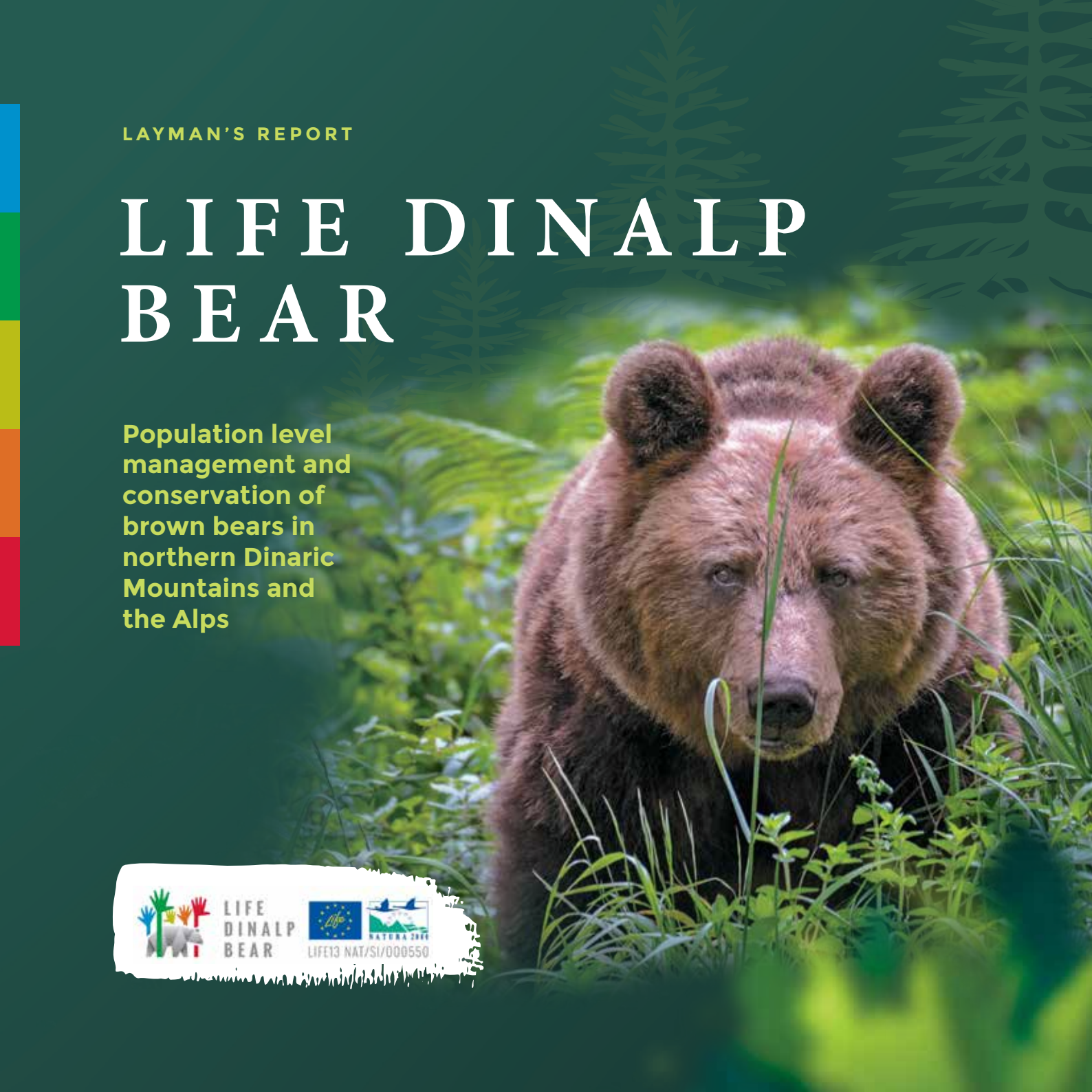
LAYMAN'S REPORT

LIFE DINALP BEAR

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



LIFE DINALP BEAR

LIFE13 NAT/SI/000550

THE PROJECT

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

Acronym: LIFE DINALP BEAR

Reference: LIFE13 NAT/SI/000550

Project time frame: 01/07/2014 – 30/06/2019

Budget: 5,987,478 € (EU financial contribution: 4,149,202 €)

