LIFE DINALP BEAR

Population level management and conservation of brown bears in northern Dinaric Mountains and the Alps

LIFE13 NAT/SI/000550

Guidelines for Common Management of Brown Bear in the Alpine and Northern Dinaric Region

Action A.6: Elaboration of Common guidelines for population-level brown bear management and management plans for Slovenia and Croatia

August, 2017

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Background

Conservation management of brown bear population (and of other large carnivore species) is challenging in human dominated and fragmented landscapes. Dinaric and Alpine brown bear populations extend through several countries and are fragmented by many types of administrative borders, which cause differences in the management of this species. Primary goal of this document is to bring the management of brown bear in Alpine and Northern Dinaric region to a holistic transboundary (population-level) approach.

This document was produced as one of the most important outputs of the LIFE DINALP BEAR project (LIFE13 NAT/SI/000550). Initially, the guidelines were intended to connect and synchronize brown bear management practices in four EU countries participating in the LIFE DINALP BEAR project - Slovenia, Croatia, Austria, and Italy - with limited spatial extension in each country participating in the project. Afterwards, the idea for development of the transboundary brown bear management strategy was shared on the meeting of the Large Carnivores, Wild Ungulates and Society (WISO) Platform, which operates as a working group of the Alpine Convention. Since many synergies with the goals of WISO Platform were found, the transboundary cooperation was extended also to other areas and countries in the Alpine area, like Germany, Switzerland, Liechtenstein, and France. Furthermore, experts from Bosnia and Hercegovina were invited to participate in the development of this document. Altogether, more than 40 bear experts and representatives of public bodies from 8 countries were included in the development of these guidelines.

The ministries in charge for the environment and nature protection in countries participating in the LIFE DINALP BEAR project expressed their support to creation of this document and its implementation in respective national brown bear management practice. These guidelines will serve as the basis for national brown bear management documents (e.g. strategies, management plans, action plans) in the Alpine and Northern Dinaric region.

Guidelines follow the EU-level documents covering large carnivore management, especially Habitats' directive, *Key actions for Large Carnivore populations in Europe* and *Guidelines for Population Level Management Plans for Large Carnivores*.

Purpose of the document

The purpose of this document is to define key actions, which need to be carried out in the Northern Dinaric and Alpine region, to enable and improve the conservation status and management, especially at the population level, of the brown bear in the Alpine and Northern Dinaric Region for the next 10 years. The actions need to be carried out by the national and regional/local authorities responsible for bear management and stakeholders. Upon necessity, this list of actions[1] will be updated depending on future developments of the brown bear populations and their management.

Management units and goals

The objectives and actions in this document are specified for two separate management units (MU) with different bear population status, geographical, environmental and socio-economic factors, and overall goals for managing brown bear population.

Management units are:

- Alpine management unit (MU): Includes the area of entire Alps including the reproductive unit in Autonomous Province of Trento.
- Northern Dinaric management unit (MU): Includes the geographic area of Northern Dinaric Mountains, where regular reproduction of bear is present.

[1] The list of actions found in the chapter *Concrete actions which need to be undertaken* was produced by the LIFE DINALP BEAR project team on the project group meeting in October 2015

Figure 1: Alpine and Northern Dinaric management units for brown bear.

	Alpine MU	Northern Dinaric MU
Title of the action	**MU goals**	
Objective(s)	Conservation and range expansion of bears. Improvement/maintenance of coexistence. To ensure connection with the Dinaric population. Improved collaboration of the countries at the population level management.	Conservation and active management of this part of the Dinaric-Pindos population. To ensure connection with the Alpine population. Improvement/maintenance of coexistence. Improved collaboration of the countries at the population level management.
Expected result(s)	Viable population in Central Alps. Coexistence between bears and humans ensured. Reproduction of bears in wider Alpine area. Connection between Dinaric-Pindos and Alpine population ensured.	Viable population in Northern Dinaric mountains as part of the Dinaric-Pindos population. Connection between Dinaric-Pindos and Alpine population ensured. Coexistence between bears and humans ensured.
Responsible for implementation	Management authorities of each involved country.	Management authorities of each involved country.

Concrete actions that need to be undertaken

Legal background

All involved countries which are members of European Union are obliged to follow European laws and ratifications of international directives: Convention on the Conservation of European Wildlife and Natural Habitats - Bern Convention (1979), Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES (1973), Council Directive 92/43/EEC, Conservation of Natural Habitats and Wild Fauna and Flora - Habitats Directive (1992). All involved countries which are not EU members also ratified both Bern- and CITES Convention.

Brown bear in EU is strictly protected species and is governed by different authority sectors. In addition to this background management for large carnivore is set in strategic documents (such as key actions for large carnivores in Europe and guidelines for population level management…). These documents give a good background for bear management but the need for more regional and concrete guidelines has been recognized. This document gives and specifies guidelines what actions need to be carried out for successful implementation of bear management in N Dinaric Mountains and in the Alps.

Actions listed within this document need to be implemented into national strategic documents. In the process of preparation of national strategic documents, it has to be considered which changes in the national legislation are needed for successful implementation of the guidelines. It is recommended to carry out gap analysis.

	Alpine MU	Northern Dinaric MU
Title of the action	**National legislation**	
Objective(s)	Securing the legal background for long-term conservation and coexistence of bears and humans. To remove obstacles for interventions and enable fast response when needed.	Securing the legal background for long-term conservation and coexistence of bears and humans. To remove obstacles for interventions and enable fast response when needed.
Description of the activities	(1) Ensure continuation and implementation of accepted strategic documents. (2) Ensure legal background for work of Bear intervention groups (BIG) and damage inspectors in the whole area. (3) Ensure legal background for protection of livestock and other human property. (4) Ensure legal background for proper ''bear proof'' waste management. (5) Enable quick removal of conflict individuals. (6) Ensure legal background for bear watching in national/regional legislation. (7) Ensure proper legal background for efficient response of police in poaching cases.	(1) Ensure continuation and implementation of accepted strategic documents. (2) Ensure legal background for work of Bear intervention groups (BIG) and damage inspectors in the whole area. (3) Ensure legal background for protection of livestock and other human property. (4) Ensure legal background for proper ''bear proof'' waste management. (5) Enable quick removal of conflict individuals. (6) Ensure legal background for bear watching in national/regional legislation. (7) Implement the CITES regulation in whole area of northern Dinaric mountains. (8) Ensure legal background for strictly regulated regular removal of bears. (9) Ensure proper legal background for efficient response of police in poaching cases.
Expected result(s)	The legal background for expert based management of bears established.	The legal background for expert based management of bears established.
Responsible for implementation	Responsible authorities of each involved country.	Responsible authorities of each involved country.
Actions that need to be implemented beforehand	Gap analysis of existing legislation and potential improvements. Workshops with all involved stakeholders, managers and legislators.	Gap analysis of existing legislation and potential improvements. Workshops with all involved stakeholders, managers and legislators.
Means of assessing success	Ensured short response time for all permits. Established damage compensation system, that prevents misuses. Established system for subsidizing prevention measures. Ensured bear proof waste management.	Ensured response time for all permits. Established damage compensation system, that prevents misuses. Established system for subsidizing prevention measures. Ensured bear proof waste management. Implementation of CITES regulation in BiH. Ensured regular sustainable culling of bears.

Population monitoring and research

The goal of population monitoring is to have a sound, data-based understanding of the bear population status and dynamics over all MUs, as well as a detailed record of all bear mortality and certain types of bear-human interactions. Monitoring also needs to have a temporal component, so that not only status, but also the changes of this status are documented. The critical issue is that data are comparable, collected consistently across all involved countries and regions in predictable, regular intervals, and readily available to all responsible authorities in each involved country/region through a common mechanism, preferably internet-based. Monitoring goals differ between MUs.

Alpine MU

In Alpine MU it is sensible to monitor every bear as an individual. The numbers of bears are low (around 50), so each individual is of high conservation value for maintenance of the bear population in the area.

The bears in Alpine MU are isolated at the moment and are subject to genetic degradation because of accumulation of inbreeding due to the low number of effective population size. This means that genetic status of this MU should be vigorously monitored both for evidence of natural gene flow from Dinaric Mountains, as well as at the genetic level, for possible signs that an augmentation is needed to forestall a population collapse.

