



AUTONOMOUS
PROVINCE
OF TRENTO

TRENTINO

2019 LARGE CARNIVORES REPORT



Dedicated to Daniele Asson





AUTONOMOUS
PROVINCE OF TRENTO



FORESTRY AND WILDLIFE SERVICE
Large Carnivores Division

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2019 LARGE CARNIVORES REPORT

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"Bear in a beech wood"

Photo by Daniele Asson - APT Forestry and Wildlife Department archives

Back cover

"Sunset in val di Non"

Photo by Daniele Asson - APT Forestry and Wildlife Department archives

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Forestry and wildlife Service ragers, forest wardens,
staff of the parks, gamekeepers from the local Hunting association,
volunteers and others.

1. MONITORING

1.1 Bear

Monitoring of bears (photo 1) has been carried out continuously by the Autonomous Province of Trento (APT) since the **1970s**. Over time, traditional survey techniques in the field have been supplemented by **radiotelemetry** (a method first used in Eurasia in 1976), automatic video controls by remote stations, **camera traps** and finally, since 2002, by **genetic monitoring**.



Photo 1 - Sampling of scat for genetic monitoring (APT Forestry and Wildlife Department archives)

Genetic monitoring

Genetic monitoring is based on the collection of organic samples (hairs, scats, urine, saliva and tissues) and takes place using two methods, commonly described as **systematic** monitoring, based on the use of hair-traps with scent bait, designed to "capture" hairs using barbed wire, and **opportunistic** monitoring, based on the collection of organic samples found in the area during routine activities, at damage sites and by checking **rub trees**.

In 2019 genetic monitoring was carried out for the **18th consecutive year**, coordinated by **APT's Forestry and Wildlife Department, Large Carnivores Division**, with the collaboration of FEM, ISPRA, PNAB, MUSE, Associazione Cacciatori Trentini (ACT) and volunteers. **Genetic testing** was carried out in a coordinated manner by the Conservation Genetics Research Unit at the **Fondazione Edmund Mach**, for samples from the province of Trento and some samples from the provinces of Bolzano and Lombardy, and at the laboratory in Lausanne in the case of Switzerland.



In **2019** both **systematic** and **opportunistic monitoring** were carried out.

In detail, during 2019 **monitoring** made it possible to collect **709** organic samples attributed to bears within the province, of which **571** were analysed and used for estimates. Other samples were collected outside Italy, contributing towards determining the **total** number of bears identified as belonging to the **population of brown bears in the Central Alps**; data was kindly provided by the **Swiss Confederation** (KORA & LBC - Laboratoire de Biologie de la Conservation, Lausanne), **Land Tirol - Austria** (Amt der Tiroler Landesregierung) and **Bavaria** (Bayerisches Landesamt für Umwelt - LfU).

In 2019, **systematic monitoring**, carried out in a standardised manner using hair-traps in areas where **bears** are present, was characterised by a specific way of preparing the **scent bait**, different compared to the method used in previous years. This was designed to increase the probability of **intercepting the animals throughout the season** (a drop in use is generally recorded in summer and autumn) and to **decrease the likelihood of the bears getting used to the lure**. This monitoring method was also chosen following an exchange of ideas with staff from the Abruzzo Lazio and Molise National Park responsible for monitoring the Marsican brown bear. Towards the end of summer 2018 work was begun to prepare the mixture of blood and fish representing the basis of the lure; 800-900 litres of the mixture were macerated for around 8-9 months. When the final product was prepared (in May 2019), different extracts (5 in total, based on fish, apples, aniseed, raspberries and blue berries) were added to each bottle of lure, in order to vary the scent bait available. The prepared bottles, which were different colours based on the added extract, were distributed to those working in the area and used for the various monitoring sessions, according to a specific calendar.

Initial analysis of the samples collected in 2019 provided confirmation that **the presence of the bears at the traps did not diminish** over the different phases of monitoring. The likelihood of “capturing” male and female bears thus remained relatively constant over the 4 summer sessions and the 3 late summer-autumn sessions (in the latter case with lower values), confirming a decidedly higher probability of capturing female bears, which can be explained because they are present entirely within the area in which the traps were positioned, whereas over the summer the males occupied a much larger area than it is possible to cover with systematic monitoring.

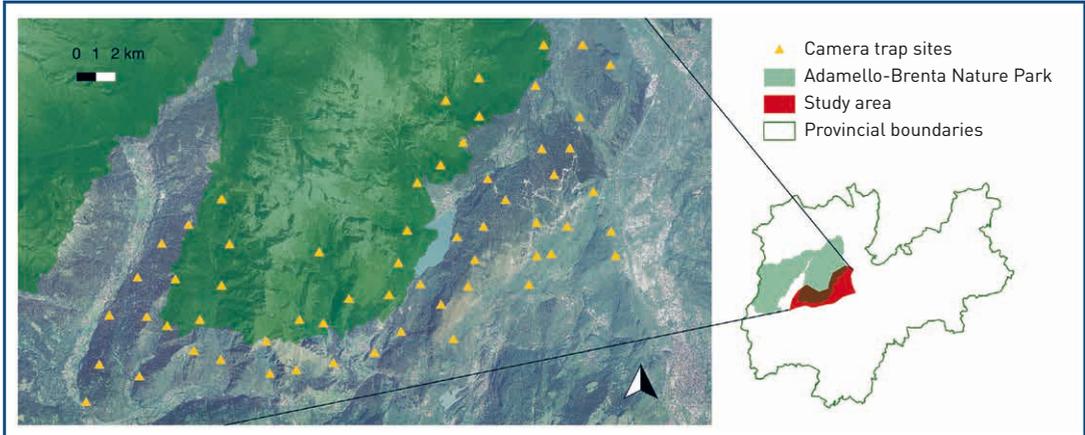
Photographic monitoring

The long-term monitoring programme of **wild mammals uses systematic camera trapping** and begun in the summer of 2015 (and thus reached its **5th year** in 2019) under an agreement between APT and MUSE for the monitoring of large carnivores. Since 2019 the programme benefits from the scientific support of the University of Florence. Monitoring is conducted in the summer and across 60 sites, covering an area of approx. 220 km² in the southern part of the Brenta massif and the neighbouring Paganella-Gazza mountains (Figure 1). For details regarding the sampling design see the previous editions of the Report.

In line with the previous years, in **2019 sampling** took place from June 9th to September 1st, with a total of **2,053 camera days** (with an average of 34.8 per camera). Due to damage caused by Vaia storm in autumn 2018 and the large number of fallen trees, one site was inaccessible. No camera traps were stolen during the sampling, with a total of **59 sites usable for analysis**. Cameras recorded **79,698 images**, of which **13,218 of wild animals**, belonging to **9 species**.

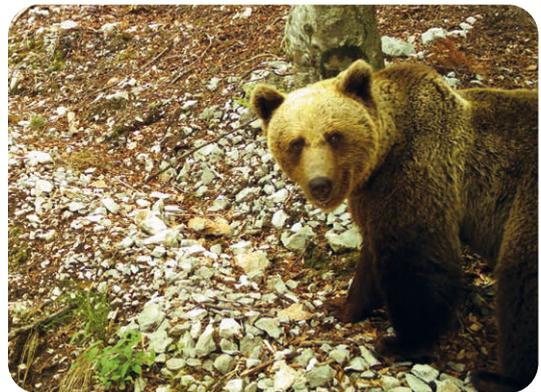


Figure 1 - Map of the 60 camera trap sites in the study area. The area of the Adamello-Brenta Nature Park (PNAB) is shown in green



In 2019, the presence of domestic species and people (both pedestrians and vehicles) was again recorded and quantified.

The presence of the **brown bear** in 2019 was recorded at **18 out of the 60 sites** overall (59 operational; photos 2 and 3, Figures 2 and 3), with **48 independent events** (number obtained by eliminating from the count images relating to the same detection event, considering a standard time interval of 15 minutes), and a maximum of 8 at a single site.



Photos 2 and 3 - Images of brown bears taken by camera traps in 2019 (MUSE archives)

Results were **consistent with the previous years** (2015-2018), when 15-23 sites of passage, with 39-51 independent events and a maximum of 4-11 events at a single site were recorded (Figures 2 and 3).

There are 4 common sites of passage for the five years (Figure 2; the size of the pie chart is proportional to the number of total events, while slices show the percentage of events for each year of monitoring).

In addition to the brown bear, 8 other species of mammals were recorded: roe deer, fox, red deer, chamois, hare, badger, stone marten, and squirrel (ordered by decreasing number of events), matching results from previous years. Once again, in 2019 there were **no detections of the wolf**, only camera-trapped on a single occasion in the summer of 2015 in Val Algone.



Figure 2 - Map of camera trap sites and events involving brown bears in the study area in the 2015-2019 period

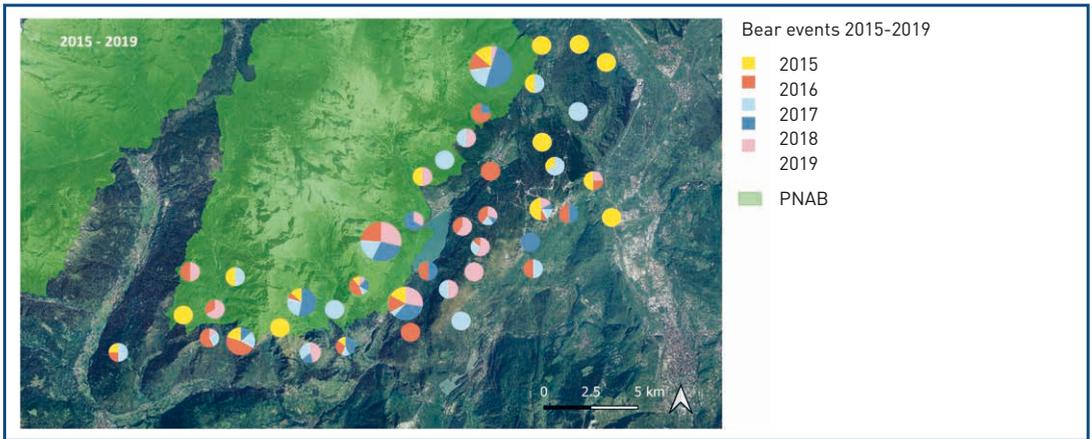
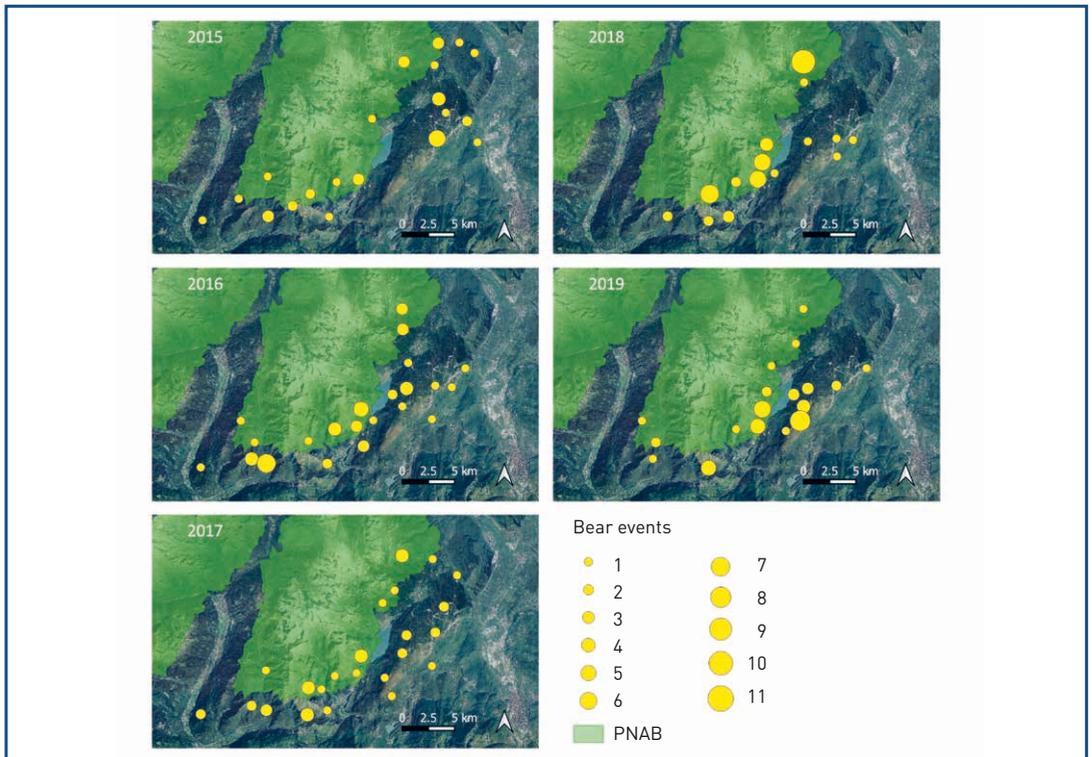


Figure 3 - Maps of camera trap sites and events involving brown bears in the study area in the 2015-2019 period

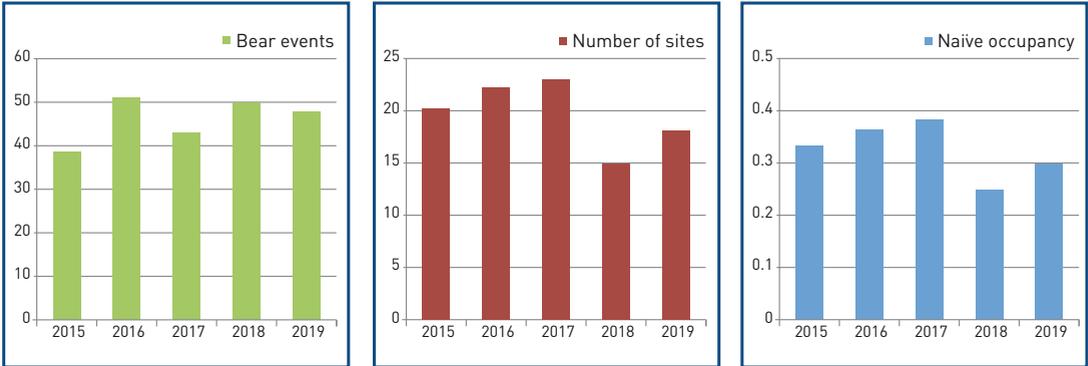


It is important to point out that five years of sampling, while representing a significant amount of data, is the minimum length of time for the purpose of investigating temporal dynamics of populations, and thus distinguishing real trends from normal annual oscillations. Hence it will be particularly important to see whether the apparent reduction in the number of sites with bear detections in 2018 and 2019 is maintained in subsequent years. For this purpose, a preliminary temporal analysis is underway, in the context of a master degree thesis at La Sapienza University of Rome.