Coordinating beneficiary: Slovenia Forest Service

Partners:

- Autocesta Rijeka - Zagreb d.d., Company for construction and operation of the motorway
- Eurofins ERICo Slovenija d.o.o.
- Research Institute of Wildlife Ecology University of Veterinary Medicine, Vienna
- Faculty of Veterinary Medicine, University of Zagreb
- Provincia autonoma di Trento - Servizio Foreste e fauna
- Progetto Lince Italia
- Regione del Veneto - Direzione Agroambiente, Caccia e Pesca
- University of Ljubljana

Co-financers:

- Ministry of the Environment and Spatial Planning
- Ministry of Agriculture of the Republic of Croatia, Directorate for Forestry, Hunting and Wood Industry
- Lebensministerium, Abteilung II/4: Natur- und Artenschutz, Nationalparks
- Euronatur
- Bernd Thies Foundation

Webpage: www.dinalpbear.eu

Social networks: dinalpbear DinalpBear

PROJECT BACKGROUND

The brown bear is important to the natural and cultural heritage of Europe. Brown bear numbers were severely reduced in a large part Europe in the 19th century. People's attitudes towards this large carnivore are shifting, and there are projects in different parts of Europe that put immense effort into restoring the brown bear population.

In the wider area of the Dinaric Mountains, the brown bear persisted largely due to the availability of habitat and also because of local people's positive attitudes towards bears. Protection and management of such a charismatic species as the brown bear is not easy; public opinion is typically divided, and the public closely follows the details of management decisions.

In the politically fragmented landscape of Europe, one of the most important goals in conservation and brown bear management is transboundary, population-level coordination, which is often difficult to achieve. We tackled this obstacle in Croatia, Slovenia, Austria and Italy through a project targeting the brown bear population in the Northern Dinaric Mountains and South-Eastern Alps.

GOALS & OBJECTIVES

The main goal of the project was to facilitate the transition from local-scale practices to population-level conservation, monitoring and management of brown bear in the project area, while decreasing human-bear conflicts and promoting better coexistence. Three specific objectives were set out to frame the project activities:

1. Establishing a transboundary network of professionals, optimizing monitoring methods, initiating long-term transboundary monitoring and providing data about bears at this level.

2. Defining causes for conflict hot-spots and exploring people's attitudes towards bears, using non-lethal solutions to provide best-practice examples and promoting eco-tourism and education.

3. Understanding the social and physical barriers to expansion of bears to the Alpine region, inducing protection of important corridors, reducing traffic related mortality and increasing acceptability of bears.

CHALLENGES

Bears in the study area belong to Alpine (smaller, more isolated population) and Northern Dinaric (larger, part of the Dinaric-Pindos bear population) populations. However, dispersal between them is limited and the natural recolonization process of the Alpine area remains slow. Habitat fragmentation and low human tolerance of bears in the areas where bears have been absent for decades are slowing down the process. Moreover, management of these bear populations that reflects local-level interests and lacks support from efficient population-level monitoring provides a poor base for long-term conservation of the species. Traffic related mortality, insufficient human-bear conflict mitigation measures and poor understanding of value of brown bear are also threats that are preventing successful natural expansion of bears to the Alps.

The LIFE DINALP BEAR project was designed to tackle these threats step-by-step through a set of planning, conservation and communication activities.

CONFLICT MANAGEMENT

Anthropogenic food sources

The main reason bears approach human settlements and cross highways is to gain **easy access to anthropogenic food sources**. Various protection measures were designed and implemented to reduce human-bear conflicts in areas with the most numerous reported conflicts and traffic induced mortalities. To mitigate one of the main attractants for bears, food remains, **25 bear-proof garbage containers** were installed on sections of the Rijeka-Zagreb motorway. Additionally, **143 bear-proof garbage containers** and **100 compost bins** were installed at different “hot-spots” in Slovenia. Proper use and maintenance of these measures are crucial for their maximum effectiveness. To achieve this, in partnership with local experts, we regularly inspected the use and condition of the measures in the field. This resulted in an effective partnership based on cooperation among local users and project experts, a practice that should be maintained in the future. We received much **positive feedback from local communities** regarding these types of attractant security measures. Since there is great interest in receiving these measures, implementation will continue through the initiative of local communities.