In the Alpine MU, we should keep track of the re-colonization process and focus on how it is perceived by the local residents. A major obstacle for bear conservation in this MU are negative attitudes of general public and critical stakeholder groups that can hinder or even prevent bear population expansion. This makes monitoring of human attitudes towards bears possibly the most important monitoring activity in this area.

Northern Dinaric MU

The Northern Dinaric MU faces a different reality. While bears in this area are in no immediate threat of extinction in the foreseeable future, a challenge remains in their coexistence with humans. Since bears there are regularly culled, effective conservation and management require reliable data on abundance and sex/age structure of the population. Abundance estimates using the best available methods (currently noninvasive genetic sampling and mark-recapture modelling) should be assessed in regular intervals to detect any trends that could worsen the conservation status. Effects of cull structure (sex/age of animals) on sex ratio, age structure and genetic characteristics of the population should also be monitored and this knowledge included in management praxis. On the other hand, humans, as the most important component of bear habitat, should also be monitored by having their attitudes towards bears and bear management surveyed in regular intervals. Extremely negative attitudes could spell disaster for bears, and there are numerous benefits for managers having up-to-date human dimension data at their disposal, as this allows them to react in a timely manner.

Different types of data are required for a comprehensive, holistic monitoring:

- **Population Status Data**: this includes all data required to assess population status in each MU and at the level of population.
    - **Mortality data**, including causes of mortality, measurements of dead bears and collection of genetic / health status samples. Should be routinely collected as mortalities occur in all MUs.
    - **Abundance and population expansion / connectivity data** – mark-recapture analysis using noninvasive genetic sampling. This should be executed in pre-set intervals, but at least once per bear generation time (~5 years) in areas with constant bear presence and reproduction (Northern Dinaric MU). In areas that bears are colonizing (Alpine MU) noninvasive samples should be collected and analysed constantly to keep track of bears that appear in that area, monitoring population expansion and connectivity between MUs. Since bears are still rare in the Alpine MU (with exception of the Trentino), such a task should be feasible from both the financial and the workload viewpoints.

- Collection and analysis of noninvasive samples should ideally be done in tight collaboration and coordination among the responsible authorities in all relevant countries/regions to obtain simultaneous abundance estimates at the level of a MU, since this increases both cost-effectiveness and quality of results.
- **Genetic status data** – tissue samples collected from detected mortality as well as noninvasive genetic samples (if of sufficient quality) should be used to estimate the effective (genetic) population size and genetic diversity of the bear population in each MU. This is especially important for the Alpine MU (Trentino) to forestall possible genetic deterioration.
- **Health data** – a post-mortem examination by a qualified wildlife veterinarian should be done for all bears that died from causes other than severe trauma (i.e., traffic accident, gunshot wound). A representative sample of all other dead bears should be checked for important pathogens, especially highly contagious diseases and zoonoses. If any morphological abnormalities or indications of disease are detected in any dead bear, regardless of the cause of death, these should be reported to a qualified wildlife veterinarian that will determine further actions. All these cases should be recorded.

- **Human Interaction Data:** Bears in this area live in a landscape relatively densely populated and intensively shaped by humans, which makes humans the most important component of bear habitat. Understanding human attitudes towards bears and the drivers shaping these attitudes is of foremost importance for human-bear coexistence, and ultimately for bear conservation.
  - **Human-caused mortality data**: all detected human-caused mortality should be recorded. Particular attention should be awarded to all intervention removals, with a detailed record of why the intervention was necessary, how the decision was reached and the outcome of intervention. Documented poaching cases should also be recorded and analysed in detail, and criminally persecuted whenever possible.
  - **Interventions by Bear Intervention Groups (BIG)** – in interventions (both, lethal and non-lethal) detailed record should be kept. An effort should be made to understand how the bear behaviour or situation that led to an intervention developed in each specific case. If aversive conditioning is carried out effectiveness of taken measures should be monitored. This may lead to a broader understanding of the underlying mechanisms that cause development of bear-related problems that require interventions.
  - **Damages done by bears** – a detailed record should be kept of all bear-caused damages, including their geo-location, a precise description of circumstances and damaged property, and the amount of compensation paid. If possible bear's ID should be identified.
  - **Human attitudes towards bears** – coordinated surveys of public attitudes towards bears, both general public as well as specific stakeholder groups, should be done in regular intervals. They should provide monitoring of how public attitudes towards bears and bear management change through time, and how they were changed by specific events or management / conservation activities.

	Alpine MU	Northern Dinaric MU
Title of the action	**Population monitoring**	
Objective(s)	1) Knowledge available about population status and trend, e.g. abundance, sex and age structure, reproduction, survival, dispersal and distribution. 2) Knowledge of genetic and health status, with special attention to zoonoses, inbreeding and effective population size. 3) Knowledge of frequency and distribution of bear-human interaction data. 4) Knowledge about human attitudes towards bears, bear management and trend. 5) Coordinated monitoring activities within Alpine MU and between Alpine and Dinaric MU.	1) Knowledge available about population status and trend, e.g. abundance, sex and age structure, reproduction, survival, dispersal and distribution. 2) Knowledge of genetic and health status, with special attention to zoonoses and effective population size. 3) Knowledge of frequency and distribution of bear-human interaction data. 4) Knowledge about human attitudes towards bears, bear management and trend. 5) Coordinated monitoring activities within Alpine MU and between Alpine and Dinaric MU.
Description of the activities	1.1 Monitoring of abundance, sex and age structure in regular intervals where reproduction occurs (at least once per generation time – every 5 years). 1.2 Sampling of non-invasive genetic material monitors (1) survival of individual bears, (2) origin of individual bears and dispersal distances, and (3) parentage analyses. 1.3 Monitoring of changes in distribution. 2.1 Monitoring of bear genetic status. 2.2 Routine examination of all detected bear mortality not caused by severe trauma by a qualified wildlife veterinarian. Regular examinations of a sample of other bear mortality for specific pathogens. 3.1 Monitoring of bear-human interactions. 4.1 Standardized (across MU) structured questionnaire with questions about attitudes towards bears and bear management applied to a representative sample of the general public and the most important stakeholder groups. 5.1 Organization of a regular population-level forum where monitoring activities are coordinated and discussed. 5.2 Sharing of monitoring data through the joint online database.	1.1 Monitoring of abundance, sex and age structure in regular intervals (genetic monitoring at least once per generation time – every 5 years) coordinated between all countries within the MU. 1.2 Monitoring of changes in distribution. 1.3 Continued collection of observational data through stakeholder engagement (“bear counts” done by hunters), coordination/adaptation at the population level (see point 5). 2.1 Monitoring of bear genetic status. 2.2 Routine examination of all detected bear mortality not caused by severe trauma by a qualified wildlife veterinarian. Regular examinations of a sample of other bear mortality for specific pathogens (coordinated at the population level in point 5). 2.3 Monitoring of changes in effective population size using genetic data from mortality samples and age data (tooth cross-sections). 3.1 Monitoring of bear-human interactions. 4.1 Standardized (across countries and MUs) structured questionnaire with questions about attitudes towards bears and bear management applied to a representative sample of the general public and the most important stakeholder groups. 5.1 Organization of a regular population-level forum where monitoring activities are coordinated and discussed; routine sharing of monitoring data through the joint online database. 5.2 Organization of an expert group that includes members of all three countries in the MU, dedicated to capacity building in Bosnia and Herzegovina, with the final aim to make bear monitoring in that country comparable to bear monitoring in Slovenia and Croatia. 5.3 Sharing of monitoring data through the joint online database.

