they can be considered as an “umbrella species” whose conservation provides for a protective umbrella to numerous co-occurring species (FLEISHMAN et al. 2000). According to the U.S. FISH AND WILDLIFE SERVICE (1993), the grizzly bear is the best example of an umbrella species in the Rocky Mountains because it has one of the largest average home ranges of any mammal species and occupies a variety of habitats from valley bottom riparian zones to alpine mountaintops. Using bears as umbrella species may therefore justify also the high costs for the conservation of a few large carnivores as long as other species, often more important but less charismatic ones, also benefit from their preservation.

This chapter analyses the actual brown bear management plans and may hopefully provide a useful insight into the process of species recovery planning on an international, European, regional and a national level. Most of the plans discussed have been developed on a national level as it is recommended to identify threats to the survival of bears in a smaller, national, and more population-oriented context and also to carry out appropriate conservation and restoration actions by actors in the area concerned. The topics addressed in the analysis include the development and implementation process, the main contents and highlights of each planning document. Besides the analysis of the management plans, the situation of brown bears in many European countries and the continental United States are outlined briefly in order to understand the necessity and significance of the documents, their goals and conservation actions. Countries with no management plans thus far are welcome to go through the different scenarios and seek inspiration for their future national documents.

4.1 International

4.1.1 IUCN Conservation Action Plans

Species Action Plans have been published since 1986 by the Species Survival Commission (SSC) of IUCN (FULLER et al. 2003) and according to FULLER et al. (2000), the series is one of the world's most authoritative sources of species conservation information available to nature resource managers, conservationists, and government officials around the world. In 1999, IUCN published also the 'Status Survey and Conservation Action Plan – Bears', which covers eight bear species currently existing in 60 countries on four continents, the brown bear, the American black bear, the spectacled bear (*Tremarctos ornatus*), the Asiatic black bear (*Ursus thibetanus*), the sun bear (*Helarctos malayanus*), the sloth bear (*Helursus ursinus*), the Giant panda (*Ailuropoda melanoleuca*), and the Polar bear (*Ursus maritimus*) (SERVHEEN et al. 1999).

Most of this Action Plan is a series of species by species, country by country reports essential for understanding the status and needs of bear conservation in various places (HERRERO 1999). Bear scientists from all over the world were asked to provide information on the following topics: historic range and current distribution of the bear species, the current status of bear populations in their country, the legal status of bears, threats to bear populations and to their habitat, management of bears, human-bear interactions, and public education needs. The general information on each bear species is followed by specific conservation recommendations for those who can promote, support and implement species conservation actions in each country.

The Action Plan summarizes issues of particular concern such as the genetics of the bears and illegal trading of bears and bear parts. Furthermore, information on bear conservation planning and implementation as well as ways to ameliorate these processes are compiled with the purpose of guiding all responsible agencies and individuals through the complex recovery process. Thus, the Action Plan can be also considered as a strategic planning document for making bear conservation more effective by describing methods such as identifying and prioritizing threats, determining recovery criteria, and choosing project implementators.

4.2 European

4.2.1 Pan-European Species Conservation Action plans

A series of Pan-European Action plans have been elaborated, in co-operation with the Council of Europe, for each of the five species presently dealt with under the Large Carnivore Initiative for Europe [Brown Bear, Wolf (*Canis lupus*), Eurasian Lynx (*Lynx lynx*), Iberian Lynx (*Lynx pardinus*) and Wolverine (*Gulo gulo*)] (LARGE CARNIVORE INITIATIVE EUROPE 2001). These plans have been through an exhaustive, collaborative process (SWENSON et al. 2000), including discussions between several experts throughout Europe and reviews by the Bern Convention Contracting Parties, the European Commission and also by EU governmental experts, which resulted in incorporating most of the comments into the final versions of the plans. The LARGE CARNIVORE INITIATIVE (2001) emphasizes in all five plans fundamental guiding principles such as managing the bears on the population level and thus increasing cross-border cooperation, supporting re-colonisation of areas by large carnivores, setting up a specific body that is responsible for large carnivore issues and studying human attitudes, which includes the work on conflict resolution.

The “Action Plan for the Conservation of the Brown Bear in Europe” is an instructive document on the situation of European brown bears providing detailed background information on distribution and population numbers in Europe, the life history, which covers food, reproduction, hibernation, activity and home range, social organization and dispersal, and habitat requirements. Furthermore, issues such as the human-bear conflict, the main threats and limiting factors to the survival of the bears and some obstacles to their conservation are discussed. The second part of the plan begins with the definition of the ultimate goal of the plan, which is the maintenance and restoration, in coexistence with people, of viable brown bear populations as an integral part of ecosystems and landscapes across Europe. To reach this status, it is first necessary to achieve three smaller objectives. SWENSON et al. (2000) recommends the expansion of bears into suitable habitat, thereby increasing their population numbers and range and also reducing the conflict between brown bears and humans. Appropriate actions that are recommended to meet the main goal and objectives are identified on a European as well

as on a national level. The actions are related to issues of species conservation in general, the recovery of acutely endangered populations, habitat protection, conflicts with humans, problem bears, public involvement in brown bear management, public awareness, education and information, and research and monitoring. The listing of actions required for each country forms the basis for national decision-making in order to maintain and restore viable brown bear populations on national level. National authorities are, for instance, assigned to coordinate the development and implementation of national brown bear management plans, which must be carried out by professional teams that involve a wide range of appropriate interest groups. In the case of trans-national populations, it is recommended to produce management plans co-operatively in order to secure cross-border management (SWENSON et al. 2000).

Taken together, the “Action Plan for the Conservation of the Brown Bear in Europe” has contributed significantly to the conservation of the European brown bear. One of the major strengths of the action plan is that it overlooks the actual conservation status of brown bears in Europe and identifies necessary conservation actions on a country or even a smaller scale (National parks, SACs etc.), which are taken from national authorities for establishing priorities in the brown bear conservation.

4.3 Regional

4.3.1 Large Carnivore Action Plans for Dinara - Pindus range

The “Large Carnivore Action Plans for Dinara-Pindus range” is a multi-species approach covering the large carnivore populations of brown bear, Eurasian lynx, and grey wolf in the Dinara-Pindus range, which contains the countries Albania, Bosnia and Herzegovina, Croatia, Greece, the Former Yugoslav Republic of Macedonia, Slovenia and the Federal Republic of Yugoslavia. According to HUBER (2002), none of these countries is big enough to have its own viable population of any large carnivore species, and therefore, trans-boundary management of all populations is unavoidable. This action plan is not a strategic document that identifies its own specific conservation strategy for the Dinara-Pindus range. It is, rather, the answer to the Pan-European Large Carnivore Conservation plans prepared by the LCIE which recommended specific actions to be

taken on a country level. The plan also does not provide specific information on the situation of the species; it lists all recommended actions from European LCIE plans and comments on each action point whether or not appropriate measures have been taken and also revises or adds actions points, if necessary.

4.3.2 Action plan for the Baltic Large Carnivore Initiative

The conservation of three large carnivore species - the brown bear, Eurasian lynx, and grey wolf - is of particular importance in the Baltic States, Estonia, Latvia and Lithuania. According to the ESTONIAN FUND FOR NATURE (2001), with the joining of the European Union, the Baltic States' role in protecting the wider European natural heritage has been increasingly under focus. Thus, in 2001, the "Action Plan for the Baltic Large Carnivore Initiative 2001-2005" was developed by many experts from the Baltic States and also from the European Large Carnivore Initiative at the request of the Council of Europe with the intent to give an overview of the status of large carnivore conservation in the Baltic States. The document outlines the status of large carnivore protection for the three Baltic States, focusing on how already existing national management plans fulfill the guidelines and recommendations set out in the European Action Plans prepared by the Large Carnivore Initiative for Europe and the Council of Europe (ESTONIAN FUND FOR NATURE 2001). This comparison and analysis covering the topics "brown bears and humans", "threats, limiting factors, and obstacles to conservation" and "conservation status and recent conservation measures" has been possible for Estonia and Latvia, but not for Lithuania, which has not yet begun the preparation of such management documents. Regarding to brown bear conservation, Estonia developed the "Large Carnivore Control and Management Plan" in 2001 and Latvia developed the "Action Plan for the Conservation of Brown Bear (*Ursus arctos*) in Latvia" in 2003. The latter management document is not included in the Baltic Action Plan as it was finished quite recently. According to the ESTONIAN FUND FOR NATURE (2001), the Estonian "Large Carnivore Control and Management Plan" does not specially discuss the relationship between bears and humans, but provides general information on threats and limiting factors to the bears' survival and defines conservation objectives, population goals and also actions required to meet these goals and objectives.

Furthermore, the plan seems to serve as some sort of management framework, which guides the activities of the Baltic Large Carnivore Initiative from the period 2001 to 2005. Six main objectives are identified and followed by appropriate actions required to meet these objectives, the means of verification, a timeframe and comments on the status of each action to be taken are provided as well. For instance, the Baltic States aim to ensure the application of the Habitats Directive since Estonia, Latvia and Lithuania are Member States of the European Union. Thus, consultations with the Council of Europe and the European Community regarding the needs for large carnivore conservation in the Baltic States have been conducted. Additionally, the Action Plan emphasizes the need of reliable scientific methods to obtain robust data and to improve the scientific basis of large carnivore management. The preparation of an annual status report on all scientific activities, projects, studies, and the organization of regular meetings in order to improve the scientific exchange are recommended (ESTONIAN FUND FOR NATURE 2001).

4.4 National

In Europe, the use of species management plans is getting more common, especially in Western and Central European countries (Figure 7), although it is a pretty new trend. Most documents are initiated through international agreements such as the Bern Convention or the Habitats Directive, and a few are either based on national endangered species legislation or developed through committed official authorities or NGOs.

In the United States, species recovery plans have already a longer tradition. They are widely used and legally based conservation tools, which may have already contributed to the rescue of highly endangered species from the brink of extinction.

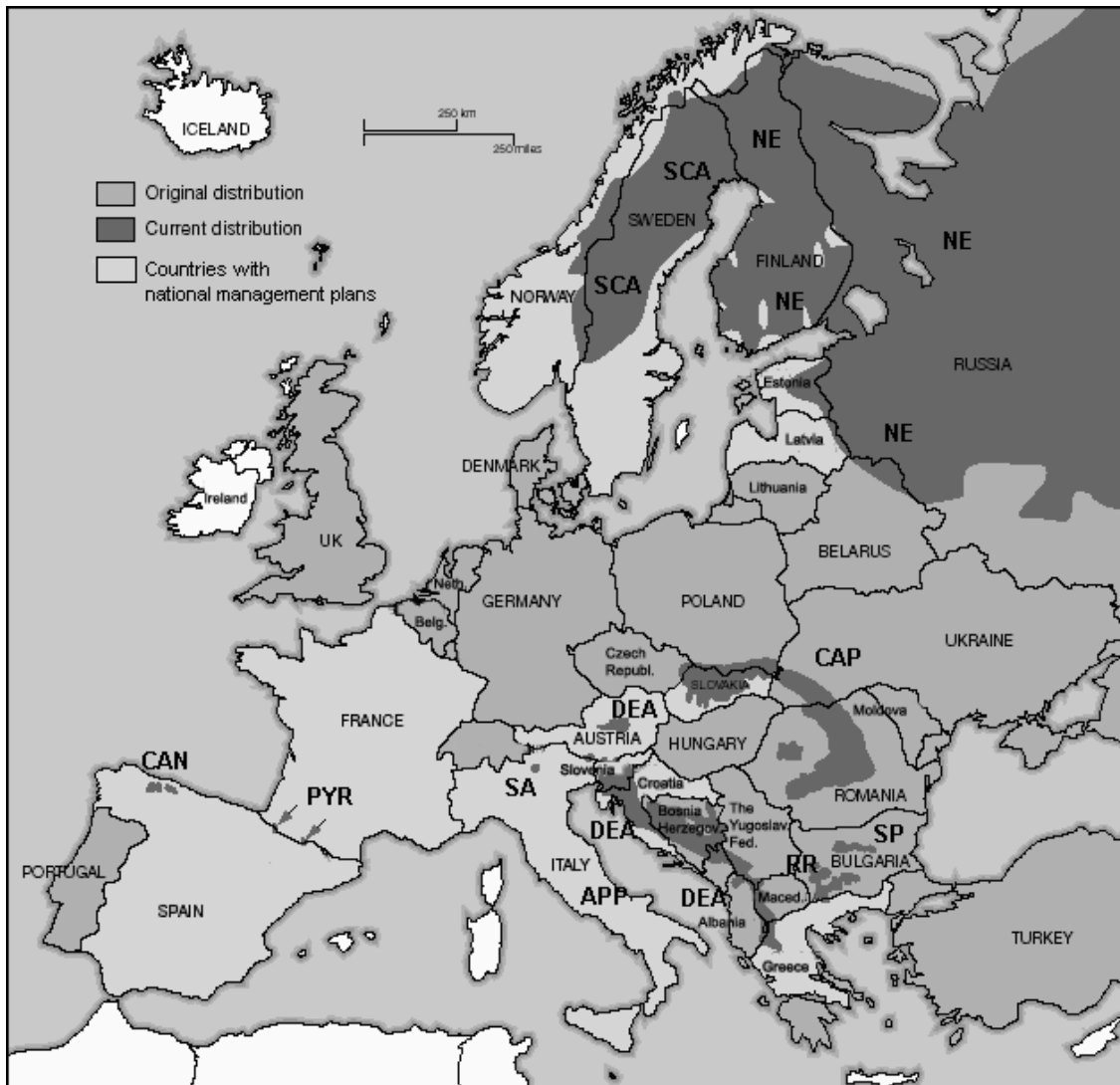


Figure 7. Distribution of brown bear populations and national brown bear management plans in Europe (based on SWENSON et al. 1998; modified)

4.4.1 Austria

For the past 100 years, bears in Austria were occasional migrants from Slovenia only (GUTLEB 1998). A reintroduction project conducted by WWF-Austria from 1989 to 1993, the development of a management plan, the commitment of a bear emergency team, and the creation of a public awareness program, all financed through a funding from the European Union LIFE program from 1995 to 1998 and 2002 to 2005, has resulted in the appearance of two small brown bear subpopulations in central and southern Austria. From 1991 to 2000 at least 21 cubs were born, and the number of bears

in this area is estimated at 15-20 animals; an additional 5-10 bears is estimated to live in southern Austria, mainly along the border with Slovenia (RAUER et al. 2001). From the perspective of population development the future does look promising (ZEDROSSER et al. 1999), but the Austrian brown bears still seem to be threatened by some major factors. Austrian bear habitat is dissected by barriers such as highways or densely populated valleys (RAUER 1999). Besides habitat fragmentation, “administrative fragmentation” seems to complicate Austrian’s brown bear conservation. Austria is divided into 9 federal states, and management authority falls under the jurisdiction of the individual counties of the states, which have their own hunting and protection laws (KACZENSKY 1996). There is also no uniform damage compensation system. Damages caused by bears are paid by the appropriate federal hunting organization. For the future, it is desirable to manage and protect the Austrian brown bears at the national level. A greater involvement of the federal governments should be also envisioned (RAUER 1999), since brown bear management is currently directed by private nature conservation (WWF Austria) rather than the official authorities (ZEDROSSER et al. 1999).

The most serious threat is the negative attitude that humans have towards bears (Zedrosser et al. 1999). People in Austria and from many other countries are not accustomed to live with bears and often exaggerate the dangers associated with them (RAUER 1999) and bears are forced to live close to humans since Austria has a very small amount of remaining wilderness area (ZEDROSSER et al. 1999). According to RAUER et al. (2003), there is a high potential for bears to lose their fear of people and become habituated or to associate humans with food and become food conditioned in a densely settled and human-altered landscape. However, in 1994 the amount of damage caused by bears reached a height never seen before (ZEDROSSER et al. 1999), thus WWF had to cancel the reintroduction program and to develop new methods to conserve the brown bear population of Austria (ZEDROSSER et al. 1999). A new working team called “Brown Bear Life” composed by members of the Munich Wildlife Society, WWF Austria, and the Institute for Wildlife Biology and Game Management (University of Agricultural Sciences, Vienna) was formed to develop a bear conservation program financed through the European Union LIFE program. The first step of the conservation program was the development of a management plan for brown bears in Austria

(ZEDROSSER et al. 1999), which was initiated by the Munich Wildlife Society. The preparation and the development of Austria's first national bear management plan was a tedious process since the working team, a project advisory board (members of the Austrian Environmental Ministry and federal governments) and a forum of interests were involved. During the first workshop the working team and the project advisory board identified their objectives and demands on the management plan and set up a list with possible members of a forum of interests with experts from agriculture, forestry, hunter associations, tourism, livestock growers associations, and several other governmental and non-governmental organizations. After four months, the working group began to develop guidelines for the future bear management in Austria in another workshop together with the advisory board and the forum of interests (HOFER and PROMBERGER 1998). Members of all bodies were asked to join different working groups and to work on special items of the draft (HOFER and PROMBERGER 1998). Besides the workshops, many dialogues integrated the needs and suggestions of the interest groups and employers, especially when the first draft was written and also when the final version was revised (HOFER and PROMBERGER 1998). In 1997, the final version of the first national bear management plan was presented to the Austrian Ministry of Environment and also to the provincial governments.

Austria's first "Management plan for brown bears" is a national document, but without a legal basis in Austria. The management plan was set up instead following the recommendations of the EU Habitats Directive. Generally, the document is divided into two parts describing the situation in Austria: the first outlines the organizational structure of bear management and the second informs more detailed on bears and possible conservation measures. Chapter 1 provides a good insight into the development of the plan and lists all authorities and representatives responsible for each step necessary for setting up such a management document. The main principles of bear management in Austria are also outlined especially emphasizing that the bear management prioritizes the protection of people over the protection of bears. Furthermore, the plan aims for a nationwide uniform bear management and also for the involvement of research and monitoring results in decision making processes. Public relations are supposed to inform

the people and encourage them to trust in bear management (ARBEITSGEMEINSCHAFT BRAUNBÄR LIFE 1997).