Damage prevention

Damages to human property are one of the most important causes for human-bear conflicts. To reduce these conflicts, several activities were conducted in the field involving two main approaches: electric fencing and the use of livestock guarding dogs (LGDs). **In Slovenia**, we distributed **55 sets of electric fences** to farmers and beekeepers and introduced “intervention sets” - sets of equipment needed to quickly set up effective protection. **In Italy (Veneto region), 120 sets** of electric fences were placed in the field to protect sheep and cattle.

In Slovenia, **five experienced LGD breeders** collaborated in the project with four different breeds. From these **working lines, 20 pups were delivered to new owners**. In Italy, the Autonomous province of Trento provided **51 pups to 30 breeders**. Through the collaboration with breeders, veterinarians and cynology experts, the project guaranteed **expert help** for new owners by ensuring that the livestock guarding dogs were effectively integrated into the new environment.

To test the effectiveness of scare-devices in the field, we applied different types of **electronic repellents** and **electric mats**, with the latter being the only effective approach.

Our activities were strongly **supported by the media**. To inform the public regarding damage prevention, proper behaviour in areas of bear presence and approaches to prevent bears from approaching human settlements, we launched a **special web-site**, available in Slovenian and English language: www.varna-pasa.si.

Spatial planning

Re-colonization of the Eastern Alps through natural expansion by individual bears from the Dinaric population in Slovenia and Croatia is one of the priorities of bear conservation in Europe. **Connectivity between habitat patches** is a critical issue for long-term survival of many wildlife populations, as it directly affects not only its dynamics and chances of long-term survival, but also improves outlooks for population expansion. An inexpensive and effective way to maintain habitat connectivity is to prevent development in small, critical areas that connect large habitat patches. To achieve this it is important to provide scientifically sound data impact assessments (EIA). Hence, one of the challenges for ecologists, infrastructure planners and engineers is to develop adequate tools for the **assessment, prevention and mitigation of the impacts of infrastructure.** However, such assessments must be based on a solid understanding of landscape connectivity for the brown bear, which is what we aimed for. The advice provided in the prepared **"Handbook for integrating the bear habitat suitability and connectivity to spatial planning"** is based upon the accumulated knowledge of a broad range of experts from the participating countries. It remains necessary to adapt and adjust measures to the local context, as well as to the specific needs and possibilities of the location.

Traffic mortality

Highways, roads and railways can have negative impacts on bears and many other species of wildlife. Bears killed by motor vehicles and trains are a significant part of the total documented bear mortality. Additionally, **bear-vehicle collisions** represent an important **risk to drivers and passengers**. Therefore, **mitigation measures** were implemented along the main road Ljubljana – Kočevje (installation of dynamic signs and acoustic deterrents) and along the railway Ljubljana – Pivka (installation of acoustic deterrents) to reduce traffic-related bear mortality in Slovenia.

Roadkill of larger species is effectively reduced by installing **acoustic deterrents** into roadside posts. They are equipped with sensors, which are only triggered by approaching vehicles; when activated, they emit a high frequency sound that deters wildlife from crossing the roadway.

Dynamic road signs are a new way of alerting drivers that wildlife may be present near the roadside. They are called »dynamic«, because they are activated by animals that enter into the dangerous area of the road and intersect the sensor beam. Otherwise these signs do not flash. Radar measurements have **detected a reduction in the speed** of vehicles driving past the activated signs by about 8 km/h.

Bear mortality has decreased on the sections of national roads where such measures have been implemented, on average from 2 road-kills per year to 0,7 and from 3 train-kills to 1,3 on the railways. There were no recorded roadkills of bears on the motorway section, where measures have been implemented.