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	Alpine MU	Northern Dinaric MU
Title of the action	**Population monitoring**	
Expected result(s)	1.1 High-quality monitoring data required for population-level conservation and management of bears on abundance and age-sex structure available in 5-year intervals. 1.2 Data available of survival, reproduction, dispersal and origin of individuals, parentage between bears, as well as connectivity between the Alpine and Dinaric MU. 1.3 Early detection of distributional changes (expansions, contractions). 2.1 Early detection of genetic problems (inbreeding, small effective population size). 2.2. Early detection of pathogens and zoonoses. 3.1 Data on human-bear interactions that likely affect public attitudes towards bears and bear management. 4.1 Detection of changes in attitudes towards bears and bear management as well as understanding of driving forces. 5.1 Coordinated monitoring at population level. Monitoring data comparable at population level. Common data interpretation. 5.2 Local as well as population-level data available to the competent authorities.	1.1 High-quality monitoring data (population status data: abundance, distribution, sex structure, genetic status) required for population-level conservation and management of bears on abundance and age-sex structure available in 5-year intervals. 1.2 Early detection of distributional changes (expansions, contractions). 1.3 Data available – distribution of females, reproductive characteristics, trend of population abundance; stakeholder engagement (hunters). 2.1 Early detection of genetic problems (inbreeding, small effective population size). 2.2 Early detection of pathogens and zoonoses (health status). 2.3 Data on changes in effective population size and age structure of the population. 3.1 Data on human-bear interactions that likely affect public attitudes towards bears and bear management. 4.1 Detection of changes in public attitudes towards bears and bear management that will allow managers to act before strong negative attitudes could be developed as well as to understand driving forces. 5.1 Coordinated monitoring at population level. Monitoring data comparable at population level. Common data interpretation. 5.2 Increased capacity (human resources) in Bosnia and Herzegovina to conduct monitoring at the same level as other countries. 5.3 Local as well as population-level data available to the competent authorities.
Responsible for implementation	(1-4) Organisations responsible for implementation of bear population monitoring. (5) Management authorities of each involved country.	(1-4) Management authorities and other organisations responsible for implementation of bear population monitoring. (5) Management authorities of each involved country.
Actions that need to be implemented beforehand.	Activity 5 (population-level coordination forum) needs to be implemented before other activities.	Activity 5 (population-level coordination forum) needs to be implemented before other activities.
Means of assessing success	- Amount of collected data in the joint database. - Reports for each activity produced.	- Amount of collected data in the joint database. - Reports for each activity produced.

Research recommendations

Monitoring requires tested, routine methods that allow consistent tracking of critical parameters for conservation and management through time. Research, on the other hand, is typically a one-shot activity that tries to answer an important, well defined question or provide a new method to be included in monitoring and/or management.

While funding for monitoring should be provided through responsible national authorities as a part of regular budget planning to ensure consistent data collection through time, research is typically project funded. While sources of funding might in some cases be the same (e.g. if a management authority requires answers to a specific critical question that may not have been covered through monitoring), the research activities should also tap into specific research funds provided at national, EU or other levels.

An important issue from the perspective of population level management and conservation is to identify research priorities, and clearly state research recommendations for each MU and the population as a whole. This would provide a foundation for applied researchers to prepare project applications for appropriate funding instruments, and basis for the relevant management authorities in each MU to plan for and provide funding or co-funding instruments.

Applied research priorities will often differ between MUs and will change through time. Instead of spelling them out in this document, it makes more sense to provide mechanisms that will enable defining them in regular, predictable cycles through involvement of all parties.

	Alpine MU	Northern Dinaric MU
Title of the action	**Defining Research Priorities and Providing Research Recommendations**	
Objective(s)	- To define and rate in order of priority applied research activities required for bear management and conservation, for both MUs. To clearly spell them out as "Applied Research Recommendations". - To identify possible sources of (co)funding and motivate national authorities to prepare appropriate (co)funding instruments.	
Description of the activities	Organization of a regular (every 3 years) population-level forum where research priorities and available/possible funding are coordinated and discussed.	
Expected result(s)	- Clearly defined, prioritized and coordinated Applied Research Recommendations needed for management and conservation of bears in both MUs. - Proposal of funding or co-funding instruments at national levels. - Basis for national authorities to organize project calls to address the research requirements. - Support for researchers to prepare project applications for general national or EU funding instruments.	
Responsible for implementation	Management authorities of each involved country rotating. EU funding. Research institutions.	
Actions that need to be implemented beforehand	-Identify and establish research teams within or in partnership with the relevant research institutions. For some specialities the capacity building should be considered. Some studies can be performed on the international level and some samples can be analysed abroad.	
Means of assessing success	Number of defined applied research priorities that got funded in each 3-year period between the meetings. Number of reports produced, number of scientific papers published.	

Stakeholder dialogue and involvement

A stakeholder is a person, group or organization that has an interest or concern in bear management. Stakeholders can influence or be influenced by bear management decisions, objectives and policies. Some examples of key stakeholders in bear management are local public, farmers, beekeepers, hunters, environmentalists, experts, forest workers, recreationalists, tourists, urban public, etc.

Not all stakeholders are equal. Urban public, for example, are entitled to fair attention as a constituency for which bear population is also managed, but they are not entitled to the same consideration as for example the local (rural) public from within bear range that face the challenges and opportunities of coexisting with bears on a daily basis. Stakeholders can also differ with respect from which country they are coming. For example, public attitude research results suggests that hunters in Slovenia hold a considerably different set of values than those from Austria. Characteristics of a stakeholder can also change over time, especially following highly emotional bear-related events. Such events can change not only internal characteristics of specific stakeholders, but can also affect the dynamics within the entire network of stakeholders (for example, when trust or credibility get compromised). All this diversity needs to be considered when planning stakeholder dialogue and involvement processes.

Different types of stakeholder involvement are often visualized as a continuum (Figure 2) starting from simple information sharing with increasing intensity of stakeholder involvement towards transferring complete decision-making power to stakeholders. Types of public participation with lower level of stakeholder involvement (such as information sharing) can target large numbers of people, such as general public, while those with higher level of involvement usually target only selected representatives of stakeholder organisations.

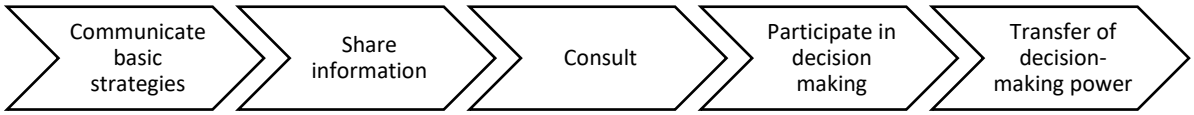

Figure 2: Visualisation of the public participation continuum. The intensity of stakeholder engagement increases from left to the right.

In brown bear management a combination of all types of stakeholder involvement, wisely selected for the local context and management objectives, should be used. It is important to carefully take into account stakeholder characteristics, their expectations and even stakeholders network dynamics when planning either communication campaigns or more involved stakeholder dialogue such as public consultations. Specific tools and techniques are many, and selection of the ones to use will vary depending on the objectives and available resources. When possible, it is advisable to use opportunities to actively involve stakeholders in implementation of management measures, thus

additionally increasing the sense of common responsibilities and ownership among the stakeholders. Opinions and expectations of the stakeholders should be periodically checked through social sciences research in order to evaluate the success of implemented actions and plan suitable ones for the future. At the population level, stakeholders should be encouraged to meet and discuss brown bear management related issues together, e.g. through establishment of a population level stakeholder forum.

	Alpine MU	Northern Dinaric MU
Title of the action	**Stakeholder dialogue and involvement**	
Objective(s)	- To ensure stakeholders' commitment to long-term recovery and conservation of brown bear population in coexistence with humans. - To improve collaboration, dialogue, relationships, and trust amongst relevant stakeholder groups by integrating them into the process of planning. - To integrate relevant stakeholders into the implementation of actions.	- To ensure stakeholders' commitment to long-term conservation of brown bear population in coexistence with humans. - To improve collaboration, dialogue, relationships and trust amongst relevant stakeholder groups by integrating them into the process of planning. - To involve relevant stakeholders into the implementation of actions.
Description of the activities	(1) Organisation of regular (every 3 years) population-level stakeholder forum for exchange of experience and ideas among stakeholders. (2) Yearly consultations with the key stakeholder organisations at the MU level. (3) Authorities delegate representatives to coordinate work with stakeholders planned under (1) and (2). (4) Active involvement of the stakeholders in planning and implementation of the management at the national level. (5) Active involvement of the stakeholders in population monitoring.	(1) Organisation of regular (every 3 years) population-level stakeholder forum for exchange of experiences and ideas among stakeholders. (2) Yearly consultations with the key stakeholder organisations at the MU level. (3) Authorities delegate representatives to coordinate work with stakeholders planned under (1), (2) and (5). (4) Active involvement of the stakeholders in planning and implementation of the management (namely population monitoring) at the national level. (5) Regular information exchange with the non-EU neighbours (Bosnia and Herzegovina and Switzerland).
Expected result(s)	Concerns and ideas of key stakeholder groups such as hunters, farmers, local communities and environmentalists provide regular input to planning and implementation of the coordinated population level management.	Concerns and ideas of key stakeholder groups such as hunters, farmers, local communities and environmentalists provide regular input to planning and implementation of the coordinated population level management.
Responsible for implementation	(1), (2) Management authorities of each involved country rotating. (3) Management authorities of each involved country. (4) Management authorities and other organisations responsible for implementation of bear population monitoring.	(1), (2) Management authorities of each involved country rotating. (3) Management authorities of each involved country. (4) Management authorities and other organisations responsible for implementation of bear population monitoring.
Actions that need to be implemented beforehand	- Standardisation of monitoring methods (comparable population monitoring data).	- Standardisation of the monitoring methods (comparable population monitoring data).
Means of assessing success	- Number of events organized. - Level of satisfaction among stakeholder groups. - Avoiding unwanted population decrease - Structures for active involvement of stakeholders implemented	- Number of events organized. - Number of actively involved stakeholders. - Level of satisfaction among stakeholder groups. - Structures for active involvement of stakeholders implemented