Graphs 1, 2 and 3 show camera trap events of brown bears in the 2015-2019 period, illustrating the number of independent events, number of camera trap sites and naïve occupancy (ratio between sites where the species was caught on camera and the number of sites sampled), respectively. The comparison between the results of the 5 years is purely descriptive and does not aim to identify temporal trends.

Graphs 1, 2 and 3



During 2019, using data obtained in the first 4 years of photographic monitoring (2015-2018), an analysis regarding both **temporal (daily activity)** and **spatial distribution patterns (site use)** for the brown bear **in relation to anthropogenic disturbance** was carried out. The sampling protocol made it possible to obtain quantitative data on the passage of bears and people simultaneously, at the same spatial scale, and consistently during consecutive seasons in the field.

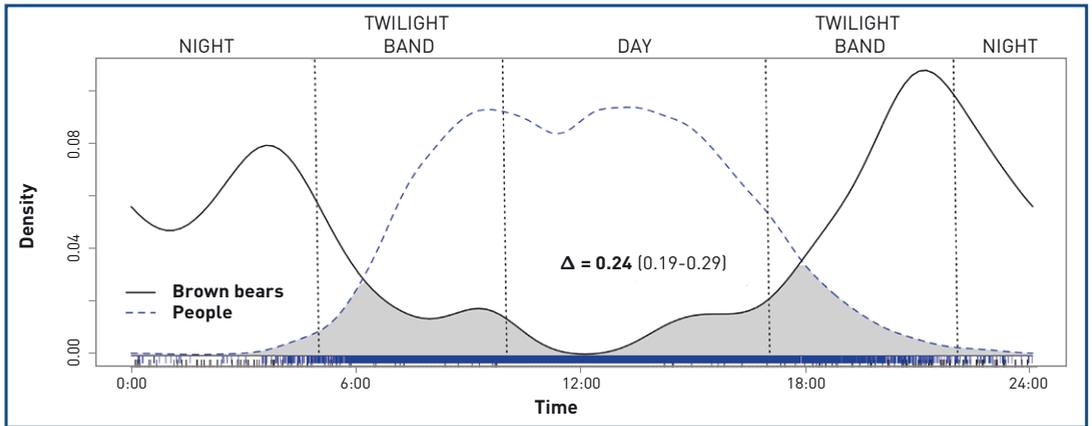
Results of this work suggest that in the study area the brown bear modifies its rate of activity and spatial distribution in order to avoid sources of anthropogenic disturbance, specifically the passage of people at sites (both pedestrians and vehicles, mainly for recreational purposes) and settlements. Analysis of activity patterns shows a temporal displacement between people and bears, with bears mainly being active during the night and crepuscular hours, whereas human activity being typically concentrated in daylight hours (Graph 4). In addition, spatial analysis carried out for crepuscular hours only, when both bears and people are active, showed a spatial effect of anthropogenic disturbance, with bears avoiding sites with a high level of human passage, and being less detectable close to settlements (Graph 5).

The shift in activity pattern from daytime to night-time/twilight, presumably to avoid anthropogenic disturbance, along with the tendency to spatially avoid encounters with people, has also been documented for other populations of bears in Europe. In contrast, in North America, where the areas occupied by brown bears are generally characterised by low intensity of use by man, brown bears are largely active during the day and more aggressive than their European counterparts. These results are of important relevance to the users and managers of the mountains, providing proof that bears living in areas with high levels of anthropogenic disturbance have developed a solid attitude of human avoidance, an important prerequisite for the coexistence of men and bears, both in the study area and in the Alps in general.

Graph 4 shows the curve for activity rates of the brown bear in the study area in the 2015-2018 period and superimposition with human activities (dashed curve). The dotted vertical lines delimit the crepuscular time intervals used in the spatial analysis.



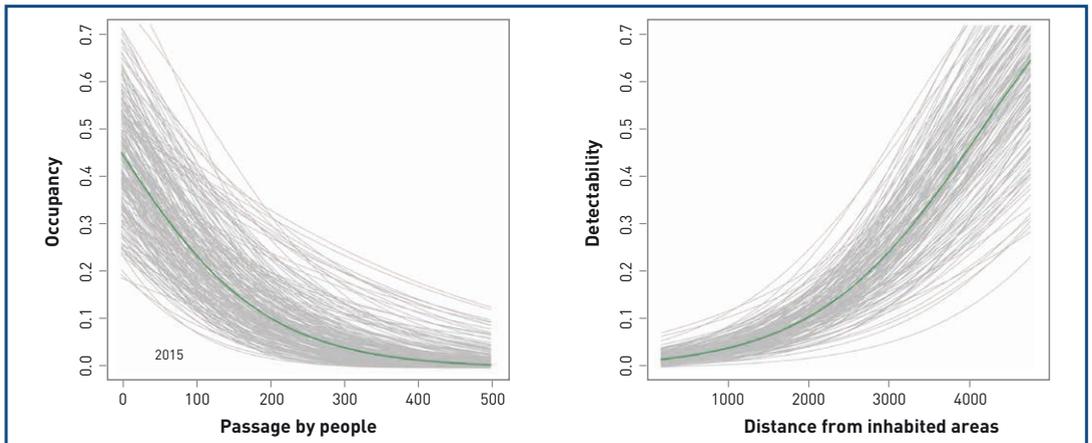
Graph 4 - Activity rates for brown bears and humans



The coefficient of overlap (Δ) between the two activity curves and the relative confidence intervals are also shown. Source: Oberosler et al. (under review).

Finally, Graph 5 shows the significant effects obtained by spatial analysis of data on the brown bear in the 2015-2018 period, estimated for the half-light band (5 to 10 am and 5 to 10 pm): the negative effect of passage by man on the use of sites, and the positive effect of the distance from inhabited areas on detectability, respectively, source: Oberosler et al. (under review).

Graph 5 - Negative effect of the passage of people on the use of sites, and positive effect of the distance from inhabited areas on the detectability of the bear



By *Valentina Oberosler, Margherita Rinaldi and Francesco Rovero*



Definitions

- “**Cubs**”: bears aged between 0 and 1;
- “**Young bears**”: males up to the age of 4 and females up to the age of 3;
- “**Adults**”: males aged 4 and over, and females aged 3 and over, considered to be sexually mature and capable of reproducing;
- “**Detected bears**”: bears whose presence has been ascertained during the year, either genetically or on the basis of unequivocal information (associated with radiotelemetry for example) and repeated observation;
- “**Undetected bears**”: bears not genetically detected just in the last year;
- “**Rediscovered bears**”: bears detected genetically after two or more consecutive years during which their presence was not recorded;
- “**Dispersion**”: movement outside the core area where the females are present, coinciding essentially with western Trentino, by bears born in this area, without them reaching the territory habitually frequented by bears belonging to the Dinaric population;
- “**Emigration**”: abandoning of the source population by bears reaching the territory habitually frequented by bears belonging to the Dinaric population;
- “**Return**”: return to the core area where the females are present, coinciding essentially with western Trentino, by dispersing or emigrating bears;
- “**Immigration**”: arrival of bears from the Dinaric bear population in the territory used by bears in western Trentino.

Results

All the **data** collected are processed on an annual basis, with reference to the calendar year (1/1 - 31/12), which effectively coincides with the “biological year” of the bear.

It is implicit that the monitoring techniques cited do not guarantee that **all the bears present in the area will be detected**. However, retrospective reconstruction of the population present and the application of statistical methods to estimate the total extent of the population make it possible to provide the overall estimates for the total population, with the relative confidence intervals, that are subsequently presented in the report.

Graphs regarding demographic aspects have been updated not only by including data for the last year, but also by retrospectively amending the data **for previous years** regarding bears that monitoring in 2019 has made it possible to rediscover, and which are thus also considered to be present in previous years. This explains the differences that can sometimes be found in relation to graphs in previous Reports. **Updating of the data available and the relative graphs is therefore ongoing**, and the current graphs must thus be considered to substitute previous ones.

Processing of the **data** collected in 2019 has provided the information given subsequently regarding the **demographics, survival rates, numbers, structure, trend, distribution, density and dispersion of the population**.



(C. Groff - APT Forestry and Wildlife Department archives)



Demographics: births and rediscovered bears



In 2019, it was estimated that there were **9-12 new litters** (photo 4), with a total of **16-21 cubs**. This estimate was made based on information regarding genetic testing and geographical distribution, together with direct observation of females with cubs recorded during the year.

Furthermore, during 2019 one bear was **“rediscovered”** (see definitions). This was M35, recorded genetically for the last time in 2016.

Photo 4 - Four youngs just after separation from the mother (A. Stoffella - APT Forestry and Wildlife Department archives)

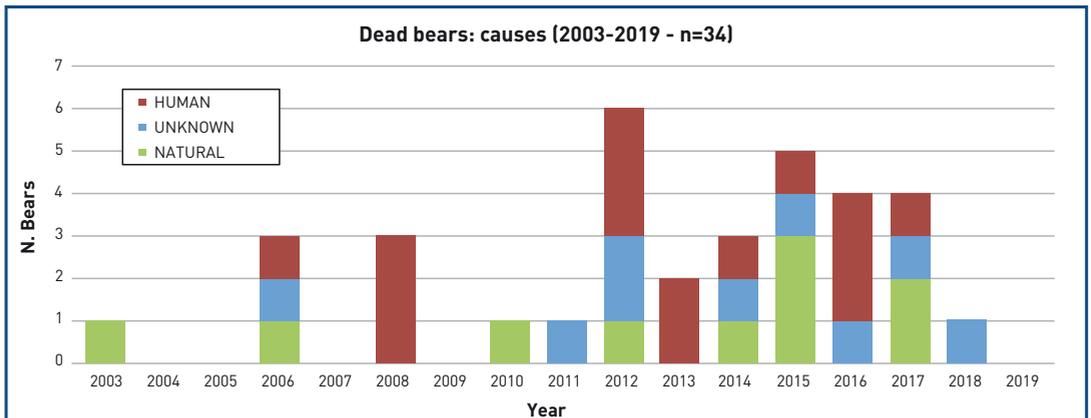
Demographics: dead bears

No dead bears were recorded in 2019.

Therefore, from 2003 to the present day **34 bears** in the bear population of the central Alps are known to **have died** (also outside Trentino). In 10 cases (29%) the deaths were due to **natural causes**, in 9 cases (27%) the cause is **unknown**, while in 15 cases (44%) the deaths were **linked to man** (Graph 6). It should be underlined that these figures probably do not reflect either the total number of dead bears, nor the real proportions in terms of the cause of death, given the different likelihood of noting them (for example, it is much easier to find bears hit by vehicles along roads than those dying from natural causes).

The 15 **dead bears caused by man** are due to: 27% following **illegal killings** (4), 46% **accidentally** (7) and 27% due to **legal removal** (four of which one in Germany, two in Switzerland and one in Trentino).

Graph 6

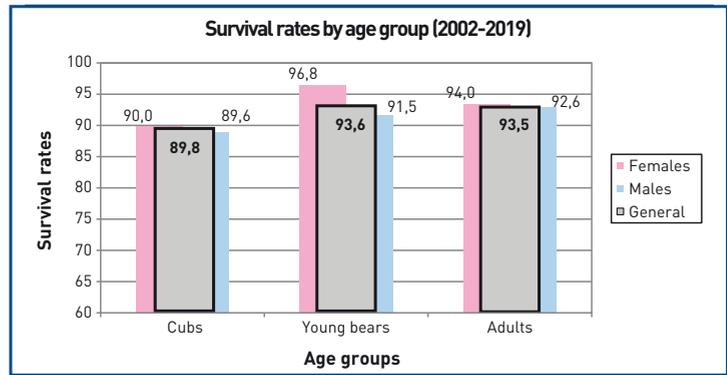


Survival rates

The new data available make it possible to update the **survival rates** for the three different age groups, differentiated for the two sexes (Graph 7). The data refers to a period of **18 years** (2002-2019) and to **136 different bears**, making it possible to record their survival or death over **703 bear-years**. In addition to ascertained deaths, the "fatalities" category, considered in the broader sense, also includes bears undetected in the last two years or taken into captivity, confirming the criteria used for "missing" bears. Data regarding any emigrating bears is instead only considered up to the time when they leave their original population.