The main threats brown bears are facing in Austria are not mentioned specifically, although the plan intends to address most of them. Chapter 2 describes a new organizational structure for the bear management in Austria. A “Coordination Unit” for brown bears was created in 1997 in order to deal with the administrative situation and to address “administrative fragmentation” in Austria. The “Coordination Unit” composed by members of the provincial governments and the Ministry of the Environment coordinates bear conservation at the national level. Nevertheless, there is no legal mandate for that issue. A significant part of the bear conservation program is funded by the Ministry of the Environment and the provincial governments. Besides the “Coordination Unit”, new components in national bear management include advocates helping to analyze critical situations and consulting with the local people (ZEDROSSER et al. 1999), a bear emergency team which would handle human-habituated or food-conditioned bears (ZEDROSSER et al. 1999), and a scientific institute monitoring the Austrian bear population. The handling of nuisance bears, suggestions for different damage compensation systems, and public relations and its significance and proceedings are discussed in further chapters. The plan provides cost estimates for an entire year and also for the future bear management, but lacks an implementation as well as a time schedule for the single tasks of the plan.

The second part of the document provides general information on bears and their biology and ecology as well as their status and distribution in Austria and other European countries. Furthermore, a habitat evaluation determines whether or not there is sufficient habitat for a self-sustaining and viable bear population in Austria and identifies additionally appropriate areas considering the distribution of sheep and other livestock, forest, roads, people and tourism. The public attitude toward bears, the role of the media in bear conservation, the legislative status of bears in Austria and internationally are analyzed in the last chapters of the management plan.

Overall, it is a comprehensive document which provides good insight into the situation of brown bears in Austria and is easy to read for anyone who is interested.

Scientific terms are explained and complicated topics like the organizational structure of the bear management are illustrated very clearly through graphics.

In 1999, Austria created an Action plan for brown bears, the “Action plan for the Conservation of the Brown Bear (*Ursus arctos*) in Europe” in response to the Bern Convention. The document summarizes the history of brown bears in Austria, the reintroduction project and the conservation program in general, which resulted in the development of the brown bear management plan mentioned above. Furthermore, the Action plan comments on specific actions regarding species conservation, habitat protection, conflicts with the human race, nuisance bears and public involvement in brown bear management, which have been suggested for Austria in the European Action plan on brown bears. The Austrian Action plan outlines additionally if the actions have been already taken or not and, if yes, in what way.

The revision process of the actual management document for Austrian brown bears, the “Management plan for brown bears in Austria”, began in 2003. According to N. GERSTL (WWF Austria, personal communication, 2004), the redraft process intends to incorporate more conservation issues on brown bears. Aspects like habitat fragmentation due to highways, scenarios on bear development and necessary steps in future bear management should provide a clearer picture of future bear conservation in Austria.

4.4.2 Croatia

Currently, about 400 brown bears exist in Croatia (SWENSON et al. 2000). All brown bear habitat in Croatia is within the Dinara Mountains, which parallel the Adriatic Sea coast, running from northwest to southeast and extending from Slovenia through Croatia, Bosnia and Herzegovina, Montenegro, Macedonia, and Albania to Greece (Pindus Mountains) (HUBER 1999). The area is politically divided into Lika and Gorski kotar regions with Plitvice Lakes and Risnjak National Parks, respectively, as bear core areas (HUBER 1999). Croatian brown bears are threatened by an increasing disturbance of bear habitat, according to HUBER (1999), due to new forest roads, other forestry operations, and, in particular, the construction of a new highway through Gorski kotar. The brown bears do survive in the forests of the high mountains of Croatia, not because

this habitat is best suited for their needs, but because these areas are the least affected by man (HUBER 1999). The most important long-term threat is garbage conditioning of bears, which, over generations, changes their natural feeding and living habits and makes them less timid and more tolerant of sharing space with humans (HUBER 1999).

Although the present status of Croatian brown bears is considered stable (SWENSON et al. 2000), national authorities have decided to enhance bear conservation through the development of a national management plan, which is being prepared through the cooperation between the Ministry of Agriculture and Forestry and the Ministry of Culture - Directorate for Nature Protection (RADOVIC, J., Scientific Manager, State Institute for Nature Protection, Zagreb, Croatia, personal communication, 2004). According to D. HUBER (Univ. Professor, University of Zagreb, Croatia, personal communication, 2004), the “Croatian brown bear management plan”, which is based on the Bern Convention and on the “Action plan for the conservation of the brown bear in Europe”, is still in the course of completion, not yet adopted and only in Croatian manuscript available. D. HUBER (Univ. Professor, University of Zagreb, Croatia, personal communication, 2004) reports that the management plan was written by a Committee of 8, which was composed of experts nominated by the Ministry for Environment and the Ministry for Agriculture and Forestry. NGOs and the general public were also involved in the development of the plan through the participation in workshops (June 2002 and April 2004). Additionally, a public questionnaire survey of about 800 people was carried out with the purpose of identifying attitudes toward bears and various management options, beliefs about bears and personal experiences. Understanding all these attitudes seems to be especially valuable for developing appropriate conservation measures to address the causes of negative attitudes, which could jeopardize the future survival and recovery of bears.

4.4.3 Estonia

Estonian brown bears are part of Europe’s largest, the North-eastern, brown bear population. According to SWENSON et al. (2000), the number of brown bears in Estonia can be estimated between 440 and 600 individuals. They are threatened by over-hunting and (potentially) by an unfavorable public opinion (LÖHMUS 2001). Extensive forest

clearance and human disturbance (VALDMANN 2001) are also limiting factors to the survival of bears. If intensive forestry continues, especially logging of climax forest, bear habitats can become fragmented or even eliminated (VALDMANN 2001). According to LÖHMUS (2001), the bear population is already relatively isolated, especially considering possible fencing of the border between Estonia and Russia. However, the Estonian brown bear population seems to be stable (SWENSON et al. 2000). As these species are simultaneously highly endangered or extinct in number of other regions in Europe, the regulation of the species needs analysis and planning to guarantee the maintenance of sustainable populations (PETERSON et al. 1998). For that purpose a project for ratification of management plans for large carnivores was initiated in Estonia in 1998 (PETERSON et al. 1998). The ESTONIAN FUND FOR NATURE (2001) states that within the scope of the project “National Inventories of Internationally Important Habitats and Species in Relation to International Conventions and Directives” a draft management plan for large carnivores was developed and additionally reviewed by the Ministry of Environment. Unfortunately, the document was found to be insufficient for effective control and management planning. Thus, according to P. MÄNNIL (Senior officer, Forest department, Ministry of Environment, Estonia, personal communication, 2004), a new management document, the “Large Carnivore Control and Management Plan for Estonia, 2002-2011” was completed in 2001, which includes all three large carnivore species, brown bear, wolf and lynx existing in Estonia. It is an official document based on the Bern Convention and signed by the Minister of the Environment. P. MÄNNIL (Senior officer, Forest department, Ministry of Environment, Estonia, personal communication, 2004) indicates that the plan was developed by a working group, which consists of officials, scientists, hunters (Estonian Hunters Association, State Forest Management Centre) and conservationists, all led by the Ministry of Environment and also in cooperation with NGOs (Estonian Fund for Nature, Estonian Theriological Society). Such a “community” is rather new to Estonia and obviously also a valuable addition to achieved results (LÖHMUS 2001). Furthermore, P. MÄNNIL (Senior officer, Forest department, Ministry of Environment, Estonia, personal communication, 2004) reports that the Ministry of Environment takes the responsibility for the plan’s

implementation and its working group manages the large carnivores by planning conservation activities and determining the annual sustainable exploitation rates.

The development of the plan was facilitated by funds from the Danish Environmental Protection Agency and the Estonian Ministry of Environment and according to A. LÕHMUS (Conservation biologist, University of Tartu, Estonia, personal communication, 2004), its implementation has been financed by Estonian Ministry, European, but mostly by public funds.

The “Large Carnivore Control and Management Plan for Estonia, 2002-2011” is a comprehensive document on the three large carnivore species - brown bear, wolf and lynx - existing in Estonia. Although it is a “multi-species” management plan, detailed information on distribution, population size, and basic biology of all three species is provided. The author gives insight into conservation biology by defining basic terms as viable and effective population size and informs about genetic and demographic stochastic factors limiting the survival of large carnivore populations. The plan also discusses the relation of large carnivores to other mammal species and emphasizes the significance of choosing large carnivores as conservation targets by explaining the “keystone species” concept. According to POWER et al. (1996), it is a species whose effect is large, and disproportionately large relative to its abundance. In the case of Estonian large carnivores, they are able to control small predator populations, decrease damages to the forest caused by ungulates, limit beaver populations and increase the food basis for scavengers.

An entire chapter deals with risk factors such as over-hunting, illegal hunting, habitat destruction, decrease in abundance of prey species, disturbance, road kill and artificial distribution barriers, negative public opinion, cross-breeding and the spread of diseases in the populations. The author gives a theoretical overview of each factor and comments on whether there is an impact on bear, lynx or wolf in Estonia. Additionally, he tries to assess whether the effects on the species are high or low. General information is also provided on population control and management. The plan outlines the main goals concerning large carnivore conservation such as the preservation of wolf, lynx and bear as free-ranging species in natural habitat, which is followed by a list of specific actions to be taken in order to improve the species status and to address the threats the large

carnivore populations are actually facing. The author provides a table listing all recommended activities in the fields of improvement of legal acts, development of infrastructure, monitoring and information systems, applied studies, habitat protection, control and rehabilitation, dealing with damages caused by large carnivores and increasing of awareness and molding of public attitudes. Additionally, the activities are ranked into three categories where A is indispensable, B medium and C the low priority category (LÕHMUS 2001). Further on, each activity is analyzed in detail, providing a motivation, a summary of current and international practice, and single proposals and actions to be taken in order to achieve a favorable status in each category. The author identifies as well the obstacles for each activity and refers to references for further readings.

Taken together, the management plan is very problem and action-oriented; which brings the three large carnivore species under a common light and identifies and addresses their individual conservation concerns (ESTONIAN FUND FOR NATURE 2001). It does not only list the threats and actions addressing these threats, it provides furthermore an analysis for each planned activity. Thus, the document can be used on a daily basis by wildlife managers and other responsible authorities as a manual and working plan. It is not surprising that the plan has already generated a positive effect on the situation of Estonian brown bears. According to A. LÕHMUS (Conservation biologist, University of Tartu, Estonia, personal communication, 2004), the public knowledge as well as their interest has increased, as has the number of conservation actions being taken.

4.4.4 Finland

The number of brown bears in Finland can be estimated between 430 and 600 individuals (NYHOLM and NYHOLM 1999). They have re-established most of their former range after the population bottleneck at the beginning of the 20th century, which was caused by overharvest and habitat degradation (SWENSON et al. 2000). Currently, the species is adapting well to a growing human population and to drastic changes in its environment (NYHOLM and NYHOLM 1999) and existing at low densities distributed again throughout the country except for the Ahvenamaa Islands (SWENSON et al. 2000).

Bears have become accustomed to humans and humans have changed their negative attitude toward bears since the government of Finland decided to start paying compensation to farmers for damages caused by large predators, including those made by the brown bear (NYHOLM and NYHOLM 1999). The most important threat to the brown bear population in Finland is the possibility that the present positive attitude will turn negative (NYHOLM and NYHOLM 1999). Intensive hunting is another limiting factor, thus new hunting regulations were approved, which set a quota based on the numbers of bears that can be killed without endangering the existence of viable bear populations (NYHOLM and NYHOLM 1999). Nonetheless, interest in brown bear hunting in Finland still seems to be increasing.

However, according to NYHOLM and NYHOLM (1999) a plan for the management of the brown bear population was developed in 1987 by the Finnish Game and Fisheries Institute Predator Division in cooperation with the Ministry of Agriculture and Forestry. The Natural Resources Division intended to carry out the plan using an annual population growth of 6–7% as a basis in order to reach a future target population of 1000 bears by the year of 2000; this is large enough to ensure a stable and viable brown bear population (NYHOLM and NYHOLM 1999). The plan can be realized only assuming that farmers, reindeer owners, and other taxpayers can agree on the measures to be taken, the timetable, and the necessary financing (NYHOLM and NYHOLM 1999).

According to S. HÄRKÖNEN (Senior officer, Ministry of Agriculture and Forestry, personal communication, 2004), an official national management policy for large carnivores was developed by a specialist Working Group and accepted by the parliamentarian Council for Environment and Natural Resources in 1996. The Working Group involved representatives from the Ministry of Agriculture and Forestry, the Ministry of Environment, the Finnish Game and Fisheries Research Institute, the Hunter's Central Organisation, the Finnish Association for Nature Conservation, WWF and from the reindeer husbandry. I. KOJOLA (Finish Game and Fisheries Research Institute, Taivalkoski, Finland, personal communication, 2004) reports that in the same year, the Large Carnivore Working Group working for the Ministry of Agriculture and Forestry and the Ministry of Environment developed a new management plan on the four large carnivore species - brown bear, lynx and wolf and wolverine - existing in Finland.

Currently, the Ministry of Agriculture and Forestry is starting to develop new, species-specific plans. S. HÄRKÖNEN (senior officer, Ministry of Agriculture and Forestry, Finland, personal communication, 2004) indicates that public involvement through meetings with local stakeholders and the general public is an essential part of the developing process of management plans. According to I. KOJOLA (Finish Game and Fisheries Research Institute, Taivalkoski, Finland, personal communication, 2004), the management plan for brown bears in Finland will possibly appear in 2005 or 2006.

4.4.5 France

The Pyrenean brown bear population is considered as one of the most seriously threatened with extinction in Western Europe (CHAPRON et al. 2003). As a result of declining populations and habitat loss over the past decades, the Pyrenean brown bear is limited to only 2 isolated populations confined to remote areas of the Pyrenees (CAMARRA 1986). In the Western Pyrenees, one brown bear population is estimated to be 6 individuals (SWENSON et al. 2000), which are present on the French side and to a lesser extent on the Spanish side (CAMARRA 1999). In the central Pyrenees, another population of no more than 5 bears (SWENSON et al. 2000) is likely to be found, which was supported by a reintroduction of three bears originating in Slovenia, as conducted by the French government in 1996 and 1997 (ARQUILLIÈRE 1998). However, according to CHAPRON et al. (2003), the future of the bear in the Pyrenees is far from secured. Some of the core issues are conflict with sheep farming, forestry and road use, and the human dimension (CHAPRON et al. 2003). For a long time, the local people considered the brown bear as a pest, yet presently, as the situation has improved, the shepherds are more accepting of the presence of the bear than in the past (CAMARRA 1999). The small population numbers seems to be the most serious threat to French brown bears. In the Western Pyrenees, the population has been below the minimum viable population size for a long time, and it is expected that the last specimen will vanish by the beginning of the next decade (CAMARRA 1999). In the Central Pyrenees, a restoration plan has been decided upon (CAMARRA 1999).

Generally, since 1984, several plans (SERVHEEN 1990) have been submitted for approval by local people and the traditional owners of the land; contrary to expectations,

only a few were applied (CAMARRA 1999). Currently, the main management document is the management plan “Status of brown bear in France and perspectives”, which is according to P.Y. QUENETTE (LIFE-Ours, Saint Gaudens, France, personal communication, 2004) both national (initiated in 1985) and European (initiated with Spain in the framework of a LIFE project between 1993-1999). The Ministry of Environment is responsible for the development and the implementation of the bear management plan, whereas NGOs are involved mainly in the implementation of the document. P.Y. QUENETTE (LIFE-Ours, Saint Gaudens, France, personal communication, 2004) also indicates that such conflictive species as brown bears can be only recovered if the majority of local population accepts the presence of the species. Thus, public involvement has turned out to be an essential component in bear recovery planning. A campaign of awareness has been organized and public associations have been involved in the development of the management plan.

4.4.6 Greece

Habitat alteration, hunting (illegal after 1969) and poaching have restricted the remaining and declining Greek brown bear populations to the most remote mountainous areas of north-western and north-eastern Greece (MERTZANIS 1990). According to MERTZANIS (1990), these bear populations, which do not exceed 150 individuals, are divided into two distinct nuclei. The eastern population nucleus is estimated to have a minimum 15 to 20 individuals, and the western population nucleus to have a minimum of 95 to 110 individuals (PROJECT ARCTOS 1996). These populations communicate with bear populations in neighboring countries and represent the southernmost distribution of the bear in Europe (MERTZANIS 1990). Although protected as a threatened species, problems like poaching and the exhibition of “dancing bears” by itinerant gypsies still persist (MERTZANIS 1999).

The first large-scale Bear Action Project was launched in Greece (MERTZANIS 1999). MERTZANIS (1999) reports that the project was mainly financed by the European Union, conducted by the Wildlife Division of the Greek Ministry of Agriculture with the participation of the Hellenic Society for the Protection of Nature and was supervised by the Royal Institute of Natural Sciences, Belgium. Upon completion of

this project it was clearly understood that a long-term integrated management strategy, based on better understanding of both brown bear ecology and bear-human interaction, was urgently needed (MERTZANIS 1999). To achieve this main objective, a 2-year national project (“ARCTOS” Project) was jointly launched in January 1994 (MERTZANIS 1999). This project involved the Greek Ministry of Agriculture (General Secretariat of Forests and Natural Environment – Game Department) and three NGOs: the ARCTUROS Society, WWF Greece, and the Hellenic Society for the Protection of Nature (HSPN).