Conflict management

Conflict management is one of the most important aspects of brown bear conservation and management. Presence of brown bears in human-dominated landscape often leads to conflicts between human and bears which decrease human acceptance of bears. Since conflict bears are commonly removed from the population (legally or illegally), low human acceptance of bears is considered as one of the main threats to bears worldwide.

Conflicts usually arise due to the damages that bears can cause to human property, e.g. eating crops, killing domestic animals and damaging objects when searching for food or due to the fear of bears causing harm to people. Bears very rarely attack people, but this still happens and not just "problem bears" are involved. Such events cause fear among some people. The public in Alpine MU seems to be more sensitive to such issue, because of the lost tradition of coexistence with bears.

Best way to deal with the human-bear conflicts is to prevent the occurrence of so-called "problem" bears, which are food-conditioned and/or human-habituated bears. Usually small number of bears in the population turn into problem bears, but they cause majority of all human-bear conflicts. Bears are opportunistic omnivores and therefore can be easily attracted to anthropogenic food sources, e.g. garbage, crops and domestic animals and that often triggers food-conditioned behaviour. With proper protection of human property, it is therefore possible to reduce the occurrence of problem bears. Although it is not always possible to protect human property against bear damage, there are several measures for preventing bear access to anthropogenic food sources. Most important are:

- Prevention of bear access to human waste (bear-friendly waste management, use of bear-resistant garbage cans and compost bins, ban of organic waste dumps, e.g. slaughter dumps, accessible to bears);
- Protection of crops and domestic animals, including beehives (use of electric fences, night enclosures, shepherds and livestock guarding dogs).

At least as important as the measures themselves is active promotion of good practices and education of people living in (or visiting) bear areas about: a) bear biology and ecology, b) suitable behaviour when entering bear areas, c) bear related conflicts that might occur and d) practices/measures that make coexistence of human and bear easier.

Damages caused by bears sometimes occur despite proper protection of human property. For such cases damage compensation system has to be established (damages can be paid by regional/state authorities or local hunting associations), which should still promote prevention measures and include regulations to prevent fraud. If such damages occur repeatedly (e.g. bear learns how to jump over working electric net fence), it is often best to remove such bear – if this is reasonable according to the conservation status of bear population.

Translocation of conflict bears is generally not reasonable and not recommended. Since there are no large habitat patches without human settlements in Central Europe, translocated conflict bears usually remain conflict, continue approaching human settlements and in many cases return to their original home range.

	Alpine MU	Northern Dinaric MU
Title of the action	**Conflict management**	
Objective(s)	To reduce human-bear conflicts and improve acceptance of bears among main stakeholders.	To reduce human-bear conflicts and improve acceptance of bears among main stakeholders.
Description of the activities	(1) Active promotion of good practices and education for a) preventing bears from accessing anthropogenic food sources and b) to reduce risk of attacks. (2) Applying damage prevention measures (LGDs, electric nets, bear resistant compost/garbage bins etc.). (3) Damage compensation for damages caused by bears despite reasonable use of protection measures. (4) Removal of bears (see next chapter: *Removal of individuals from population*).	(1) Active promotion of good practices and education for a) preventing bears from accessing anthropogenic food sources and b) to reduce risk of attacks. (2) Applying damage prevention measures (LGDs, electric nets, bear resistant compost/garbage bins etc.). (3) Damage compensation for damages caused by bears despite reasonable use of protection measures. (4) Removal of bears (see next chapter: *Removal of individuals from population*).
Expected result(s)	Local people coexist with bears. Improved acceptance of bears among key stakeholders.	Maintained or improved acceptance of bears among key stakeholders.
Responsible for implementation	(1), (2), (3), (4) Management authorities of each involved country (ministries, local authorities, environment agencies, agricultural consultants). (1), (3) Damage inspectors. (1), (4) Bear intervention groups.	(1), (2), (3), (4) Management authorities of each involved country (ministries, environment agencies, agricultural consultants). (1), (3) Damage inspectors. (1), (4) Bear intervention groups. (3), (4) Hunting organisations.
Actions that need to be implemented beforehand	Renovation or implementation of strategic documents (if needed).	Renovation of strategic documents.
Means of assessing success	Level of acceptance of bears among stakeholder groups / public. Number of damage cases. Number of bear intervention groups' interventions. Number of damage prevention sets subsidised, bear resistant garbage cans distributed etc.	Level of acceptance of bears among stakeholder groups / public. Number of damage cases. Number of bear intervention groups' interventions. Number of damage prevention sets subsidised, bear resistant garbage cans distributed etc.

Removal of individuals from population

Removal of bears from population is in practice often highly controversial issue, especially in the areas where hunting of bears is not a traditional practice. However, in some situations removal of bear is the only reasonable management decision. Removal of bears from the population can be done lethally (e.g. by shooting) or non-lethally (e.g. bear is immobilized and put into the captivity), although the effect on the bear population is identical in both cases.

Bears, which are recommended to be removed from population in any situation, are those representing serious threat to people or property (for details see Appendix 1) or other particularly problematic bears. If no action is taken, both of these kinds of bears can cause rapid drop of human acceptance towards bears (locally or on wider-scale) and therefore jeopardize the efforts for human-bear coexistence and long-term conservation of bear population. Normally specially trained Bear Intervention Groups (BIGs) are responsible for removal of dangerous and other problematic bears, but also help of the local hunters can be used.

Often it is not easy to determine which bear is potentially dangerous or particularly problematic. Also the value of an individual bear for the conservation of the population is not the same in different areas, but depends on the conservation status of the local population. For example, it is not the same to remove a bear in Slovenia or Croatia, where it is one among hundreds and where regular culling is taking place anyway and management removals are included in the culling quotas, or at the expanding front of the population somewhere in the Alps. In situations, where managers/BIGs have do decide how to react on the occurrence of dangerous or problematic bears, *Guidelines for bear intervention groups* (Appendix 1) should be followed.

In countries with stable and viable bear population (e.g. Slovenia, Croatia) culling of bears is done regularly to maintain the brown bear population in densities that are still tolerable for local people. Such culling should never jeopardize the conservation status of bear population and should allow bears to spread through important corridors connecting Dinaric Mountains with Alps. Culling should be carried out following annual culling quotas, that are based on expert opinions and especially on regular monitoring results. The precautionary principle should always be used when determining culling quotas and hunting should be done in a way to minimize unwanted side effects as much as possible.

