LIFE DINALP BEAR

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

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2018 ANNUAL POPULATION STATUS REPORT FOR BROWN BEARS IN NORTHERN DINARIC MOUNTAINS AND CENTRAL-EASTERN ALPS

Action C.5: Population surveillance

Prepared by Tomaž Skrbinšek, Marjeta Konec, Natalia Bragalanti, Sonia Calderola, Claudio Groff, Đuro Huber, Aleksandra Majić Skrbinšek, Anja Molinari-Jobin, Paolo Molinari, Georg Rauer, Slaven Reljić, Matija Stergar, Rok Černe, and Maja Jelenčič

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Introduction

This is the fourth of annual Population Status Reports planned within LIFE DINALP BEAR. It provides an overview of both how population is being managed and its current status over the entire area in question. With these reports, we'd like to give the basic tool to wildlife managers dealing with bear management in each respective country/region, to include the situation in neighboring areas in their conservation and management planning.

Understanding the status of populations of conservation concern is essential for effective conservation and management, which is also true for brown bears in the area covered by LIFE DINALP BEAR. Such population-level understanding is the foremost condition that must be met if we are to transcend the national or regional-level conservation and management practices that are the current norm in wildlife management and conservation.

In this fourth report, each of the experts updated the text for his or her geographic area with the most recent available data on all recorded aspects of bear monitoring to produce an up to date picture of the status of the bears in the entire area. The same goes for the distribution maps – we used distribution maps prepared for the previous report and updated them with new information. In this manner we're keeping information and its presentation consistent.

That last year has seen some interesting developments. As population size estimates for the core bear range in Slovenia and Croatia were finalized, we have for the first time precise population size estimates for the entire area. Also, population in Slovenia grew considerably since the last census in 2007. Bears are also recovering in the Alpine part of Slovenia with the population increasing, but even more importantly, with an increasing number of females. This development is something to watch closely in the near future.

We believe that this document is a useful, updated compendium of available knowledge about our bears and that it will serve its purpose for management and conservation.

Contents

Bear population status – project area overview

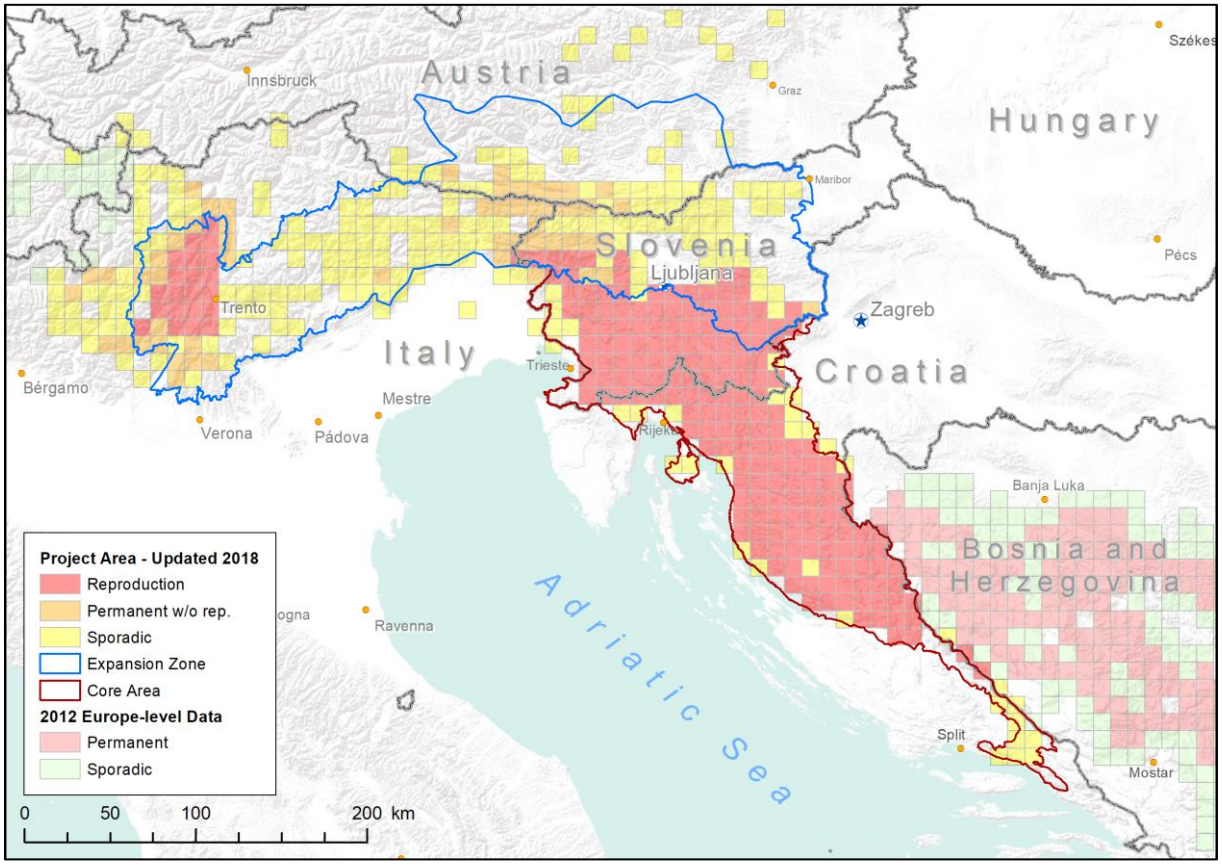

Figure 1: Bear distribution in LIFE DINALP BEAR project area – updated 2018 (status between 2012 and 2017). Permanent presence, reproduction – areas where cubs were confirmed within the last three years; **permanent presence, no reproduction** – areas where bears have been present for at least three years over the last five years; **sporadic presence** – areas where bear presence has been documented for fewer than three seasons in the last five years period.

Distribution

The project area of LIFE DINALP BEAR spans over four countries: Croatia, Slovenia, Austria and Italy. It is roughly divided into two areas: the Core Areas and the Expansion Zone.

The **Core Areas** are the main brown bear range in Croatia, Slovenia and western Trentino in the Central Alps. The first area stretches from Bosnian border in Croatia, along the Dinaric Mountain Range up to the foothills of the Alps. This is where most of the bears are. The area is rugged, covered by dense forests and has relatively low density of people, mostly limited to valleys. It has one of the highest brown bear population densities ever recorded. It is the main source for natural expansion of bears into the Alps and has been the source for all reintroductions of this species in Western Europe.

The second area, in Central Alps, host a small but so far viable population of around 50 bears originated by the reintroduction carried out in the frame of two LIFE projects (Ursus I and II) in 1997-2004. 48 litters and 101 cubs have been recorded in that area in 2002-2015, representing an important stepping stone for natural expansion of bears into the Central and Eastern Alps.

The **Expansion Zone** includes Eastern Alps in Slovenia, Austria and Italy. Bears are expanding into this zone from the Core Areas in Slovenia and in western Trentino. There is permanent bear presence in the southern part of this zone, in the pre-alpine and alpine areas in Slovenia, and in the alpine and pre-alpine range in the Region of Friuli V.G., Veneto and eastern Trentino. The last genetic survey in Slovenia in 2015 has shown that bears in Slovenian Alps are still few (48, 41-57 95% CI), but the population more than doubled since the last survey in 2007. Even more important, while the sex structure was still male-biased (60%M vs. 40%F), this ratio improved since 2007 (70%M vs. 30%F). Over three times as many females were detected in 2015 compared to 2007 (16 vs. 5), and the reproductive area (where females are present) is slowly expanding, now almost reaching the southern slopes of Julian Alps. However, "Alps proper" are still populated only by males, and (as expected from the biology of the species) females are expanding considerably slower.

Population estimates & monitoring

While monitoring of brown bear conservation status has traditionally been country-specific, this situation is improving considerably through the monitoring activities within LIFE DINALP BEAR. In 2017, the results of the genetic population size estimate that was done in 2015 within LIFE DINALP BEAR was published, and now we have a very good idea of the actual situation. There are estimated to be between 1600 and 1700 bears in the entire project area in 2017. However, since the population in the core area is showing considerable dynamics, this may be an underestimate. The vast majority of these bears are in the Core Areas (52-63 are in the Trentino area where bears were reintroduced). We estimate that approximately 50-60 animals are present in the expansion zone (not including Trentino), majority of those in the Slovenian part (estimated in 2015 as 48, 41-57 95% CI). In subsequent years the estimates for the core area will be improved through predictive population modelling, but the models still need to be thoroughly verified so we chose not to include these estimates in the report.

Table 1: Mark-recapture estimates of brown bear population size in the core bear range (Slovenia and Croatia). Estimates were produced for 2015: the minimal yearly estimate is the actual mark-recapture estimate and excludes all yearly mortality (winter estimate). The maximal estimate is the minimal estimate with added complete detected yearly mortality (spring estimate, applies to spring 2015).