The complexity of bear conservation required a multilevel approach in order to evaluate the interactions between bear populations, bear habitat, and bear-human interaction (MERTZANIS 1999). MERTZANIS (1999) reported that this multilevel approach provided necessary data on the following issues: 1) bear occurrence and activity in time and space in relation to habitat suitability and availability; 2) demographic parameters dealing with direct mortality and natality for the evaluation of populations levels and trends; 3) identification of the ecological requirements of the brown bear; 4) identification and analysis of the main components of brown bear habitat, and; 5) identification of human activities versus bear activities. Most of the project’s goals are long-term, but according to MERTZANIS (1999) imminent threats cannot wait for long-term scientific studies to be controlled. Immediate efforts should focus on minimizing illegal killing, improving habitat security by limiting human activities in important areas, maintaining linkages within and between bear populations, and increasing public support (MERTZANIS 1999). Thus, a management document, the Greek Bear Action Plan, was developed in 1996 in the framework of a LIFE project in order to deal with the bear conservation problems and to reduce or resolve imminent threats as soon as possible.

According to G. MERTZANIS (ARCTUROS, Thessaloniki, Greece, personal communication, 2004), the plan was developed and has been implemented through the Ministry of Environment, the management body of each National Park and NGOs, which were the first to produce a brown bear action plan at a national level. Therefore, NGOs (at least the most active involved in this kind of issues) have played and are still playing a leading role in Greece’s bear management. The Greek Action Plan generally follows the guidelines of the Bern Convention Action Plan but is also based on field data, which

makes the document much more detailed and comprehensive (G. MERTZANIS, ARCTUROS, Thessaloniki, Greece, personal communication, 2004).

The main purpose of the plan is to identify the brown bear's conservation needs. Therefore, the identification of imminent threats, their sources and consequences upon bear populations and habitat and their prioritization cannot wait for long. The plan defines illegal killing, habitat degradation and loss, range fragmentation and shrinkage of linkage areas at a national scale and a lack of public and political support as the main threats compromising the survival of the bear populations. The Action Plan provides at the same time several immediate and future actions to be undertaken in order to address the threats. Additionally, the plan identifies collaborating authorities, organizations and associations in charge.

Public involvement seems to play another important role in the recovery planning of Greek brown bears. G. MERTZANIS (ARCTUROS, Thessaloniki, Greece, personal communication, 2004) indicates that the public is involved in the action plan as part of the targeting strategy in the frame of sensitization, educational and information campaigns and not at a decision making level (at least for the time being). It is mainly planned to reverse negative attitudes and to increase tolerance levels. To this extent, environmental education programs play also a major role in forming the tolerant and sensitive citizens of tomorrow.

Taken together, the management plan has improved the situation of brown bears in Greece significantly. G. MERTZANIS (ARCTUROS, Thessaloniki, Greece, personal communication, 2004) notes that a great number of actions have been and are being implemented mainly through NGOs in the framework of bear conservation projects. The only problem now is that this practice must be definitely and officially endorsed by competent national authorities. However, according to G. MERTZANIS (ARCTUROS, Thessaloniki, Greece, personal communication, 2004), it seems that in over 6 years of implementation there are signs of bear population recovery in some areas, whereas in some other sectors a re-colonization phenomena occurs. This is accompanied by a more positive attitude of the public and of local communities.

4.4.7 Italy

Currently, brown bears in Italy are found in two populations which exist in the Abruzzo National Park and surrounding areas in the Apennine Mountains in central Italy and in the province of Trentino in the Southern Alps (SWENSON et al. 2000). The brown bear population in the central Apennines has been completely isolated from any other continental population for many centuries (RANDI 2003). This population is estimated to be around 40-80 individuals (SWENSON et al. 2000), but the exact number is uncertain (RANDI 2003). In the Southern Alps, brown bears were at one time virtually extinct, but currently there are about 15 bears, which are sustained by an ongoing reintroduction project (RANDI 2003).

In Central Italy, the most important causes of bear mortality are poaching and accidents (BOSCAGLI 1999), whereas in Trentino the brown bear population is mainly threatened by its low reproductive capacity due its small population size, habitat loss and disturbance caused by increasing human presence (OSTI 1999). According to OSTI (1999), the population is being squeezed into smaller and smaller areas. The need for a biologically-based regulation to assess and limit the impact of natural resource exploitation on bear occurrence and bear habitat has been recently recognized as a priority task by several agencies (parks, ministries, forest service, NGOs) (POSILLICO et al. 2003). These also asked for the establishment of a technical committee, on behalf of the Ministry of the Environment, to formulate a bear conservation plan and to identify urgent conservation actions (POSILLICO et al. 2003).

In 2000, WWF Italy drafted the “Action plan for conservation of the bear in the Italian alps”, but according to P. GENOVESI (National Wildlife Institute, Italy, personal communication, 2004), it has no legal power or implementation.

P. GENOVESI (National Wildlife Institute, Italy, personal communication, 2004) reports furthermore that an action plan for the Abruzzo population based on the Bern Convention and funded by the Ministry of Environment is currently under development and coordinated by the Ministry of Environment. It is also planned to involve local administrators in the implementation process of the plan.

The development of an action plan for the alpine population also based on the Bern Convention is planned to begin in the next future. According to P. GENOVESI (National Wildlife Institute, Italy, personal communication, 2004), the proposal is to receive limited funds from the local administrations (regional, provincial) involved in the development of the plan. OSTI (1999) already indicated that bear conservation requirements in Trentino demand that all bear areas are the object of a management plan to integrate legal protection measures and active management programs (OSTI 1999).

4.4.8 Latvia

The number of brown bears in Latvia fluctuates around 10 (at present, no more than 6 individuals) (OZOLINŠ 2003) and according to Andersone and OZOLINŠ (2002), only a few of these individuals find residence in Latvia, the rest periodically comes from the neighboring countries of Estonia, Russia and Belarus. Thus, immigration of bears from the neighboring countries is critical for the population's existence (OZOLINŠ 2003).

In 2003, an "Action Plan for the Conservation of Brown Bear (*Ursus arctos*) in Latvia" was initiated through the national Nature Protection Board acting under the Ministry of Environment (J. OZOLINŠ, State Forest Service, Riga, Latvia, personal communication, 2004). According to J. OZOLINŠ (State Forest Service, Riga, Latvia, personal communication, 2004), the Nature Protection Board must send the draft plan to all governmental and non-governmental bodies involved for reviewing it. The Ministry of Environment only signs the plan if comments and suggestions from the review are considered and incorporated into the plan. The Action Plan is a national management document based on Clause 17 of the Species and Habitat Protection Law (OZOLINŠ 2003). J. OZOLINŠ (State Forest Service, Riga, Latvia, personal communication, 2004) reports further that Latvia is a small country and cannot ensure a completely independent development, implementation or evaluation of its species management plans, thus mainly the same governmental organizations are involved in all activities.

Generally, the "Action Plan for the Conservation of Brown Bear (*Ursus arctos*) in Latvia" is divided into two main parts: one provides basic information on bears in general as well as facts related to the Latvian situation, and the other one is more management-

oriented defining conservation measures in order to address all threats to the Latvian bears. The plan starts with a short summary informing about the current status of brown bears in Latvia and the national legislation related to their protection. Furthermore, conservation priorities as well as appropriate conservation measures to be taken are outlined briefly in order to attain a general idea of the plan's main goals. The key conservation measures are for instance: (1) The establishment of an inter-institutional work group of experts for coordinating bear conservation measures, (2) improvement of monitoring systems, (3) reduction of direct disturbance during the time when bears are looking for winter dens as well as during hibernation, (4) elaboration of a system for a centralized registration of the bear-inflicted damage and (5) establishment of a compensation system embodied in the national legislation.

The summary is followed by a general section, which provides information on the bears' biology and habitat, their distribution, species status and present research and monitoring efforts. The main factors influencing bears and their habitat such as immigration, direct mortality, negative public attitude, trophic competition, and modern forestry practices are also defined. Due to a small population size, it is impossible to judge correctly which factors significantly influence species survival in Latvia; however, it is possible to make theoretical assumptions (OZOLINŠ 2003). After defining the limiting factors, the plan discusses present conservation efforts undertaken to improve the situation of the species and its habitat, which include, for instance, legislative protection, commitment of NGOs and a study carried out on the public opinion about large carnivores in Latvia.

The second part of the plan attempts to address the limiting factors to bears' survival through identifying specific conservation measures, which are later summarized in a table together with all responsible implementators and estimates on the implementation time, costs and potential funds. One of the conservation measures, for instance, is the creation of a co-ordination centre for bear scientists, which could act as an inter-institutional network of experts and would also coordinate the implementation process of the action plan. It is also recommended to incorporate members from various state and non-governmental institutions related to environmental protection, science, and education in the coordination centre. Further conservation measures work on cooperation

with forest owners and hunters in areas where bears usually exist, on implementation of a sociological study in order to find out how prepared the society is to accept forest exploitation restrictions for bear conservation, and on restoring cooperation with the State Border Guard Service in registering border-crossing bears.

Taken together, Latvia's brown bear action plan is a valuable document in providing basic information on the bear's status, in identifying conservation measures and organizing their realization through an implementation schedule. Due to the fact that Latvian brown bears depend on immigration from neighboring countries, the plan aims to ensure and facilitate natural processes that are occurring in the distribution range on the scale of joint Baltic-Russian bear population rather than increasing the bear distribution in Latvia or creating a self-sustainable local population in the short term (OZOLINŠ 2003).

4.4.9 Norway

Today, Norwegian brown bears are only found in a few areas next to the borders with Sweden, Russia, and Finland (SØRENSEN et al. 1999). The Directorate of Nature Management assumes that there are on average about 20-25 bears in Norway, approximately 15 of which form part of the Scandinavian bear population and 6-11 (in Finnmark County) part of the Russian-Finnish bear population (SAGØR et al. 1997). The re-establishment of bears in Norway is therefore dependent on immigration of bears from Sweden, and from Russia and Finland in the far north (SAGØR et al. 1997). According to SØRENSEN et al. (1990) a "rapid" re-establishment of bears has thus far been delayed mostly by the killing of bears that prey on sheep. A comparison among European countries revealed Norway had the highest livestock depredation rates by far (ZIMMERMANN et al. 2003). Thus, it is not surprising that people in rural communities are generally opposed to re-establishment of the bear in their areas and see it as a threat to the social structure of rural communities (SØRENSEN et al. 1999).

However, Norway requires intensive bear management to secure the small and scattered bear population for the future; therefore, the Norwegian Parliament adopted a national brown bear management plan in 1992, which requires the development and implementation of action plans on a county level. The national management plan was

developed by the Directorate of Nature Management, the Institute for Research (NINA) and several bear scientists. The county government administrations (environmental protection offices) are responsible for development and implementation of the action plans (J. SWENSON, Univ. Prof., Agricultural University of Norway, Ås, Norway, personal communication, 2004). Generally, bear management in Norway is purely governmental and the Directorate for Nature Management has the main responsibility, however individual counties deal with the daily management such as damage compensation, population monitoring and public education (KLENZENDORF 1997). Non-governmental organizations are not directly involved in the management of brown bears in Norway, but they do have a strong lobby to influence decisions at NINA and the Ministry of Environments and Agriculture (KLENZENDORF 1997).

The public was also involved in the developing process of the management plan, which seems to be crucial in Norway's bear management. The Directorate of Nature Management organized meetings in communities within bear core areas in order to integrate local concerns, to inform the public about goals for future management and also about effects these goals will have for the future of the local community (SØRENSEN et al. 1999).

In 1996, the plan was revised based on experiences from previous years of research and management due to ineffective conservation measures included in the first version. NGOs such as the National Farmer Association and the National Sheep Breeders Organization also reviewed the management document and incorporated many useful recommendations. The current management plan states two main goals in bear conservation. It aims to ensure a viable population within the specific management zones - called bear core areas - located along the national border and to reduce or, alternatively, to limit the loss of unguarded free-ranging sheep caused by bears, which is the main management problem with bears in Norway (SAGØR et al. 1997). Farmers still keep free-ranging sheep, but often do not have the time or money to invest in preventative measures. SAGØR et al. (1997) and LANDE et al. (2000) indicate that the diverging political goals of having viable populations of large carnivores and viable agriculture in marginal areas, based on extensive sheep grazing, seem to be incompatible. However, the revised management plan seems to incorporate more effective conservation measures in

order to deal with this conflict. The situation in rural areas has improved since the Department of Agriculture has a greater responsibility in advising farmers on how to keep their sheep (KLENZENDORF 1997). Strong electric fences and the use of herders and guard dogs may be appropriate damage-preventing measures. There was also a great need to develop a damage compensation system financed by the Ministry of Environment and the Ministry of Agriculture and to apply a large carnivore management regime, which depending on the area either protects the large carnivores or supports livestock husbandry. Both measures contributed to turn the negative attitude of rural communities toward large carnivores more positive. According to S. STENER (Senior Executive Officer, The Royal Ministry of the Environment, Oslo, Norway, personal communication, 2004), in some parts of the country large carnivores are protected, and in other parts sheep and reindeer production is given priority. This is necessary to avoid great conflicts with agricultural interests because Norway has a tradition of free range livestock in forests and mountains during the summer.

4.4.10 Slovakia

Brown bears in Slovakia are distributed through the Western Carpathians with the exception of the southernmost and westernmost parts (HELL and FIND'O 1999) and are estimated to be around 800-1000 individuals (M. ADAMEC, zoologist, State Nature Conservancy of the Slovak Republic, personal communication, 2004). At present the Slovak bear population is not isolated from its eastern counterpart as it was 20 years ago (HELL and FIND'O 1999). The Slovakian and Polish bear population was reconnected with that of the Ukrainian (SWENSON et al. 2000). The greatest pressure on the bear population in Slovakia is due to intensive hunting (HELL and FIND'O 1999), although the number of bears is still increasing.

Currently, there is a national bear management plan which has been prepared by the Ministry of Environment and the Ministry of Agriculture on an annual basis and implemented as well through both ministries, hunters associations, and the State Nature Conservancy of Slovak Republic, which takes the lead in managing the plan. According to M. ADAMEC (Zoologist, State Nature Conservancy of the Slovak Republic, personal communication, 2004), the document provides information on the status of brown bears

in Slovakia as well as on the existing hunting policy. It generally enhances the protection of brown bears in Slovakia and tries to regulate brown bear activities in areas of high human densities. Funding is provided by the ministries and governmental organizations. M. ADAMEC (Zoologist, State Nature Conservancy of the Slovak Republic, personal communication, 2004) reports that a brown bear action plan based on the Bern Convention is in preparation in cooperation with the Ministry of Environment and the Ministry of Agriculture.

4.4.11 Slovenia

Slovenia is among the few European countries with a preserved viable indigenous brown bear population (JERINA et al. 2003). The calculated size of the population in Slovenia, derived from the results of 1995 and 1996 censuses performed on a nationwide level is 350-450 individuals (HUBER and ADAMIC 1999). The bears are threatened by various factors such as garbage and human-related food conditioning of bears and increased disturbance and obstacles in bear habitat due to the opening of new forest roads, other forestry operations and old and new highways and railroads (HUBER and ADAMIC 1999). The importance of Slovenian, together with Croatian, brown bears in Europe has increased in the last four years as they are a source for reintroductions into other countries (HUBER and ADAMIC 1999). Presently the bear population in Slovenia is also the only source for natural re-colonization of the Alps and provides the only link between the large bear population of the Dinaric Mountain range and the small and fragmented bear occurrence in the Alps (ADAMIC 1997, ADAMIC 2003).

Thus Slovenia set up a brown bear management strategy, which was adopted by the government of the Republic of Slovenia in January 2002. It aims to ensure long-term conservation of the brown bear and its habitat in Slovenia and also a non-conflictive coexistence of humans and bears. The strategy introduces “modern management” of wildlife species, which does not only focus on the species itself; it rather concentrates on everything naturally linked to the species. The strategy summarizes, furthermore, all legal aspects relevant to brown bear protection in Slovenia, ranging from national conservation legislation to international agreements. General understanding of brown bear conservation should be enhanced by providing general information on bear biology,

ecology, and its past and current distribution in Slovenia. The threats Slovenian brown bears are facing, such as habitat degradation and fragmentation and the fear of local residents, which can evolve into a negative attitude toward bears, are only mentioned very briefly.

The strategy identifies appropriate conservation measures based on fundamental principles of brown bear management in order to protect bears effectively and to ensure a non-conflictive human-bear coexistence. It is suggested to enhance the protection of bears through prevention and restriction of encroachments and activities in bear habitat, improvement of the habitat quality and also through deliberate culling of bears, if necessary. The strategy describes each measure and provides additionally guidelines for their successful implementation. Bear culling, for instance, is defined as the shooting of a specific number of bears with the intention of facilitating coexistence with humans which keeps the population density at a level suitable for the features of the habitat by taking into account human use and activities (GOVERNMENT OF THE REPUBLIC OF SLOVENIA 2001). Culling also includes the shooting of bears which directly threaten humans and their property or capturing live bears for transfer and release into the wild or for settlement in another location in the wild (GOVERNMENT OF THE REPUBLIC OF SLOVENIA 2001). Besides this definition, further information on planning, permitting, performing, the extent and deployment of bear culls is provided. Under most circumstances, bear culls are planned for the entire Slovenian bear population through the development of a planning document drawn up each year by the state authorized professional public institute. Culls must be permitted and it is further recommended that they are only carried out by state authorized professionals unless humans are directly threatened and must shoot the bear in defense of their lives.

Besides the protection of bears, the strategy also intends to improve the coexistence of bears and humans. Appropriate conservation measures are, for instance, informing the public about the biology of bears, how to behave in case of an encounter with a bear, preventing or limiting the damage caused by bears, and ensuring rapid payment of damage compensation. Guidelines for correct bear feeding are also provided, which recommend setting up feeding stations to keep bears away from settlements and to

maintain them only in central areas in such a way that they do not cause any attachment of bears to humans (GOVERNMENT OF THE REPUBLIC OF SLOVENIA 2001).

The strategy also differentiates between whether measures are to be carried out in the core habitat for brown bears, in the “transit area”, where bears move from the central area towards the west and north into the Alps, or in areas with exceptional bear presence. All area types are defined geographically and information on the size of the area, significance and purpose, and the state of the bear population is provided. Conservation measures concerning bear culling, bear feeding and the improvement of coexistence of bears with humans (related to local residents; farming and forest fruit gathering; forestry; tourism, recreation; building of infrastructural and other structures and their use; military and police activities) are identified as well for each habitat area.