	Alpine MU	Northern Dinaric MU
Title of the action	**Removal of individuals**	
Objective(s)	(1) To remove bears (lethal or non-lethal), which potentially represent threat to people. (2) To reduce damages and conflicts related to bears.	(1) To remove bears, which potentially represent threat to people. (2) To reduce damages and conflicts related to bears. (3) To maintain the density of brown bear population on a level that is tolerable for local people.
Description of the activities	(1) Potentially dangerous bears and (2) particularly problematic bears (e.g. repeatedly causing damages on large cattle) are removed by bear intervention groups. Dangerous and problematic bear behaviour is determined in *Guidelines for bear intervention groups* (Appendix 1).	(1) Potentially dangerous bears and (2) particularly problematic bears (e.g. repeatedly causing damages on large cattle) are removed by bear intervention groups and counted into annual culling quotas. Dangerous and problematic bear behaviour is determined in *Guidelines for bear intervention groups* (Appendix 1). (2), (3) Culling quotas are planned every year separately by the governmental bodies. Quotas are based on results of monitoring and consider the precautionary principle.
Expected result(s)	Improved human safety and improved acceptance of bears among local people. Reduced illegal killing (e. g., poisoning).	Improved human safety and maintained / improved acceptance of bears among local people. Reduced illegal killing (e. g., poisoning).
Responsible for implementation	Management authorities of each involved country (ministries, public services). Bear intervention groups.	Management authorities of each involved country (ministries, public services). (1), (2) Bear intervention groups. (2), (3) Hunting organisations.
Actions that need to be implemented beforehand	Renovation of strategic documents when needed or expired.	Renovation of strategic documents when needed or expired.
Means of assessing success	Level of satisfaction among stakeholder groups (acceptance of bears). Number of illegally killed bears.	Level of satisfaction among stakeholder groups (acceptance of bears). Number of illegally killed bears.

Functional connectivity and habitat quality including food availability

Suitable and connected habitat is the basic requirement of each species. Suitable habitat provides food and shelter, and cover against predators. Habitat connectivity is especially important for species roaming on large scales as brown bears do. Such species often experience human made barriers and destroyed habitats in our modern cultural landscapes.

In this chapter we explore (1) all key brown bear habitats and the corridors connecting them and (2) discuss measures of prevention of fragmentation and destruction of these habitats and corridors and make proposals on mitigation of existing barriers.

1. Key brown bear habitats and corridors connecting them

Habitat suitability in Europe agree very much on general patterns in habitat selection: bears prefer forest and avoid open areas and human settlements as well as the vicinity of dominant human infrastructures. Additionally, they seem to prefer an altitude somewhere in the middle between the bottom of the valleys and the natural timberline. This probably is not a direct function of altitude, but a compromise between the avoidance of disturbances by humans next to the valley bottoms and the decreasing food availability with increasing altitude.

Dinaric Mountains

Studies have shown that the large forested areas in the Dinaric Mountains are of high suitability for bears. Beech trees are very common and provide high energetic food in autumn in mast years. Other natural food sources for bears are plenty, but may differ from region to region. Worthwhile to mention are ants (and wasps) which provide an important protein source during summer that is available almost everywhere. Additionally, baiting and feeding of ungulates with corn is very common and also bears profit from this practice. In some countries, there is also intensive artificial feeding primarily targeting bears.

Coming from south to north, the highway Zagreb-Rijeka is the first major barrier bears face. This barrier can be crossed by bears quite well due to tunnels, bridges and one green bridge, but poses an additional risk for mortality of bears by traffic accidents. Further north the border between Croatia and Slovenia is partly fenced against refugees. At the moment the fence covers only 10% of the border in suitable bear habitat, but dependent on future measures deriving from refugee and asylum policy this barrier might become stronger.

The next and most important barrier south of the Alps is the highway and railway Ljubljana-Postojna (and further to Trieste). These two just cut through the main bear core area in the south of Slovenia and the best corridor to the Alps. The importance of the barrier has been shown by following many radio-collared bears and also by the genetic studies. Especially in the area of Rakek and Unec this barrier is the major source of mortality (stronger than hunting). The area northwest of this highway (Nanos, Hrušica and Trnovski gozd) forms the most suitable corridor between the Dinaric Mountains and the Alps. East of Ljubljana there is another corridor connecting both mountain ranges, but bears have to cross very fragmented and quite flat areas before they reach the Alps. Both corridors have been used by bears.

Alps

Naturally, the Alps are divided into northern and southern part by the main ridge of the Central Alps. This is a natural barrier and can be crossed by bears on many places, but hinder them by vast areas of rocks and glaciers without much vegetation. Beside the central part, the Alps provide very good habitat, especially in the Northeast. Bears in this area (of a former introduced and later extirpated population) have shown one of the highest reproductions ever found in brown bears in the wild worldwide. As a general pattern, in the Eastern Alps the North is less fragmented by unforested agricultural areas as the South, but both areas show contiguous suitable habitat for bears. There is one large area of destroyed habitat, i.e. the "Klagenfurter Becken" in southern Carinthia. This is full of settlements and disturbances by humans are too frequent for bears to settle in permanently. But bears have shown to be able to cross this area.

The Alps are crossed by many highways and railways, but due to the rough terrain they usually have a lot of tunnels and bridges and do not form significant barriers. But there are two exceptions: The Inn valley (Inntal) and the Adige valley (Val d´Adige/Etschtal). Both valleys are wide and the valley bottoms are more or less unforested and used for settlements and agriculture. Additionally, highways and railways follow these valleys. The Inn valley is located in the north (Tirol, Austria) and represents a major barrier from Landeck downstream to the northern edge of the Alps in Bavaria (Germany). Although it separates only a small piece of suitable habitat from the rest of the Alps and is far away from the next bear range, the bear JJ1 alias "Bruno" from the Trentino population demonstrated that we also have to take into account this valley (JJ1 crossed it twice). However, at the moment it is more of a barrier for other species (e.g. ungulates) than for bears.

The Adige valley between Meran/Merano and the southern edge of the Alps near Verona divides the Central Italian Alps into two halves. West of this valley there is the only reproducing bear population in the Alps. Male bears have shown to be able to cross this valley and to expand to the east. Because of the close location to the Trentino bear population and the gene flow between the MUs, this barrier needs much attention.

The area east of this valley (regions of Veneto and Friuli Venezia Giulia) is not a classical corridor rather than a large suitable area that acts at the moment as corridor between the bear populations in Trentino and Slovenia.

2. Prevention of fragmentation and destruction and proposals on mitigation Corridors

The corridor east of Ljubljana leads through very fragmented areas. Since a significant defragmentation with removals of settlements and reforestations on a large scale is unlikely, its functionality for the future is questionable. The corridor to the northwest, however, is well intact and connects the Dinaric Mountains directly with the Alps. Here the barrier effect of the highway Ljubljana-Postojna is the biggest obstacle.

The corridor functionality of the alpine areas of the regions of Veneto and Friuli Venezia Giulia needs attention. At the moment, habitat connectivity is good and the conflict potential with humans due to certain land-use practices is low. People are leaving this area, and the forest comes back on unused meadows and other open areas. However, any change like increasing subsidies for sheep husbandry should be evaluated with regard to bear conservation.

Barriers

At the highway Zagreb-Rijeka many measures reducing the barrier effect have already been taken or are implemented in the current LIFE DINALP BEAR Project. The border fence between Slovenia and Croatia forms a new obstacle, but probably does not have big effect on wildlife crossings at the moment. But a further extension of this fence would be negative for habitat connectivity in this region. A major concern, however, is the highway Ljubljana Postojna. Measures need to be undertaken to reduce the effect of these barriers.

The two big valleys in the eastern Alps (Inn valley and Adige valley) are strong barriers. Most important here seems to develop further land-use planning not only in terms of e.g. expansion of settlements and designation of industrial areas, but also in terms of increasing the permeability of these barriers for wildlife. One way could be to reforest corridors of a few hundred meters width through these valleys that can be used by all forest-preferring species. These corridors have to be placed on locations, where animals do not have to cross the highway and railway (e.g. where a bridge crosses the river).

In total, the Dinaric Mountains and the Alps provide large suitable areas for brown bears and these areas are mostly still connected. However, barriers exist already and should be mitigated for easier movements of brown bears and other wildlife species as well.