Area	CMR Model	Minimum Yearly N (95% CI)	Maximum Yearly N (95% CI)	Sex ratio F:M [%]
Entire study	MhChao+Capwire TIRM	1363 (1248-1522)	1619 (1504-1778)	58.9 % : 41.1 %
Slovenia	MhChao	599 (545-655)	711 (657-767)	59.6 % : 40.4 %
Croatia	MhChao+Capwire TIRM	764 (679-893)	908 (823-1037)	58.2 % : 41.8 %

An issue worth mentioning is that for Slovenia we switched from reporting the lowest yearly number to reporting the maximum yearly number. This makes the data more directly comparable with other countries, but care must be taken in interpretations and comparisons with previous estimates since because of considerable annual dynamic in population size, the yearly maximum and minimum population size differ considerably (Table 1).

Table 2: Population estimates for bears in the project area for 2017.

Item	Slovenia	Croatia	Italy, FVG	Italy, Veneto *	Italy, Trentino	Austria
Number of bears (best estimate)	711 (657-767)	937 (846-1072)	6	2 (temporary presence)	52-63	<5 (temporary presence)
Sex Structure (if available)	59.6 % : 40.4% (F:M)	58.2 %:41.8% (F:M)	6 M	2M	M: 24, F: 28	
Method of Estimation	Mark-recapture estimate using noninvasive genetic samples (2015)	Mark-recapture estimate using noninvasive genetic samples (2015)	Minimal number based on genetic data	Minimal number based on genetic data	Population abundance based on genetic monitoring (opportunistic on damage and other and systematic on rub trees), camera traps, observations	

*As already in the last 3 years, sporadic appearances and damages only in spring and autumn: in central Cadore (Belluno province), bear Gen23 of Slovenian origin; in Monte Baldo (Verona province, border TN), bear M19 from Trentino population.

Detected bear mortality

Most of mortality in Slovenia and Croatia has been through legal cull/hunting (74.8 %). There were two cases of illegal killing reported in Slovenia. In Croatia hunting was followed by traffic mortality (11.8 %), while in Slovenia by intervention cull (15.6 %) and traffic accidents (14.7 %).

Mortality is as in previous year male-biased (M: 58.5 % vs. F: 38.9 %). In this season this ratio in Slovenia (M: 54 % vs. F: 42.6 %) is less skewed than in Croatia (M: 63.2 % vs. F: 36%), situation being more similar to that from 2 years ago. Such ratio skewness is expected since females with cubs are protected, making males more exposed to legal cull.

In Croatia detected mortality is more or less the same as reported in previous years. However, in Slovenia there is an increase of 165% of mortality detected in 2017 in comparison with year 2016. That is due to delay in late acceptance of decree on removal of specimens of brown bear and wolf from nature and thus only 34.4 % of the hunting quota in 2016 had been fulfilled. When mortality in years 2017 and 2015 are compared, there are 10 more cases of mortality in 2017.

In Italy detected mortality was very similar to reports in previous years. However, in 2017 one bear was found dead also in FVG region. In Trentino one was found dead, two killed by interspecific aggression and one was legally culled. This is the first case of culling in Trentino area since start of the LIFE DINALP BEAR project. In 2017 there was one male bear killed in a car accident also in Austria.

Table 3: Mortality in the project area in 2017.

Item	Slovenia	Croatia	Italy, FVG	Italy, Trentino	Austria	Total
Number	122	144	1	4	1	272
Sex structure	M: 66, F: 52, U: 4	M: 91, F: 52, U: 1	M: 1	F: 2, U: 2	M: 1	M: 159, F: 106, U: 7
Legal cull/hunting	76	123		1		200
Illegal killing	2					2
Intervention cull	19	4				23
Traffic: car	10	5			1	16
Traffic: train	8	12				20
Found Dead	4		1	1		6
Intraspecific aggression	2			2		4
Accident	1 (drowned)					1

*M – male, F – female, U - unknown

Population goal and population level cooperation

There are currently no clear guidelines or common visions for development of a common bear management strategy, and collaboration at the management level is still relatively poor. The initiative is starting within LIFE DINALP BEAR to change this through the project. The first step are these reports.

Conflicts and conflict management

Conflicts with humans appear over the entire project area. These are mainly livestock and property damages, but there have also been cases of humans being injured by bears. In all countries involved compensations are being paid for bear-caused damage, but the compensation systems vary. The differences between countries are still huge, but in general the number of damages has increased in the last year, but has not reached the number reported in year 2014. In 2017 there were 342,520 € paid for compensation of 731 damage cases. In 2017 there were 65 cases more than in 2016 (666 cases) and 78 more than in 2015 (653), but still less than in 2014, when 850 damage cases were reported. The number of damages in Slovenia was reduced by 32% in 2015 (or by 99,047 €, 404 damage cases compared to 597 in 2014) and further reduced to 375 cases in 2016. This decrease is in all damage categories and not connected to a specific type of damage. However in 2017 it has again increased to 522 reported cases (or to 222,121€, compared to 162.202 € in 2016). The biggest difference in number of damages was with crops and grass silage (category other), followed by sheep and orchards. There were only 8 more cases of damaged beehives (93 in 2017 compared to 85 in 2016). 2017 was also characteristic in very low beach mast production, which may have been in part responsible for the increase in damages. As in the previous years the majority of damages are compensated in Slovenia (71.4%). This relatively large number of damages in Slovenia is not unexpected since there are many bears sharing space with a considerable population of humans. But as a contrast, damages in Croatia, which grew compared to 2016, still remain remarkably low, with altogether 10,027 € (2.93 %) paid for 24 (3.28 %) cases. The money paid per damage case in Croatia is the lowest (417.8 €), and closest to that in Slovenia (425.5 €). In Croatia, damages done by bears are compensated by responsible hunting right owners directly to the owners of the damaged property. Investigation of damage cases is done by representatives of the hunting organizations and owners of the property, and they agree on the value of compensation. If they cannot agree the court process is initiated. Because the state does not cover damage compensations, reporting of damage cases to the responsible Croatian Ministry of Agriculture may be incomplete.

There were 20 more reported damage cases in Trentino (144 compared to 124 in 2016). In Austria we didn't have complete damage data for 2014 (and no data on the amount of compensations paid that year), but these data became available for 2015.

Number of damage cases and the amount of money payed for compensations have almost doubled from 2015 to 2016 (2015: 70 cases, 18,510 €; 2016: 133 cases, 36,560 €) and are significantly reduced to 30 cases in 2017. However, the amount of money paid per case is much higher in 2017 (666 €) than it was in 2015 (264 €).

In Friuli Veneto Giulia the number of damages remains low (9 in 2017, same as in 2016), but they still pay the highest compensation (689.6 € per case), although 250 € lower than in 2016 (940.11 €). As a contrast, the damages in Regione Veneto dropped to just two cases in 2017 (to 2 from 36 in 2014, and 1,186 € compensations paid vs. 47,124 € in 2014). Bear M4 who was responsible for high damages in 2014 in Regione Veneto (47,124 €) was monitored during 2015/16 in Friuli. The bear damage data for 2017 is summarized in the table below.

There was one human injury recorded in 2017. On July 22nd, in Trentino, a mature bear female (15 years old) with cubs of the year attacked a man with a dog. He was seriously injured. It was the second time that female attacked a man (the first one in 2015, with the previous litter). The bear has been genetically identified, then captured and radio-collared and, final, shot on August 12, 2017. Cubs were left in the wild and monitored. They survived the winter 2017/2018.

In Slovenia, bear attacked a hunter that was bringing feed to a feeding place for wild boar. Hunter remained unharmed. The same bear appeared one the same location also following days exhibiting aggressive behaviour towards the hunter. The bear was removed (intervention cull).

Table 4: Damages done by bears in the project area in 2017.

Item	Slovenia	Croatia	Italy, FVG	Italy, Veneto	Italy, Trento	Austria	Totals, Medians
No. of cases	522	24	9	2	144	30	731
No. of cases (%)	71.4 %	3.28 %	1.23 %	0.27 %	19.69 %	4.10 %	100 %
Paid	222,121€	10,027 €	6,207 €	1,186 €	82,979 €	20,000 €	342,520 €
Paid (%)	64.8 %	2.93 %	1.8 %	0.35 %	24.2 %	5.84 %	100 %
Paid per case	425.5 €	417.8 €	689.6 €	593 €	576.3 €	666 €	561 €
Paid per bear (€)	312.4 €	10.7€	1004.5 €	593 €	1455.7 €	?	593 €
Cases per bear	0.73	0.03	1.5	1	2.52	?	1
Damages by subject							
Sheep	122		8		16	9	155
Cattle	25		1			1	27
Other domestic animals	8		5		13		26
Beehives	93	2 (12 beehives)	5	2	35	70	207
Crops	94	1 *	1		7		103
Orchards	83	1 (plum)			57		141
Objects	20	19 **					39
Other	77 (of which 56 are grass silage)	1 (45 bale of hay)			15	2 (6 grass silage bales and 1 fishpond emptied)	95

*potatoes, barley, oats, ** (5 automatic feeders, 7 salt feeders, 7 big game feedeing sites)

All areas have implemented some sort of a quick-response system (bear intervention group) that is used when a situation with a problem animal has to be dealt with. These activities are summarized in Table 4. For Austria, Veneto and FVG region in Italy, no such activities were reported for 2017.