The strategy with all its goals can only be put into action by identifying mechanism to implement all measures effectively. Appropriate mechanism are the improvement of the damage compensation system, the establishment of a system which subsidizes farm activities in order to protect bears and to improve the coexistence of bears and humans, the receiving of international funds, the establishment of several natural parks or other protected areas and the organization of public information and awareness programs. International cooperation in brown bear conservation efforts also seems to be crucial. It is recommended to adopt a bilateral strategy for conservation of the brown bear in the territory of Slovenia and neighboring Croatia as Slovenia’s territory is too small for a long-term preservation of minimum viable brown bear populations and the bears inhabit an area that extends beyond Slovenia’s national border into Gorski Kotar in neighboring Croatia (GOVERNMENT OF THE REPUBLIC OF SLOVENIA 2001).

Within six months after the adoption of the strategy, the Slovenian government asked the Ministry of Agriculture, Forestry and Food to develop a brown bear action plan deriving from the Strategy. The Forest Animals and Hunting Section at the Forest Institute of Slovenia received the order to draw up the document and completed it by the end of August 2002. For most part, the “Action Plan for Brown Bear (*Ursus arctos*) Management in Slovenia” is based on the strategy and its main goals, but it provides much more detailed information on the conservation measures to be taken in order to improve the situation of Slovenian brown bears. First, the document refers to the general

“Action Plan for the Conservation of the Brown Bear in Europe” based on the Bern Convention and comments on its actions proposed for Slovenia and on whether the country has undertaken specific activities in the meanwhile or not. Further on, the conservation measures of the strategy (bear monitoring, culling and feeding) are listed besides more specific tasks necessary to carry out and implement these measures successfully. For instance, two management tasks are recommended for an efficient monitoring of bears in Slovenia - the elaboration of a monitoring system for the brown bear population and intensive research on bear biology. Each task is described in great detail, responsible authorities, other participants and necessary funds are identified, and timely framework is set up.

The action plan also provides conservation measures related to the different habitat areas already described in the strategy. The main concerns are the local residents and their activities in terms of a non-conflictive coexistence with bears and issues concerning farming, forestry, tourism and recreation, infrastructure, and military and police activities. Specific tasks for each measure are provided again as well as a framework (time, costs, and organization) concerning their implementation. The action plan ends with the same recommendations as the Strategy, but this time it also outlines how to put them into action.

Taken together, the “Action Plan for Brown Bears Management in Slovenia”, which is based on Slovenian’s brown bear strategy, is a very implementation-oriented working document mainly developed for all responsible authorities and individuals involved in Slovenian brown bear management. It is especially valuable as guidelines for organizing the entire implementation process. Another positive aspect of the action plan is its key role, which is not motivating all institutions and individuals involved. The key role is played by the time frame for implementing individual set assignments, and even more so by ensuring of necessary financial means for implementing the action plan (GOVERNMENT OF THE REPUBLIC OF SLOVENIA 2003).

4.4.12 Spain

Currently, the brown bears’ range in Spain is limited to 2 relict populations: the Pyrenees and the Cantabrian mountains (CLEVENGER at al. 1987). The remnant brown

bear population in the Pyrenees had almost disappeared (CAUSSIMONT 1993), but after the introduction of two females and one male from Slovenia in 1996 and 1997, the population had increased to 13-15 individuals by 2003 (S. PALAZÓN, Direccio General del Medi Natural, Barcelona, Spain, personal communication, 2004). The Cantabrian bear population is composed of two nuclei, which cover together an area of nearly 6000 km², and numbered around 80-100 individuals by 2003 (SERVHEEN 1990; G. PALOMERO, Fundacion Oso Pardo, Santander, Spain, personal communication, 2004). The two subpopulations are separated by 30-50 km of mountainous terrain and interchange between the populations is extremely rare, according to genetic analysis conducted on both nuclei (REY et al. 2004). This isolation may be caused by unsuitable habitat, a transport corridor including a railway and a motorway and the recent contraction of both subpopulations in the areas surrounding the corridor (SWENSON et al. 2000; G. PALOMERO, Fundacion Oso Pardo, Santander, Spain, personal communication, 2004). Therefore, the principal threats are habitat loss and fragmentation, genetic isolation, but also accidental killing of bears in snares and with poison used illegally to control wild boars and wolves respectively (CLEVENGER et al. 1987; G. PALOMERO, Fundacion Oso Pardo, Santander, Spain, personal communication, 2004).

The situation of Spanish brown bears is far from secured, thus the National Catalogue of Threatened Species considered brown bears as an “endangered” species “. If a species or population is included in the National List, measures must be drafted for the return of the species or populations to a favorable state (ANONYMOUS 2000). J.C. BLANCO (Large Carnivore Initiative for Europe, personal communication, 2004) reports that there is a general Bear Action Plan called "Estrategia Nacional para la Conservación del Oso Pardo Cantábrico", which has been agreed among the regional governments and the Ministry of the Environment. The plan was developed by several experts determined to give an insight into the situation of Spanish brown bears and to identify more general actions on a national level which need to be undertaken in order to ensure the survival of the species. The actions concern species conservation (e.g. direct mortality, reduction of bear-human conflict), bear habitat management, research, but also education, public awareness and participation programs in bear conservation and management issues.

Besides the national Bear Action Plan, governments from the four Autonomous Communities within the Cantabrian bear range (Asturias, Cantabria, Castilla y León, and Galicia) approved special decrees for the conservation of the brown bear (CLEVENGER et al. 1999), which required the establishment of regional Recovery Plans. Thus, brown bear Recovery Plans were developed by regional governments and approved by law in Cantabria (1989), Castilla y León (1990), Asturias (1991; revised in 2002), and Galicia (1992). The objectives of the four Recovery Plans are the same, and their conservation actions vary slightly among the different Autonomous Communities (CLEVENGER et al. 1999), which was the product of several meetings and working groups (NAVES and NORES 1999). Generally, the Recovery Plans seek to increase bear numbers, ensure stable distribution, foster contact between both populations in the Cantabrian Mountains, and bolster the demographic integrity of the whole (NAVES and NORES 1999). In order to achieve these objectives, five principal areas of management and conservation activity were identified, which are: (1) application of legal measures which will guarantee the conservation of the bear's most important habitats; (2) development of a forest management plan which will increase and conserve the amount of native deciduous forests; (3) minimize the effects of forest roads and vehicles within the bear's habitat; (4) regulate forms of tourism and recreation in bear areas that may affect their well-being; and (5) manage hunting activities in bear range so that their impacts will be minimized (CLEVENGER and PURROY 1999). Each Autonomous Community is responsible for applying the measures and making sure that they are strictly adhered to (CLEVENGER and PURROY 1999) and plan coordinators in each Autonomous Community are obliged to coordinate them. According to NAVES and NORES (1999), the plan coordinator must follow a program drawn up annually or biannually which specifies the projects to be carried out during this period, the mechanisms for public participation, and the incorporation pertinent scientific findings.

Successful implementation of conservation measures is always the most challenging part of recovery planning and sometimes a positive outcome is not guaranteed. According to NAVES and NORES (1999) some of the measures taken have already shown positive results (regarding compensations for agricultural damages and the increase in wardens), no progress has occurred in other management aspects. It is

possible that a lack of public participation in the development and implementation process of the plan is responsible for these failures. Implementation can be also delayed due to a lack of funding. In Spain, support for the implementation of the plans is being sought from a variety of sources (NAVES and NORES 1999). The European Union has supported several LIFE projects for the “Conservation and Recovery of the Brown Bear in the Cantabrian Mountains”, which were signed by the four Autonomous Communities, by the General Directorate of Nature Conservation (Ministry of Environment) and by several NGOs (J.C. BLANCO, Large Carnivore Initiative for Europe, personal communication, 2004). Sufficient funding seems to be available, although it would be necessary to provide additionally a detailed cost analysis for all conservation measures to be taken organized within a timely framework.

4.4.13 Sweden

The present brown bear population numbers about 1000 individuals (SWENSON et al. 2000) widely but very unevenly distributed in northern and central Sweden (BJÄRVALL 1980). Although the situation for the brown bear in Sweden is very favorable (SWENSON et al. 1999), the species still seems to be threatened by some major problems. One is poaching, primarily in reindeer herding areas in the north (SWENSON et al. 1999). The second is the possibility that support for bears may decrease as the bear population increases (SWENSON et al. 1999).

In 2001, the Swedish Parliament adopted the Predator Policy, which supports conservation and management of the brown bear, wolverine, lynx, wolf and golden eagle. With regards to brown bear conservation, county administrative boards are advised to survey the bear population, conduct bear culling, if necessary, and provide general information on bears for the public. The Predator Policy also recommends the development of a national “Action Plan for the Protection of Brown Bears (*Ursus arctos*)”, which was actually initiated through the Swedish Environmental Protection Agency and has been funded thus far by the State (K. ALLANDER, wildlife management section, Swedish Environmental Protection Agency, Stockholm, Sweden, personal communication, 2004). According to K. ALLANDER (Wildlife management section, Swedish Environmental Protection Agency, Stockholm, Sweden, personal

communication, 2004), public involvement in large carnivore recovery planning is especially important for the acceptance of the animals, thus hunters, farmers, and reindeers herders are involved in the establishment of the plan.

The Action Plan generally informs about the distribution of bears in Scandinavia and about basic bear biology and ecology such as habitat requirements and hibernation, home territory and range, food, reproduction and infant mortality, growth and size of the bear population and genetic issues. The main threats to bears in Sweden (hunting, conflict with owners of domestic animals, competition for huntable wildlife, illegal hunting, and barriers to dispersal) are described very briefly, followed by the objectives of Swedish bear management necessary to ensure the long-term survival of the species. It is recommended to break down the national objectives into regional objectives, which are supposed be discussed and approved by the regional predator groups (SWEDISH ENVIRONMENTAL PROTECTION AGENCY 2003). The county administrative boards are further advised to produce regional management plans which provide basic information on bears as well as specific measures to address the regional threats.

The Action Plan lists furthermore all measures already taken for enhancing Swedish bear conservation, which range from signing environmental agreements such as the Bern Convention to research and specific conservation actions in order to prevent the damage caused by bears. Although Swedish bears are not seriously threatened, it is planned to improve the conservation measures and identify new ones, if necessary. The measures are arranged in different categories: international agreements and legislation, Scandinavian collaboration, research, surveys, management, damage-preventing measures, compensation for damage to reindeer, illegal hunting, culling, state wildlife, marking of animals and animal parts, abandoned bear cubs, Predator Forum, statistics, Wildlife Damage Centre, information. For instance, in the category “management”, county administrative boards with permanent bear populations are supposed to present regional management plans for bears by 1st November 2004. Furthermore, NINA is asked to set up and administer a Scandinavian DNA register for large predators. In the category “information”, the Wildlife Damage Centre is instructed to inform about the ways of preventing damage by bears. It is expected that SEPA holds annual meetings with the

Council for Predator Issues and the regional predator groups and also provides information on bears accessible on the Swedish EPA home page.

The Action Plan ends with new measures summarized in a few tables, which can be considered as an implementation schedule. First, all responsible authorities, organizations or individuals in charge are identified. In another table, the measures are given different priorities and are additionally arranged in some sort of a time framework. The last table informs on available funds for 2003 and proposals for the following years of 2004-2006.

Overall, the plan lends a significant insight into the situation of Swedish brown bears, although the document is still in the phase of completion. The implementation schedule outlining all conservation measures involved seems to be especially handy. It summarizes the measures to be taken, identifies available funds and responsible professional and sets up a time framework. In addition to the listing of available funds, it would be also very useful to provide a detailed cost analysis for all conservation measures to be taken.

4.4.14 United States of America

In 1975, the grizzly bear was listed as a threatened species in the 48 adjacent states under the provisions of the U.S. Endangered Species Act (SERVHEEN et al. 1995). Six ecosystems were identified as supporting self-perpetuating or remnant grizzly bear populations (U.S. FISH AND WILDLIFE SERVICE 1993). A program to recover the threatened grizzly bear has been underway in the states of Wyoming, Montana, Idaho, and Washington since 1981 (SERVHEEN 1998b). This program involves implementing a species recovery plan through interagency cooperation in order to limit the grizzly bear mortality, increases public awareness, manages bear habitat to assure the security and food necessary for survival, mitigates bear-human conflicts, and performs necessary research (SERVHEEN 1998b).

4.4.14.1 Grizzly Bear Recovery Plan

The Grizzly Bear Recovery Plan is the result of the efforts of many individuals and agencies in the United States with expertise and responsibilities related to grizzly

bears and their management (U.S. FISH AND WILDLIFE SERVICE 1993). The original version of the plan was developed in 1982. A Grizzly Bear Recovery Plan Leader wrote the document through an Interagency Personnel Act assignment funded by the U.S. Fish and Wildlife Service. Individuals from the U.S. Forest and the U.S. Fish and Wildlife Services provided planning support in the areas of conceptual design and organization, grizzly bear ecology and management and in plan design and formulation (U.S. FISH AND WILDLIFE SERVICE 1993). Furthermore, bear scientists and other agencies (Interagency Grizzly Bear Study Team, Border Grizzly Project) were involved in the development of the plan. In 1993, the Recovery Plan was revised by the Grizzly Bear Recovery Coordinator. Generally, ESA recovery plans are scheduled for periodic reviews (U.S. FISH AND WILDLIFE SERVICE 1993). The Grizzly Recovery Plan is intended to be dynamic, and it will be reviewed every 5 years and further revised as necessary (U.S. FISH AND WILDLIFE SERVICE 1993).

The revised Grizzly Bear Recovery Plan is divided into three parts. Part I, the introduction, provides basic information on grizzly bears, such as history; physical characteristics; social organization and behavior; population characteristics such as density, home range, age and sex structure, natality, mortality; habitat conditions such as food, cover, denning; past distribution; current distribution/status; and legal status.

Part II, which is entitled “Needs for Recovery”, outlines and explains the principal recovery goal and further objectives of the Recovery Plan, followed by specific information and recommendations for the management of grizzly bear populations and their habitat. The identification of appropriate actions necessary for ensuring the conservation and recovery of grizzly bears is considered to be the principal goal, which may ultimately result in the removal of the species from the “threatened” status in the conterminous 48 United States (U.S. FISH AND WILDLIFE SERVICE 1993). Before a population within an ecosystem can be delisted the following requirements must be met: (1) the attainment of the population demographic parameters for that ecosystem within the monitoring period specified; and (2) the development and completion of an interagency conservation strategy, which ensures that adequate regulatory mechanism will continue to be present after the species becomes delisted (U.S. FISH AND WILDLIFE SERVICE 1993). Appropriate population demographic parameters identified

in the Recovery Plan are the number of females with cubs, which are according to KNIGHT et al. (1995), the most reliable segment of the population to count; the distribution of females with cubs; and mortality. The rate of human-caused grizzly bear mortality, especially of adult females, seems to be of particular importance as GUNTHER (2003) designates it a key factor influencing the potential recovery of the grizzly bear population in the Yellowstone ecosystem. More specific objectives of the Recovery Plan are the definition of grizzly bear population goals that represent species recovery in measurable and quantifiable terms for the grizzly bear ecosystems, the identification of population and habitat limiting factors and management measures needed to remove these limiting factors, a population monitoring approach that will allow the determination of recovered levels, and finally the establishment of recovered populations in each of the ecosystems where habitat is available to sustain a grizzly bear population (U.S. FISH AND WILDLIFE SERVICE 1993).

Furthermore, part II provides management recommendations for grizzly bear populations and their habitat. The interest in the status of grizzly bear populations has increased in recent years (HARRIS 1986). There are various approaches for monitoring the status of grizzly bear populations. The U.S. FISH AND WILDLIFE SERVICE (1993) recommends using a combination of three key indicators: (1) sufficient reproduction to offset the existing levels of human-caused mortality; (2) adequate distribution of breeding animals throughout the area; and (3) a limit on total human-caused mortality, which is related to the previous two parameters. The monitoring of population status and of other factors relevant to grizzly bears will be conducted within specially established recovery zones, which are further divided into areas designated as Bear Management Units (BMUs) (U.S. FISH AND WILDLIFE SERVICE 1993). Besides the application as monitoring and management units, recovery zones are generally identified as areas needed for recovery of the species within the continental United States. The distance between recovery zones raises more questions concerning dispersal rates of bears between the ecosystems and the management of genetic diversity within bear populations. It is recommended to conduct a linkage zone assessment, which, according to the U.S. FISH AND WILDLIFE SERVICE (1993), helps to identify the ability of individual animals to move between ecosystems. GIS (Geographic Information Systems)

should be incorporated as it provides an excellent means of bringing together all the various types of information on land use, human activity, topography, vegetation, and other factors that will influence possible linkage (U.S. FISH AND WILDLIFE SERVICE 1993). Proactive enhancement of genetic diversity is suggested in isolated small populations (HARRIS 1985) through placing grizzly bears from one population into another one, if necessary.

The maintenance of adequate effective habitat, which provides all components necessary for the survival of the species such as diversity of natural foods, resting, denning, social areas and space (U.S. FISH AND WILDLIFE SERVICE 1993), seems to be another crucial element in grizzly bear management. Thus, the Recovery Plan suggests the application of a Cumulative Effects Model (CEM), which monitors natural and human influences that affect habitat effectiveness.

Another important task in grizzly bear management mentioned in part II is the consideration of human social factors. KELLERT (1986) recommends integrating the socioeconomic and utilitarian values of the general (local) population into the establishment and management of preservation programs. The U.S. FISH AND WILDLIFE SERVICE (1993) indicates that a management system that seeks to integrate all biological, social, valuational, and institutional forces toward a common effort involving grizzly bear conservation will have the highest chance of success.