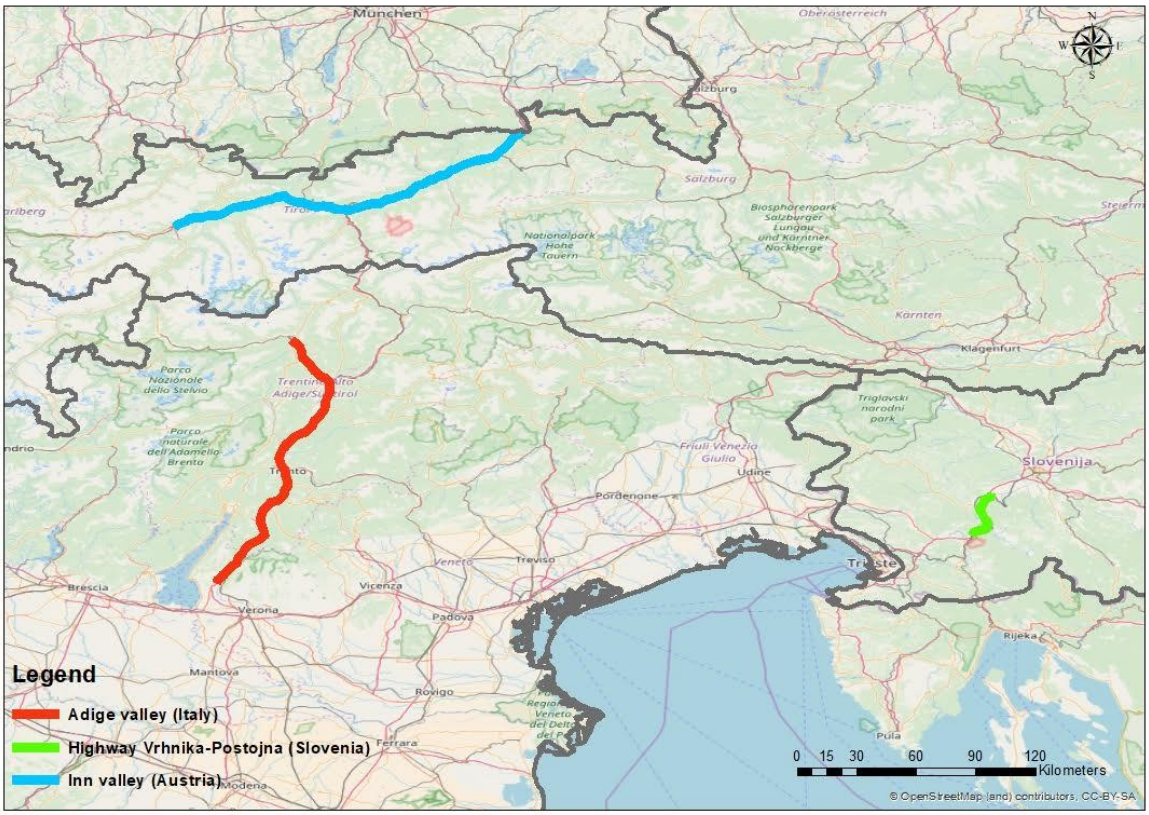

Figure 2: Three significant barriers in the Alpine and Northern Dinaric area, where connectivity needs to be improved.

	Alpine MU	Northern Dinaric MU
Title of the action	**Functional connectivity and Habitat quality including food availability**	
Objective(s)	To preserve bear habitat quality and its functional connectivity. To improve habitat connectivity where needed.	To preserve bear habitat quality and its functional connectivity. To improve habitat connectivity where needed.
Description of the activities	(1) Integration of awareness about bear habitat and its connectivity into spatial planning processes (education, workshops, guidebooks etc.) (2) Conservation of the appropriate bear habitats and corridors connecting habitat patches. (3) Determination of the most suitable micro locations and type of mitigation measures to be implemented for the reduction of the barrier effect in Inn valley and Adige valley. (4) Construction of the mitigation measures (green bridges, reforested corridors etc.) mentioned in (3). (5) Evaluation of effectiveness of the mitigation measures.	(1) Integration of awareness about bear habitat and its connectivity into spatial planning processes (education, workshops, guidebooks etc.) (2) Conservation of the appropriate bear habitats and corridors connecting habitat patches. (3) Determination of the most suitable micro locations for green bridges needed to be constructed for the reduction of the barrier effect of Ljubljana-Postojna highway and railroad. (4) Construction of the green bridges (at least 2) across the Ljubljana-Postojna highway and railroad. (5) Evaluation of effectiveness of the green bridges. (6) Mitigation of the barrier effects of the border fence between Slovenia and Croatia and evaluation of the effectiveness of mitigation measures.
Expected result(s)	Preserved quality of the bear habitats and its functional connectivity. Improved habitat connectivity in Inn valley and Adige valley. Maintenance or preservation of the corridors implemented into strategic documents.	Preserved quality of the bear habitats and its functional connectivity. Improved habitat connectivity between the Dinaric Mountains and the Alps. Maintenance or preservation of the corridors implemented into strategic documents.
Responsible for implementation	(1, 2) Spatial planning and nature conservation authorities of each involved country. (3, 5) Nature conservation authorities, wildlife management authorities (ministries, public services) of each involved country, wildlife research institutions. (4) Traffic and infrastructure authorities, nature conservation authorities of each involved country, motorway companies, EU funding.	(1, 2) Spatial planning and nature conservation authorities of each involved country. (3, 5) Slovenian nature conservation authorities, wildlife management authorities (ministries, public services), wildlife research institutions. (4) Slovenian traffic and infrastructure authorities, nature conservation authorities and motorway company, EU funding. (6) Slovenian Ministry of the interior, nature conservation authorities, wildlife management authorities.
Actions that need to be implemented beforehand	Renovation of strategic documents when needed or expired.	Renovation of strategic documents when needed or expired.
Means of assessing success	Number of functional wildlife corridors and bear habitat area preserved. Inn valley barrier effect successfully mitigated. Adige valley barrier effect successfully mitigated.	Number of functional wildlife corridors and bear habitat area preserved. Ljubljana-Postojna highway and railroad barrier effect successfully mitigated. Borderline between Slovenia and Croatia remains permeable for wildlife. Number of bears that successfully migrated from the Dinaric Mountains to the Alps.

Governance and cross – sectorial coordination

The establishment and implementation of sound management plans require an active involvement of different stakeholders at different levels: local, regional, national and international. To establish officially recognized "Brown bear population level Management plan" within all countries that share the same population, cross-sectorial coordination as well as coordination among different governance levels is of most importance.

The coordination among different governance levels has to be led at regional (some countries), national and international level. Different European countries have different intrinsic conformation with different authority powers on regional and national level. In some countries (e.g. Austria) regional official bodies have a larger degree of autonomy in decision making when it is about brown bear management, as they have in others (e.g. Slovenia), where decisions are made on national level and implemented locally.

Moreover, these Guidelines aim to establish strong management directions for population level management regarding regional or/and national cross-sectorial collaboration among various involved stakeholders . Most important sectors which should be included in cross-sectorial collaboration are: environment, nature protection, agriculture, forestry, hunting, tourism and infrastructure. The developed recommendations need to be incorporated by responsible authorities into national Management and Action plans and regional decision making to meet the goals of different MU and brown bear populations per se.

On international level, different sectors should be represented by the responsible brown bear management authorities of each country (e.g. ministries, public services). The WISO Platform of the Alpine Convention showed to be the appropriate platform for cross-national coordination - for the Alpine MU. Unfortunately, the Dinaric area still lacks the appropriate international platform, which should eventually be established.

Representatives from all responsible authorities on regional, national and international level as well as from different sectors should regularly organize workshops and discuss important issues for sound decision making to overarch present gaps in current brown bear management collaboration. First step should be exchange of information and coordination in decision making process. The long-term goal is the development of common population management decisions brought by authorities from different sectors from all involved countries. EU countries should also develop cross-sectorial collaboration as well as collaboration across different governance levels with their non-EU neighbors, primarily Croatia with Bosnia and Herzegovina.

After the expiration of the present guidelines in 2028, a cross-sectorial coordination and governance group could meet and prepare a revised version of the guidelines, based on the last developments and new policies.