Table 5: Interventions in case of "bear problems" – by reasons and outcomes in 2017. The organization of bear response teams, collection of data and actions taken are different in different countries and regions, so the data may not be directly comparable.

Item	Slovenia	Croatia	Italy, Trento	Total
Total Number of Interventions	264	31	33	328
Causes				
Bear damage	23	8	7	38
Bear in/near settlement	218	7	6	231
Traffic accident	18	18		36
Attack on human	3	1	4	8
Orphaned cub(s)				0
Other (saving the cub from the old well)	2	1	5	8
Outcomes				
Talking with people, number	134	min. 31		134
Averse conditioning (chasing bear away), number	24	4		28
Translocation of bear, number	13			13
Removal of bear, number		4*		4
Removal of attractant (garbage…)		1		1
Other	34			34
Bear on the highway		1		1
Investigation of the scene	45			45
Monitoring the area			7	7
Aversive conditioning			1	1
Research a bear after collision with car	14		3	17
Presidium of the area frequented by problematic bear				0
Ilegal killing				0

*(2 intervention shooting + 2 outside of bear zone)

In Croatia hunting right owners are investigating bear damage sites since they are responsible for damage compensation. IT members visit bear damage site only in the case of repeated damage and when her/his opinion is needed for intervention removal request by hunting right owner. Also hunting right owners and property owners implement aversive conditioning measures. IT members are not paid for their interventions by responsible Ministry. Due to all above reasons most of interventions are not recorded.

Threats

There are several threats listed in different areas, and most are repeated from the previous reports. Conflicts with humans are still listed as the foremost threat in most areas. Garbage conditioning / poor waste management and poor protection of property have been frequently listed. Additional threats are genetic isolation (in Trentino core area) and lack of females (reproduction) in Friuli-Venezia-Giulia (FVG), Austria and Alpine area of Slovenia. While a case of a bear immigrating (probably from the Dinaric Mountains) in 2009 and emigrating back in 2010 has been reported, no natural geneflow from the larger population (which would require successful reproduction of the immigrant animal) has been recorded so far.

Table 6: Threats to bear conservation and main causes of conflict with humans.

Item	Slovenia	Croatia	Italy, FVG	Italy, Veneto	Italy, Trentino	Austria
Main Threats to Bear Conservation	Low tolerance of local residents.	Male biased trophy hunting	Very low immigration, lack of females	Presence of bear is still sporadic and totally male-biased; conflicts at local level caused by damages and misinformation by local media about the danger; potentially, paoching / poisoning	Low tolerance of local residents, genetic isolation.	No females; low tolerance to damages.
Main Causes of Conflict With Humans	Small-holder grazing, ranching and farming. Increase in numbers is too fast for many people and is resulting in many complains, opposition.	Garbage conditioning (individual bears)	Low conflict level, few damages	In general, problematic and "high damaging" bears: as in the previous 3 years, is not the case of 2017, due to very low presence and few damage cases	Fear and damages.	Unprotected beehives and sheep on Alpine pastures.

b

Croatia

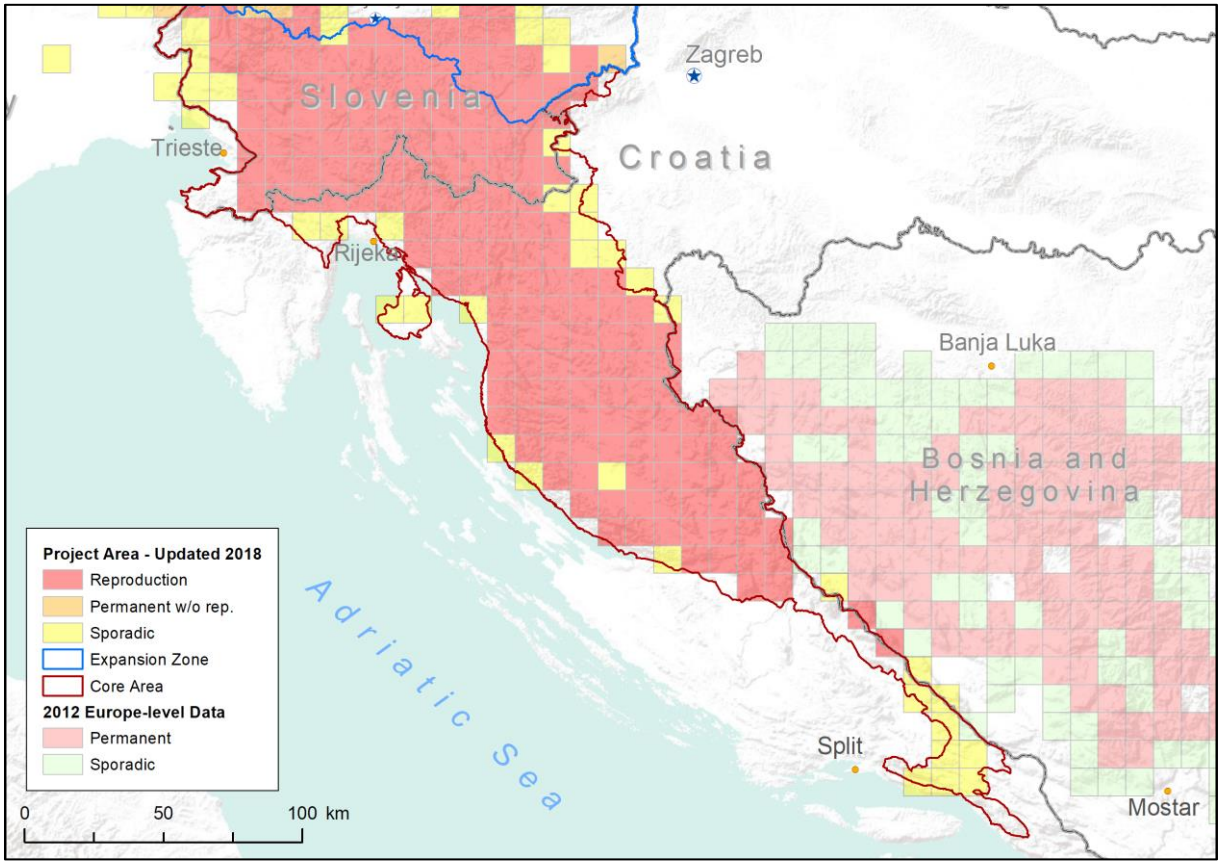

Figure 2: Brown bear distribution range in Croatia.

General Information

Distribution

The total bear distribution area in Croatia has been defined in 2008 and no new information were obtained in 2017. The refining of the bear range was done in 2018. The calculations of ranges are under way and will be used in the new Croatia bear management plan to be completed early in 2019. Officially bear range extends over 11,824 km^2. The permanent bear presence habitat extends over 9,253 km^2, while sporadic bear presence extends over 2,570 km^2. Bears are distributed over the entire Gorski Kotar and Lika regions, the western and southern part of the Karlovac county, the Učka and Ćićarija mountains in Istria, the central and northern part of the island of Krk, the Žumberak mountains, the coastal part from Bakar to Maslenica and the area surrounded by the Kamešnica, Mosor and Biokovo massifs.

The best habitats in Gorski Kotar, Velika Kapela, Mala Kapela and Velebit, have an average density of 10 or more bears per 100 km^2. High population density drives frequent migration of younger males to neighboring peripheral areas of the bear range (Učka, Ćićarija, Pokuplje, Priobalje, etc.).

94.2% of the permanent bear presence areas are hunting units, and 5.8% are located in national parks. In the national parks, bears are permanently protected.

Permanent bear presence habitats are areas in which bears satisfy all their food, water, space, non-disturbance, cover, breeding and denning needs and are present year-round. Females with cubs are regularly recorded in those areas. In those areas all prescribed protective measures are implemented in order to ensure the stability of the population. Local inhabitants accept bears as a part of their natural environment.

Sporadic bear presence habitats are areas with a sporadic presence of bears or areas in which the number of bears does not guarantee the continued existence of the species, or where bears do not den regularly. These are habitats to which bears are returning and which are usually connected to permanent bear presence areas in Croatia, Slovenia, or Bosnia and Herzegovina. Seems that there is a trend that some of "sporadic" areas will become "permanent."

Bears occasionally cause damage in these areas. Within the sporadic bear presence habitats are areas where bear presence is desirable and areas in which bear presence is undesirable, which is reflected in the management regime.

Population estimates & monitoring

A large non-invasive genetic study of population size has been organized in 2015 within LIFE DINALP BEAR together with Slovenia. A total of 2205 scat samples were collected from September until December 2015 in Croatia. The study provided a precise abundance estimate and a reference point for future brown bear monitoring. Laboratory analyses, genotyping and capture-mark-recapture models were done and final are available. In 1539 genotyped samples 582 individuals (339 females and 243 males) were recognized. Among those 62% (N=316) have been recaptured. The bear population size estimates are shown in table below.