Survival rates for cubs is more difficult to estimate, considering that they belong to an age group that it is not easy to record. This also due to the possibility that some of them may die before being recorded.

Graph 7



(M. Zeni - APT Forestry and Wildlife Department archives)

BOX 1 - Rehabilitation of motherless cubs for release into the wild

By the forestry ranger A. Stoffella

In nature, when there are viable wildlife populations, it is not so rare to find cubs left without their mothers, for example roe and red deer, but also bears. In the province of Trento two bear cubs, identified as "M11" (period of rehabilitation 23 May - 1 July 2011) and "M56" (27 May - 2 July 2019) have been rescued and then freed by the Forestry and Wildlife Department,

There can be many reasons why the mother bear abandons or loses her cub. In the two cases in question the most likely hypothesis is that the cubs had fled after male bears in search of females to mate with tried to kill them. This is supported by the fact that both the cubs were found in spring, precisely at the time when the females may be in heat.

A bear cub four or five months old (as in the cases of M11 and M56), however capable of feeding autonomously, still depends greatly on its mother, who in addition to protecting it, also guides it through the various phases of learning. So a cub remaining alone in this period of its life, while demonstrating considerable physical resistance, has very little chance of surviving in the wild. The chances improve significantly for cubs that are even a few months older (photo A).



Photo A – The bear cub M56 in the days preceding his rescue

The literature describes various attempts to recover orphaned cubs naturally, for example by entrusting them to an adoptive mother. However, with a few exceptions, these attempts have failed. In contrast, keeping cubs temporarily at a specialist centre has been shown to be perhaps the only alternative, and if managed correctly, also offers good possibilities of success. Recovering a wild animal to subsequently return it to its environment is however not an easy enterprise. This is even more true for the bear, characterised by intelligence, individuality and a considerable capacity for learning, considering the risk of possibly excessive interaction with man, which could make the animal accustomed to his presence, with all the risks that this leads to.

The instructions and suggestions received indirectly from John Beecham in the USA and Valentin Pazhetnov in Russia, responsables for the two recovery centres with most experience of the management and recovery of motherless bear cubs at international level, had an important role in the management of M11 and M56. It is undoubtedly possible to learn much from

other people's experience, but not everything; only commitment, perseverance, dedication and care can give rise to satisfactory results.

Two fundamental aspects must be considered in order to correctly carry out activities to recover a bear cub: the first is its physical recovery through an appropriate diet, the second is reducing any form of conditioning by man to a minimum, because the cub's learning and associated future risks of interaction will depend on this. In order to satisfy these requirements, it is first of all necessary to have an appropriate holding area. The Casteler forestry nursery centre is good to this purpose. It is better for a single person to take responsibility for caring for and raising the cub. While carrying out their duties, preferably always wearing the same clothes, the warden must remain in the enclosure only for the time strictly necessary to carry out management and cleaning procedures, avoiding all direct contact with the cub. All the operations and time spent in the area must take place in absolute silence, without attracting the cub's attention vocally or in any other way.

In the cases of both M11 and M56, it was possible to observe how the behaviour of the cubs changed over the period of detention. When they arrived, the bear cubs were afraid, looking for possible hiding places and showing themselves reluctant to eat food if they noted anyone's presence. After a few weeks the cubs began to feel more secure, their fear was transformed into bolder behaviour and in some cases, it was even possible to observe imitations of the false attacks typical of adults. After four or five weeks the most critical period began and the behaviour of the cubs changed once again: their attention was increasingly directed at the warden, with attempts at interaction. The cubs indeed often initiated a sort of invitation to play, with somersaults and other behaviour designed to attract the warden's attention. In this phase it is absolutely crucial to ignore and not to indulge these forms of behaviour. Faced with such strong stimuli, an unprepared warden could make mistakes: the cub's effusions can inspire great tenderness, and partly explain why so many children have a teddy bear in their lives.

In order to mitigate these attempts at interaction, it has been shown to be useful to have various objects that distract and keep the cub occupied, especially in the external area: trunks of wood, small trees to climb and stones to be rolled, while a small pool of water for bathing should most definitely not be lacking.

Correct nutrition is the first requisite for the physical recovery of a debilitated animal. For this reason, during the initial period of detention, it is appropriate to give the cub high-calorie and easily digested food, such as good quality powdered milk. A five-month-old cub, as in our cases, is perfectly capable of drinking milk from a bowl, so feeding by hand with a bottle or other system should be avoided. Pazhetnov's experience in Russia showed that the mother bear does not teach her cubs directly what foods to eat, but rather limits herself to taking them to areas with different food sources, so that they can discover them autonomously. For this reason, it is very important to give the cub the widest possible variety of food from the very beginning. Fruit or shoots growing spontaneously in the woods would be ideal, but in the absence of these, other types of fruit (also dried), vegetables and cereals etc. will do. The cub will discover them and make its selection. Feeding with a single type of food, however appetising, should most definitely be avoided, as this would inhibit the search for food in the wild in the future.

In just over 30 days (duration of the rehabilitation), the weight of the bear cub M56 went from 5.6 kg to 16.8 kg (photo B).

At recovery centres the cubs are often released after a relatively long period in captivity, generally around the age of 15-17 months, which coincides with the time they would naturally separate from the mother. However, if very large holding areas are not available, this procedure is very difficult to follow without excessive interaction with man.



Photo B - The bear cub M56 at the Casteler recovery centre

For both the cubs recovered in Trentino it was decided not to prolong the period of detention beyond 40 days, as they had achieved a good physical recovery, with a body weight exceeding that of cubs of the same age growing up in the wild. This was a sort of compromise between a low risk of interaction and a good chance of survival.

Various studies have shown that the chances of survival for cubs in good physical condition released at the age of six-seven months are already quite good, almost comparable to those of cubs growing up with their mothers in the wild.

The choice of the release site must be made on the basis of certain very important requisites: a significant distance from areas populated by man, a good presence of natural food resources, and last but not least, in so far as it is possible to ascertain, a low density of bears present, especially males.

The first cub rehabilitated, M11, was put to sleep for transportation to the release area, whereas for M56 a solution considered less debilitating was found, as the drug injected for the anaesthetic nevertheless maintains some effects for several days. Furthermore, M11 was fitted with ear tags, whereas in the case of M56 it was not considered to be indispensable, given the choice to free him without having anaesthetised him for transportation.

Given the dimensions of the cub M56, who had almost tripled his weight on arrival, a wooden box of suitable size and robustness was constructed. Several days before the date scheduled for the cub's release, the box was placed inside the holding area. In the space of a short time the box had become his favourite den. So at the time of departure to return to the woods it was only necessary to close the crate while the cub was sleeping there quietly. The whole operation took place in a few minutes, without the bear cub showing any signs of panic or stress.

After the liberation of M11 there were rare sightings in autumn, before he then reappeared the following spring a long distance from the release site, showing that he had successfully overcome the initial phase and the following winter.

There has been no news of M56 since his release. The hope is that genetic traces will be found next spring, confirming his survival in the wild.

Population and structure

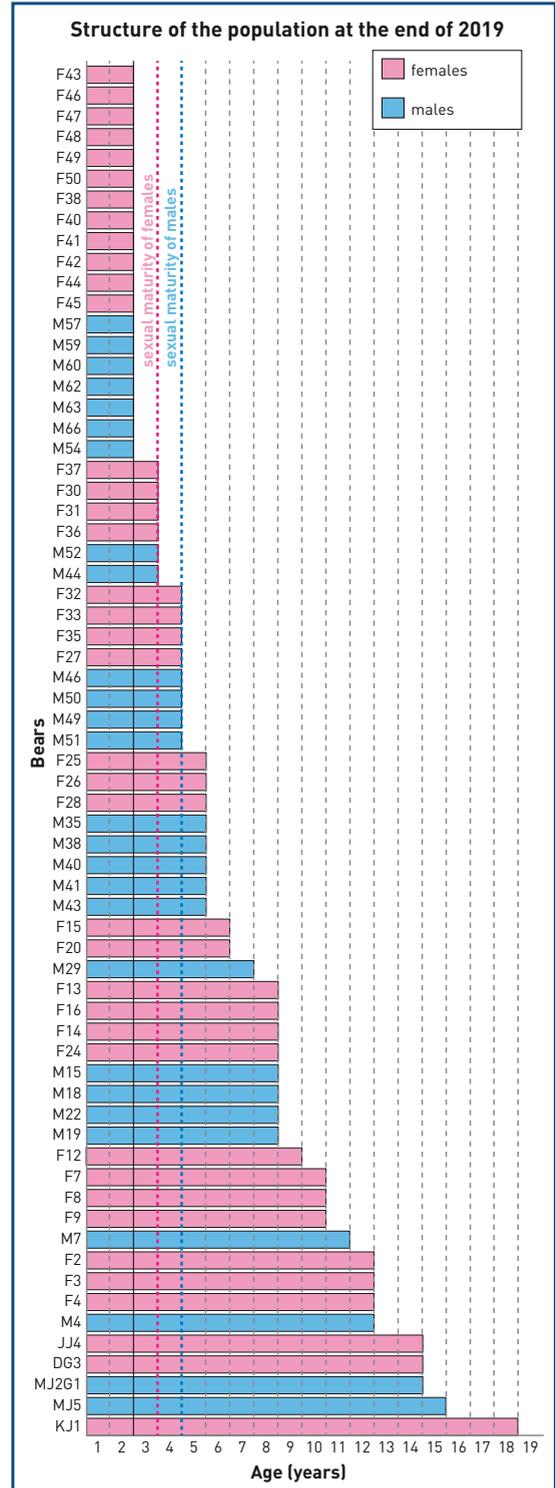
Bearing in mind the increasing difficulty of acquiring accurate and reliable data about births, it has been decided **not to consider the class of cubs** when determining the **minimum certain number** of bears.

On the basis of this criterion, the **minimum certain number** of young and adult animals considered to be present in 2019 is **66**, of which **27 males** and **39 females** (Graph 8) (sex ratio M-F 1:1.44 - n = 66).

At the end of 2019, the **structure** of the ascertained population (excluding cubs) was as follows: **37 adults** (56% - 14 males and 23 females) and **29 young bears** (44% - 13 males and 16 females). The **average age** of known bears (excluding cubs) was **4.8 years**, with a slight difference between **males (4.6 years)** and **females (5.0 years)**.

Estimation of the overall population, also taking into consideration **the category of cubs in 2019** (16 - 21 as previously reported) and individuals not genetically identified just in the last year (6), can therefore be established in a wider range of **82-93 bears**. This therefore represents the **official data on numbers in 2019**, drawn up using the same system used in previous years.

Without prejudice to this data, an estimate of the extent of the population was also carried out making use of **models involving “capture (genetic), marking and recapture” (CMR)**. The result was a population of young and adult animals comprising **68 bears** (excluding cubs born in 2019), with a confidence interval (CI) of between **66 and 76**.



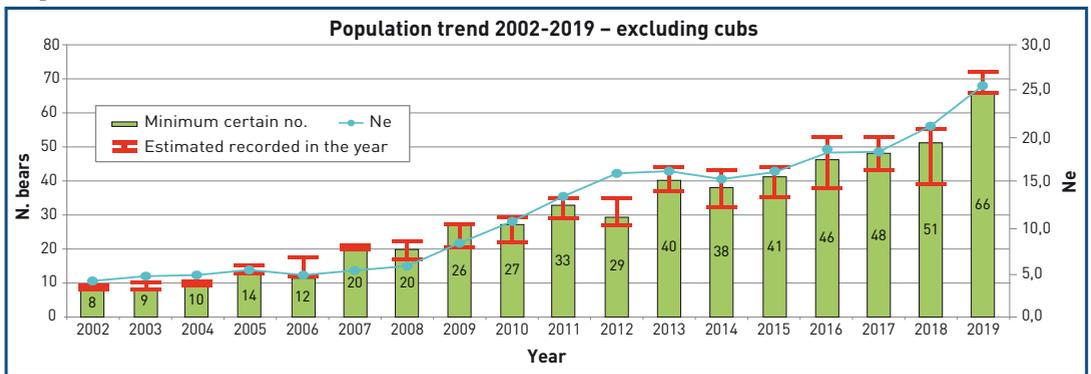
Graph 8

Trend

The population **trend** for the young and adult categories (again **excluding cubs**) is shown in Graph 9. The columns in green show the **minimum certain number** of adults and young bears recorded year by year, updated and supplemented on the basis of data acquired in subsequent years.

The graph also shows **past data for estimates** recorded year by year, represented by the interval shown in red (which also considers bears absent for only one year, again excluding cubs); the respective figures effectively provide a “snapshot” of each season, unchanged by the adjustments made possible later due to subsequent monitoring. Finally, it also shows the trend for the so-called “**effective population**” (Ne), calculated by considering the number of reproductive males, plus the number of reproductive females, divided by two (as in general they are capable of reproducing every second year).