	Alpine MU	Northern Dinaric MU
Title of the action	**Cross – sectorial coordination**	
Objective(s)	- To establish or continue sound collaboration between different national and regional sectors within each country. -To continue dialogue at international level to ensure long-term recovery and sustainability of the brown bear population. - To improve cross–sectorial dialogue, trust and particularly coordination regarding making and implementation of relevant managing decisions.	- To establish or continue sound collaboration between different national and regional sectors within each country. -To establish dialog on international level to ensure long-term sustainability of brown bear population. - To improve cross–sectorial dialogue, trust and particularly coordination regarding making and implementation of relevant managing decisions.
Description of the activities	(1) Identify a list of all relevant sectors. (2) Organization of regular cross-sectorial meetings/workshops to exchange experiences and discuss challenges on regional and/or national level (at least once per year). (3) Each sector delegates a person to coordinate work with other sectors planned under (2). (4) Organization of regular meetings/workshops with national management authorities at least once per year to exchange experiences. Discuss challenges at international level (e.g. through the WISO Platform of the Alpine Convention). (5) Each MU/country delegates a person to coordinate work with other MUs/countries planned under (3). (6) Active involvement of all responsible sectors in planning and implementation of relevant managing decisions.	(1) Identify list of all relevant sectors. (2) Organization of regular cross-sectorial meetings/workshops to exchange experiences and discuss challenges on regional and/or national level (at least once per year). (3) Each sector delegates a person to coordinate work with other sectors planned under (2). (4) Organization of regular meetings/workshops with national management authorities at least once per year to exchange experiences and discuss challenges on international level ("Dinaric Convention" should be established, which can serve as a platform for meetings). (5) Each MU/country delegates a person to coordinate work with other MUs/countries planned under (3). (6) Active involvement of all responsible sectors in planning and implementation of relevant managing decisions.
Expected result(s)	Relevant interest groups involved into bear management. Relevant sectors in decision-making and managing collaborating in well-coordinated population level management.	Relevant interest groups involved into bear management. Relevant sectors in decision-making and managing collaborating in well-coordinated population level management.
Responsible for implementation	(1), (3), (4) Management authorities of each involved country. (2) Management authorities of each involved country rotating. (5) Management authorities and other responsible organisations	(1), (3), (4) Management authorities of each involved country. (2) Management authorities of each involved country rotating. (5) Management authorities and other responsible organisations
Actions that need to be implemented beforehand	- Other actions in this document should be implemented along with this action.	- Other actions in this document should be implemented along with this action.
Means of assessing success	- Number of events organized. - Number of well-coordinated decisions made. - Level of satisfaction among stakeholder groups.	- Number of events organized. - Number of well-coordinated decisions made. - Level of satisfaction among stakeholder groups.

Artificial feeding

Artificial feeding of wildlife is a controversial measure, practiced in many areas worldwide. It serves different purposes and targets various species. In the LIFE DINALP BEAR project area, artificial feeding of bears aims to (i) divert the bears from the settlements, decrease livestock depredation and reduce other human-bear conflicts (so-called diversionary feeding), (ii) improve the quality and makes easier bear culling, simplify bear monitoring and capture for research (GPS telemetry), translocations or reintroductions (baiting), and (iii) facilitate ecotourism offers (bear watching). In some countries, e.g. Slovenia and Croatia, some artificial feeding sites are primarily maintained for bears, however bears also regularly visit the feeding sites that primarily target other species, especially wild boar and red deer (such as in Slovenia, Croatia, Austria and parts of Italy). Different feeding sites thus offer very high food accessibility for bears, which is the case in the majority of the LIFE DINALP BEAR project area (Slovenia, Croatia, Austria). On the other hand, the practice is completely absent from the Western Alpine part of the project area.

Artificial feeding is an expensive measure with complex social background and many possible direct and indirect effects on target and non-target species and is therefore receiving increasing attention. The topic has been intensively studied in the Dinaric part of the project area. Regarding local and international research on the effects of artificial feeding on bear ecology and management, we highlight the following findings, relevant for the project area:

(i.) Artificial feeding can strongly affect the annual, seasonal and diurnal bear activity and habitat use.

(ii.) Food from the feeding sites can represent an important part of the bear's diet. For example, in Slovenia, it represents approximately 1/3 of the total annual energy intake. The proportion is higher in the areas where artificial feeding is more intensive. Moreover, the proportion can reach up to 100% during the winter and strongly increases (locally up to 2/3 of the total energy intake) during the autumn hyperphagia in the years with a lack of natural food, especially beech mast.

(iii.) The accessibility and the quantity of food available at the feeding sites make this food source very predictable in time and space. Thus, feeding at the artificial feeding sites is a very energy efficient for bears. For example, bears in Slovenia gain several times more energy with the same unit of time at the feeding site than in the nature.

(iv.) Intensive artificial feeding possibly increases bear fertility and affects the population density, the species abundance and mortality. The documented natality and population density of bears in Slovenia is among the highest in the world, however despite the high densities there is no evident density-dependent effects on the species fitness.

(v.) In areas with bear management goals of maintaining the bear density at approximately constant levels, high natality calls for intensive bear hunting mortality.

(vi.) An intensive artificial feeding that impacts the bear diet, habitat selection, fertility and mortality can lead to a form of semi-domestication of the species.

(vii.) Annual (including winter) artificial feeding of the wildlife most probably increases the period of seasonal bear activity; i.e. shortens the winter denning period.

(viii.) Artificial feeding is buffering the otherwise typical fluctuations in temporal and spatial food availability which reflects on the temporal and spatial dynamics of the species' vitality.

Artificial feeding comes with many unwanted and wanted effects depending on several different factors.

(1.) Diversionary feeding may especially in the autumn (but possibly at any time of the year) decrease the frequency of bears coming to settlements and thus decreases human-bear conflict. However, this is only true when the distance of the feeding sites from the settlements is large enough; if the feeding sites are too close to the settlements, they may have a contrary effect on this type of bear behaviour.

(2.) Intensive feeding may increase fertility and thus the need to manage the species with culling, leads to a form of semi-domestication of the species. From the dogmatic ecological/biological point of view, such effects are by definition negative. On the other hand, pragmatically, the option of increased culling may be viewed upon as positive by some interest groups (hunters) and negative by the others (some parts of the wider public).

(3.) In Slovenia and Croatia, bear hunting is only allowed from the high stands at the feeding sites. In this way, hunting is more precise and selective (e.g. it's easier to estimate weight category and there's less chance to cull a female with cubs), safer for hunters (in Scandinavia where bears are hunted from the ground, wounded bears are often the cause of bear attacks) and is more "humane" for the bears (there's less chance to miss and only wound a bear). Artificial feeding also positively affects trophy hunting, as it offers an easier alternative to perform and organize the trophy hunt.

(4.) Artificial feeding eases bear monitoring and research, e.g. systematic bear counts at the permanent network of feeding places in Slovenia, capture for GPS telemetry, and provides an easy opportunity for ecotourism (bear watching). However, poorly designed artificial feeding sites may increase bear habituation to human and consequently cause serious issues. Therefore, feeding must function in a way that a bear does not connect feeding/food with human presence (better to use automatic feeders than manually deliver the food; prevent "hand feeding").

(5.) Intensive feeding was reported to shorten the period of winter denning of the bears, which potentially increases the chance of bear-human interactions (and conflicts). However, a comparative study (comparing the situations in Slovenia and Trentino) did not show there would be relatively more human-bear conflict in the areas with artificial feeding than in the areas without it during winter.

(6.) By impacting the local and global bear densities and movement/activity rates artificial feeding also affects the frequency of intra- and interspecific interactions of brown bears, e.g. it increases bear kleptoparasitism on lynx prey.

(7.) Concentrating of bears at feeding sites likely increases intra-specific interactions among the bears as well as transmission of pathogens.

(8.) Dietary change caused by artificial feeding may reduce ecological roles performed by bears (e.g. seed dispersion).

(9.) Several non-target carnivores, omnivores and herbivores frequently use food at feeding sites intended for bears. This may lead to changes in the community structure and functioning with further cascading consequences that are difficult to predict.

It is important to adjust artificial feeding so that the desirable effects are increased and the undesirable effects decreased:

- Artificial feeding sites in the vicinity of the human settlements are undesirable because they increase the number of conflicts.
- All types of artificial feeding that cause strong/easy habituation of bears on human are prohibited.
- If artificial feeding might be implemented in areas with no artificial feeding practice (e.g. parts of Italy) it should be evaluated if (and under what conditions) introduction of artificial feeding is sensible, and also who, where, when in with what intensity and form (for what purpose) could be performed in case of decision to introduce the measure. Main reasons for potential reintroduction of the practice could potentially be conflict mitigation and bear watching.
- In the areas with artificial feeding in place, we need to adjust the practice on the long term to reduce the negative impacts. We need to decrease the intensity, but maintain the positive effects of feeding, such as diversion from human settlements, monitoring and baiting. The feeding should be gradually reduced/stopped during the winter (and/or feeding should be limited to use of food avoided by bears).
- In the areas with intensive artificial feeding, bears are currently strongly conditioned to the food from the feeding sites. Thus, all changes in the artificial feeding should be implemented gradually and regular monitoring of changes ensured.
- While optimizing the artificial feeding practice, the effects on and the artificial feeding of other species need to be considered as well.