Table 7: Mark-recapture estimates of brown bear population size in Croatia. Estimates were produced for 2015: the minimal yearly estimate is the actual mark-recapture estimate and excludes all yearly mortality (winter estimate). The maximal estimate is the minimal estimate with added complete detected yearly mortality (spring estimate, applies to spring 2015).

	CMR model	Minimal yearly N (95% CI)	Maximal yearly N (95% CI)	Sex ratio F:M [%]
Croatia	MhChao+Capwire TIRM	793 (702-928)	937 (846-1072)	58.2 % : 41.8 %

In addition to the genetic approach, coordinated bear counts from high stands at feeding sites are done during pre-specified days in spring and autumn. These counts are envisioned in the Bear Action Plan and are used to determine population trends, not population size. Monitoring also includes a full record and samples of each dead bear (from hunting, traffic mortality and other causes of death), and data from satellite telemetry research.

Legal status & relevant management agencies

With accession to EU in 2013 brown bear in Croatia became a strictly protected species, but also remained a game species. The main management agency for bears in Croatia is the Hunting Directorate within the Ministry of Agriculture. Since the bear became a protected species, the management is shared with the Directorate for Nature Protection within the Ministry for Protection of Environment and Nature.

The operational management follows the Brown Bear Management Plan for the Republic of Croatia. The Brown Bear Management Committee prepares yearly Action plans and supervises their implementation. The Bear Intervention Group helps with the actions in the field including the management of bears showing problem behaviour.

In the last four years quota for bear hunting has been set to 120 bears plus up to 30 individuals expected to be lost due to other reasons, including the intervention removal of problem ones. The outcome for 2017 was 123 hunted and 21 lost by other means: 13 on railroads, 5 on roads and intervention removals. On a multi-year average only 85 % of the hunting quota has been fulfilled and other losses were also lower than anticipated (70 %).

Population goal and population level cooperation

According to the management plan the total habitat capacity is around 1100 bears and the social capacity (acceptance) may be around 900. The official number reported for Croatia on accession to Europe was 940. Currently the population targets can be assumed as reached and the goal of active management is to keep the population within the given limits.

Bears in Croatia are a part of the Dinaric-Pindos population and are directly shared with neighbouring Slovenia and Bosnia and Herzegovina. With Slovenia there is full cooperation on the level of scientists, while the political agreement and collaboration in management is still in need of improvement. Intensive activities are planned within LIFE DINALP BEAR to overcome these difficulties. With Bosnia and Herzegovina the main difficulties are lack of capacity and complicated political situation in that country. Promising partnership continues with NGO “Centar za životnu sredinu” from Banja Luka.

Conflicts and conflict management

Current conflict levels are continuing to be surprisingly low. The acceptance of bears can be on average considered as very good. The extensive surveys in 2002 and 2008 showed that 86% and 72%, respectively, respondents living in the bear range would agree with increasing bear numbers in Croatia (Majić et al 2011). That is mainly related to the status of bears as a game species, where maintenance of large population secures income through hunting. Continued tradition of living with bears makes coexistence easier as local inhabitants know how to minimize livestock depredation and destruction of beehives. The damages that occur are compensated by hunting organizations (except in the national parks) that are in most cases comprised by local inhabitants as well. Hence the total compensations paid per year are very low, on average about 6000 €, or only about 6 €/bear/year. Comparably low bear damages can only be found in Sweden (3.6 €/bear/year), while the other extreme is Norway where one single bear causes twice as much damage as almost 1000 bears in Croatia (12,666 €/year/bear).

The Brown Bear Management Committee and the Bear Emergency Team are the bodies that care for the implementation of the Brown Bear Management plan (Huber et al. 2008) and the implementation of the yearly Bear Action Plans. That work includes decisions on the size and distribution of hunting quotas and on emergency removals of problem bears after other measures have failed. The revision of Brown bear management plan for Croatia is planned for the year 2018.

Threats

The current situation with bear population segment that lives in Croatia is very favourable and the potential threat may only be the events that would change something in the ever fragile balance between any large carnivore and humans. The immediate problem was the forced change of bear status from “game” to “strictly protected” by EC decision. Efforts were taken to mitigate the negative effect on the public acceptance and to prevent the explosion of damage compensation requests towards the state. The quota hunting continued smoothly through “derogations” and bear kept the “game” status as well. The bear-caused damages are continued to be compensated by hunters.

Another issue is to prevent habituation of bears to human food sources (accessible garbage and poor or no protected property, e.g. beehives, crops, livestock…) through timely actions such as appropriate garbage disposal and better property protection or negative conditioning and removal of habituated individuals.

There was extensive construction of major new infrastructure (highways) in the bear habitat over the previous decade, but these seem to have been satisfactory mitigated by numerous crossing structures including a number of large green bridges (Kusak et al 2009). In 2015, within the scope of LIFE DINALP BEAR, large scale protection measures were implemented to prevent brown bear appearance and mortality on highways: electric fences, one-way exit doors, jump-out ramps and 30 bear-proof

garbage bins were installed along the Rijeka-Zagreb motorway. A future threat may be the planned construction of “wind power parks” in the core bear habitat, especially in the critical denning zones (Huber and Roth 1997).

Situation and events in 2017

Population size and trends

The estimate of the population size has changed with the systematic non-invasive genetic count based on samples of 2015. The previous estimate from 2007 at approximately 1000 bears, compared to the 2015 estimate of 937 should be seen just as a more accurate number, not as a population decline.

Management decisions

Following the standard decision-making procedure, hunting quota has been set as 120 plus up to 30 for other causes of mortality.

Special events

The year 2017 was similarly to 2016 calm considering special events with bears. Fewer bears were approaching houses and fewer than average died in traffic accidents.

Newly established Protocol for the highway intervention team is in use and gives directions for actions in a case of bear appearance inside the highway corridor. HBBET and Protocol were established in 2015 within LIFE DINALP BEAR project.

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Slovenia

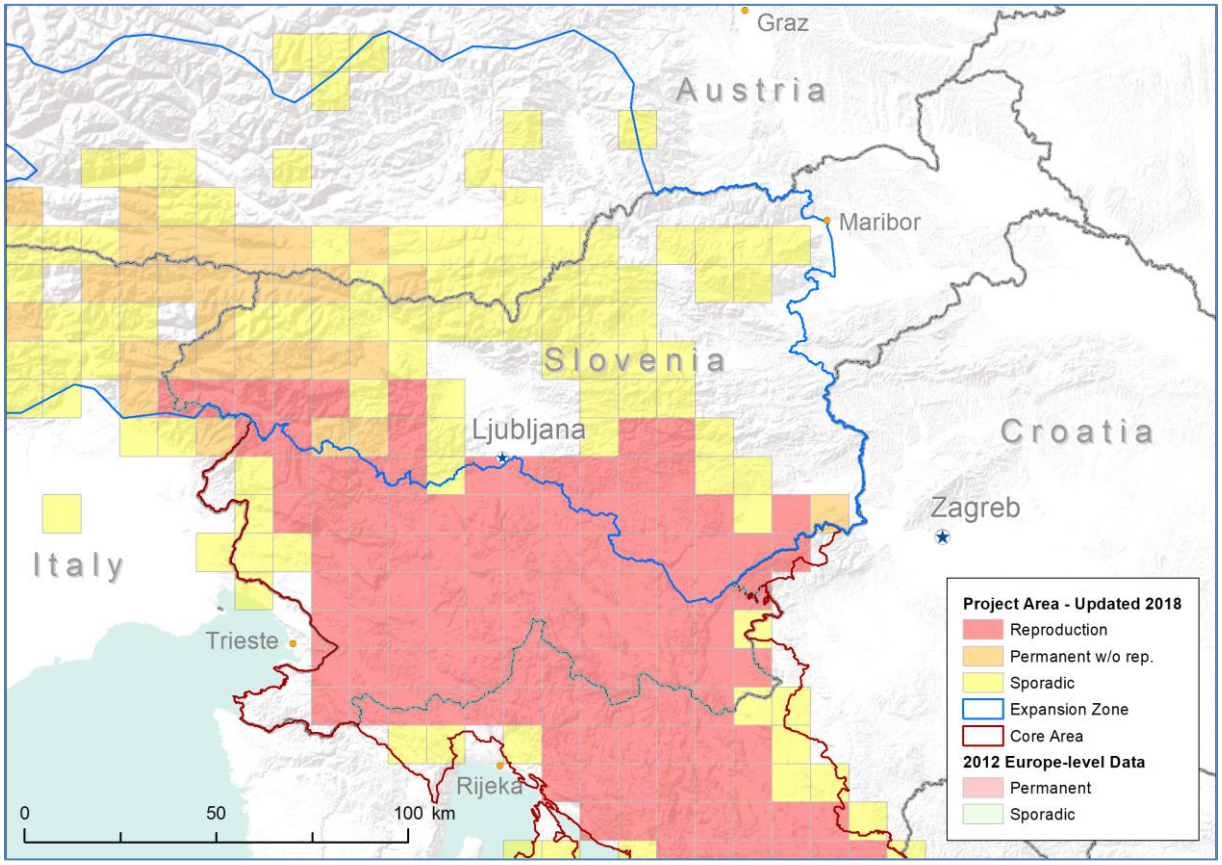

Figure 3: Bear distribution in Slovenia.