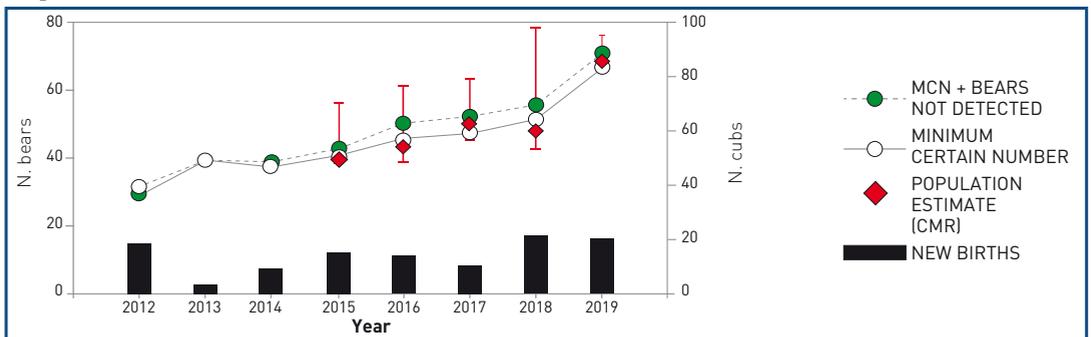
Graph 9



On the basis of retrospective examination of the population estimates, which it is possible to progressively make more reliable through the testing in subsequent years, it can be seen that **in the last 5 years** the bear population has seen an **average annual growth of 12% in the size of the population, excluding cubs** (see Graph 9). In the preceding four years (2011-2014), growth was instead around 8% a year. Considering the high level of births recorded (16-21 cubs), the 2019 data appears to be in line with the trend for the last five years.

Graph 10 shows the **trend** for population numbers of young and adult bears estimated using **genetic marking-capture-remarking (CMR)** models, with the confidence intervals in red, which are also updated on the basis of data acquired in subsequent years.

Graph 10

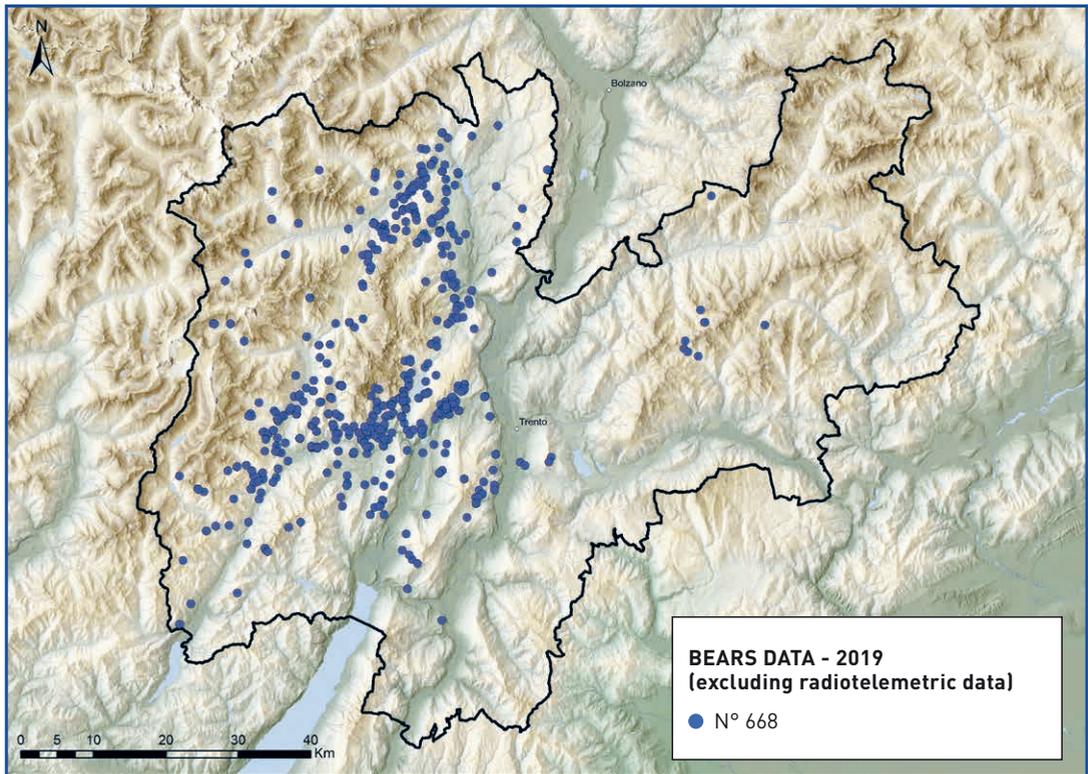


Distribution

3 of the 66 bears recorded in 2019 were **only detected outside the province**: M29 and M46 in Switzerland (M29 also in Piemonte) and M4 in Friuli Venezia Giulia. 6 other bears frequented **neighbouring provinces/regions** as well as Trentino, specifically M7, M44 and M52 in the province of Bolzano, M19 and M38 in the province of Sondrio and M57 in the province of Brescia.

The **668 data of the presence** of bears collected **within the province of Trento** during 2019 are shown in Figure 4. These represent all recorded data, with the exception of those from satellite monitoring of two bears. The data regarding eastern Trentino refers to the bear M49.

Figure 4

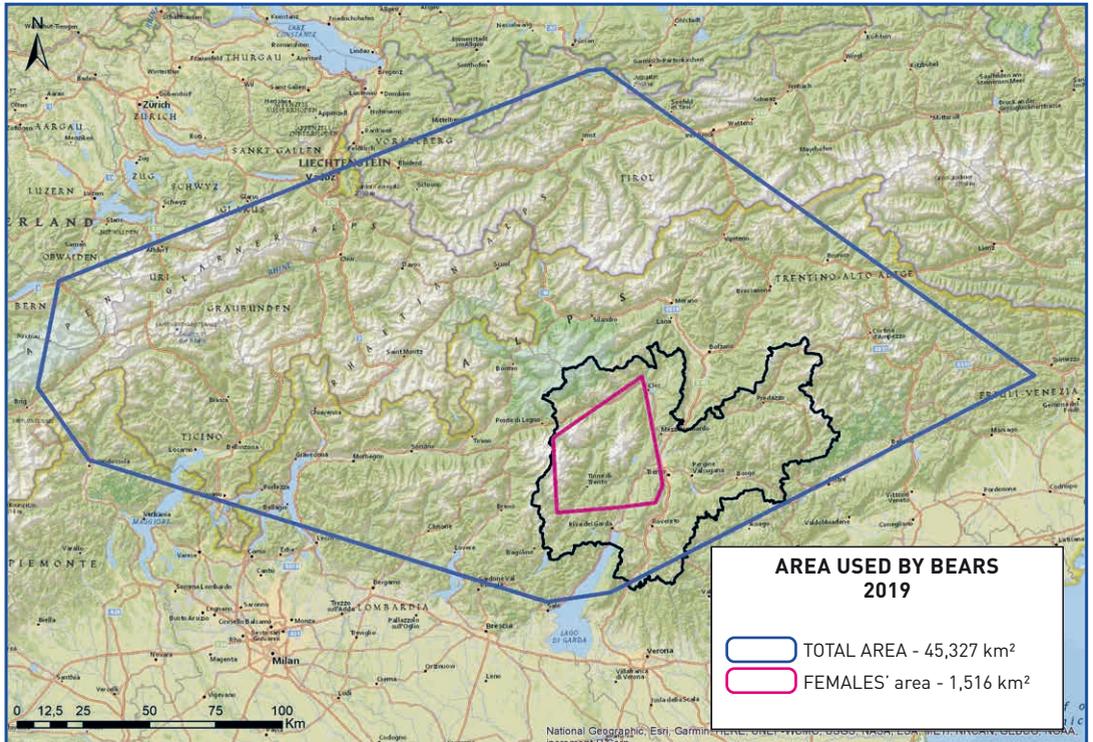


Considering also the longest journeys made by **young males**, the bear population in the central Alps was **distributed over a theoretical area stretching out over 45,327 km²** in 2019 (Figure 5). In 2019, at the extremes of the polygon regarding male bears, there were reports from **south-western Switzerland, Piemonte, the Reutte area on the border between Tyrol and Bavaria, and Friuli Venezia Giulia**, where the presence of M4 was again confirmed. During the year he lost the radio collar fitted in April 2018 by technicians from the University of Udine (Department of Agricultural, Food, Environmental and Animal Sciences).

The area occupied by the females in a stable manner is smaller (**1,516 km²**) and situated entirely within the province (western Trentino). Such area saw a substantial **increase compared to 2018 (+31%)**, which will however need to be confirmed in subsequent years, to understand whether the phenomenon is transitory or not.

The areas occupied were estimated using the minimum convex polygon (MCP) method, applied to 100% of the validated data of presence. This also leads to the inclusion of vast areas which are not suitable and/or not actually used, especially within the macro-area including the movements of young males.

Figure 5



(M. Zeni - APT Forestry and Wildlife Department archives)

Use of the space by bears fitted with radio collars

In 2019 two bears were monitored using satellite telemetry, a female (F20, aged 4) and a male (M49, aged 3), whose home ranges, calculated using the minimum convex polygon (MCP) method), are shown in Figure 6.

As regards this, it was noted that on leaving her den the female bear called **F20** (photo 5) was suffering from significant **lameness** of her back left leg, the origin of which is unknown. However, this did not prevent her from successfully raising the cub following her, born around January (the first known reproduction for this bear), or from moving over the whole territory that she had also used in previous years.

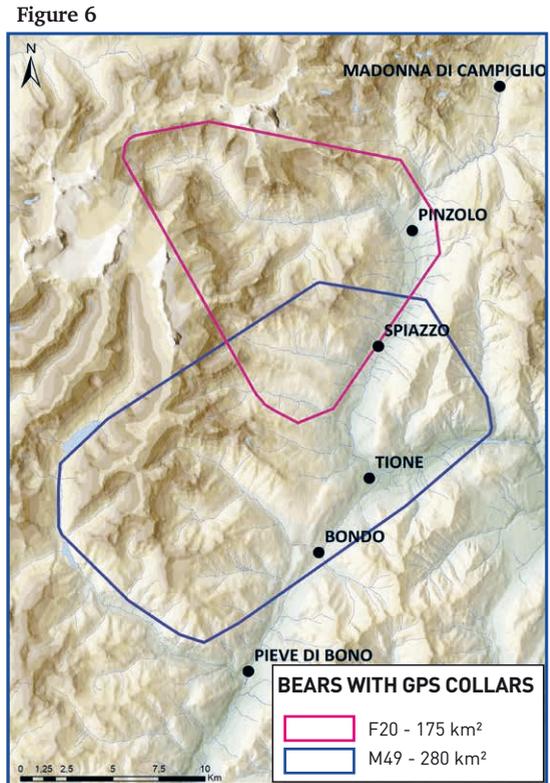


Photo 5 - The female bear F20 with her cub, photographed in Val Genova (N. Panelatti - APT Forestry and Wildlife Department archives)

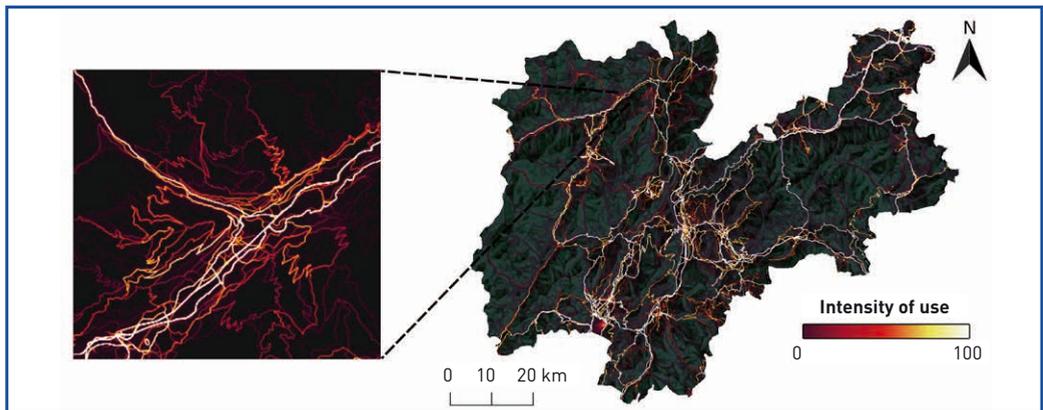
BOX 2 – Effect of human disturbance on Alpine brown bear distribution

By A. Corradini, F. Cagnacci, L. Pedrotti, M. Ciolli, C. Tattoni.

Human disturbance has become the most important determinant of wildlife **space use** and distribution worldwide. This does not only happen through hunting, urbanisation, or the construction of infrastructures, but also through the ‘active’ use of the landscape, specifically of roads and trails. This is the case, for example, in the province of Trento, where recreational outdoor activities (e.g. trekking, trail running, or mountain biking) are widespread throughout the area. However, with the exception of local contexts, to date there are no estimates of local trail network use. Human presence in non-urban areas can have a significant effect on wildlife, therefore an accurate estimate of such disturbance is key to study wild species in natural environments.