In Croatia, mitigation measures were implemented on the motorway section Vukova Gorica – Vrbovsko. 30 one way doors were installed within existing fence of the motorway and six jump-out ramps were constructed. An electric fence was installed on twelve selected sections along both sides in total length more than 60 km. The result of these implementations is a noticeable decrease of bear appearance within fenced area of the motorway.

POPULATION SURVEILLANCE

Establishment and optimization of an integrated, population-level surveillance of brown bear conservation status

Monitoring a population's biological characteristics (population size, sex ratio, fecundity/mortality, and spatial extent) and how they change over time is the foundation for science-based conservation and management of any wildlife population. The goal of this action was to start a c**omprehensive, optimized scheme for monitoring the Alpine-Dinaric bear population** that would cover its entire range within the four participating countries.

In autumn 2015, to begin **transboundary genetic monitoring**, we organized highly intensive non-invasive **genetic sampling** over the entire bear range in Slovenia and Croatia, with the help of **over 2500 volunteers** through a citizen-science approach. We estimated that 1363 (1248 – 1522) bears lived in the study area in 2015 (lowest yearly number), 599 (545-655) in Slovenia and 764 (679-893) in Croatia. For Slovenia, where a similar estimate was done in 2007, this was a **41.3% increase in population size**. We also detected an **increase in the number of bears in the expansion area towards the Slovenian Alps**. While the bears there are still scarce, the number of bears west of the Ljubljana–Koper highway more than doubled (from 21 to 48, 129% increase), and more importantly, the **proportion of females increased from 30% to 40%**. However, the range of females remains located in the pre-Alpine areas and is expanding very slowly.

We additionally **genotyped 2022 bears** that were aged using tooth cross-sections. We used this to start monitoring the effective population size (Ne), an index showing both the evolutionary potential of the population and its vulnerability to random genetic change and inbreeding. The most recent estimate for 2014 is Ne = 261.6 (247.5 – 277) – this means that there is n**o danger of inbreeding depression in the population**.

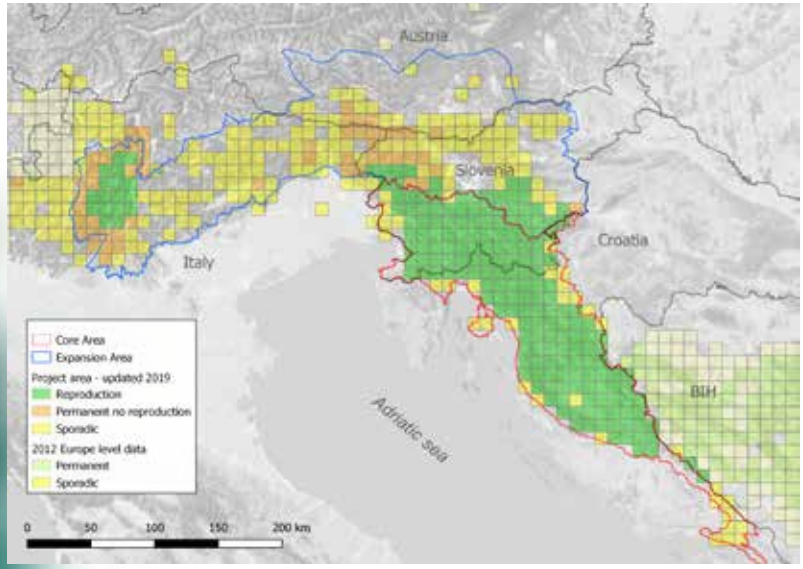
We **improved, extended and harmonized routine monitoring methods**–recording mortality, surveying bear damages and systematically counting bears from permanent counting sites. We surveyed the health status of the population and found no major health issues. We applied several methods to determine reproductive characteristics of the population.

We started producing **annual "Population status reports"**, assembling all current knowledge at the population level. As the final step, we drafted **"Guidelines for transboundary harmonization of brown bear population monitoring"** that will be the basis for future transboundary cooperation. We feel that we considerably increased our understanding of our bear population and laid a solid foundation for long-term, transboundary monitoring of bears in NW Dinaric Mountains and SE Alps.