General Information

Distribution

Bears in Slovenia are the northern edge of the large Dinaric-Pindos population. The majority of bears in Slovenia are found in the south of the country, next to Croatian border, south of Ljubljana – Trieste motorway and Sava River. The population density of bears NW of this highway is considerably lower, but seems to be slowly increasing. North of Ljubljana and Sava river bears appear sporadically and are typically dispersing juvenile males.

Populations estimates & monitoring

A large non-invasive genetic study of population size has been organized in 2015 within LIFE DINALP BEAR together with Croatia. A total of 2472 scat samples were collected from September until December 2015 in Slovenia (4677 together with Croatia). The study provided a precise abundance estimate and a reference point for future brown bear monitoring. Laboratory analyses, genotyping and capture-mark-recapture models were done, and final results are available.

In 1962 genotyped samples 614 individuals (366 females and 248 males) were recognized. Among those 69.5% (N=427) have been recaptured. The bear population size estimates are shown in the table below.

Table 8: Mark-recapture estimates of brown bear population size in Croatia. Estimates were produced for 2015: the minimal yearly estimate is the actual mark-recapture estimate and excludes all yearly mortality (winter estimate). The maximal estimate is the minimal estimate with added complete detected yearly mortality (spring estimate, applies to spring 2015).

Area	CMR Model	Minimum Yearly N (95% CI)	Maximum Yearly N (95% CI)	Sex ratio F:M [%]
Slovenia	MhChao	599 (545-655)	711 (657-767)	59.6 % : 40.4 %

Parallel to this, less intensive but long-term genetic sampling has been started in the Alpine and Pre-Alpine areas of Slovenia, complementary to such sampling in border areas of Italy and Austria. The goal of this sampling is to keep a close watch on how the population expansion into the Alps is progressing.

The last genetic survey in Slovenia in 2015 has shown that while bears in Slovenian Alps are still few (48, 41-57 95% CI), the population more than doubled since the last survey in 2007. Even more important, while the sex structure was still male-biased (60%M vs. 40%F), this ratio improved since 2007 (70%M vs. 30%F). Over three times as many females were detected in 2015 compared to 2007 (16 vs. 5), and the reproductive area (where females are present) is slowly expanding, now almost reaching the southern slopes of Julian Alps. However, “Alps proper” are still populated only by males, and (as expected from the biology of the species) females are expanding considerably slower.

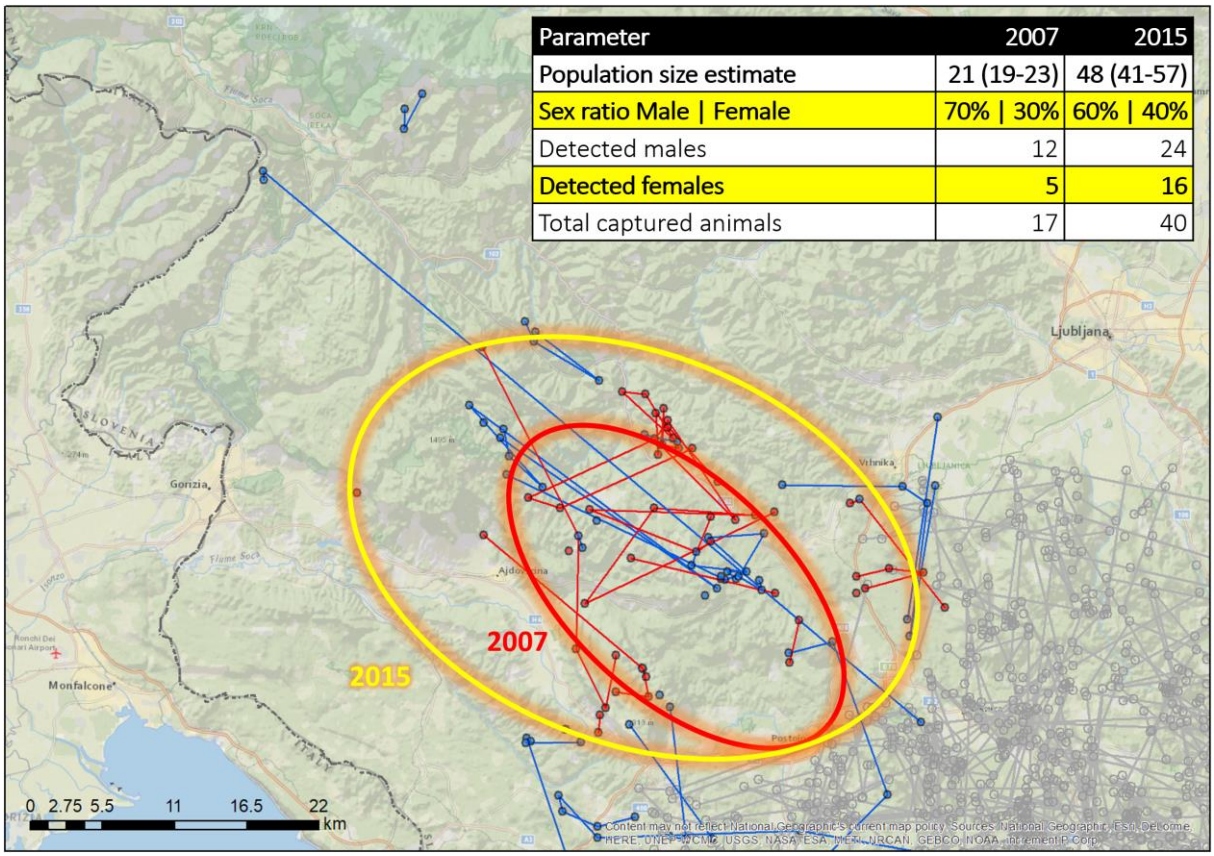

Figure 4: Increase in the number of animals, proportion of females and female area size (ellipses) from 2007 to 2015.

Genetic monitoring in the Alps indicates that this situation remains very similar also in 2017 (Figure 5).

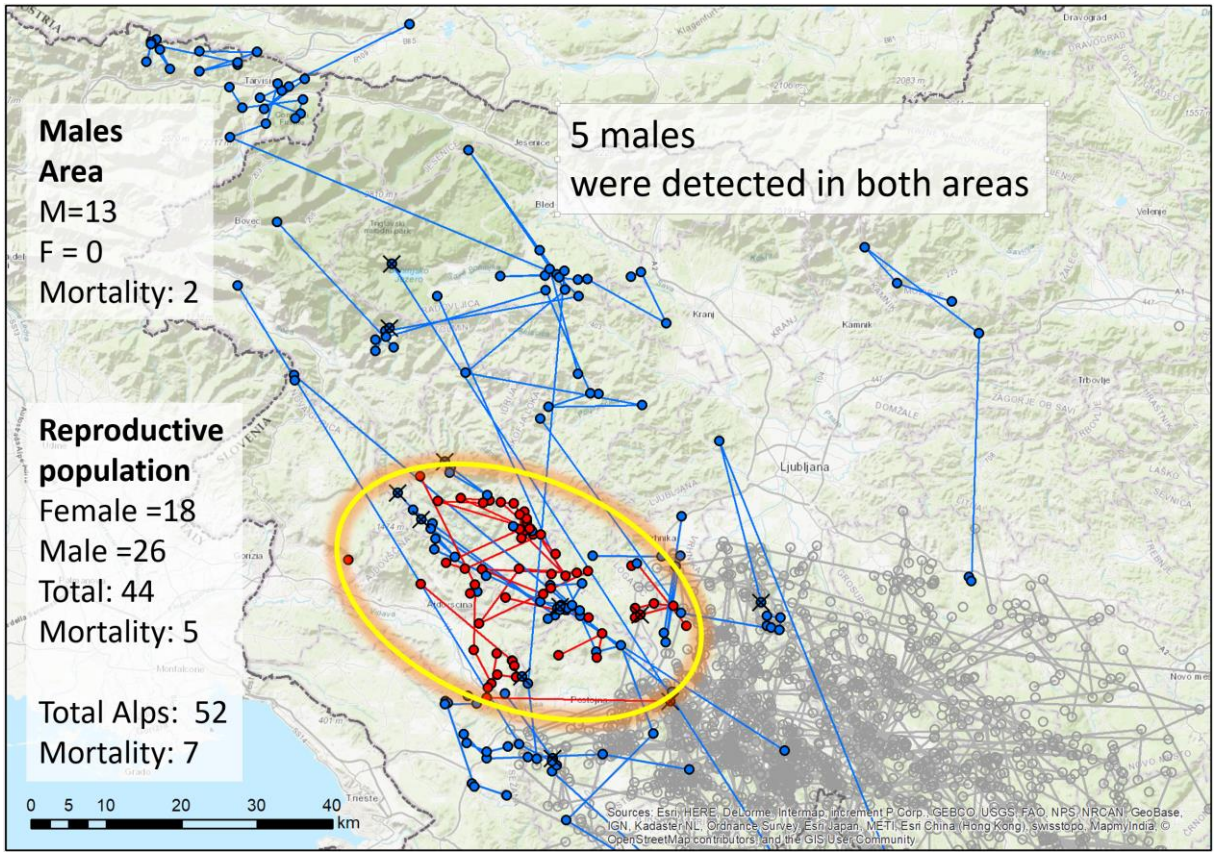

Figure 5: Genetic monitoring in the eastern part of the expansion zone. The yellow ellipse estimates the area with females.