Part III of the Recovery Plan identifies a sequence of conservation and recovery actions for most of the grizzly bear recovery zones. These actions are listed in a step-down outline, which helps wildlife managers and other responsible individuals or agencies to organize all activities necessary for the recovery of grizzly bears (Appendix 2). The step-down outline incorporates the description of population objectives for recovery as well as the identification of limiting factors for grizzly bears. After redressing the population-limiting factors, the U.S. FISH AND WILDLIFE SERVICE (1993) suggests to determine habitat and space required for the achievement of a recovered grizzly bear population. Monitoring and management of the populations and their habitat are further steps in the outline followed by the development and initiation of appropriate information and education programs. The outline ends with a revision of appropriate Federal and State regulations and recommends furthermore international cooperation

between scientists and official authorities (U.S. FISH AND WILDLIFE SERVICE 1993). This step-down outline has been completed for most of the recovery zones (Yellowstone, Northern Continental Divide, Cabinet/Yaak, and Selkirk).

Part IV of the Recovery Plan presents an implementation schedule in form of a table. The headings of the column tables are task priorities, task number, task description, task duration, the responsible parties, and estimated costs. The implementation schedule summarizes all management actions, their duration and all parties in charge on only two pages, which provides a great overview on the entire recovery process.

Taken together, the Grizzly Bear Recovery Plan is a comprehensive management document which is legally based under the ESA and especially valuable as individuals and agencies from various fields and also local communities have been involved in the development and revision of the Recovery Plan. According to SERVHEEN (1998b), cooperative efforts of this type have the greatest chance of success as all parties approach the complex decisions required for grizzly bear recovery with a willingness to work together. Generally, the Grizzly Bear Recovery Plan has been designed as a daily working document for all people involved in the recovery process. It provides detailed information on grizzly bears and their management but is also very valuable in providing the opportunity to focus on the actual implementation process. Necessary actions to be taken for the conservation and recovery of the species are not only identified, these actions are arranged in a framework of a step-down outline for most of the recovery zones. This step-down outline determines the order in which the actions must be taken, thus wildlife managers and other responsible individuals or agencies “only” have to follow the outline step by step. The actions are additionally summarized in a useful implementation schedule which establishes priorities and identifies the duration, costs of the actions and also all responsible parties involved.

4.4.14.2 Conservation Strategy in the Yellowstone Ecosystem

After revising the Grizzly Bear Recovery Plan in 1993, the Interagency Conservation Strategy Team initiated the establishment of a more detailed “Conservation strategy for the grizzly bears in the Yellowstone Ecosystem” and appointed biologists representing the National Park Service; U. S. Forest Service; U. S. Fish and Wildlife

Service; Interagency Grizzly Bear Study Team; Idaho Department of Fish and Game; Montana Fish, Wildlife & Parks; and the Wyoming Department of Game and Fish to develop this document. In March 2000, a draft version was completed and released to the public for review and comment. The Strategy generally aims to manage the grizzly bears and their habitat as integral parts of the Greater Yellowstone Area upon recovery and delisting. The Primary Conservation Area (PCA), which corresponds to the Yellowstone recovery zone from the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993), was identified. The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) defines it as a secure area maintained for grizzly bears with population and habitat conditions maintained in order to ensure a recovered population for the foreseeable future and to allow bears to continue expanding outside the PCA. Furthermore, the Governors' Roundtable recognized the need to develop state management plans as well, which will give direction for grizzly bear management outside the PCA (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). Since then, state management plans for Wyoming, Montana, and Idaho have been completed. These documents will ensure that proper habitat and population management and monitoring will remain in place (GUNTHER 2003) also after the delisting process of grizzly bears.

In general, the Conservation Strategy is a very comprehensive and cooperative management plan which intends to cover all aspects relevant to grizzly bear conservation and recovery in the Greater Yellowstone Ecosystem. The main purposes of the Strategy are the description of all coordinated efforts to manage the grizzly bear population and its habitat, the specification of population, habitat, and nuisance bear standards to maintain a recovered grizzly bear population for the foreseeable future and the documentation of regulatory mechanisms and legal authorities, policies, management, and monitoring programs that exist to maintain the recovered grizzly bear population (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). The Strategy goes back to the population recovery targets already identified for the Yellowstone recovery zone in the Grizzly Bear Recovery Plan from 1993. According to the INTERAGENCY CONSERVATION STRATEGY TEAM (2003), all recovery targets are currently being met. The PCA is further described in terms of its geographical distribution and of the areas of lands within the PCA, which are either managed by the National Park Service, the U.S. Forest Service

or by private or other owners. The PCA has been further divided into bear management units (BMUs) and smaller subunits (Figure 7) to simplify the monitoring of population and habitat conditions as it has already happened in the original recovery zones.

The Strategy first provides general background information on characteristics of brown bear habitat, food, denning, cover, and habitat security. It also gives an overview of management improvements and mortality reduction efforts, which include the creation of the Grizzly Bear Committee (IGBC) to coordinate management efforts across multiple federal lands and different states, the establishment of an Interagency Grizzly Bear Study Team to provide scientific information for the management and recovery of the grizzly bear in the Greater Yellowstone Area, the development of nuisance bear guidelines, the reduction of motorized access through restrictions and decommissioning, changes in highway design to facilitate bear crossings, the implementation of food storage orders that require people using grizzly bear habitat to store food properly, the installation of bear resistant garbage containers on campgrounds, picnic areas and other public use areas on federal lands, the development of education and information materials and programs to teach those living, working, and recreating in grizzly bear country how to be safe, the reduction of domestic sheep allotments and the number of domestic sheep grazing within the PCA in the case of sheep or cattle grazing, the strict requirements in their grazing permits which must be followed as well, the coordination of an annual analysis of the causes of conflicts and known and probable mortalities, proposed management solutions, and the management of livestock and road-killed carcasses to minimize grizzly bear/human conflict (INTERAGENCY CONSERVATION TEAM 2003).

The Strategy aims to maintain a healthy, self-sustaining grizzly bear population, which consists of an adequate number of individuals, is widely distributed and maintains a balance between reproduction and mortality (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). Thus, the INTERAGENCY CONSERVATION STRATEGY TEAM (2003) suggests identifying multiple criteria to provide sufficient information upon which to base management decisions as grizzly bears are a difficult species to monitor and manage. MILLER and WAITS (2003) recommend that the total population throughout the ecosystem is more than 400 bears to ensure a minimum loss of genetic diversity. Furthermore, the INTERAGENCY CONSERVATION STRATEGY TEAM

(2003) expects that sixteen of eighteen BMUs within the PCA will be occupied by females with young and that the running six-year average total known and probable human-caused mortality does not exceed 4% of the total population estimate and that no more than 30% of the known and probable mortalities are females. Compared to the Recovery Plan criteria, which focus on the recovery zone and 10 miles outside the

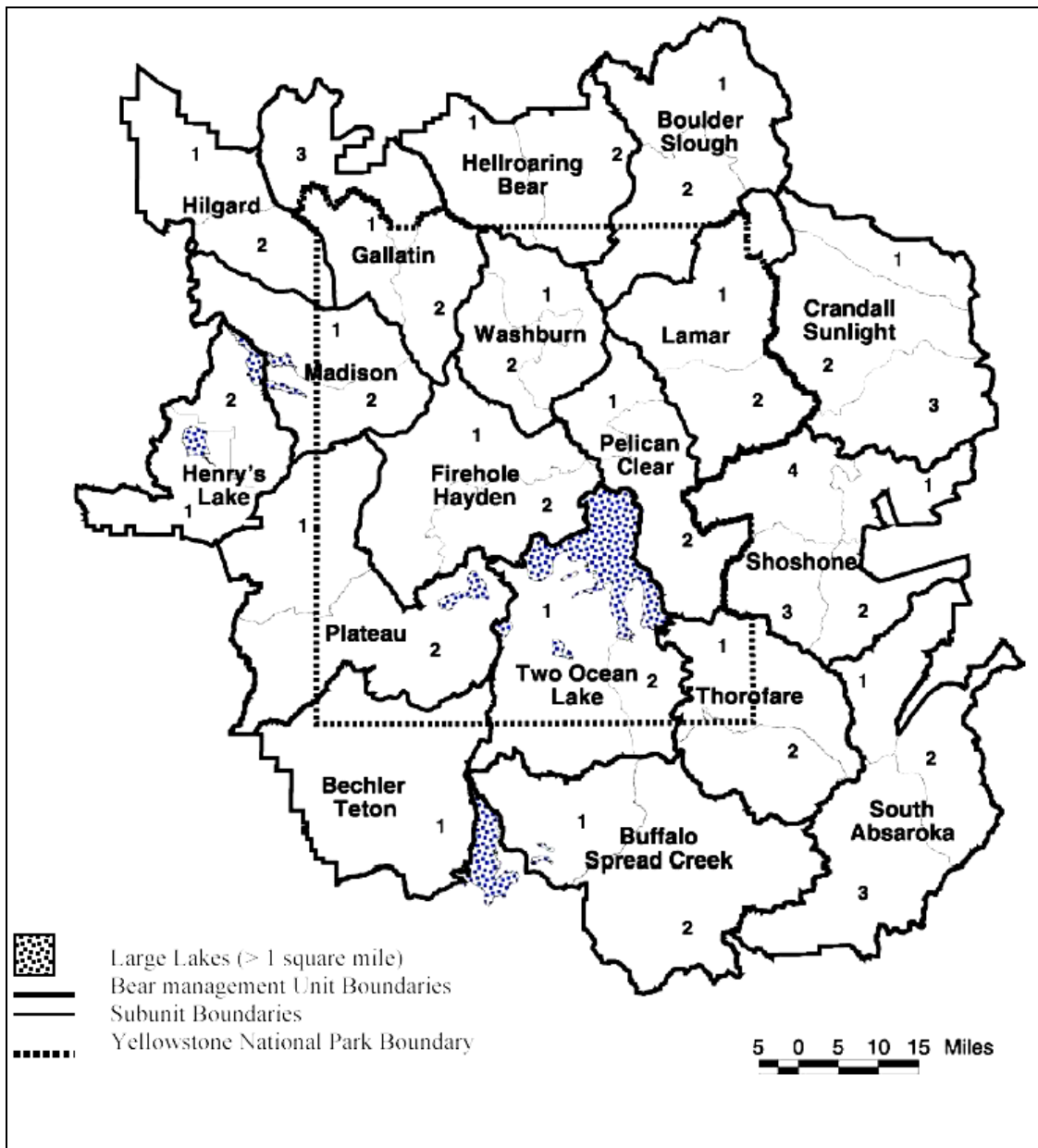


Figure 7. The Primary Conservation Area in the Greater Yellowstone Ecosystem showing bear management units and subunits boundaries (Interagency Conservation Strategy Team 2003)

recovery zone, the Strategy standards and the standards in the state plans are tied to either the PCA or all areas suitable for occupancy by grizzly bears (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) also presents a population trend using a statistical method called bootstrapping and the Lotka equation as described in EBERHARDT et al. (1994) and EBERHARDT (1995), for the Yellowstone Ecosystem. The Lotka equation states that the grizzly bear population has increased, according to SCHWARTZ et al. (2002), in both the numbers of bears and the geographic area they occupy. Genetic management such as retrieving genetic samples from all captured and dead bears in the Yellowstone Ecosystem, determining if genetic material from the Northern-Continental-Divide grizzly bears is found in the Yellowstone population, and ensuring the natural or artificial gene flow between the ecosystems, seems to be another important issue as this grizzly bear population is more or less isolated from the other grizzly bear ecosystems.

The Strategy also deals with habitat standards (secure habitat, developed sites, livestock allotment standards) inside the PCA, several other habitat parameters and their monitoring in order to determine the habitat condition and to improve it, if necessary. The control of human activities on grizzly bear habitat seems to be crucial to secure the bears' survival and recovery, as these activities often result either in mortality or in habitat displacement. The INTERAGENCY CONSERVATION STRATEGY TEAM (2003), for instance, sets up rules for secure habitat management within the PCA which determine seasons where access is possible (Season 1 – 1 March to 15 July, Season 2 – 16 July to 30 November), defines secure habitat as an area more than 500 meters away from an open or gated motorized access route or reoccurring helicopter flight line, which is greater than or equal to 10 acres in size, and identifies activities allowed in secure habitat, which do not require road construction, reconstruction, opening a restricted road, or reoccurring helicopter flights. In addition, the INTERAGENCY CONSERVATION STRATEGY TEAM (2003) only allows changes in secure habitat if one project that may temporarily reduce secure habitat is active per grizzly subunit at one time and permanent changes to secure habitat only if secure habitat is replaced with an equivalent habitat quality.

The INTERAGENCY CONSERVATION STRATEGY (2003) also sets up a developed site standard, which refers mainly to areas with high human activities such as campgrounds, trailheads, lodges, administrative sites, service stations, summer homes, restaurants, visitors centers, and permitted resource development sites such as oil and gas exploratory wells, production wells, and work camps. The Strategy indicates that all developed sites within the PCA from 1998 are maintained and changes in size or use since then and also all positive and negative impacts on the sites are analyzed as well. Furthermore, the INTERAGENCY CONSERVATION STRATEGY TEAM (2003) outlines special mitigation measures in order to minimize negative impacts such as consolidation and/or elimination of dispersed camping, to offset any increases in human capacity, habitat loss, or increased access to surrounding habitats, and also to involve land managers who are instructed to improve the condition of grizzly bear sites.

The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) also aims to control the impact of livestock grazing allotments on grizzly bear habitat by not increasing it and by monitoring and evaluating already existing livestock allotments, which include both vacant (without an active permit) and active commercial grazing ones.

Habitat monitoring will be conducted in order to determine whether habitat standards defined in this Strategy are successfully implemented and also to survey other habitat parameters such as major foods (winter-killed ungulates, cutthroat trout, army cutworm moths, and white bark pine cones), habitat effectiveness and value, hunter numbers, private land development and habitat connectivity. The habitat parameters are measured and reported on an annual basis to the Yellowstone Grizzly Management Committee and results are additionally presented in the annual Interagency Grizzly Bear Study Team reports. According to the INTERAGENCY CONSERVATION STRATEGY TEAM (2003), a high proportion of secure habitat and reduced motorized access is especially important to the survival and reproductive success of grizzly bears, particularly to adult female ones. Thus, special parameters such as the percentage of secure habitat, the open motorized access route density (OMARD) in mile/square mile, and the total motorized access route density (TMARD) in miles/square mile per subunit are identified (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). The portion of

developed sites within the PCA is monitored in order to indirectly assess the loss of grizzly bear habitat and the risk of becoming food-conditioned and/or to human-activities-habituated grizzly bears. Great importance is attached to both factors as they may increase grizzly bear mortality. Furthermore, numbers of commercial livestock grazing allotments and permitted sheep Animal Months (AM) are counted to control the bear-livestock conflict, which may result in relocation or removal of grizzly bears from the PCA. The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) also suggests monitoring the availability of winter-killed ungulates, cutthroat trout, army cutworm moths, and white bark pine cones directly or indirectly and on an annual basis, as these are food sources with the highest portion of digestible energy available to grizzly bears in the Yellowstone area and are often limited in distribution and subject to wide annual fluctuations in availability. GUNTHER et al. (1997) indicates that the abundance of these food sources correlates with the number of grizzly bear/human conflicts - during years when these food sources are abundant, there are very few grizzly bear/human conflicts, and during years when there are shortages of one or more of these foods, higher numbers of grizzly bear/human conflicts as well as an increased human-caused grizzly bear mortality may occur. This knowledge is of particular importance for wildlife managers as they are able to estimate the annual seasonal bear habitat use and prepare for or better avoid grizzly bear/human conflicts in advance (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). The actual monitoring of ungulate carcasses is carried out through counting carcasses per km along survey routes in Yellowstone National Park and the Gallatin National Forest in southwestern Montana. The size of cutthroat trout populations is determined using gillnets, fish weirs, spawning stream surveys, and hydro acoustic techniques and the grizzly bear use of moth aggregation sites is determined by comparing the number of confirmed moth sites with moth sites used and the numbers of locations and observations of grizzly bears during radio tracking and observation flights (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). White bark pine cone production is monitored by several transects running annually through the Great Yellowstone Area. Besides the information on how to monitor the major food sources, general information on the significance of these foods for bears and the seasons when bears feed on it is provided.

Furthermore, grizzly bear habitat can be evaluated by determining the level of its value and effectiveness. The habitat value refers to the distribution of bear foods and other ecological requirements. Habitat effectiveness measures the availability and accessibility of quality habitat to bears, which is monitored in each subunit and BMU inside the PCA by application of the best available system (INTERAGENCY CONSERVATION STRATEGY TEAM 2000). Relative changes in habitat effectiveness are calculated with the CEM, which is, according to GIBEAU (1998), a tool developed to quantitatively and qualitatively assess the effects of human actions on grizzly bears and their habitat. The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) indicates that the Yellowstone Grizzly Bear CEM uses GIS databases and relative value coefficients of human activities, vegetation, and key grizzly bear foods to calculate habitat value and habitat effectiveness. It is planned to apply CEM on a regular basis in each BMU and subunit within the PCA and to review and update the CEM databases annually.

The number of hunters within the PCA is also monitored as there seems to be a correlation to grizzly bear mortalities. The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) combines hunter use levels with numbers of grizzly bear/human conflicts to identify when and where to increase public education efforts in order to decrease human/bear conflicts.

Development of private land inside and outside the PCA is responsible for further grizzly bear habitat fragmentation and grizzly bear/human conflicts. GUNTHER et al. (2004) indicates that 41% of the grizzly bear/human conflicts inside the Yellowstone Grizzly Bear Recovery Zone occur on private land. According to the INTERAGENCY CONSERVATION STRATEGY TEAM (2003), the Montana Fish, Wildlife and Park Department and the Wyoming Game and Fish Department employ bear management specialists, who manage grizzly bear/human conflicts on private lands and work with private landowners to minimize these conflicts.