Brown bear population size and management scenario modelling system

We produced an **Internet-based bear population size and management scenario modelling system** available to managers and researchers. We used the population dynamics model as the mathematical "back-end" to program a population simulation system, which is updated yearly with new empirical data (recorded bear mortality, new population dynamics data etc.). For the user interface front-end, we programmed an Internet-based application that produces model-based estimations of bear population in periods between genetic-based estimates. Even more important, it allows managers to s**imulate different bear mortality scenarios**, simulating actual management decisions and predicting future population dynamics based on proposed management. This allows managers to **better understand possible outcomes** of their **management decisions** (as well as their uncertainty), both within their country and at the transboundary level.

Since this scenario modelling system is the first tool of its kind that we're aware of, **the application has considerable demonstration value**. The **approach can be transferred to other species and/or populations**, it can improve transboundary cooperation and promotes conservation and sustainability in management of our brown bear population.



PROMOTING COEXISTENCE THROUGH BEAR FRIENDLY TOURISM

One of the most important factors for long-term survival of bears is **human acceptance**. Bear-related tourism can improve socio-economic conditions in the local communities, enhancing the value of brown bears as an economic asset. In turn, tolerance for bears may improve if economic benefits result.

However, bear-related tourism activities can also have negative impacts on bears if not managed properly. Therefore, an important project output was generated to provide **clear guidelines for responsible bear tourism practices**. These guidelines provide tourism operators with explicit direction on what should and should not be done. “Discover Dinarics” portal (www.discoverdinarics.org) was established to present best practice bear tourism programs that are not solely based on bear observations, but include experiencing the bear’s habitat, recognizing signs of bear presence, as well as learning about coexistence and local environmental stewardship efforts.

To incentivize and encourage a positive image of the bear within communities, we developed the **“bear friendly label”**, which was awarded to a diverse range of products and services from artisanal souvenirs, tourist programs and accommodation, to food products like honey, jam, meat or milk products. The label **promotes bear friendly practices**, which include effective damage prevention measures, use of bear-proof garbage bins, development of responsible tourism programs and active promotion of bear conservation in local areas. More than **70 bear friendly ambassadors from Slovenia and Croatia** have joined the scheme and close to 90000 pieces of their products were labelled with the bear-friendly sign and actively promoted at international agriculture/food and tourism fairs. Through the label, they can communicate positive stories about bears and the unique heritage of human-bear coexistence in the region.

ARTIFICIAL FEEDING OF BROWN BEAR WITH CARRION

In several European countries, **artificial feeding of brown bears has a deep-rooted tradition** with the main goal of mitigating conflicts, hunting and population monitoring. In Slovenia, bear feeding sites were mainly supplied with maize and livestock carrion. This was based on the assumption that carrion acts as a stronger attractant for bears. In 2004, feeding bears livestock carrion was banned, which led to higher public concern over rising conflict levels which coincided with the ban. Moreover, deep rooted beliefs in the efficacy of artificial feeding seemed to cause people to reduce their use of other protection measures, such as bear-proof compost bins, trash containers and electric fences. However, **no study to date has clearly proved or discarded bear's preference for carrion**, and no study has documented whether access to carrion prevents bear damage.

To test the efficacy of artificial feeding with carrion, we designed a two-year (2016 and 2017) **field experiment**. We selected **22 feeding sites** in the brown bear core area based on local availability of carrion deriving from wild ungulates (remains of animals killed by hunters and traffic mortality). Every feeding site was interchangeably supplied with corn in one year and carrion+corn in the other. The use of carrion feeding was monitored by the use of camera traps. The cameras were set to take a picture in the presence of bears or other animals over a 2 years period.

Altogether we recorded 41,147 images with bears, and 77,453 images with other mammals (18 species) and 40,176 pictures with birds (35 species). On average, the bears used carrion feeding sites 2.0 % of the time and plant-based feeding sites for 1.5 % of the total time. The difference mainly derived during 2017. In 2016, bears used feeding sites generally less frequently than in 2017, which is probably due to lower natural food availability in 2017. Feeding sites were most visited in summer months from 9 to 10 pm.