An interesting result was also that we detected four male bears that have been in this area for a very long time – three at least since 2007, and one at least since 2005. We have sampled them genetically in the respective years (Figure 6). It would seem that individual bears are able to peacefully coexist also in an area where people are generally not used to presence of brown bears and much more sensitive to bear-human conflicts than in the bear core range in the Dinaric Mountains.

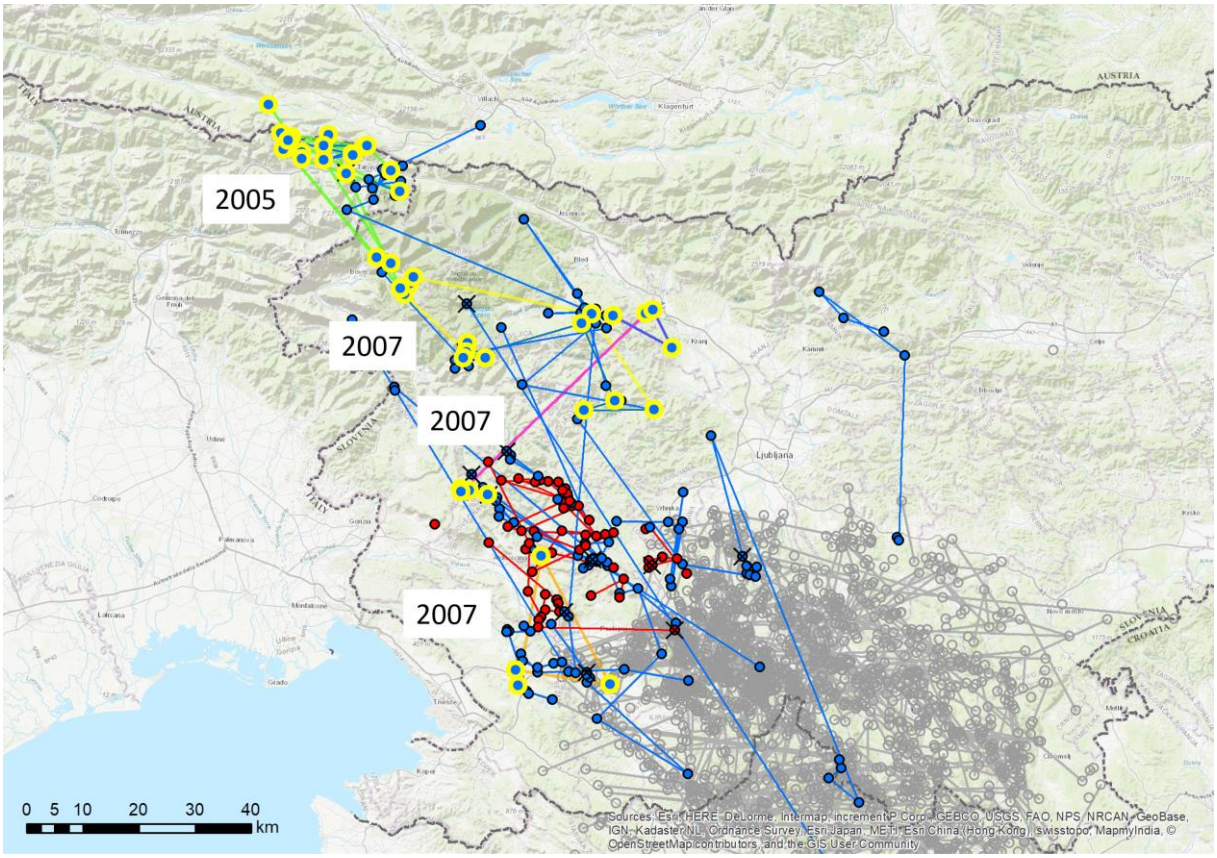

Figure 6: Long-term present males in the Eastern Alps.

Legal status & relevant management agencies

Bear is listed as a strictly protected species in Slovenia. Its management and conservation are responsibility of Ministry of Environment and Spatial Planning. There is a yearly cull quota which is based on an expert opinion by Slovenia Forest Service, which is then discussed and modified by the Large Carnivore Management Advisory Board, which consists of representatives of various stakeholders. On basis of this the "exceptional cull" is allowed through a decision by the competent minister. For the last 10 years culling quota has varied between 60 and 90 animals (with exception of the season 08/09). The quota for the last few years has been similar to those set over the past decade.

Population goal and population level cooperation

The management goal in the bear core area is to keep the population in favourable conservation status and minimize conflicts with humans. Towards the Alps, corridors are designated to enable movement of bears into the Alps and across the border with Italy and Austira. At present there is no regular hunting there, only management removals of problem individuals. Slovenian management strategy is outdated and currently under revision, and the clauses that define the status of bears outside of the core area will be updated to adhere to the international "Guidelines for Common Management of Brown Bear in the Alpine and Northern Dinaric Regions" that were drafted within LIFE DINALP BEAR. These Guidelines

are a very important step towards transboundary harmonization of conservation and management efforts. When integrated into national management documents of respective countries, in is expected to have an important impact on improving coordination of conservation and management actions, particularly in the transboundary areas in the Alps.

Conflicts and conflict management

There are regular conflicts with agriculture and occasional bears wandering into villages or even cities which create considerable fear among local residents. There have been infrequently injuries of humans, however no fatalities have happened in the last couple of decades. Damages to property are being systematically compensated, but the compensation system has been criticized as it does not stimulate people to invest in protection (compensations usually exceed commercial value of the destroyed property). A "Bear Response Team" has also been organized which deals with problem bears and immediately reacts to concerns expressed by people in the bear area.

Within LIFE DINALP BEAR extensive work in the field of conflict mitigation has been done. Damage prevention measures (electric fences, livestock guarding dogs) have been implemented in bear core area as well as in the expansion zone. Following the best practice examples from the project, prevention measures are now systematically being implemented by the competent authorities. Bear-proof containers and compost bins were also delivered to several conflict hot-spots within LIFE DINALP BEAR.

Threats

The main threats are habitat fragmentation/loss through urban sprawl and development of traffic infrastructure. A considerable threat is also traffic (automobile or train collisions) which causes significant bear mortality on a yearly basis. An indirect, but very serious threat are conflicts with humans and destruction of their property, as this lowers the support for bear conservation and increases demands for high cull quotas. During the last years bear population in Slovenia is increasing in numbers and expanding its distribution area. In terms of human acceptance, the pace of population increase is happening fast. This can cause resistance and opposition of certain interest groups.

Situation and events in 2017

Population size and trends

The population has shown remarkable dynamics since we've seen 41% population growth between 2007 and 2015. Interestingly, this has not been followed by an increase in human-bear conflict up until 2017, when the number of conflicts did in fact raise. The only other method that indicated an upward population trend was bear counting on permanent counting sites, but the results of this method have considerable variance and were not taken at face value.

A population modelling tool is being developed within LIFE DINALP BEAR that will enable us to use stochastic predictive modelling to predict population size from the last genetic estimate. This will, at least for several years after the genetic estimate, enable us to have a very good idea of the actual population size. Current results indicate that the population has most likely grown since the 2015 estimate.

Management decisions

A culling decision that was made for the period 1 October 2016 until 30 September 2017 only came into force in 2017. Due to late acceptance of the "Decree on removal of individual brown bears and wolves from nature", culling started with a three and a half months delay (20 January 2017). The cull quota was fulfilled within the period it was prescribed for.

A new cull quota was made for the period from 1 October 2017 until 30 September 2018. The planned quota for removal of bears is 132 bears. 107 bears are planned for culling, and 25 are predicted other loses (traffic and other mortality). The quota is strictly prescribed by age classes and spatially distributed over the whole area of regular bear presence in Slovenia.

Special events

Bear attacked a hunter that was bringing feed to a feeding place for wild boar. Hunter remained unharmed. The same bear appeared one the same location also following days exhibiting aggressive behaviour towards the hunter. The bear was removed (intervention cull).