Roads and other transport corridors are often detrimental to grizzly bear habitat and its connectivity. The INTERAGENCY CONSERVATION STRATEGY TEAM (2003) indicates that certain road designs that allow increased speed, have wider road surfaces - including wider shoulders and wide vegetation clearing widths for visibility -

may reduce bear crossing, eliminate traditional dispersal routes, fragment the home ranges of bears and also increase bear mortality in the Greater Yellowstone Area. It is planned to improve road designs in order to ensure habitat connectivity, but the INTERAGENCY CONSERVATION STRATEGY TEAM (2003) recommends conducting a connectivity analysis prior to such improvements to identify important crossing areas by surveying or analyzing bear crossing areas, bear sighting information, ungulate road mortality data, bear home ranges, and game trail information.

The Strategy also emphasizes the management and monitoring of grizzly bear/human conflicts, according to the INTERAGENCY CONSERVATION STRATEGY TEAM (2003), especially nuisance bear management implemented through public education, removal of attractants, preventive sanitation of human use areas, deterrence of the bear from the site through the use of aversive conditioning techniques, and capturing and relocating nuisance bears, which is essential to successful grizzly conservation and often necessary to prevent property damage, livestock losses, and human injury or death. Terms relevant for nuisance bear management such as ‘food conditioned’ or ‘habituated’ bears and ‘relocation’ or ‘removal’ are defined in order to increase the general understanding. Additionally, responsible management authorities are identified, which vary depending on whether problem bears occur inside or outside the PCA as there are also differences in terms of the actual management of nuisance bears. In the case of a grizzly bear/human conflict inside the PCA, the Strategy aims to minimize the conflict, focuses more on the management of an individual nuisance bear, and generally gives bears a greater consideration than outside the PCA, where human uses are favored. Furthermore, specific nuisance bear standards are outlined which differentiate between bears which display food conditioning and/or habituation, natural or unnatural aggression, or prey on livestock. The Strategy also provides general principles to be followed in nuisance bear management as well as specific criteria for bear removals. All conflicts involving grizzly bears as well as consequential nuisance bear control actions are summarized in an annual report of the Interagency Grizzly Bear Study Team, which can be used by wildlife managers for analyzing useful trends in terms of locations, sources, and types of grizzly bear/human conflicts (INTERAGENCY CONSERVATION STRATEGY TEAM 2003).

The Strategy also emphasizes the importance of a positive public attitude toward grizzly bears, which often determines the success of conservation efforts for grizzly bear populations to be recovered. A positive public attitude can be achieved through public involvement in grizzly bear management efforts and the organization of coordinated information and education campaigns understandable for all people who visit, live, work, and recreate in bear habitat, all of which can contribute to changing inappropriate human behavior and to teaching people how to coexist with bears peacefully (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). An information and education team within the Greater Yellowstone Area has been formed, which, for instance, is responsible for the development of information and education campaigns, living-with-bears workshops, public information through various media and the involvement of local citizen groups, and the organization of state and federal volunteer programs. Furthermore, information material such as brochures, videos, signs, articles, etc., is in use to improve the general knowledge about bears and the acceptance of grizzly bears by people (INTERAGENCY CONSERVATION STRATEGY TEAM 2003). The public is always welcome to comment on all published information, to bring up concerns and to participate in open discussion forums, which may be particularly necessary in order to implement conservation measures presented in the Strategy successfully.

The actual implementation of the Strategy requires the identification of several responsible parties involved in grizzly bear conservation and management in the Greater Yellowstone Ecosystem. The Strategy mentions all parties as well as their primary activities (Table 2).

Responsible authorities		Primary activities
(Composed of)		
Yellowstone Grizzly Coordinating Committee (YGCC)		
<i>Federal</i>	National parks, National forests, Bureau of Land Management, The	Coordinates the implementation of the Strategy Identifies management, research, and financial needs to successfully implement the Strategy Ensures that population and habitat data are collected annually

Brown Bear Management Plans in Europe and the continental United States

<p>Biological Resources Division of the U.S. Geological Survey</p> <p><i>State wildlife agencies</i> (Idaho, Montana, Wyoming)</p> <p><i>Local government</i></p> <p><i>Tribal</i></p>	<p>Implements a Biology and Monitoring Review Coordinates information and education efforts Revises or amends the Strategy based on best biological data and science available Seeks funding</p>
<p>Three teams are responsible for performing necessary tasks and reporting to the YGCC: The Interagency Grizzly Bear Study Team (IGBST)</p>	
<p><i>Federal</i> National Park Services, U.S. Geological Survey, U.S. Forest Service, U.S. Fish and Wildlife Service</p> <p><i>State wildlife agencies</i> (Idaho, Montana, Wyoming)</p>	<p>Collects, manages, analyzes, and distributes science-based information Conducts short- and long-term research projects Bear population monitoring (status and trend, numbers, reproduction, mortality) Monitors bear habitats, foods, impacts of humans Provides technical support to agencies and other groups Takes a lead in preparing Biology and Monitoring Review with support from YGCC</p>
<p>Habitat Modeling Team (CEM)</p>	
<p>Biologists and GIS specialists from the six national forests and the two national parks in the Greater Yellowstone Ecosystem</p> <p>Database coordinator</p>	<p>Coordinates annual updates of motorized access database Coordinates annual evaluation of motorized access route density and secure habitat Coordinates periodic updates of the Cumulative Effects Model Coordinates periodic evaluation of habitat effectiveness Documents annually any changes in developed sites, livestock allotments or other related databases Sets and maintains standards, definitions, values, formats and processes for collecting and updating data and assessment models</p>
<p>The Information and Education Team (I & E)</p>	
<p><i>Federal</i> National Park Services, U.S. Forest Service</p> <p><i>State wildlife agencies</i> (Idaho, Montana, Wyoming)</p>	<p>Increases public support and an understanding of grizzly bears and their habitat Utilizes all possible modern technology and media resources Foster information exchange Provide public involvement through open houses, direct mailings, media campaigns</p>

In the end, the Strategy outlines additional useful information on laws and regulations relevant for grizzly bear conservation in the Greater Yellowstone Area, which provide the legal basis for most conservation measures, and lists further plans and

guidelines and their tasks in grizzly bear conservation and management developed from the National Park Service (National Resource Management Guidelines, Final Environmental Impact Statement of the Grizzly Bear Management Program, Yellowstone National Park Annual Bear Management Plan, Grand Teton National Park Human/Bear Management Plan) and the U.S. Forest Service (National Forest Land and Resource Management Plans).

The Conservation Strategy for grizzly bears in the Yellowstone Ecosystem is a very special and valuable management document which profits from longstanding U.S. experience in endangered and threatened species management and conservation. It is a good example of interdisciplinary cooperation between federal and state agencies, the governors of three states, county and city governments, universities, several organizations, private landowners and the general public, and it will hopefully provide useful information and guidance to other attempts in managing and conserving small brown bear populations.

5 RECOMMENDATIONS FOR FUTURE SPECIES MANAGEMENT PLANS

This chapter does not attempt to provide a step-by-step outline for developing and implementing a species management plan, it rather tries to guide through the complex process of endangered species planning constituting general advice for wildlife managers, national authorities and all other parties involved. It offers only an introduction to endangered species planning, but provides hopefully some useful recommendations that can help to increase the effectiveness of species management plans which may further secure the survival and recovery of highly endangered species.

5.1 Planning and implementing species conservation

The conservation of endangered species seems to be a major challenge to every conservation biologist who is faced with the daunting task of identifying appropriate biological information for species recovery planning. The biological information is necessary for evaluating the causes of endangerment in order to ensure the continued survival of the target species in nature and also for developing criteria in order to determine whether recovery is achieved or not (SCHEMSKE et al. 1994). Recovery is generally a process by which the decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival in nature can be ensured (U.S. DEPARTMENT OF INTERIOR and U.S. FISH AND WILDLIFE SERVICE 1990). Endangered and threatened species approaches initiating recovery must be carefully planned as they are expensive in time, money, and effort (COMMITTEE ON THE APPLICATIONS OF ECOLOGICAL THEORY TO ENVIRONMENTAL PROBLEMS 1986). Biologists need to use the best tools, skills, and experience available (CLARK and CRAGUN 1994a) in order to bring the rarest species away from the brink of extinction.

Species management plans proved to be a useful tool in endangered species planning particularly necessary for identifying and prioritizing the species' conservation needs and appropriate actions with the greatest promise of success to recover the species.

According to O'CONNOR et al. (2000), these plans are the central documents available to decision-makers who are responsible for the management and recovery of threatened and endangered species. However, in order to be successful species management plans must be developed, implemented and evaluated carefully considering following procedures described by PEYTON et al. (1999) (Figure 8). The planning phase of the document includes (1) the identification of responsible parties (agencies, groups, recovery team etc.), (2) the collection of biological, environmental, socio-political, legal-economic, and valuational knowledge relevant for the species' recovery, (3) the identification and definition of threats to the species, (4) the prioritization of these threats, and (5) setting up of conservation strategy. PEYTON et al. (1999) recommends in order to implement a plan successfully (6) to identify appropriate implementators, (7) to set up a timetable, (8) to allocate resources, and (9) to conduct sufficient monitoring. The implementation of the plan is followed by its (10) evaluation which is an external activity best done by knowledgeable reviewers who are not personally involved in the project (CASLEY and KUMAR 1987). According to BRYANT and WHITE (1982), plans need to be evaluated as the initial project plans are hypotheses about what a series of actions will accomplish. It is necessary to determine if there is a link between the initial plans and the intended outcome.

O'CONNOR et al. (2000) identifies more attributes that may improve species management plans. A plan that assesses the relative risks of various threats to a species, provides a firm scientific accounting of the basis of those risks, identifies biologically sound actions to mitigate those threats, defines biologically based (rather than arbitrary) criteria for a decision that the species has recovered enough to become de-listed, involves monitoring, and responds to the results of its management actions, is clearly superior to one that lacks all these attributes. Together, these components make species management plans to a singular resource for information on the threats listed species are facing and actions needed for their recovery (CLARK et al. 2002).

Generally, it is necessary to develop and implement species management plans carefully but there are also other factors wildlife managers have to focus their attention on. Figure 9 summarizes the main biological, social, political and organizational factors relevant for species management plans. For instance, according to PEYTON et al. (1999),

the process of planning and implementation relies on organizational expertise and capacity, political support, and interdisciplinary collaboration. Interdisciplinary collaboration between scientists, administrative bodies, NGOs as well as hunter associations, landowners and the general public seems to be particularly crucial if species management plans aim to incorporate all aspects influencing the species' survival and recovery.

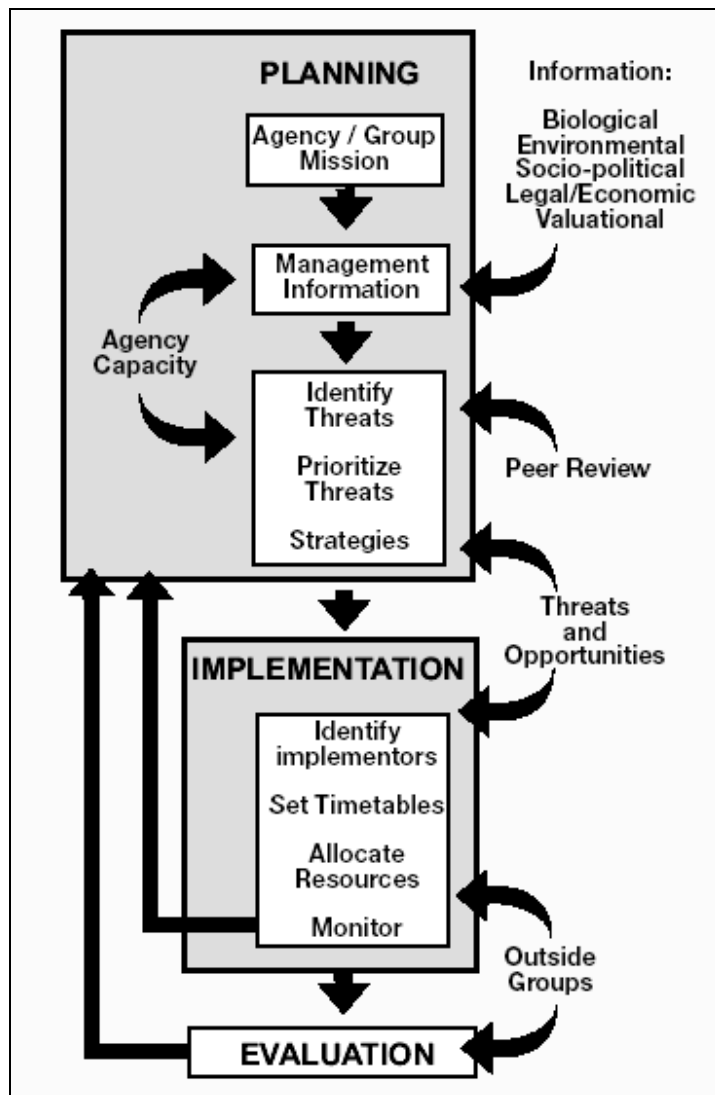


Figure 8. Planning and implementation procedures of a species management plan (PEYTON et al. 1999)

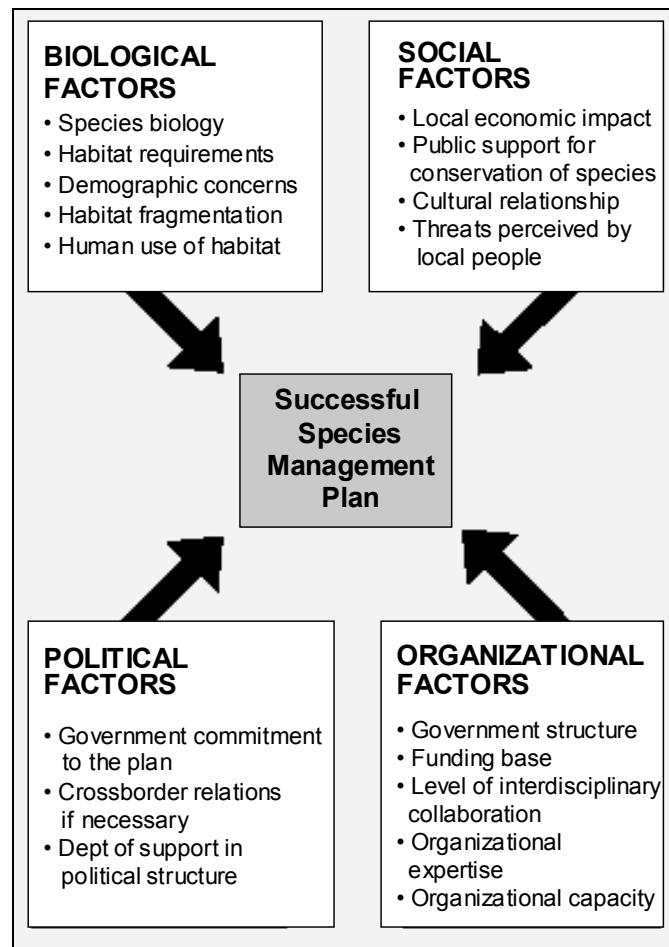


Figure 9. Factors influencing the success of species management plans (based on PEYTON et al. 1999, modified)

5.1.1 Recovery team

First, a recovery team needs to be set up, which supervises the entire project ‘species management plan’ and is responsible for taking the main steps ranging from the development to the actual implementation and follow-up of these management documents. Working in a recovery team often may be a special challenge as the people have to work under the constraints of little money, conflicting interest groups, and little time for producing species management plans (FOIN et al. 1998). The structure and composition, organization and working method of the teams may have a major influence

on the success and effectiveness of species management plans, on which many endangered species approaches are based on.

CLARK et al. (1994b) indicates that the success or failure of recovery plans is determined in part who writes the documents. Thus, the importance of understanding the relationship between authorship and recovery planning seems to be crucial as selecting appropriate groups of people to write recovery plans is one of the few facets of recovery planning that is within the control of responsible agencies (GERBER and SCHULTZ 2001). Usually team members have expertise on the biology of the endangered species, the threats to its survival, or on other disciplines needed to address recovery (SCOTT 1999). It is especially recommendable to involve all parties relevant for the conservation and recovery of the species in the development, implementation and follow-up of the management plan as, according to O'CONNOR et al. (2000), the quality of a recovery plan varies with the spectrum of diverse expertise represented in its authorship. Ideally, representatives from all responsible administrative authorities, universities and other institutions, NGOs, the general public, experts and private landowners are active participants in the recovery process. Such a multi-disciplinary development and implementation of species management plans may be desirable as a diversity of options for the species' recovery is considered, and according to HATCH et al. (2002), tasks of the management document are more likely to be completed when more parties are involved in developing recovery plans. GERBER and SCHULTZ (2001) report that a group of authors with diverse affiliations may strengthen the recovery planning process, and, according to MACHADO (1997), would additionally avoid biasing the entire process or missing important questions.

The implementation of species management plans depends on the effectiveness and efficiency of its implementors. CLARK and CRAGUN (1994a) outline five implementation problems, all connected to weaknesses in the organization and management of the recovery process: (1) a lack in appropriate management of complexity inherent in recovery teams; (2) high-level bureaucratic officials may be responsible for the displacement of 'saving-the-species goals'; (3) an inappropriate organizational structure may influence the allocation of tasks and resources, the distribution of information, and the overall effectiveness of the team negatively; (4) a dismiss of high-

quality, accurate, and reliable data by top-level officials as the data does not run counter to their preferred policy; and (5) a delay of critical management actions due to slow planning and decision-making of the officials. Addressing all these problems and following the recommendations outlined in Table 3 may result in the improvement of recovery teams and their effectiveness.