We conclude that **bears seem to prefer carrion in the years with low natural food availability**. Carrion may be provided when available (e.g. roadkill) and the transport to the feeding site is feasible. Still, artificial feeding remains controversial and should only be practiced when its desirable effects outweigh the unwanted outcomes.

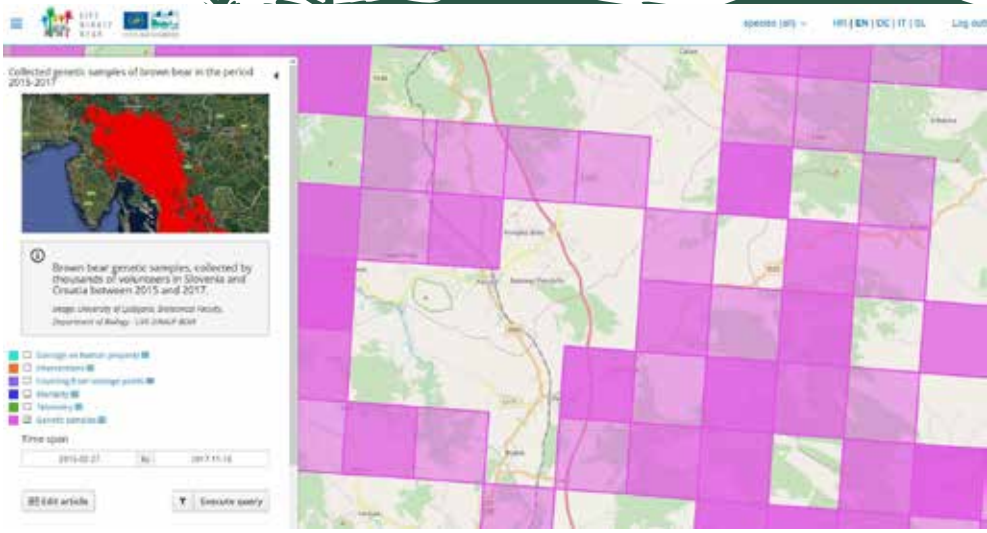
POPULATION LEVEL MANAGEMENT

Strategic documents

One of the fundamental project actions was to prepare **guidelines for population-level management of brown bears**. The guidelines were used in preparation of **national brown bear management plans in Slovenia and Croatia**. The plans were written through a participatory approach, involving several meetings and workshops with stakeholders to ensure the document was well understood and widely accepted. The plans include information about the frequency and extent of optimized population-level monitoring, including genetic sampling, the maintenance of shared databases and the means of transboundary coordination of management measures in the bear core area. Additionally, population-level guidelines were **acknowledged outside the project area**; they were suggested for the revised Italian bear management plan for the Alpine area and in the Austrian bear management plan. Moreover, the document was **extended to the wider Alpine area through the WISO platform**. Thanks to a good communication and close collaboration of Croatia and Bosnia and Herzegovina, the common guidelines were also well-recognized in regions south of the project area.

Intervention groups protocols

It was crucial to improve the knowledge and skills of the **officials working with human-bear conflicts** (wildlife managers, damage inspectors, bear intervention group members). They are the most important source of information for local communities and generally receive trust from local people. We organized a **series of meetings and workshops** where we communicated the revised field-guide for damage inspectors and the **»Guidebook to human carnivore conflict«**, written by **dr. Seth Wilson**, a foreign expert and project collaborator. We **trained the existing intervention groups** and established **two new ones** in Croatia and Italy, which will act under the protocol outlined in **»Guidelines for bear intervention groups«**.



Database

Management of wildlife at the population level is a conservation challenge that aims to overcome disadvantages of species management on the national or even regional level. Fast, reliable and coordinated data exchange among institutions in real-time is a base prerequisite for any transboundary cooperation. Thus, we created **an internet-based monitoring geo-database**, which houses tens **of thousands of brown bear data points**, collected by different institutions in four countries. Databases that efficiently hold bear data at the population-level can contribute to scientific-based management decisions regarding conservation efforts.