Italy

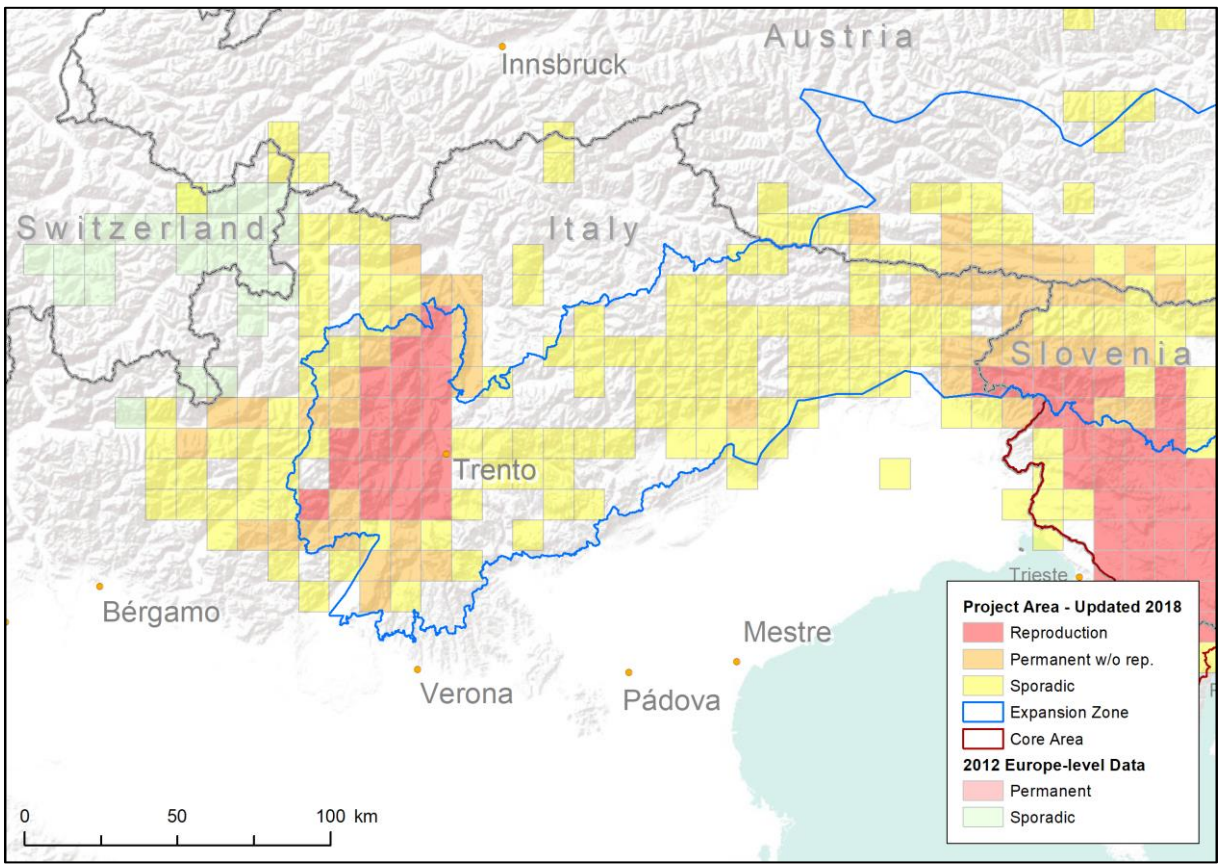

Figure 7: Brown bear distribution in Northern Italy.

General information

Distribution

Bears in Italy are found in 2 populations, the autochthonous Central Apennine and the re-introduced Alpine population in Trentino. The autochthonous population in the Apennines is outside of the project area, completely isolated and will not be treated in this report.

In Trentino the female area covers 1,070 km² (2017) in the western part of the province. The resident range is more or less stable since 2012, as well as the range of the dispersers (around 24,360 km2 in 2017). Additionally, there is a third nucleus in the eastern Italian Alps which is part of the expanding Slovenian population and partially from expanding individuals from Trentino. This occurrence is situated in north-eastern Friuli VG, where a few male bears are permanently present.

In Veneto only opportunistic monitoring is done by the provincial police and national forest service (CFS) staff, following damages or presence signs reports. Biological samples collected during the monitoring are sent to ISPRA (the national Institute for Environmental Research) for genetic analysis.

Even in 2017 only a few sporadic bear presences were detected in the region. These were for the fourth consecutive year, the presence of the bear in Veneto was therefore extremely small and sporadic.

Population estimates & monitoring

The minimum estimate for the Trentino bear population is 52 individuals (range 52-63 including cubs of the year (coy)), with a CMR estimate of 50 (45-63 without coy's). The population trend is slightly increasing in the last four years. Monitoring is done and coordinated by Forestry service of PAT personnel, Park staff, Museum of Science staff, Hunting Association and volunteers. In Friuli VG in 2017, six different bears (all males) have been detected through genetic sampling. The monitoring is done by the Regione Autonoma Friuli Venezia Giulia and Comando Unità Tutela Forestale Ambientale e Agroalimentare Carabinieri, Progetto Lince Italia and the University of Udine.

Legal status & relevant management agencies

Bear management in Italy is decentralized at regional and local (i.e. provincial and regional) level. The bear is fully protected in Italy. A national (Italian Alps) management Plan was drafted in 2010 by a team of experts (neither the public, nor stakeholders have been involved) of the PAT, Ministry on Environment, National Wildlife Institute and the Regional governments; it is not really mandatory at the legal level, but in fact it is pretty much observed by g.o. managers.

The Trentino population falls under the jurisdiction of the Forestry and Wildlife Department of the Provincia Autonoma di Trento. Management involves the public and all stakeholders on the highest level possible. The management of bears in Trentino does not depend on single projects but is rather carried out since the 1970s as part of routine wildlife management.

Population goal and population level cooperation

The goal for the Trentino population is to reach a MVP of ~50 individuals (accomplished) and to connect the small and isolated Alpine population with the large Dinaric-Pindos population. So far, a couple of bears are known to have moved from Trentino to northern Slovenia but no significant movements in the opposite direction (which would be useful for the small isolated population of the central Alps) have been recorded so far. International cooperation occurs through the Alpine Convention and other international networks.

Conflicts and conflict management

Conflicts exist over livestock depredation, destruction of beehives and crops harvesting; compensation is paid by the Forestry and Wildlife Department of the PAT after inspection and confirmation by own, specifically trained personnel. 100% of the market value is paid within two months. In Trentino, additional funds are available by the Forestry and Wildlife Department for prevention measures such as electric fences, livestock guarding dogs and shelters for shepherds in the mountains. Three attacks on humans have been recorded in 2014, 2015 and 2017 (two females with cubs involved) reducing even more the positive attitude of people toward bears. Both female involved have been removed (killed) because of safety reasons, with an order of the PAT president.

Threats

Trentino: Despite the positive trend, livestock depredation and the occurrence of problem bears (bears approaching human infrastructure & settlements in search of food in a place with high human density and females attacking people defending her cubs) still remain a challenge when it comes to local acceptance of bears. This makes it necessary and important to improve 1) quantity and quality of information, and 2) efficiency in removing problem bears. Both are regarded critical success factors.

Friuli VG: there is a low conflict level with only a few damages.

Veneto: both conflicts and threats, and the overall perception of bears, follow the irregularity of bear presence, changing radically from year to year between “total indifference” and “priority emergency”. These conditions, which is reflected in the attention of media and local politics, makes it difficult to build a balanced and regular management approach to the bear in the region.

Situation and events in 2017

Population size and trends

The monitoring season 2017 (16th year of successive genetic monitoring) on brown bears in Trentino-Italy pointed out that the population has slightly increased in the last four years, with a minimum population presently estimated to be 52 (max 63 individuals with 11-13 cubs observed in 2017).

Trentino is still the only region in the Italian part of the project area where reproduction is reported.

In Friuli VG six to eight different bears have been confirmed using genetic sampling, all of them males.

In Veneto in 2017, only few sporadic presences of bear were recorded in the region, concentrated in spring and autumn and in areas neighbouring to Trentino and Friuli VG (Monte Baldo in Verona province, Alpago – Cansiglio in Belluno and Treviso province). The presence of bears in Veneto is still a sporadic and irregular event.

Special events

In Trentino a mature bear female (15 years old) with cubs of the year attacked on July 22 a man with a dog. He was seriously injured. It was the second time that female attacked a man (the first one in 2015, with the previous litter).

According to the order of the PAT president the bear has been genetically identified first, then captured and radio-collared and, finally, shot on August 12, 2017. The whole procedure (identification, making her recognizable with a collar and shooting) took 20 days.

Cubs (two) have been left in the wild, according to the specific guidelines drawn up by PAT and National Wildlife Institute. Specific monitoring (camera traps, genetic monitoring) detected both the cubs several time till the end of fall 2017. Genetic monitoring and sightings in 2018 showed that both survived winter 2017-18.