Table 3. Recommendations for improving recovery teams (based on Clark and Cragun 1994a, modified)	
	Consequences
Organization of the team	
Identification of an appropriate team leader who is a credible professional and able to stimulate and recognize creative ideas, gives instructive feedback etc.	Strong leadership of the team may strengthen the team additionally
Training of the team members in areas related to the recovery process and other related skills	Team gets more informed and is able to base decisions on scientific knowledge and other skills
Individual team members must be good learners, perceptive, energetic, willing to work without close supervision or rules and regulations, and professional in demeanor (Clark 1986)	May foster independence and professionalism in recovery planning
Team members should be 'reflective practitioners' (Schön 1983)	Continuous evaluation of all actions implemented improves the recovery process
Little formalization and only a few hierarchical levels, rules, and regulations within the team (Daft 1983)	Improvement of the team's responsiveness
Frequent group meetings	Brings together a diversity of expertise and enhances coordination and knowledge exchange
Studying and evaluating the activities, structure, interpersonal relationship and success of recovery teams	Enhancement of effectiveness and efficiency of recovery teams
Characteristics of the team	
Team flexibility	Enables quick response to changing tasks and demands
Goal and action-orientation of the team (Harrison 1972, 1975)	Actions may be completed quickly and successfully

5.1.2 Public involvement and education

Conservation and management efforts for highly conflictive species such as brown bears or other large carnivores, which, according to BATH (1998), often elicit strong public emotions, may be more successful when the public is involved in recovery planning and education campaigns are implemented to turn negative public attitudes toward bears positive, or at least into acceptance. KEMF et al. (1999) recommends undertaking these activities especially in bear country in order to improve the general

understanding of the social, economic and cultural relationship of local people to bears. A public survey may be additionally helpful, which analyses the general knowledge and education needs and identifies citizens' interests and concerns.

The ESA, for instance, requires a public review of all species recovery plans before approval. The public is usually notified through a press release in the newspapers saying that a draft recovery plan is available, and invited to submit written comments on the recovery plan within a public comment period. In addition to involving the public in the actual development of species management plans, another important aspect may be the organization of public education campaigns which provide general information on bears and the implementation of recovery and conservation measures identified in the species plans such as reintroduction of bears or the reduction of motorized access in grizzly bear habitat. Generally, KLEMEN et al. (2003) recommends basing all measures for improving the coexistence between man and brown bears on objective information, and LECOUNT and BALDWIN (1986) suggest getting the best bear information possible to as many people as possible. MAGUIRE and SERVHEEN (1992) indicate that an augmentation of the small grizzly bear population in the Cabinet-Yaak Ecosystem in north-western Montana was implemented after the realization of a carefully prepared public education campaign through the formation of a citizens' advisory committee, the distribution of a question-and-answer booklet to all residents affected by the translocation, and the organization of explanatory meetings in all communities.

The school community would also be a valuable way to disseminate bear information. LECOUNT and BALDWIN (1986) recommend incorporating a training of the teachers, because they are a vital link to the students, developing materials for all age groups but concentrating on kindergarten through 6th grade as this age group has the least bias against bears, and also presenting various points of views (e.g. economical, cultural, ecological, ethical, or political) concerning the bear issue and its conflicts.

The public involvement and education could be further enhanced through active participation of interested citizens in field work, the organization of guided field trips to inform people on bears and how to behave in case of an encounter while wandering through bear country, and the arrangement of community events intending to educate the public how to prevent and reduce conflicts between people and bears.

5.2 Species Management Plans

5.2.1 Terminology

The terminology of species management plans is very confusing and in the interest of the species concerned, the following scheme is recommended. Species management plans can be divided in species conservation, species recovery and species action plans depending on their geographical range and how action-oriented the documents are (Fig. 10).

<p>Species Conservation Plans</p> <p>International range Gives an overview on the situation of the species and its populations Identifies necessary conservation actions for all populations Advices countries or regions in species conservation</p>	
<p>Species Recovery Plans</p> <ul style="list-style-type: none"> • National or regional range • Provides general information on the national/regional situation of the species • Defines recovery actions 	<p>Species Action Plans</p> <ul style="list-style-type: none"> • National or regional range • Brief summary on the species and its national/regional status • More action-oriented • Detailed implementation schedule

Figure 10. Terminology of species management plans

5.2.2 Contents

It seems that there are several schools of thought on the contents of species management plans depending on the species, the plan's target group, its range (e.g. regional, national), and other circumstances. Ideally, species management plans cover all possible aspects relevant to the conservation or recovery of the species ranging from basic biological information to actual recovery strategies which intend to address the species' limiting factors. Generally, the content of the plans can be divided in two types

of information: (1) theoretical and (2) analytical/ strategic. The theoretical section of the plan provides best biological and ecological data available on the species and its habitat and may also inform on its legal status within the conservation/recovery area. The analytical/strategic section is more action-oriented and includes ideally definitions of the main aims and objectives of the plan, identifies all known and potential threats and limiting factors to the species and its habitat and also appropriate conservation/recovery measures to address them, sets up conservation/recovery criteria to assess the success of the plan and includes an implementation schedule with time and cost analysis. These two sections are often kept in separate documents as the actual management plan should be short and succinct.

The extent of biological information in species management plans varies depending on the scope of the document. Wildlife managers using these kinds of documents on a daily basis should not lose track of things overwhelmed with too much data. On the contrary, a lack of knowledge would also affect recovery planning negatively as it contributes to uncertainty about the correct action to take (PEYTON et al. 1999). ENVIRONMENT AUSTRALIA (2002) recommends providing a brief introduction and a general overview of the plan's broader context, which summarizes the best information available on the biology of species and its habitat and the major threats and limiting factors to the species' survival and recovery. Species management plans could be read and understood without reference to further information.

TEAR et al. (1995) analyses the type and extent of biological information contained in ESA recovery plans by comparing information available on four major biological topics: species distribution, species abundance, population demographics, and population dynamics (Table 4) and indicates that the most biological information is available on more general topics regarding species distribution and abundance, and less information on population demographics and dynamics. SERVHEEN (1994) identifies the distribution of the population and of females with cubs, the source, location and causes of mortality, human-bear conflicts, habitat use and fragmentation, the population size and genetic viability as the most important research and monitoring items to the immediate conservation of bear populations.

Table 4. Knowledge on bear species/population and its biology (based on Servheen, 1994; Tear et al., 1995; modified)

Species' distribution	
	Species' distribution or range Range expansion Distribution variability due to habitat differences addressed Area of current distribution or range (% of historical) Home-range data Dispersal data
Species' abundance	
	Current total population size estimated Effective population size evaluated Temporal variation in abundance addressed
Population demographics	
	Estimates of Fecundity Age structure Survival Survival by age class Fecundity by age class Temporal variation Fecundity estimated for Age structure Survival
Population dynamics	
	Estimates of actual growth rate Temporal variation in growth rate Lack of information addressed Density dependence addressed Population regulation addressed
Habitat	
	Seasonal habitat use (from sign) Habitat fragmentation Critical habitat
Food	
	Seasonal food habits (from scats) Food abundance
Threats and limiting factors	
	Source and causes Location Extent, size and severity
Legislative status	
	Laws Regulations

5.2.2.1 Threats and limiting factors

Generally, threats can be defined as modern human activities or consequences of those activities that have changed or have the potential to change (COLE and LANDRES 1996) conditions to species' survival. Effective conservation and recovery of endangered

species requires the removal of these threats, or at least their reduction. The initial aspect of species recovery planning is to identify all threats (known and likely) that could affect the species, so that the most appropriate course of conservation or recovery actions can be established (ENVIRONMENT AUSTRALIA 2002). FOIN et al. (1998) note that a greater weight has to be given to contemporary than to historical threats as wildlife managers should be more responsive to the management of contemporary causes of endangerment. After identifying them, threats are defined comprehensively (SCHÖN 1983). CLARK et al. (1996) believe that the extent of people both inside and outside the planning organization sharing the same definition of threats greatly affects the success of the plan's implementation.

All threats to the species' survival or recovery are undesirable, but some needs to be addressed more than others. PEYTON et al. (1999) indicate that the ability to prioritize threats leads to efficient use of resources and emphasis on actions that are immediately required to preserve endangered populations, thus it is suggested developing strategies for ranking threats. MACHADO (1997) recommends designing a simple and conceptual rating scale (severe-medium-low) or just a numerical scale (1 to 5). HEREDIA et al. (1996) uses a more complicated system for threat rating based on four categories: (1) critical: a factor could lead to the extinction of the species in 20 years or less, (2) high: a factor that could lead to a decline of more than 20% of the population in 20 years or less, (3) medium: a factor that could lead to a decline of less than 20% of the population over significant parts of its range in 20 years or less, and (4) low: a factor that only affects the species at a local level. However, threat ranking systems can be based on the variation of threats in their aerial extent, longevity, and intensity described by COLE and LANDRES (1996). Besides ranking the actual threats, factors influenced by these threats can be additionally surveyed. Depending on the range of the species management plan, populations that are known to be under particular or extreme threats and also areas that are affected by a threatening process more than others can be ranked and additionally illustrated in maps (ENVIRONMENT AUSTRALIA 2002).

5.2.2.2 Recovery Strategy

Once threats have been prioritized, a recovery strategy needs to be set up for dealing with them and with other limiting factors to the species' survival. First, the strategy needs to define general goals of the plan in terms of the number of individuals or other population parameters. The goals can also relate to other factors influencing the species' recovery. MACHADO (1997) recommends dividing recovery goals into a hierarchical structure, which results in the definition of more precisely recovery objectives. It is recommended to keep these objectives specific, measurable, achievable, and time-fixed. The overall goal of a species management plan is usually the recovery of the species or O'CONNOR et al. (2000) describes it as the return of a listed species to a status in which its future is reasonable secure. SERVHEEN (1997) outlines general goals necessary for recovery of endangered bear populations, which are minimizing human-caused mortalities of bears, maintaining habitat, maintaining linkages between habitats and populations, increasing public knowledge and support for bear conservation.

However, the strategy synthesizes all available information on the species into an approach, which intends to address the threats and limiting factors to the species' survival and to recover the species to a self-sustaining level. In order to achieve recovery, it is necessary to identify appropriate recovery actions and measures and to define objectives or criteria to measure recovery. According to GERBER and SCHULTZ (2001), recovery criteria explicate how progress and success of recovery planning must be judged and provide additionally focus for actions toward the plan's goals.

Conservation actions identified in a species management plan need to have a direct relevance to the objectives of the plan and should be specified in terms of scientific or technical information, specific information on nature of research to be undertaken or experimental design (ENVIRONMENT AUSTRALIA 2002). MACHADO (1997) also recommends breaking recovery plan actions down into specific activities or recovery tasks and also prioritizing them as all actions or tasks are not equally important. The threat ranking system may form the foundation for setting priorities for action. Wildlife managers might also use the following very simple priority system of three levels: (1) Priority 1: actions to prevent extinction, (2) Priority 2: actions to prevent significant declines, and (3) Priority 3: all other actions needed for recovery. In order to implement

conservation actions successfully, a lack of knowledge, which contributes to uncertainty about the correct action to take, and also a lack of capital and trained human resources, which increases the probability of inefficient actions, needs to be avoided (PEYTON et al. 1999).

It is essential that species management plans define measurable recovery goals, hence criteria for assessment of recovery status as they are the means by which the ultimate success of recovery programs is assessed (GARRY OAK ECOSYSTEMS RECOVERY TEAM 2002). According to O'CONNOR et al. (2002), tracking progress toward meeting the criteria that would allow the species to get down-listed or de-listed is particularly crucial.

5.2.2.3 Implementation schedule

The implementation of species management plans seems to be the most important and also most challenging part of species recovery planning. Recovery planning is usually very costly and according to MASTER (1991), resources (e.g. time and money) available for the conservation of species and ecosystems are invariably short relative to the needs. Accordingly, it is necessary to divide the limited amount of resources among tasks necessary for species recovery based on decisions about the priority of tasks (O'CONNOR et al. 2000). The U.S FISH AND WILDLIFE SERVICE (1990) recommends providing estimates of the time and expenses of achieving recovery in the plans. Generally, PEYTON et al. (1999) indicates that an organized approach benefits conservation planning. Thus, an implementation schedule may be a useful and organized framework, which lists the identified management tasks, prioritizes them, provides additionally brief descriptions on the tasks, informs on the task duration and costs, and identifies all responsible parties involved for each task (Appendix 3).

5.2.3 Adaptive management

Generally, all species management plans should incorporate an organized monitoring approach in support of adaptive management. Adaptive management relates to periodically revisions, reexaminations and reevaluations of the species management plans, which may all lead to a more efficient recovery of endangered species both in

terms of time and money (O'CONNOR et al. 2000). HARVEY et al. (2002) recommends conducting revisions as the planning process becomes more flexible and responsive to new information or changes in the status of a species. According to FOIN et al. (1998), as part of adaptive management, plans should be reexamined periodically, the results of any previous work on the plan reported and critically analyzed, and, if needed, a revised plan developed. Taken together, species management plans should be dynamic and flexible documents responding immediately to any changes in the species' status or environment that may have an influence on the survival and recovery of the target species.

6 CONCLUSION

Planning is an activity that we all need to do in our lives. In much the same way, there is a need for planning the recovery of endangered species in order to ensure their long-term survival in a human dominated world. The complex process of recovering endangered species is best managed and organized through the application of species management plans. If well developed and implemented, species management plans are regulatory conservation tools playing a key role in rescuing highly endangered species from the brink of extinction. This thesis has generally covered species management plans, their significance in recovery planning, their legal framework if existing and also their development and implementation processes. Brown bear management plans are considered as example as brown bears are a high priority species in conservation in most parts of Europe and the continental United States. Brown bear recovery planning takes place at different geographical scales ranging from international, national to regional approaches. Particular emphasis is given to those plans based on a long tradition in species recovery planning and applied on smaller scales focusing on the needs of a highly-endangered population. In the United States, for instance, species recovery plans are widely used and legally based conservation tools which may have already contributed to the delisting of some species from endangered or threatened status in the last years. In Europe, the use of species management plans is getting more common, although only a few countries integrate the plans' development and implementation into their national legislation. Instead, international agreements such as the Bern Convention or the Habitats Directive provide a legal basis for countries without appropriate endangered species legislation to frame the development and implementation of species management plans. There are also a few countries, in which species management plans are not in use at all. The reason may be a lack of funding, knowledge in recovery planning and experienced professionals in order to develop and implement such documents appropriately. Some countries are also not aware of the need of a species-oriented approach as there are not sufficient resources, personally and financially, to conduct monitoring and research on endangered species.

Generally, it is crucial to develop species management plans on a larger as well as on a smaller geographical scale as both types of documents play an important role in the species recovery process. International species management plans often focus on the species and its populations on a larger geographical scale, and assess their status and distribution to each other. Ideally, these documents consider the ‘metapopulation approach’ and aim to recover and stabilize single populations as well as to maintain the dispersal and gene flow between them. Recovery measures are often identified at the population or rather at the national level as they seem to be implemented more likely on a smaller geographical scale. International species management plans define recovery needs on larger scales, but intend to implement them on a smaller scale by advising countries in conducting appropriate species recovery measures. The fact that populations are often transboundary requires the coordination of recovery efforts between countries, which may be another function of international management plans. All in all, international species management plans are a great source of information for everybody who is involved in species conservation as well as interested to find out more about the actual situation of the species and its populations.

International species plans often initiate the development of regional or national management documents as the species’ situation seems to be analyzed in greater detail and appropriate recovery measures need to be identified and implemented at a national level as the threats to the species may vary from country to country. However, this thesis analyses national brown bear management plans considering their scope, contents, management approaches and their developing and implementation process, and reveals great differences between single national documents. The contents of the documents depend on the management approach the different countries are considering for bears and also on the actual scope of the plans. National species management plans are not always action and implementation-oriented. Several documents are a source of information for all parties involved in national bear conservation ranging from official authorities to private landowners living in bear country. These kinds of plans generally provide more basic information on bears at a national level, their threats and conservation measures to secure the bears’ survival, which may have an influence on people coexisting with bears. The plans intend to turn negative public attitude into positive and also to convince the

reader of the importance of the species and its recovery. Furthermore, the documents inform the general public on conservation measures which may have an influence on the people living and recreating in bear country, and teaches them how to behave in order to prevent human-bear conflicts. Species management plans can be also used as some sort of scientific forum for presenting and compiling the best scientific data available on the species, its biology and habitat. The main threats to the species may be analyzed as well as appropriate recovery measures to address these threats. Other planning documents are more management and action-oriented and mainly prepared for wildlife managers and others directly responsible for carrying out actions in the recovery process. Biological information relevant to the recovery and survival of the species is summarized briefly and special emphasis is given to the definition of the multi-dimensional problem many species are facing, the identification of recovery actions and the organization of their implementation by providing a time and cost frame. This type of plan is very often used as a daily working document guiding all parties responsible through the complex process of species recovery. The focus of a species plan may depend on the scope of the document. Actually, most plans analyzed integrate more or less all three approaches – they have an informative value for the public, present scientific data and often also provide guidance through the implementation of the identified recovery actions. However, is it really desirable to include all approaches in one document? There is a need for all three approaches as the information of the public increases the acceptance to implement recovery actions, best scientific data available on the species and its threats increases the quality of recovery actions and an orientation towards action may result in a quick and successful implementation of species management plans. The only disadvantage of plans considering all these aspects in great detail may be the size of the documents which could get too comprehensive to serve as a daily working document. The public may also get distracted through the amount of information and difficult scientific terms. However, it is recommended to develop and implement species management plans thoroughly always keeping the scope and the target group of the document in mind. Actually, defining the scope of the document should be the first step in the long decision-making process of recovery planning, followed by the identification of the target group for the species plan. The species itself, its status and the serious nature

of the threats indicate the needs of recovery but the authors of the document are the deciding factor which approach may be applied in the species management plan. Generally, it is recommended to keep planning documents developed for the recovery of a species on a smaller geographical scale short and clear mainly focusing on the management and implementation of recovery actions. Most relevant scientific data as well as information relevant to the species recovery may be summarized briefly to provide general background knowledge. The general public may be rather informed through appropriate education programs and information material which are often easier to understand as many recovery documents. Although people should not have the feeling to get excluded from species recovery planning as it is recommended to give the public the opportunity to get involved and decide on conservation measures along with others responsible for the species recovery. The results of scientific research conducted on the species, its habitat and main threats and other scientific information such as ecological modeling of populations and habitat may be presented in another appropriate framework available to all groups or individuals involved in recovery planning as it is desirable to base recovery action on best scientific data available but presenting it in the recovery document would go in many cases beyond the scope of the plan.