We invite you to visit our **geo-portal "MBase"** on https://portal.mbase.org/, where you can browse the preinstalled queries in the portal gallery. You are also encouraged to request your own user account to log-in. In this way, you will be able to peruse the data freely with your own temporal filters, while respecting the data licences indicated.

COMMUNICATION CAMPAIGN FOR HUMAN BEAR COEXISTENCE AND CONSERVATION OF BROWN BEARS

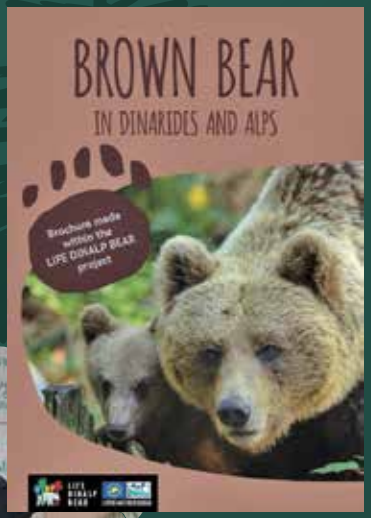
Conservation of nature and protection of endangered species requires a broad approach, especially with large carnivores whose presence can cause problems to local people or can bring benefits to local community and tourism. With species like bears, it is important that people learn how to coexist by understanding both bear and human behaviours. Our public awareness and education campaign has a strong emphasis on reaching out to specific interest groups who share their living space with bears.

Project activities demonstrated human-bear coexistence and mitigation measures and helped define the bear's role in ecosystems and its value for communities. Publications, presentations and workshops for schools in bear areas not only offer an insight into the biology of the species, but also provide a wide range of information on reducing human-bear conflicts and explain how bear-friendly practices can provide additional value for local economies.

At least **11 different publications** were made, but the most widely distributed was a leaflet and posters about how to behave in bear areas and to coexist with bears. These publications present an important awareness raising tool for local inhabitants and visitors to bear areas. Coexistence was also promoted through an **international photo contest** in which photographers presented their visions of coexistence with brown bears. The best 34 photographs were chosen for a **travelling exhibition called "Living with bears"** which was displayed in 10 locations before the photographs were donated to organizations that are working on large carnivore topics.

We conducted **76 workshops** in schools and scouting organizations by using a didactic bear kit which was given to teachers and scout leaders in order to educate children about large carnivores within their regular activities.

In order to reach our key interest groups, we've organized **48 presentations for hunters** through genetic sampling activities and **86 national and local events for farmers, beehive owners and other inhabitants**. By developing numerous expert and popular publications, we believe that after our project ends, the awareness raising campaign about bears will continue within other large carnivore projects and through organizations with which we have built strong partnerships.



The LIFE DINALP BEAR project was based on a multidisciplinary approach, has lasted five years, and involved four countries. As such, its social impacts are far-reaching.

Human-bear conflicts, such as damages that bears cause to human property and agriculture, remain an ongoing threat to the conservation of bears in Europe. One of the main objectives of the project was to address these conflicts in order to maintain and improve human-tolerance of bears.

Human-bear conflicts were the main reason that people have viewed the species as pest that need to be exterminated. Today societal interests surrounding bears are much more diverse, and while bears are can still be a difficult neighbour, they are seen as a symbol of wildness and a valuable pride-enhancer among both local people and visitors to bear areas.

Collaboration with other projects and organisations has allowed us to learn from other bear experts and managers and to share our results and experiences. During the project we have presented our work on 111 occasions, and members

SOCIAL IMPACTS OF THE PROJECT

of our project team have attended an additional 40 workshops or meetings where they actively participated at discussions. We have networked with other LIFE projects on 38 different occasions. Five university theses were completed in collaboration with our project team, and collaboration has been initiated with the "Laboratoire d'Ecologie Alpine" in Grenoble, France.