With the large-scale spread of GPS technology, particularly among personal devices (e.g. smartphones or smartwatches), in recent years it has become possible to track individual movement while hiking or cycling. Mobile applications such as **Strava** (San Francisco, USA) enable users to track and share their movements with the user community. Indeed, all GPS-tracked activities recorded are automatically uploaded to Strava’s website and aggregated into a Global Heatmap. The Heatmap (**Figure A**) is a representation of the cumulative outdoor activity recorded by users, in which higher ‘heat’ corresponds to greater use of the infrastructure.

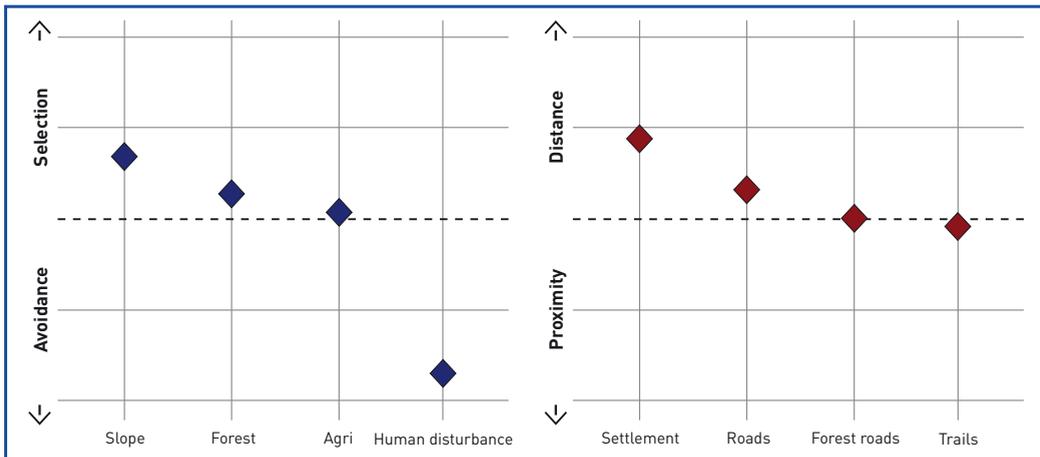
Figure A - Strava heatmap for the province of Trento.



Within the PhD project “**AlpBearConnect**”, involving scientific collaboration between the University of Trento, Edmund Mach Foundation and Stelvio National Park, the impact of human disturbance on the distribution of Alpine brown bear is being studied. Among the different sources of disturbance analysed, a new index of human presence was created based on the aforementioned Strava Heatmap (**Figure A**). This new index, unique in its kind, has been validated with camera trapping data provided by MUSE - Museo delle Scienze and scientifically tested using brown bear telemetry data.

Using the GPS locations of 12 animals (radio-collared between 2011 and 2019), bear space use was estimated in relation to the new index derived from Strava, as well as environmental variables (forest cover, slope and distribution of agricultural areas) and infrastructural variables

(distance from paved roads, forest roads, trails and human settlements). Within their home ranges, Alpine bears selected steep areas and high canopy cover, avoiding areas in proximity to human settlements and paved roads (**Graph A**). Bears neither avoid nor select agricultural areas and forest roads, but occasionally select areas in proximity to trails, generally used at times of low human presence (as already demonstrated in previous studies). Nevertheless, as shown by the distribution of recreational activities in the province of Trento, collared animals showed a strong avoidance of areas highly frequented by people (**Graph A**). This result shows that in the same environmental conditions, the distribution of bears is affected by people's 'active' use of the landscape and not just by the simple distribution of roads and human settlements.



Graph A - Estimated coefficient values influencing brown bear space use. Variables close to zero (dashed line) should be considered irrelevant to the bear. On the left (in blue), a greater distance from zero corresponds to stronger selection or avoidance of environmental and human disturbance variables. On the right (in red), a greater distance from zero corresponds to selection of areas further away or close to infrastructure variables.

The study indicates that bears minimise the risk of encountering humans by selecting little disturbed areas. In a region where outdoor recreational activities are widespread, the availability of "shelter areas" is essential for the wellbeing of the species. Despite the current presence of large suitable areas, an increase in disturbance could restrict the accessibility of the safest areas. In this regard, the effects of the aforementioned disturbance on ecological connectivity in the Central-Eastern Alps is currently being studied, in particular evaluating the mechanisms of population expansion in the presence of widespread human disturbance.

Density

The density recorded in the area occupied by the females (1,516 km²) was 4.0 bears/100 km² (61 bears, excluding cubs born during the year). This data should be considered bearing in mind the following:

- the density refers to a dataset collected over an extensive period of time (a whole calendar year) and therefore the number of bears present in the area at a certain moment, which would represent a figure closer to the real average density, is likely to be lower;

- some bears (males) also frequented areas outside the area occupied by females in the period of time considered. This also contributes towards making the effective density lower than reported.

The density may be different locally, as is partly evident in Figure 7, which shows the **minimum number of bears**, excluding cubs, identified with certainty (genetic tests or radio-telemetry) **in each sector** of western Trentino. It goes without saying that many animals were present in more than one sector, also in relation to different seasonal availability of food, and may therefore have been identified in several of them. It follows that the total minimum number ascertained in the province and in neighbouring areas in 2019 remains 64 bears (excluding cubs) and thus there is no sense in summing data from the individual sectors.

Dispersion

In the period 2005-2019 it was possible to document **dispersion** (see the definition on page 11) involving **38 bears** (all males) (Figure 8). **15 of these (40%) died or disappeared** (before returning), a further **10 (26%) returned** (and 5 of these subsequently died or disappeared), **2 (5%) emigrated** and **11 (29%) are still dispersing**. **No dispersion by females born in Trentino** has yet been documented.

Figure 7

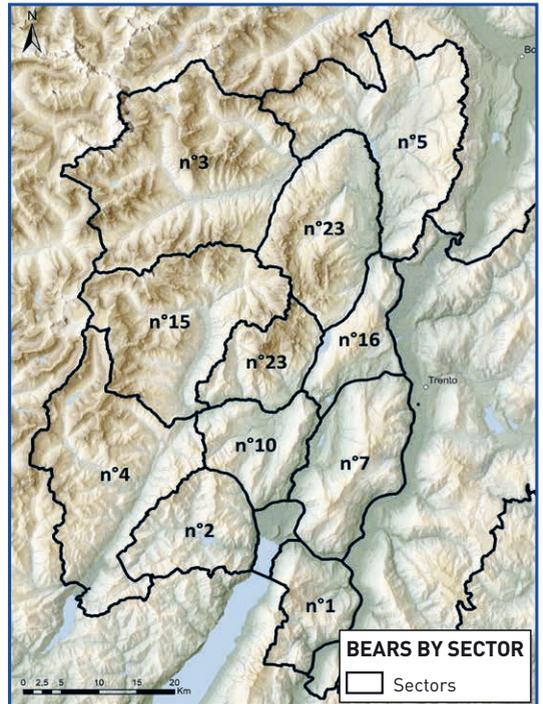
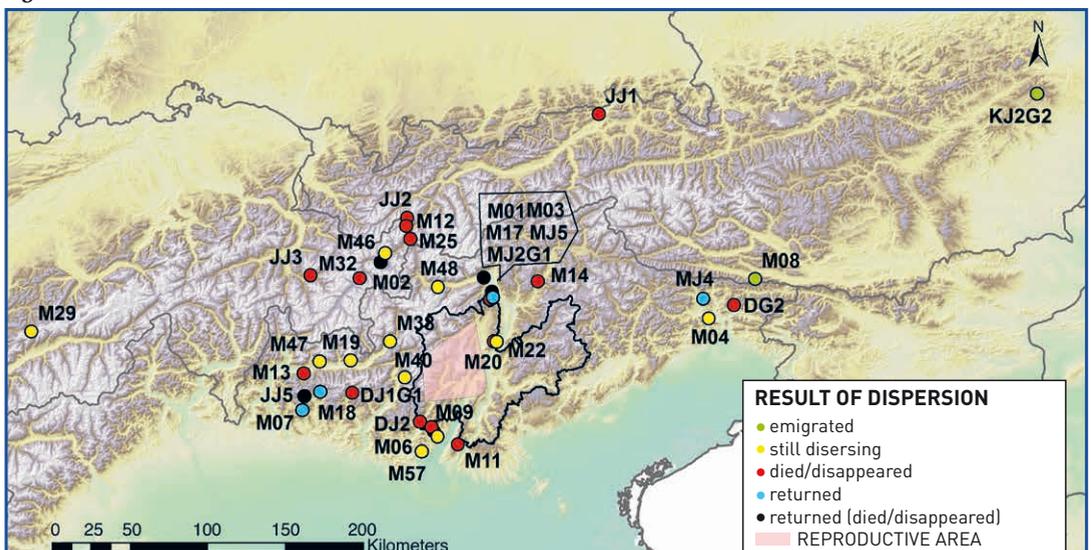


Figure 8



1.2 The Wolf

Monitoring of the species **began** with the natural return of the wolf to Trentino in **2010** (first live wolf detected), after its disappearance around the middle of the 19th century.

From the beginning, **genetic monitoring**, traditional **surveys in the field** and **camera traps** (photo 6) were used to detect also this species.



Photo 6 - Camera trap image of a wolf on Monte Zugna, with Ala village in the background (T. Borghetti - APT Forestry and Wildlife Department archives)

The **genetic monitoring efforts** for the wolf are significantly **smaller** in comparison to the efforts dedicated to the bear, which is a priority for several reasons (small isolated population, in contrast to the wolf, which belongs to an “Alpine” population that is part of an even broader European metapopulation).

During 2019, **515 data** reports referring to the **wolf** were recorded in the province, belonging to categories **C1** and **C2** (data defined as “irrefutable” and “confirmed by experts” respectively, on the basis of Kora-CH criteria), such as sightings, photographs, prey, footprints, hairs, scats and urine. Of these, **137** are referred to organic samples, **70** of which were analysed by the Conservation Genetics Research Unit of the **Fondazione Edmund Mach (FEM)**.

In 2019, in addition to the standard sampling of indicators of presence, some workers in the Forestry and Wildlife Department were involved in **health monitoring**. This initiative, carried out in collaboration with the Conservation Genetics Research Unit of the Fondazione Edmund Mach and different Veterinary Medicine Institutes in northern Italy, has the scope of investigating the presence of the **parasite *Echinococcus multilocularis***, associated with species representing the definitive host for the pathogenic agent, such as the fox and the wolf. In addition to standard sampling, the staff collected the whole scats, to be delivered to the laboratories dealing with testing. The survey area for the research involved most of northern Italy (Trento, Bolzano, Udine and Belluno) and the results will be issued in 2020.

Reproduction, numbers and distribution

Thanks also to the information provided by the Veneto and Lombardy Regions and the Autonomous Province of Bolzano, in 2019 the overall data collected led to an estimated **population of 13 packs** (or family groups) whose home range also included, at least part of, the province of Trento over the course of 2019. No less than 11 of these are believed to gravitate at least partly in the territory of neighbouring provinces (Verona, Vicenza, Belluno, Alto Adige/Südtirol and Brescia), whereas 2 are believed to be based entirely within the confines of the province.

They are listed in **Table 1**, with the number and name of the area identifying them, the year the pack was formed and the number of ascertained cubs in 2019, when available (photo 7).

In 2019 the **deaths** of 2 wolves were recorded:

- **10 March 2019**, in the **Avisio stream in the municipality of Soraga**; a **male wolf weighing 22.5 kg**, cause of death contusions (photo 8). The animal was found without its head and front legs, which had been cut off. The case was therefore reported to the judicial authority.
- **16 May 2019** at **Virti di Carbonare, municipality of Folgaria**; a **pregnant female wolf** (6 pups) weighing 26.4 kg, cause of death unknown (photo 9).

These are the third and fourth wolves found dead in the province, after the initial finding of a few bones in autumn **2008** not far from **Passo degli Oclini** in Fiemme (2009 Bear Report,

page 57) and a second wolf hit by a vehicle in **Valsugana** on 21 April **2016** (2016 Bear Report, page 37).

In 2019 a new wolf **pair** was also recorded on Monte Baldo.

Furthermore, the presence of **other lone wolves** was also documented during the year in a sporadic manner in the following areas: **Bleggio, southern Brenta, Val di Peio, Predaia tableland, Val di Cembra, Val di Fiemme and Tesino.**

Table 1 - Packs recorded in the province of Trento

| N | NAME | FIRST YEAR | N. PUPS 2019 |
|----|-------------------|------------|--------------|
| 1 | Lessinia | 2013 | ND |
| 2 | Carega | 2016 | 8 |
| 3 | Asiago-Marcesina | 2016 | 4 |
| 4 | Pasubio | 2017 | 5 |
| 5 | Alta Val Di Fassa | 2017 | 5 |
| 6 | Alta Val Di Non | 2017 | 5 |
| 7 | Folgaria-Vigolana | 2018 | 0 |
| 8 | Vezzene | 2019 | ND |
| 9 | Manghen | 2019 | 5 |
| 10 | Vanoi | 2019 | ND |
| 11 | Vette Feltrine | 2019 | 3 |
| 12 | Maddalene | 2019 | 4 |
| 13 | Tonale | 2019 | 5 |



Photo 8 - Carcass of the wolf found dead at Soraga (M. Poli - APT Forestry and Wildlife Department archives)



Photo 9 - Carcass of the wolf found dead at Folgaria (APT Forestry and Wildlife Department archives)



Photo 7 - Cubs in the Upper Val di Non pack (I. Stocchetti – APT Forestry and Wildlife archives)

The **distribution of packs** in the province is shown in the map in Figure 9, which also indicates localisations outside the packs' territories, probably relating to **lone wolves** or **pairs**. It should be pointed out that the **polygons** relating to the territories were established on the basis of data from camera traps and sightings in the field, and only minimally by genetic testing. They therefore represent the **minimum extent** of the packs' territories within the province of Trento and their "borders" have necessarily been determined with a certain degree of **approximation**.