There are also great differences in the quality of species management plans, which may depend on the experience of the authors in recovery planning, and if sufficient funding is available to develop and implement the plans successfully. International cooperation may be desirable as countries with a long tradition in species recovery planning could support other countries with useful know-how in order to strengthen already existing documents, to increase their effectiveness and thus the chance to succeed in species recovery. The creation of an international forum for species recovery planning could be particularly useful as it supports the exchange of knowledge giving experts from various countries the possibility to discuss and share experiences in recovery planning in meetings and workshops with international colleagues.

The basic approach of preparing and implementing species management plans also varies in the different countries. In most countries the management of endangered species falls under the jurisdiction of the government and its corresponding ministries. Official authorities are responsible for organizing the establishment of species

management plans, who often instruct professionals in the field of conservation to prepare these documents. A few countries have also created special working groups or recovery teams who involve representatives from various fields in the development and implementation of the species plans. The first draft of the plans is often submitted and revised by a governmental expert group. A few countries consider public involvement also as a crucial element of species recovery planning and present the draft version of the plan to the general public who is always welcome to comment on the documents and to bring in their own concerns. There are also a few countries where the government does not take the leading role in recovery planning. NGOs and other private organizations manage the preparation, implementation and follow-up of the documents. Ideally, species management plans are the result of a collaborative effort between the government, NGOs, scientists and the general public. The management of endangered species within human-dominated landscapes requires the involvement of many interest groups relevant to the species, which is especially desirable as such efforts consider also cultural and social factors which may have a major influence on the success of the entire recovery process.

Species management plans also face a lot of critique. The weakness of the documents may stem from major gaps in the knowledge on even fundamental aspects on the species, from choosing non-professionals for developing and implementing the plans or being not recovery-oriented enough by identifying not adequate recovery goals, criteria or conservation measures, or even missing a recovery strategy. Plans are usually prepared within a few years, which often results in a too late implementation as the identified conservation measures may be already outdated. Species management plans are also criticized as they often cause conflicts between opposing interests. In order to protect and recover endangered species and their habitat usually regulations are set up, which may clash with the interests of people living and recreating in the recovery area of the species. However, critique is necessary to strengthen management plans. A planning process requires continuous feedback, if positive or negative, otherwise it would not be possible to improve the plans by accommodating the documents to a changing environment and other circumstances, identifying a new strategy if the old one is not working, or by pointing out other weak points of the document. Species management

plans may even fulfill the function of a perpetual open forum which enables to bring forward everybody's concerns and suggestions.

The last chapter of the thesis outlines recommendations for future species management plans based on the latest literature on recovery planning and on personal remarks after going through several brown bear management plans. These recommendations may hopefully provide more insight into the complex subject of recovery planning and useful advice for the development and implementation of future species management plans.

As we have seen, there is a great variety in species management plans. They have been developed on different geographical scales, through many different nationalities and experts from various fields. Looking to the future it is desirable that species management plans get a frequently used tool in endangered species management as many countries still do not consider these documents as organizational frameworks for their conservation efforts. A world-wide use would require a uniform terminology system for the plans which may simplify international collaboration and exchange of knowledge in recovery planning. With this in mind, we should not forget to keep species management plans as flexible as possible focusing on the special needs of endangered species and addressing their threats in an organized way in order to save unique species from the brink of extinction.

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APPENDIX 1

Brown Bear Management Plans online

International

IUCN Conservation Action Plans

<http://www.iucn.org/themes/ssc/actionplans/actionplanindex.htm>

European

Action Plan for the Conservation of the Brown Bear in Europe

http://www.coe.int/t/e/Cultural_Co-operation/Environment/Nature_and_biological_diversity/Publications/SN114-E.pdf

Action Plan for the Baltic Large Carnivore Initiative

<http://www.nature.coe.int/cp21/tpvs73e.doc>

National

Austrian Brown Bear Action plan

<http://www.large-carnivores-lcie.org/public.htm#bear>

Large Carnivore Control and Management Plan for Estonia, 2002-2011

<http://www.large-carnivores-lcie.org/blcipublic2.htm>

Action Plan for the conservation of the bear (*Ursus arctos*) in the Italian Alps

<http://www.large-carnivores-lcie.org/apbear.pdf>

U.S. Grizzly Bear Recovery Plan

http://ecos.fws.gov/docs/recovery_plans/1993/930910.pdf

Final Conservation Strategy for the Grizzly Bears in the Yellowstone Ecosystem

http://www.fs.fed.us/r1/wildlife/igbc/ConservationStrategy/final_cs.pdf

State of Idaho Yellowstone Grizzly Bear Management Plan

http://www.accessidaho.org/species/gb_managepl.pdf

APPENDIX 2

Recovery Plan Actions - Step-Down Outline Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993)

1. Establish the population objective for recovery and identify limiting factors.
 11. Determine population conditions at which the species is viable and self-sustaining for each ecosystem.
 111. Determine population monitoring methods and criteria.
 112. Establish reporting procedures and systems to gather and evaluate information on populations.
 12. Determine current population conditions.
 13. Identify the human-related population limiting factors if present populations differ from desired.
 131. Identify sources of direct mortality.
 132. Identify sources of indirect mortality.
 133. Determine effects of human activities on bears and bear habitat, and incorporate the results into management plans and decisions on human activities.
2. Redress population-limiting factors.
 21. Manage sources of direct mortality.
 211. Reduce illegal killing.
 2111. Coordinate State, Federal, and tribal law enforcement efforts.
 2112. Reduce illegal killing by big game hunters and mistaken-identity killing by black bear hunters.
 2113. Investigate and prosecute illegal killing of grizzly bears.
 2114. Reduce accidental mortality.

21141. Increase efforts to clean up carrion and other attractants in association with roads, human habitation, and developed areas within recovery zones.

21142. Reduce losses due to mishandling of bears during research and management actions through development of a bear handling manual.

21143. Reduce losses due to predator and rodent control.

21144. Ensure that control of nuisance bears is accomplished according to 50 CFR 17.40 and the Guidelines.

21145. Reduce losses by developing and implementing public education and awareness programs.

212. Appoint a grizzly bear mortality coordinator.

22. Identify and reduce sources of indirect mortality.

221. Make domestic livestock grazing compatible with grizzly bear habitat requirements.

222. Make timber harvest and road building compatible with grizzly bear habitat requirements.

223. Make mining and oil and gas exploration and development compatible with grizzly bear habitat requirements.

224. Make recreation on Federal lands compatible with grizzly bear habitat needs.

225. Coordinate with State and county governments to make land-development and land-use decisions within the recovery zones compatible with grizzly bear habitat needs.

226. Monitor the cumulative effects of management actions in grizzly bear habitat.

23. Coordinate, monitor, and report activities relating to redressing population limiting factors, and monitor compliance with the recovery plan.

3. Determine the habitat and space required for the achievement of the grizzly bear population goal.

31. Define the recovery zone within which the grizzly bear will be managed.

32. Identify agency management stratifications within the Recovery Zone including the delineation of BMUs and Management Situations I, II, or III as defined in the Interagency Grizzly Bear Guidelines.
 33. Conduct research to determine extent of grizzly bear range.
 34. Conduct research to determine habitat use, food habits, home range size, and seasonal habitat preference, and incorporate into habitat management programs.
 35. Conduct research to determine the relationship between habitat values, physiological condition of bears, and the ability of the habitat to sustain a population density necessary to achieve viable population size.
 36. Conduct research to determine the effects of various road densities on grizzly bear habitat use and human-caused bear mortality.
 37. Conduct research on the effects of habitat fragmentation caused by human activities in order to assess the possibility of linkage between grizzly bear ecosystems and between habitat tracts within ecosystems.
 38. Evaluate the applicability of population viability analyses to grizzly bear recovery.
4. Monitor populations and habitats.
41. Monitor populations before, during, and after recovery.
 411. Develop and conduct an intensive monitoring system to measure the annual number of females with cubs, family groups, and number of human-caused mortalities.
 412. Develop a system of responsibilities to collate, analyze, and report annual information on population data.
 413. Standardize observation report forms and methods, and develop training methods for all persons involved in reporting sightings of females with cubs and family groups.
 414. Monitor relocated bears in order to assess the success of nuisance bear management.
 42. Monitor habitats before, during, and after recovery.
 421. Develop and apply the CEA process to allow monitoring of effects of management actions over a large geographic area of habitat.

- 422. Complete habitat mapping of the recovery zones and digitize these data so they are available for use by the CEA.
- 423. Establish a threshold of minimal habitat values to be maintained within each CEA unit in order to ensure that sufficient habitat is available to support a viable population.
- 424. Apply CEA to each BMU to ensure habitat quality is sufficient for maintenance of a viable population and to monitor changes in habitat as a result of human activity.
- 425. Report activities successfully used to manage habitat.
- 426. Develop a conservation strategy to outline habitat and population monitoring that will continue in force after recovery.

5. Manage populations and habitats.

- 51. Manage populations and habitats prior to recovery on Federal lands.
 - 511. Refine procedures for aversively conditioning or relocating nuisance grizzly bears.
 - 512. Develop and test procedures to relocate bears between areas for demographic or genetic purposes.
 - 513. Apply Interagency Grizzly Bear Management Guidelines prior to recovery that maintain or enhance habitats.
- 52. Manage populations and habitats on private and State lands by developing and applying management guidelines prior to recovery that maintain or enhance habitats. Recommend land use activities compatible with grizzly bear requirements for space and habitat; minimize the potential for human/bear conflicts.
- 53. Develop and implement a conservation strategy for each ecosystem that outlines all habitat and population regulatory mechanisms in force after recovery.

6. Develop and initiate appropriate information and education programs.

- 61. Evaluate public attitudes toward grizzly bear management, habitat protection and maintenance, and use restrictions, mitigating measures, relocation of bears, hunting, nuisance bear control actions, and habitat acquisition or easement.

62. Formulate ways to improve public attitudes about grizzly bears and the grizzly bear recovery program.
7. Implement the recovery plan through appointment of a Recovery Coordinator.
8. Revise appropriate Federal and State regulations to reflect current situations and initiate international cooperation.
 81. Revise Federal and State regulations as necessary.
 82. Coordinate and exchange information and expertise with Canada and other countries concerning bear research and management.

APPENDIX 3

Implementation schedule Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993)

Priorities are assigned as follows:

Priority 1 – all actions that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

Priority 2 – an action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

Priority 3 – all other actions necessary to provide for full recovery of the species

Key to Acronyms used in the Implementation schedule

BLM – Bureau of Land Management

FS – Forest Service

ES – Fish and Wildlife Service, Ecological Services

IGBC – All IGBC Agencies (Fish and Wildlife Service, Forest Service, Bureau of Indian Affairs, Bureau of Land Management, Idaho Department of Fish and Game, Montana Department of Fish, Wildlife and Parks, National Park Service, Washington Department of Wildlife, Wyoming Department of Fish and Game, British Columbia, Alberta and Tribes)

LE – Fish and Wildlife Service, Law Enforcement

NPS – National Park Service

U - Universities

Grizzly Bear Recovery Plan Implementation Schedule

Priority	Task	Task Description	Task Duration	Responsible Party			Cost Estimates (in \$1,000's)			Comments	
				Region	FWS		Other Agency	FY - 01	FY - 02		FY - 03
					Program						
1	11	Determine population monitoring methods and criteria	Complete	6,1	ES	IGBC					
1	112	Establish reporting procedures and systems to gather and evaluate information on populations	Complete	6,1	ES	IGBC					
1	12	Determine current population conditions	Ongoing	6,1	ES	IGBC	300	300	300		
1	131	Identify human sources of direct mortality	Complete	6,1	ES	IGBC					
1	132	Identify sources of indirect mortality	Complete	6,1	ES	IGBC					
1	133	Determine effects of human activities	Ongoing	6,1	ES	IGBC	60	60	60		
1	2111	Coordinate State, Federal, Tribal law enforcement	Ongoing	6,1	ES	IGBC	10	10	10		
1	2112	Reduce mistaken-identity killing by big game and black bear hunters	Ongoing	6,1	LE, ES	IGBC	15	15	15		
1	2113	Investigate and prosecute illegal killing of grizzly bears	Ongoing	6,1	LE	IGBC	-	-	-	Included in Tasks 21 and 2111	

APPENDIX 4

Overview of national brown bear management plans

Country	Title of the plan	Status	Based on	In charge	
				Development	Implementation
Austria	Management plan for brown bears in Austria	In implementation	Based on the recommendations for Habitats Directive	Brown Bear Life Working team Forum of interests Project advisory board	WWF Austria Coordination Unit Bear advocates Bear emergency team
	Action plan for brown bears in Austria	In implementation phase	Bern Convention	As above	As above
Croatia	Croatian brown bear management plan	In completing phase	Bern Convention	Committee of 8 (experts from the Ministry of Agricult.&Forestry and the Ministry of Culture) NGOS and public	
Estonia	Large Carnivore Control and Management Plan	In implementation phase	Bern Convention	Working group (officials, hunters, scientists) led by the Ministry of Environment NGOs	Ministry of Environment and its working group
Finland	Management plan for large carnivores in Finland	In implementation phase	Finnish Nature Conservation Act (1096/1996)	Large Carnivore Working Group (Ministry of Agricul.&Forestry, Ministry of Env., Finnish Game and Fisheries Institute Predator Division, hunters, NGOs)	Large Carnivore Working Group (Ministry of Agricul.&Forestry, Ministry of Env., Finnish Game and Fisheries Institute Predator Division, hunters, NGOs)
France	Status of brown bear in France and perspectives	In completing phase	National legislation Habitats Directive	Ministry of Environment	Ministry of Environment NGOs
Greece	Greek Brown Bear Action Plan	In implementation phase	Bern Convention	Ministry of Environment National Parks NGOs	Ministry of Environment National Parks NGOs

Brown Bear Management Plans in Europe and the continental United States

Italy	WWF action plan for the bear in the Alps	Developed, but without implementation		WWF Italy	
	Action plan for the Abruzzo population	In preparation	Bern Convention	Ministry of Environment	Ministry of Environment Local administrators
	Action plan for the Alpine population	Development starts in next future	Bern Convention	Regional and provincial administrations	
Latvia	Action Plan for the Conservation of Brown Bear (<i>Ursus arctos</i>) in Latvia	In implementation phase	National Species and Habitat Protection Law	Governmental organizations	Governmental organizations
Norway	Brown Bear Management Plan for Norway	In implementation phase		Directorate of Nature Management Institute for Research (NINA) Several bear scientists	Directorate of Nature Management Institute for Research (NINA) Several bear scientists
	Brown Bear Action plans (on country level)	In implementation phase		County government administrations (environmental protection offices)	County government administrations (environmental protection offices)
Slovakia	Brown Bear Management Plan for Slovakia	Developed on annual basis	Bern Convention	Ministry of Environment Ministry of Agriculture	Ministry of Environment Ministry of Agriculture Hunter associations State Nature Conservancy of Slovak Republic
Slovenia	Brown Bear (<i>Ursus arctos</i>) management strategy in Slovenia	In implementation phase		Government of the Republic of Slovenia	Government of the Republic of Slovenia
	Action Plan for brown bear (<i>Ursus arctos</i>) management in Slovenia	In implementation phase	Slovenia's Brown Bear Strategy Bern Convention	Ministry of Agriculture, Forestry and Food	Government of the Republic of Slovenia
Spain	Estrategia Nacional para la Conservación del Oso Pardo Cantábrico	In implementation phase	National Catalogue of Threatened Species Declaration on the Conservation of Natural Areas and of Wild Flora and Fauna	Regional governments Ministry of Environment Several brown bear experts	Regional governments Ministry of Environment Several brown bear experts
	Regional recovery plans (Galicia, Castilla y Leon, Asturias and Cantabria)	In implementation phase	Declaration on the Conservation of Natural Areas and of Wild Flora and Fauna	Regional governments Several brown bear experts	Regional governments Several brown bear experts
Sweden	Action plan for the protection of Brown Bear (<i>Ursus arctos</i>)	In preparation	Swedish Predator Policy	Swedish Environmental Protection Agency Public	

Brown Bear Management Plans in Europe and the continental United States

	Regional brown bear management plans	In preparation	Swedish Predator Policy	County administrative boards	
United States	Grizzly Bear Recovery Plan	In implementation phase	Endangered Species Act of 1973	U.S. Forest and U.S. Fish and Wildlife Services Bear scientists Interagency Grizzly Bear Study Team Public involvement	U.S. Forest and U.S. Fish and Wildlife Services Bear scientists Interagency Grizzly Bear Study Team
	Final Strategy for the Grizzly Bear in the Yellowstone Ecosystem	In implementation phase	Endangered Species Act of 1973	National Park Service U.S. Forest and U.S. Fish and Wildlife Services Interagency Grizzly Bear Study Team Idaho Department of Fish and Game Montana Fish, Wildlife & Parks Wyoming Department of Game and Fish Public involvement	National Park Service U.S. Forest and U.S. Fish and Wildlife Services Interagency Grizzly Bear Study Team Idaho Department of Fish and Game Montana Fish, Wildlife & Parks Wyoming Department of Game and Fish
	State of Idaho Yellowstone Grizzly Bear Management Plan	In implementation phase	Governors' Roundtable (Governors from Idaho, Montana and Wyoming)	Delisting Advisory Team IDFG, U.S. Fish and Wildlife Service, Office of Species Conservation, regional bear experts, members of the public.	Delisting Advisory Team
	Grizzly Bear Management Plan for Southwestern Montana	In implementation phase	Governors' Roundtable (Governors from Idaho, Montana and Wyoming)	Montana Fish, Wildlife and Parks Meetings with affected agencies, governments, interested persons and groups	Montana Fish, Wildlife and Parks