Our greatest networking achievement was **hosting the 26th International Conference on Bear Research and Management in collaboration with the International Bear Association**. The 5-day conference was held in Ljubljana in September 2018 and was attended by 266 participants from 42 different countries. There were 88 oral presentations and over 90 poster presentations. **Our project team contributed with 14 oral presentations**.

It is ultimately the acceptance of bears by local people that determines the long-term outcome of the species. Surveys of public attitudes on a representative sample of adult inhabitants of bear areas that was done at the beginning of the project and repeated at the end and showed that public support for bear conservation remained high, although respondents from the Alpine part of the project area (Italy and Slovenian Alps) have on average expressed more concerns over potentially problematic human-bear interactions at the end of the project in comparison to the beginning of the project.

The mass media is an important source of nature conservation information globally. A content analysis of how the media has portrayed the LIFE DINALP BEAR project has provided important insights for evaluation of the projects' achievements. During the project, we have recorded and evaluated 3702 media pieces mentioning bears. The analysis revealed that project was mentioned in approximately 10% of media clips. On average, the media portrayed the project in a positive way and media pieces that mentioned the project have consistently portrayed bears in a positive way overall, suggesting that the project was being presented as a solution-provider by the local media.

OUR GREATEST SUCCESSES AND THE WAY FORWARD

We developed a strong partnership among 4 countries that share the same brown bear population. This helped us harmonize and improve our management of bears across international boundaries and cultures with common guidelines. The transfer of this **joint management proposal into national strategic documents and action plans** for these countries is another major achievement of the project, outreached by the expansion to the Alpine area and Bosnia and Hercegovina.

Major advances in new methods of genetic monitoring occurred in this project and enabled us to count bears in Slovenia and Croatia more efficiently and more precisely. Furthermore, our **population models** help us understand the dynamics of the population, so the management decisions can be based on solid, scientific data.

GPS-telemetry data enabled us to define suitable habitat for bears in the project area and to identify movement corridors. This knowledge is being incorporated into **infrastructure and spatial planning**, transboundary cooperation and other national-scale measures that will help provide options for bears well into the future and promote bear expansion towards the Alps.

Farmers, livestock breeders, beekeepers and local people are important stakeholders within our project, both with **mitigation measures implemented in the field** (electric fences, livestock guarding dogs, bear-proof compost bins and garbage bins) and extensive communication. The conflict mitigation methods will be kept in use and further communicated, while intervention groups will perform under revised protocols to keep the level of human-bear conflicts low.

Numerous **project presentations and workshops** with children, youth and adults helped raise the level of co-existence, while bear-friendly label made local products more recognisable. Coexistence will continue to be promoted through active project web portals (project webpage and Facebook), organized workshops and operational info-points. Bear watching and other **bear-related eco-touristic programmes**, promoted by our website http://www.discoverdinarics.org/, are becoming a well-established tourism product of Slovenia and Croatia.

ACKNOWLEDGMENTS

When the LIFE DINALP BEAR project was approved this was one of the happy moments in my life. I have put months of work and free time into something that I believe in—to do something for our bears and for the people who live with them. It was my pleasure and honour to work with an enthusiastic group of experts and researchers from different institutions from Slovenia, Croatia, Italy and Austria. All of us invested passion and enthusiasm into the LIFE DINALP BEAR project and this resulted in success! I want to thank all partners who invested their time during the year it took to prepare the proposal and for all their hard work during the five-year project.

As a project team, we also extend our sincere thanks to all the hunters, farmers, local communities, volunteers and people from the ministries who participated in different actions of the project. I believe we all worked for the same final goal to improve management of bears in this part of the world. I believe we will continue our collaboration well into the future and see benefits for bears, people, and nature.

Rok Černe, project coordinator

ABOUT THE LAYMAN'S REPORT

Published by: Slovenia Forest Service

Editor: Tomaž Berce

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Expert review and proofreading: Seth M. Wilson, Jennifer Claire Ellis

Graphic design: Barbara Kralj, Prelom d.o.o.

Ljubljana, 2019

With the financial contribution of the LIFE financial instrument of the European Union.