Figure 9

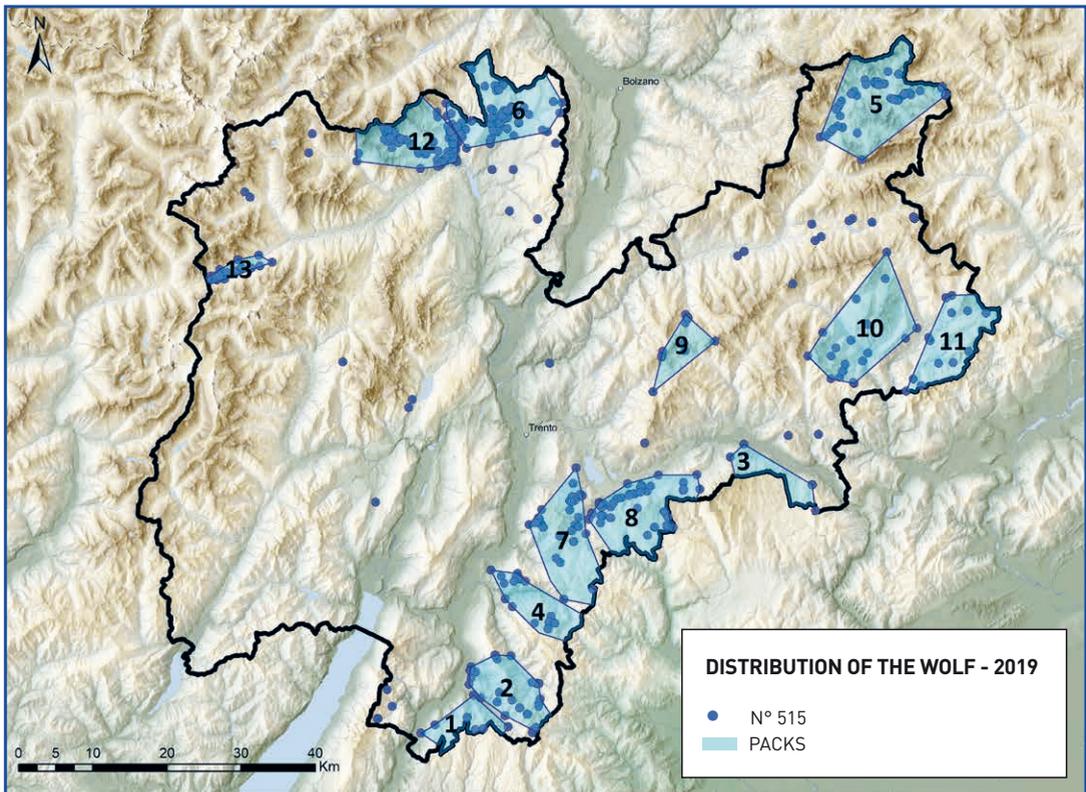
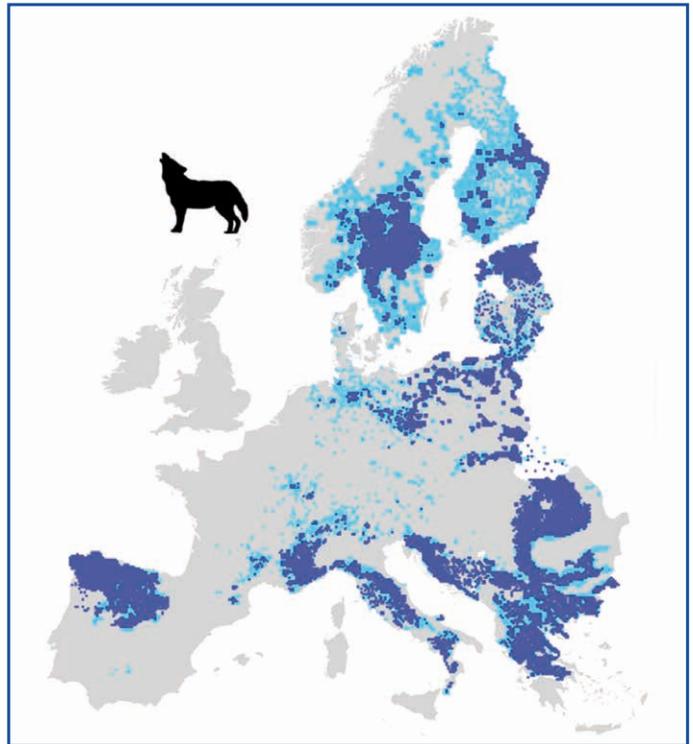


Figure 10 offers a broader view of the **distribution of the wolf at European level** (source: **Large Carnivore Initiative for Europe, 2018**), necessary to better understand a **phenomenon on a much broader scale than the provincial territory**. Almost all the wolf populations present in Europe are indeed today connected to each other, making up a single **European meta-population** of around 17,000 animals (in 2018).

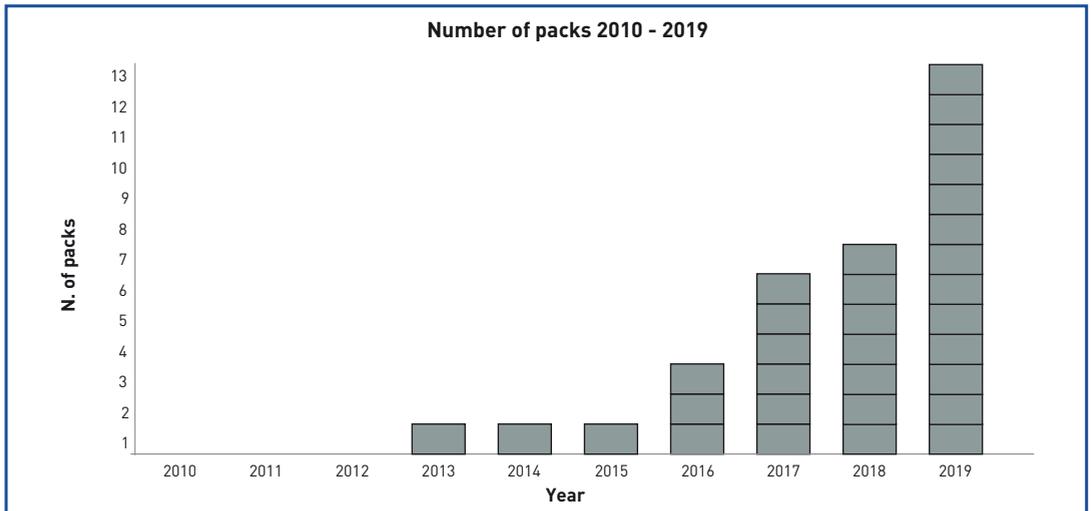
Figure 10



Trend

Graph 11 shows the **trend** for the ascertained number of **packs** in the province of Trento, from the time the presence of the first live wolf was documented (2010) until 2019.

Graph 11



1.3 The Lynx

Monitoring of the species began when the **lynx made its return to the province**, namely in the **second half of the 1980s**, with the appearance of a number of animals in eastern Trentino (present for around 15 years). Traditional survey methods in the field, **camera traps**, **radio-tracking** and **genetic monitoring** were also used for this species from the beginning.

As is known, the **only lynx certainly present** in the last years in the province of Trento (since 2008) is the **male** known as **B132**, who comes from the small Swiss population reintroduced in the St Gallen Canton (see page 45 and subsequent pages of the 2008 Report, and the appendices and chapters relating to the lynx in all subsequent Reports). Since November 2012, B132 has established himself in the south-western part of the province, specifically in the mountains of Val d'Ampola (Tremalzo and Lorina slopes on the left-hand bank and Monte Stigolo on the right) and the mountains on the right of the river Chiese, above Darzo and Lodrone, on the border with Brescia province.

During the course of **2019** it was possible to repeatedly document the **presence** of the lynx **with certainty** (photos, videos, tracks in the snow) in the following cases:

- 11 January in Val Lorina (Ampola) - camera trap;
- 13 January at Stigolo (Ampola) - camera trap;
- 20 January in Val Lorina (Ampola) - tracks in the snow;
- 29 January at Bragone (Tremalzo) - tracks in the snow;
- 17 February at Stigolo (Ampola) - camera trap;
- 13 March in Val Lorina (Ampola) - camera trap;
- 15 April in Val Lorina (Ampola) - camera trap;
- 11 June in Val Lorina (Ampola) - camera trap (photo 10);
- 25 November in Val Lorina (Ampola) - camera trap;
- 29 November at Monte Nota (Molina di Ledro) - live video footage.



Photo 10 - Lynx B132 in Val Lorina (F. Cadonna - APT Forestry and Wildlife Department archives)

Figure 11

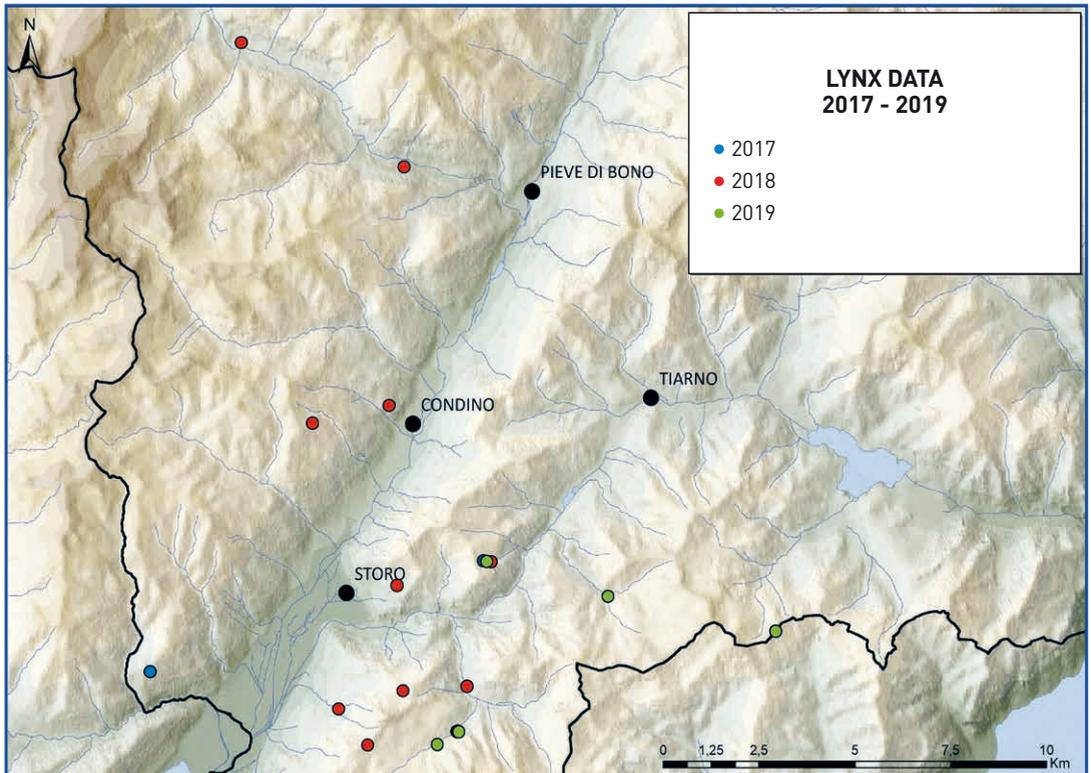
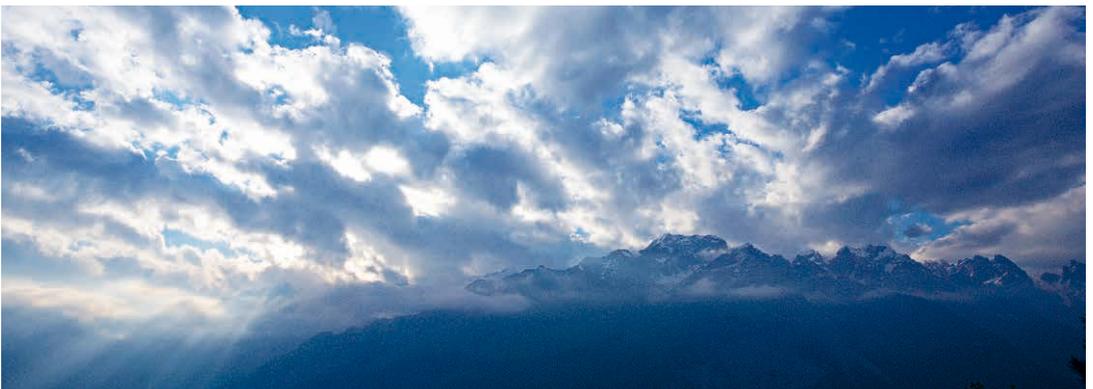


Figure 11 shows localisations for the lynx B132 in the last three years. As can be seen, in 2019 B132 would appear to have remained in the mountains of Val Lorina and Val di Ledro, without frequenting the mountains on the right-hand side of the river Chiese.