	Alpine MU	Northern Dinaric MU
Title of the action	**Supplementary feeding**	
Objective(s)	- Adaptation of the artificial feeding practice, with the most desirable and the least undesirable effects on the long-term brown bear conservation in the region. - In case that artificial feeding is considered to be implemented, pros and cons of introduction of the measure should be evaluated.	- Adaptation of the artificial feeding practice, with the most desirable and the least undesirable effects on the long-term brown bear conservation in the region.
Description of the activities	*Areas with artificial feeding:* 1.) Determine the pros and cons of the current feeding regime. 2.) Determine the situation, areas, seasons and objectives for each form of artificial feeding. 3.) Adjust the practice and set the short and long-term goals of the feeding regime (abandonment of feeding in long term is also a possible option). 4.) Enforce prescribed regulations in practice. *Areas without artificial feeding in case it is considered to be implemented:* 5.) Determine the pros and cons of the proposed feeding regime. 6.) Determine the situation, areas and objectives, where introduction of the artificial feeding would be meaningful measure; choose the optimal regime and the suitable personnel to implement each objective. 7.) A possible introduction of the artificial feeding with certain restrictions (minimum distance from closest settlement, allowed quantity and types of fodder, allowed seasons of feeding).	1.) Determine the pros and cons of the current feeding regime. 2.) Determine the situation, areas, seasons and objectives for each form of artificial feeding. 3.) Feeding should not be performed in vicinity of human settlements. 4.) Adjust the practice (e.g., feeding should be gradually reduced/stopped during the winter). 5.) Enforce prescribed regulations in practice.
Expected result(s)	1.) and 5.) pros and cons of the feeding in the region recognized. 2.) and 6.) optimal methods for feeding identified. 3.) practice optimized. 7.) considering the criteria from 5.) and 6.) possible introduction of the artificial feeding.	1.) Pros and cons of the feeding recognized. 2.) Optimal methods for feeding identified and necessary adjustments for optimization implemented. 3, 4.) Practice optimized.
Responsible for implementation	1.), 2.), 5.) and 6.) wildlife managers in collaboration with the experts for recognizing the impacts of artificial feeding 3.) and 7.) Management authorities	1.) in 2.) wildlife managers in collaboration with the experts for recognizing the impacts of artificial feeding. 3.) Management authorities.
Actions that need to be implemented beforehand	- Application of a harmonised artificial feeding site register for all sites (sites that target bears and sites that cover other wildlife). Register must include the information about the purpose and the regime of the feeding.	- Application of a harmonised artificial feeding site register for all sites (sites that target bears and sites that cover other wildlife). Register must include the information about the purpose and the regime of the feeding.
Means of assessing success	The least difference between the current situation on the field and the recognized optimal state. Level of support of proposed modifications of the measure of main interest group.	The least difference between the current situation on the field and the recognized optimal state; Level of support of proposed modifications of the measure of main interest group.

Poaching control

Illegal killing of bears and other large carnivores is widespread across Europe. In some bear populations poaching may be a threat for the population – either in small and endangered ones or in ones without regulated and implemented management.

Police investigations rarely dedicate significant resources and very few cases are successfully prosecuted. Killing is both by shooting (where large carnivores are directly targeted) and poisoning or trapping/snaring (where large carnivores may not always be primary target). In some areas bears are also chased away from wild boar feeding sites by shotgun which can also cause bear mortality. Motivation for illegal killing in Europe seems to be linked to low tolerance and social protest rather than for economic gain.

There is a need to raise awareness of the extent of the problem among law enforcement agencies, to improve understanding of motives underlying poaching, to encourage a greater investment of resources into investigation, and to exchange best practices in investigation techniques.

The goal is to raise consciousness that illegal killing of large carnivores is a serious crime and that society expects its laws to be upheld such that political disagreements about large carnivore management and conservation are conducted through legal channels.

	Alpine MU	Northern Dinaric MU
Title of the action	**Poaching control**	
Objective(s)	- To remove one of the threats for long-term survival of the local bear population. - To determine the main causes/motivations for poaching. WHY somebody poaches: due to (a) damages on human property, (b) economic interest, (c) fear/self-defence, or (c) something else including the above combinations. - To develop the network of information sources to obtain the data on most of poaching cases. - To develop the state of mind where poaching is socially unacceptable. - To encourage the enforcement of legal acts. - To improve the detection of poaching cases.	- To remove one of the threats for long-term survival of the local bear population. - To determine the main causes/motivations for poaching: WHY somebody poaches: due to (a) damages on human property, (b) economic interest, (c) fear/self-defence, or (c) something else including combinations. - To develop the network of information sources to obtain the data on most of poaching cases. - To develop the state of mind where poaching is socially unacceptable. - To encourage the enforcement of legal acts. - To improve the detection of poaching cases.
Description of the activities	(1) Perform the survey (questionnaire) on the stakeholders' opinion on the bear poaching issue: motivations, extends, ways to achieve the positive attitude and to control poaching. (2) Survey the relevant legislation in each country. (3) Organize the initial and then regular (every 3 years) workshops with key stakeholder organisations at the MU level. (4) Organize the information campaign and training for the authorities: - for customs and border officials on CITES and other documents use, - for hunting inspectors and police on the ways of detecting and reporting poaching, - for court and other relevant institutions? to enforce the regulations.	(1) Perform the survey (questionnaire) on the stakeholders opinion on the bear poaching issue: motivations, extends, ways to achieve the positive attitude and to control poaching. (2) Survey the relevant legislation in each country. (3) Organize the initial and then regular (every 3 years) workshops with key stakeholder organisations at the MU level. (4) Organize the information campaign and training to the authorities: - for customs and border officials on CITES and other documents use - for hunting inspectors and police on the ways of detecting and reporting poaching - for court and other relevant to enforce the regulations.
Expected result(s)	The general rate of bear poaching is significantly reduced and does not pose the threat to the population any more. Clear rules to mitigate conflicts including the removal of problem individuals are established, local people are informed and the procedure is implemented. Authorities are aware of their responsibilities and do apply them.	The general rate of bear poaching is significantly reduced and does not pose the threat to the population any more. Clear rules to mitigate conflicts including the removal of problem individuals are established, local people are informed and the procedure is implemented. Authorities are aware of their responsibilities and do apply them.
Responsible for implementation	(1) Management authorities of each involved country (2) Hunting organizations with their inspecting bodies (3) State officials: (a) border control, (b) police, (c) courts.	(1) Management authorities of each involved country (2) Hunting organizations with their inspecting bodies (3) State officials: (a) border control, (b) police, (c) courts.
Actions that need to be implemented beforehand	- The initial steps of this action should start independently of other actions. - At some point the standardisation and implementation of the rules for problem bear management should be implemented.	- The initial steps of this action should start independently of other actions. - At some point the standardisation and implementation of the rules for problem bear management should be implemented.
Means of assessing success	- Number of events organized. - Genetically estimated poaching rate. - The rate of detected/undetected poaching.	- Number of events organized. - Genetically estimated poaching rate. - The rate of detected/undetected poaching.

Appendixes

Appendix 1: Guidelines for bear intervention groups (Černe R., Majić Skrbinšek A., Bartol M., Jonozovič M., Angeli F., Bartol M., Blažič M., Bragalanti N., Groff C., Huber Đ., Jerina K., Krma P., Knauer F., Marinčič T., Molinari P., Molinari-Jobin A., Musil T., Pedrotti L., Rauer G., Reljić S., Sila A., Slijepčević V., Stoffella A., Vilfan M., Vivoda B., Wilson S. 2015. Guidelines for bear intervention groups. Guidelines prepared within A.1 action of the LIFE DINALP BEAR project (LIFE13 NAT/SI/000550): 23 pp.)

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