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Austria

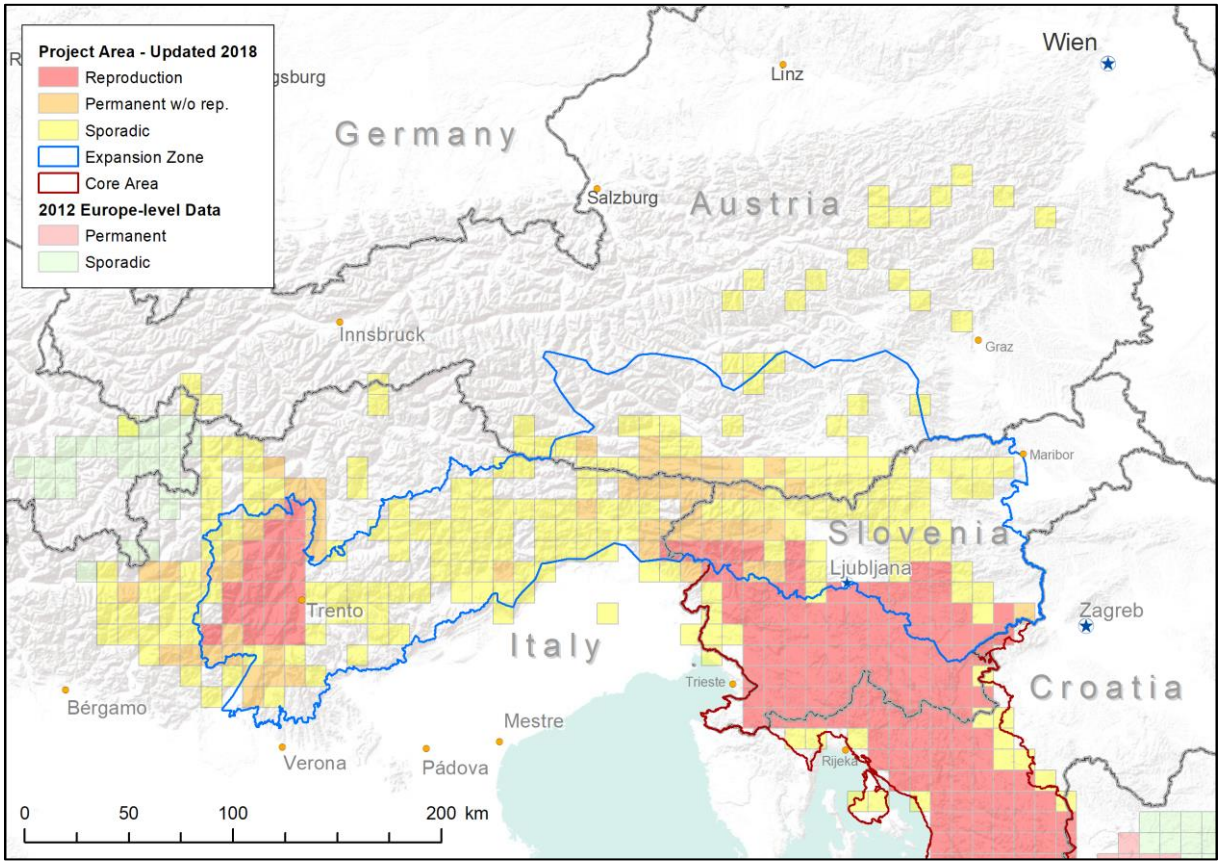

Figure 8: Bear distribution in Austria.

General information

Distribution

Bears in Austria are part of the Alpine bear population but are presently only found in southern and western Austria along the border to Slovenia, Italy and Switzerland. No reproduction has been confirmed in this area and so far, all animals that were individually identified have been males, either originating from the Slovenian or the re-introduced Trentino bear population.

Between 1989 and 1993 three bears (2 females and 1 male) were re-introduced to the Northern Limestone Alps in central Austria where a single migrant male bear had settled in 1972. Between 1991 until 2006 a minimum of 31 cubs was produced. However, genetic monitoring which was started in 2000 finally revealed that the population never reached more than 12 individuals (1999) and that most cubs disappeared already as a yearling or two-year-old bear (Kruckenhauser et al. 2008). By 2011 the last descendent of the released bears had finally disappeared and the population is now formally considered extinct. The most likely explanation for the disappearance of this small population is illegal killing in combination with the small population size.

Population estimates & monitoring

Population size of the bear occurrence in Austria is difficult to provide as long-distance dispersers from both the Slovenian and the Trentino bear population seem to move in and out of the border region. It is probably realistic to assume that ca. 5 different male bears may roam for some days, weeks or months the southern Alps of Austria within the course of a year (in 2013, 2014, 2015, 2016 and 2017 four, three, two, six, and three individuals, respectively, were detected by genetic monitoring). Presumably no bear is staying permanently in Austria, but some individuals have been registered in several consecutive years indicating that some bears stay permanently in the border region of Slovenia, Italy, and Austria.

Bear signs reported by third parties are inspected and documented by three wildlife professionals, the so called “bear advocates”. All bear signs (with the reservation that in Carinthia not all data collected by the provincial administration and hunting organization are provided) are entered into a central database and rated according to the re-fined German SCALP criteria (Kaczensky et al. 2009). Bear monitoring is heavily based on genetic monitoring since 2000 (Kruckenhauser et al. 2008).

Legal status & relevant management agencies

In Austria the bear is mainly subject to the hunting law but enjoys a year-round closed season. Responsibility for protecting species in accordance with the Habitats Directive lies with the hunting and nature conservation authorities of the provinces. A Coordination board for bear, wolf and lynx management in Austria (KOST) - composed of representatives of the hunting and nature conservation authorities of the provinces, the bear advocates and representatives of selected stakeholders - meets twice a year to review and discuss management issues regarding large carnivores in Austria.

The first bear management plan for Austria was published in 1997 and revised in 2005 (Coordination board for Bear Management in Austria 2005). The target of the Austrian bear management is “to protect brown bears in Austria and to establish and maintain a viable population in a favourable conservation status, with special emphasis on a peaceful coexistence of humans and bears and the creation of necessary conditions to connect existing populations to allow the bears to expand into suitable habitats” (Coordination board for Bear Management in Austria 2005).

Population goal and population level cooperation

There are no explicit population goals for bears in Austria. Habitat modelling shows a high habitat suitability of the Eastern Alps (Austria, NE Italy, Germany & N Slovenia) and suggests a habitat capacity for a minimum of 518-686 mature bears (1228-1625 individuals; Güthlin et al. 2011).

Monitoring within Austria is coordinated by the bear advocates. Genetic monitoring is closely coordinated with the neighbouring countries so that individual bears can be identified and backtracked to the respective source population (Karamanlidis et al. 2009). Furthermore, there is and always has

been close cooperation on the technical level with colleagues from neighbouring countries e.g. cross-border tracking of radio collared animals. On the political level cooperation is happening within the framework of the Alpine Convention. However, there is no formal population level management or even a commonly expressed goal.

Conflicts and conflict management

The main conflicts with bears are over 1) damages caused by bears to beehives and to free-ranging livestock on Alpine pastures (~130,000 sheep / goats and ~300,000 cattle graze with minimal supervision on Alpine meadows over the summer months) and 2) actual or perceived impacts on hunting (bears visiting ungulate feeding sites spooking game and raiding feed, bears killing red deer in winter enclosures or at feeding sites, hunters risking close encounters).

Damage compensation is paid for destroyed beehives and confirmed livestock kills. However, compensation payments are "voluntary" (no legal right for compensation) and in many provinces they are covered at least partly by the hunting associations through the hunting insurance. Compensation payments do not cover additional labor costs. Because of the expansion of the wolf population in the Alps, a pilot project for damage prevention in sheep grazing on Alpine pastures has been launched in 2012. The program includes the testing of fencing, herding, and livestock guarding dogs in 5 pilot areas (two projects have been realized up to now).

Game killed by bears or damages to hunting infrastructure (e.g. feeding sites) are not reimbursed.

Re-introduced bears seem to have been perceived by local people as "artificial" and "belonging to WWF". The official policy by the Austrian hunter's associations is that they oppose any re-introductions, but welcome bears that arrive naturally.

Threats

The re-introduced bear population in central Austria became extinct, the situation in Carinthia is stagnant, but dispersing male bears from Trentino are increasingly reaching Western Austria. Illegal killings seem to be a problem, although a proof is extremely difficult to obtain (Kruckenhauser et al. 2008). The latest case was the radio collared male bear *Rožnik*, which dispersed from Slovenia into the Austrian province of Carinthia in May 2009. Three days after having crossed the border into Austria for the first time the collar stopped. Twelve days later the carcass was found by locals on the Slovenian side of the border and an autopsy confirmed the bear had been shot (Kaczensky et al. 2011). Another case was detected in Central Austria in 2007, 13 years after the bear has been shot.

Situation and events in 2017

The general situation of bears in Carinthia and in the whole of Austria did not change in 2017. There is no trend visible in the number of bears present and the number of damages recorded. The number of bears individually genotyped (3) was within the range of the number of bears genetically confirmed in the years before (2 – 6)) although the contribution of Paolo Molinari nearly doubled the number of samples compared to the years before. For several months a bear roamed the Sattnitz-area causing quite a few damages to bee-yards. The Sattnitz is a rural area with farmland, grassland, and forests bit lies close to Klagenfurt, the capital of Carinthia. Therefore the public reacted quite excited about the presence of a bear. The conspicuous bear of 2016 (Rudolf/Rudolfo) did not show up again in 2017. In April 2014 the remnants of a paw were found in Tarvisiano and DNA-analysis confirmed its origin from this bear. End of October a bear (Ktn-09) was hit by a car in the Gail valley. It is likely that the victim of the accident was a brother of Rudolf. A year before hairs of both individuals were found together on a silage bale torn apart at a storing place about a kilometre away from the location of the car accident.

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