Once again during 2019 there were some **reports of lynx** in other places in the province, which it was **not however possible to verify**. B132 thus remains the only lynx to have been documented with certainty.



(M. Vettorazzi - APT Forestry and Wildlife Department archives)

2. DAMAGE COMPENSATION AND PREVENTION

By now APT has gained over forty years' experience as regards compensation and the prevention of damage. Indeed, **since 1976** 100% of the material value of assets damaged by bears has been **reimbursed** and it is possible to acquire **prevention** works (mostly consisting of electric fences or livestock guarding dogs - LGD). The relative regulations, covered by article 33 of provincial law no. 24/91, have been revised and updated several times over the years, also on the basis of directives imposed by the provincial government with resolution no. 1988 of 9 August 2002. With Resolution no. 697 of 8 April **2011**, the provincial government further reviewed the regulations for damage compensation, also providing for compensation of ancillary expenses and extending 100% compensation even to the damages caused by **lynx** and **wolves**.

Preventive activities take place following two main lines of action: **funding** covering up to 90% of the cost of works, or **gratuitous loans** of prevention works.

Compensation for damage

In 2019, **274 cases of damage by large carnivores** were ascertained, of which **228** by bears and **46** by wolves. There were no cases involving the **lynx**.

In **98% of cases**, reports of damage by a large carnivore (**311**) were followed up with an **inspection** by forestry rangers, who drew up a report.

Table 2

| ASSETS | BEAR | WOLF | TOTAL |
|--------------|------------|-----------|------------|
| BEEHIVES | 47.556,94 | | 47.556,94 |
| AGRICULTURE | 37.122,39 | | 37.122,39 |
| OTHER ASSETS | 9.245,94 | | 9.245,94 |
| LIVESTOCK | 58.764,41 | 37.394,13 | 96.158,54 |
| TOTAL | 152.689,68 | 37.394,13 | 190.083,81 |

Overall, **€190,083.81** of compensation for damage was paid out. 152.689,68 caused by bears and **€37,394.13** for damage by wolves; the details are given in Table 2.

Whereas the data for **bears** shows an **increase in damage compared to 2018 (+31%)**, the figure for **wolves** shows a **significant fall (-32%)**, despite a significant increase in

the number of animals present (see Graphs 12 and 13). It is believed that the fall in damage by wolves may be linked, at least partially, to the adoption of more **heavily supervised systems for managing flocks/herds** and to the use of **prevention measures** suitable for reducing the risk of predation (wardens, fences and LGD). This may have led wolves to prey more significantly on wild ungulates, and in the case of packs in frontier areas of the province, to hunt more outside the provincial territory.

It is nevertheless implicit that **the number of cases of damage is probably destined to increase** in the next few years, with the further expected increase in the number of packs and



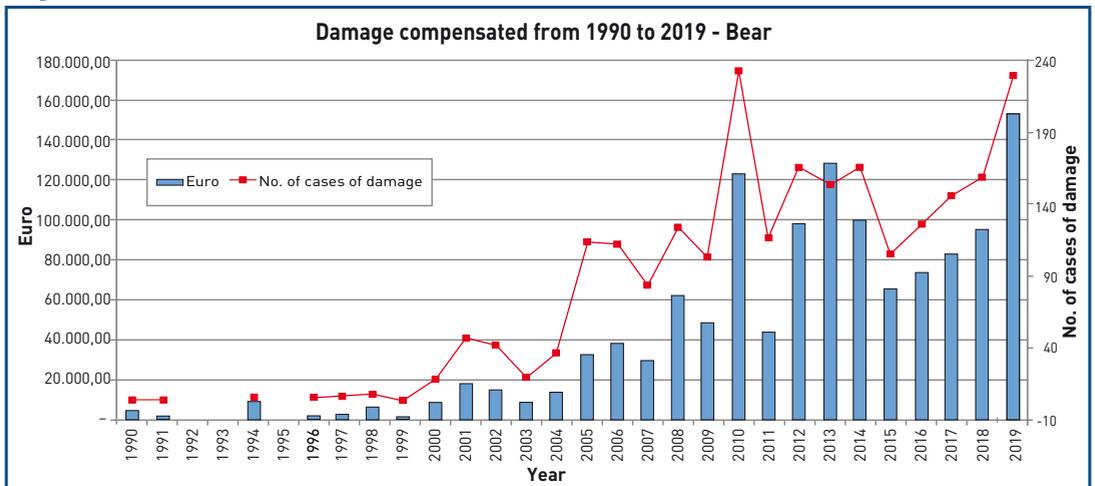
the diffusion of the species within the province. The various management activities (photo 11) are also and above all designed to seek to contain this phenomenon.



Photo 11 - Inspection of predation by a bear (APT Forestry and Wildlife Department archives)

Graph 12 shows the long-term trend for damage caused by bears and the amount of compensation.

Graph 12



As regards damage by bears, in 83 cases (36% of overall ascertained damage by bears), it was possible to determine the **identity of the bear involved** with certainty, thanks to **genetic analysis of organic samples**. Overall **29 different bears**, excluding cubs, were identified at damage sites, of which 15 males and 14 females. Specifically, 12 bears were detected at only one damage site, 6 at 2 damage sites, 3 at 3 damage sites, 3 at 4 damage sites, 1 at 5 damage sites, 2 at 6 damage sites, 1 at 10 damage sites (KJ1) and 1 at 11 damage sites (MJ5).

Graph 13 shows the trend for damage caused by wolves (photo 12) and the amount of compensation.

Graph 13

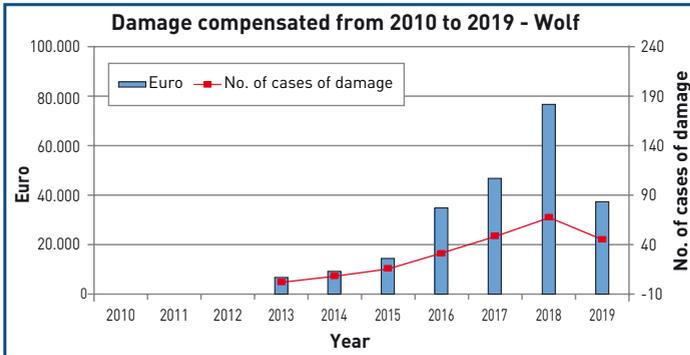
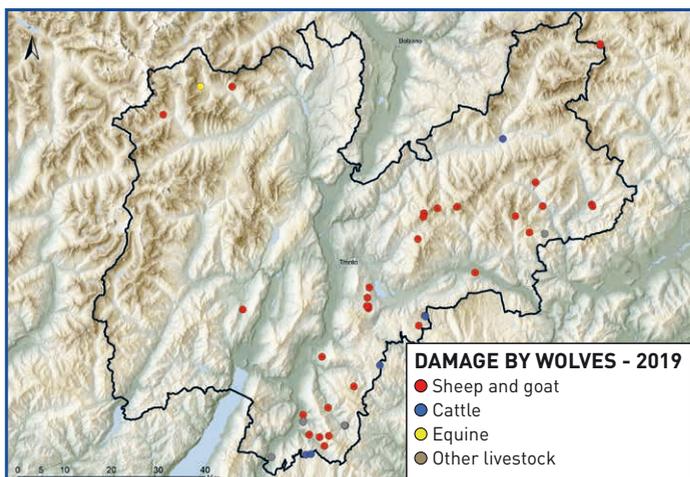
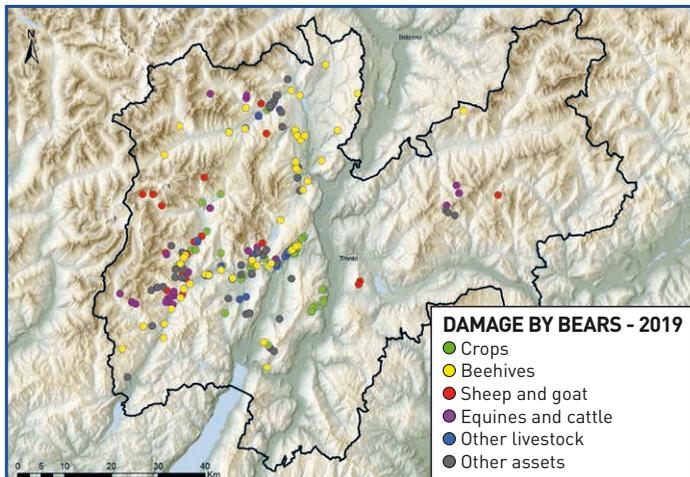


Photo 12 - Sheep preyed on by a wolf (APT Forestry and Wildlife Department archives)

Figures 12 and 13



Figures 12 and 13 show the distribution of damage caused in the province by bears and wolves respectively, distinguished on the basis of the main categories.

With reference to damage by wolves, it is pointed out that 42 events (91%) took place in the eastern part of the province and only 4 (9%) in the western part.

Prevention of damage

The management of prevention measures at provincial level is coordinated by the staff of the Large Carnivores Division, in association with the **local prevention coordinators**. The latter figure was created to manage activities relating to the supply of prevention measures, through dialogue, support and continuous liaison with users (managers of farms and mountain dairies, shepherds, beekeepers and hobbyists) who manage assets in the area susceptible to damage by large carnivores. In order to respond promptly and effectively to these needs, APT's territory has been subdivided into **10 zones**, generally corresponding to the Forest District Offices (FDOs), each of which is managed by a **contact figure** and **their assistant/substitute**.

During the course of 2019, **170 applications** were presented to the Forestry and Wildlife Department for prevention measures to protect against damage by large carnivores (electric fences and LGD), designed to defend livestock and beehives (photo 13), with a fall of around 18% compared to 2018.

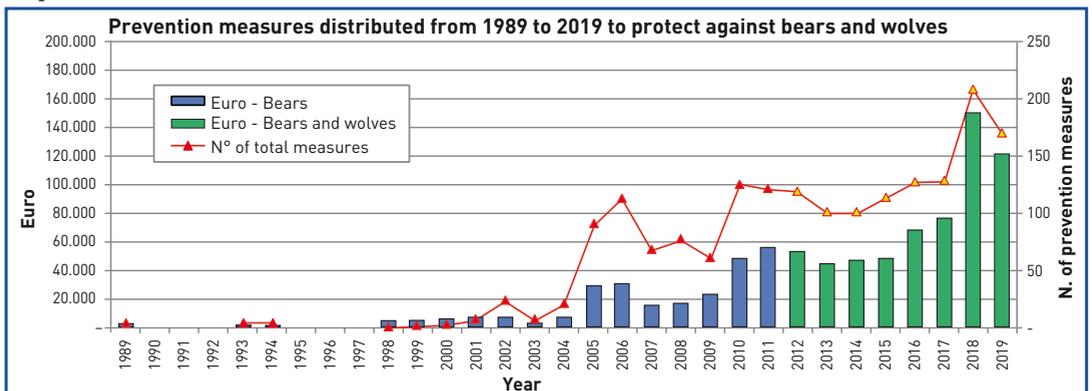


Photo 13 - Prevention works to protect beehives, with clear signs of digging by bears (D. Asson - APT Forestry and Wildlife Department archives)

Of these, **157** were dealt with by the FDOs through **gratuitous loans** of works (mobile fencing and fixed enclosures), at a cost of around **€110,000**, and **13** by the Large Carnivores Division through **60-90% capital funding** (mobile fencing, fixed enclosures and LGD), at a cost of around **€11,600**. A total of **€121,600** was thus invested.

The following graph shows the long-term **trend** for the number of **prevention measures** distributed and the relative cost (Graph 14). It is pointed out that until 2012 the

Graph 14



provision of preventive measures concerned only bears, and from 2012 to 2017 almost exclusively bears, whereas since 2018 there has also been a considerable increase in preventive measures distributed to protect against wolves.

Since 2016, an additional instrument for funding prevention measures has been the “Piano di Sviluppo Rurale” (PSR) or Rural Development Plan, through Measure 442: “Traditional wooden fencing, renovation of stone walls, and prevention of damage by bears and wolves” (photo 14). With this measure, it is possible to fund, among other things, fixed structures to defend beehives (Bienenhaus) and electrification systems protecting livestock from large carnivores. It should be specified that around 43% of the funding provided comes from the European Community, 40% from Italian central government and around 17% from APT. The construction method for the protection system is essentially the same as for the works provided by the Province in the form of gratuitous use/loans: 5 electrified wires for bears and 7 electrified wires for wolves. In 2019, 5 electric fences were funded and will be completed in the course of 2020, amounting to a cost of around € 56,900, and 2 *Bienenhaus* beehive protection works, with a cost of around €20,700.



Photo 14 - Prevention work funded by the PSR (D. Asson - APT Forestry and Wildlife Department archives)

Therefore, the **total investment in prevention measures in 2019** was €199,200, also considering works implemented through the PSR.

Assessment of the vulnerability of alpine pasture

In summer 2019, also bearing in mind the provisions of the policy document “*Management and prevention of conflict between wolves and animal husbandry in the province of Trento*” drawn up in 2018, monitoring of mountain farms and pastures was carried out with the scope of gathering useful information for **assessing the level of vulnerability of mountain pastures to predation by large carnivores**.

This activity was undertaken by the **local prevention coordinators**, who completed **questionnaires** with the managers of mountain farms in order to collect data about alpine pastures (name of farm, municipality, physical and environmental characteristics of the pasture, infrastructures, type of management, animals grazed, protection adopted or adoptable and any predation experienced). The investigation made it possible to survey **408 active mountain farms** present in the province, while those remaining will be visited in summer 2020.

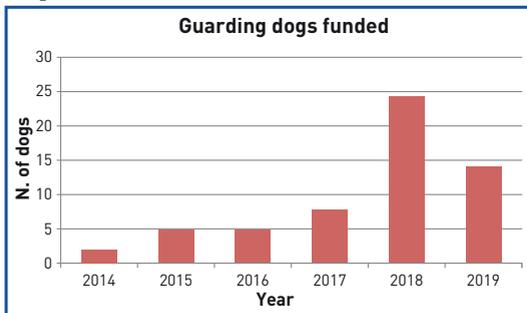
Analysis of the survey sheets made it possible to categorise mountain farms, infrastructures, pasture, animals at alpine pasture (low or high risk) and the type of management, and to give each farm/pasture a score, in order to create a **scale of priorities** on the basis of which to assign **resources and prevention works**, bearing in mind the level of risk.

The survey activities also allowed the forestry staff responsible to have **direct contact with the managers of alpine pasture**, raising awareness of the need to adopt prevention measures and informing them of the funding opportunities available through the Rural Development Plan measures, or directly through the Forestry and Wildlife Department. The data gathered was being processed when this report was being drawn up.

Guarding dogs

Guarding dogs are used to **protect animals at pasture** from attacks by wolves and bears. The first two dogs were handed over to a sheep/goat farmer in Val di Non in **2014** (see the 2014 Report, page 43). Since then the use of guard dogs has gradually increased (Graph 15).

Graph 15



In **2019**, **14 dogs** were funded and consigned, at a cost of **€10,100**. The animals, belonging to the Abruzzo-Maremmano race, were purchased from specialist/certified breeders, also from Trentino, belonging to ENCI (Ente Nazionale Cinofilia Italiana), guaranteeing health standards, genetic lines and good aptitude for work.

By the **end of 2019**, the Large Carnivores Division was following the progress of **33 live-stock farms** using a total of **77 guarding dogs** (mostly purchased with financial support from APT, but also **acquired directly**, the result of **home litters** or **exchanges** between farmers). These additional ways of acquiring dogs are a sign that the practise of using guarding dogs is by now continuing in an increasingly **independent** manner, as the provincial Administration expected and hoped for.

Once again in 2019, with the assistance of a veterinary surgeon specialising in animal behaviour and wellbeing, and thanks to financial support from the Life Dinalp Bear project (photo 15), visits were carried out to **evaluate the behaviour** of the dogs consigned, with the objective not just of assessing the health and progress of the animals, but also of providing useful advice to farmers. In this context **10 farms** were visited and a total of **17 dogs** examined.



Photo 15 - Guarding dogs funded by the Forestry and Wildlife Department (APT Forestry and Wildlife Department archives)

In this framework, in order to provide continuing training and constant updates for those using guard dogs in farms, the Large Carnivore Division produced a **manual regarding the correct rearing, training and use of guarding dogs**, in collaboration with other Life Dinalp Bear project partners and using LIFE funds.

The manual is online and can be downloaded in pdf format via the following link:

https://dinalpbear.eu/wp-content/uploads/IT-pastirski-psi-WEB-V3_manj%C5%A1a-resol.pdf

Furthermore, the distribution of information boards by the Forestry and Wildlife Department (began in 2017) continued during 2019 with a further **50 boards**. These have the scope of making users of the mountains and pastures aware of the presence of dogs protecting flocks, and the conduct to be adopted in their presence.

Box 3 – Guarding dogs used to protect farmed deer: a novel experience

At the end of 2018 and beginning of 2019, farmed deer in the Camposilvano enclosure in the municipality of Vallarsa were subject to a series of attacks by wolves. The attacks led to the death of 7 deer (4 adult females and 3 young). The enclosure in question is privately owned and used to manage around 14 deer reared for food production. The land concerned has a surface area of around 3 hectares of woodland and meadows, enclosed by a metal fence, within which the ungulates are free to graze.

Following the first predatory events, forestry staff set up monitoring with camera traps, which made it possible to document the presence of 2-3 wolves, which periodically visited the area alongside the enclosure. As a preventive measure and in order to rapidly manage the situation, two scare devices emitting sound alarms every 40 minutes during the night were immediately installed.

Due to subsequent predation, in March 2019 an electric wire was installed all the way around the perimeter around 20 cm above ground level, using APT material and staff, in an attempt to deter predators. Subsequently, given the interest displayed by the owners and the favourable opinion of the vet, two guarding dogs were placed in the enclosure with the deer (photo A).

Two female puppies, 70-80 days old, belonging to the Abruzzo-Maremmano race, were rapidly obtained from a local breeder in Trentino who already had guarding dogs working in areas where wolves were present.

The phases involving the placing of the dogs inside the enclosure were constantly supervised by the managers of the ungulates, initially assisted by the original dog breeder. In order to get the dogs used to the presence of the deer and vice-versa, the deer's feeding



Photo A - The two guarding dogs inside the deer enclosure (A. Brunelli - APT Forestry and Wildlife Department archives)

area was exploited, with a small 3 by 3 metre enclosure created for the dogs in the vicinity of the deer feeding place containing hay and feed. In this way the puppies, protected by a metal fence, could safely interact with the deer, gradually creating trust between the animals, a trust that was steadily reinforced.

In April 2019, during the behavioural visits, the situation was assessed by an **expert vet**, who evaluated the results obtained positively. Despite the deer's initial diffidence towards the dogs, it was possible to create a good bond between the animals. After these prevention measures, funded by APT, **there were no more cases of predation in the enclosure.**

Following an exchange of ideas with experts dealing with the prevention of damage by large carnivores, it emerged that to date this experience would appear to be the **only documented case** of the use of guarding dogs to protect farmed deer **in Europe.**

Meetings with farmers and beekeepers

In 2019 the relations already started up for some time with the economic interest groups most affected by the presence of bears and other large carnivores continued.

The **round table with representatives of farmers and beekeepers** met twice, on **25 June** and **25 November 2019.**

Support for animal husbandry

One of the objectives of the provincial Administration is to encourage shepherds and their flocks/herds to stay at alpine pastures. The presence of the shepherd and the adoption of the most appropriate systems for preventing damage, along with fair compensation and constant liaison with local forestry service staff, are fundamental strategies in guaranteeing **coexistence between large carnivores and livestock reared in the mountains.**

The data gathered during experimentation carried out in 2018 (see BOX 5, 2018 Large Carnivores Report, pages 32-36) have made it possible to take stock of what has been done and to consider possible modifications, considering the changes taking place over the years (regulations, needs of the animal husbandry sector, distribution of large carnivores, technology and new materials). The practical and operational results of this experimentation were brought together in a **manual**, called the **Prevention Handbook**, created by the staff of the Large Carnivores Division in collaboration with a wildlife technical adviser specialising in preventing damage caused by wolves. The document was subsequently supplied to all those responsible for prevention measures as a **technical policy document** in the field of prevention and applied throughout Trentino. The handbook deals specifically with prevention measures (types of work, construction methods, type of materials, methods of distribution etc.) and the relative characteristics to be adopted and recommended in every situation susceptible to damage by large carnivores.

2019 saw the continuation of activities by the Forestry and Wildlife Department to monitor such **experimental prevention works set up in 2018 (all implemented again)**, with the planning of further works having the same scope and characteristics. Specifically, the four enclosures set up in 2018 at Malga Viezzena (2 in the Municipality of Predazzo), Campobrun



(property of the Province) and Malga Boldera (Municipality of Ala) were also recovered and used during the 2019 grazing season for overnight stabling of young cattle, **with no predation being recorded**. For a series of reasons linked to the managers' requirements, the **Malga Boldera** enclosure was extended, agreeing the project with the staff of the Large Carnivores Division and sharing the costs. Furthermore, in 2019, following contact with the municipal administration of Levico, an electrified enclosure around an area of 1.8 hectares was created at **Malga Fratte** to protect 50 cattle. In this case, the planning phase was once again undertaken and assisted by the staff of the Large Carnivores Division. The results of the first grazing season were excellent, considering that the use of prevention works made it possible to reduce losses due to predation by wolves to zero.

In 2019, the **prevention coordinators** specifically followed the progress of **55 alpine pastures**.



Photo 16 - Box to support animal husbandry activities high in the mountains (D. Asson - APT Forestry and Wildlife Department archives)

These were provided with prevention works during the pasturing period for the animals (usually from June to September). Activities to support pasture activities also involved the installation of **15 box** transported by helicopter, in order to encourage the constant presence of shepherds guarding the livestock (photo 16). **2 further units** were acquired autonomously by private breeders.

Activities carried out by the Paneveggio Pale di S. Martino Nature Park

In 2019, following a specific assignment awarded to the University of Padua's Department of Agronomy, Food, Natural Resources, Animals and the Environment (DAFNAE) by the Park, there was continuation of the activity directed at increasing knowledge about livestock breeding systems and the **possible impact of the presence of wolves within the Park and neighbouring areas**.

The activity concluded with presentation of a report by Professors Maurizio Ramanzin and Enrico Sturaro. On the basis of the data gathered by the Park, they analysed **objectively defensible areas**, specifically identifying areas that could be defended with damage prevention works and those that, in contrast, **did not objectively appear to be defensible**. Problems regarding compatibility and the work commitments of the farms concerned were also analysed, and in so far as this was possible, the additional financial costs resulting from the application of the different protection systems were quantified.

The report shows that the situation of farms and pastures in the area is very diversified. The total surface area concerned by pasture activity comprises **14,364 hectares**, characterised by very different environmental conditions and referring to **457 pastures area units** managed by **229 farmers**. This area is not made up exclusively of mountain farms, but also of other types of pasture, distributed over slopes at all altitudes in the valleys investigated.

The report also provides an index of the main factors (livestock category, area, perimeter, period of pasture, information about the presence of the shepherd etc.) influencing the applicability of the protection systems, in order to develop a conceptual system for assigning each pasture area with a potential method of protection, or to identify those that cannot be protected in the current situation. It is underlined that this process only considered protection methods excluding contact between predators and their prey, using various kinds of **electric fence**, for which adequate experience and technology is available. In this context, it is also necessary to emphasise that no method guarantees total protection and that the efficacy of the fences is totally dependent on correct installation and careful management and maintenance.

Furthermore, when identifying protection systems, attention was paid to options compatible with current management systems, or with an acceptable impact on working practices, while noting cases where there was instead evident incompatibility, indicating the consequential requirements in terms of changes to management systems. These requirements, together with the additional work to manage protection systems, are perceived by farmers to be the main limitation to the implementation of protection measures, and in many cases this is effectively the case. Hence indices were developed for this purpose, to highlight the need to modify the ways in which the shepherd is present and to assess the **additional work involved**. Furthermore, while aware of the considerable variability in the cost of these methods, which are not standard but must rather be adapted to the specific circumstances of each pasture area unit, an **assessment of costs** (for installation not management) was produced, in order to obtain an estimate of the extent of the expenditure necessary to prepare effective protection measures.

Given the large number of pasture area units and farms present, the report established straightforward priorities in terms of the **risk of attack**, essentially on the basis of the livestock category and pasture season, and regarding interaction with tourist activities and biodiversity, considering the aspects believed to be of increasing interest for public sector bodies and in particular for protected areas.

As far as what is known, this approach to **assessing** the possibility of preventing damage at provincial level, but also on the **scale of individual pasture area units and farms**, has not to date been applied with this level of detail. The field of application for this research concerns the opportunity to summarise and link indicators that can be used to **support the planning decisions of G.O.** and to provide ideas and concrete elements for establishing a framework of coherent measures to be included within forthcoming planning and support tools in the agricultural sector.

Finally, the Park's cooperation in **monitoring activities regarding the wolf continued**, through the organisation of surveys to ascertain the presence of the species throughout the year. For this purpose, around ten camera traps were positioned and checked.



3. MANAGEMENT OF EMERGENCIES

In the **province of Trento** the management of emergencies represents a field of action in which it has been necessary to operate for some time, given the presence of single problem bears.

The **PACOBACE (Interregional Plan of Action for the Conservation of the Brown Bear in the Central-Eastern Alps)** represents the document of reference also for the management of emergencies in the province of Trento (and the rest of the Italian alpine region), on the basis of which the Forestry and Wildlife Department has identified, trained and equipped special staff.

Action may be taken to control problem bears or bears in critical situations, in accordance with the provisions of European regulations (Directive 92/43/EEC – Habitat Directive) and national regulations (D.P.R. 357/97, article 11, paragraph 1; L. 157/92, article 19, paragraph 2; L. 394/91, article 11, paragraph 4, and article 22, paragraph 6).

Indeed, in order to avoid conflict with human activities and for reasons of public safety or for other compelling reasons of significant public interest, the possibility of an exception to the ban on the capturing or killing of animals is provided for, subject to the authorisation of the Ministry for the Environment, Land and Sea (MATTM), having consulted ISPRA, on condition that there are no other practicable solutions and that departure from the rules does not prejudice the favourable conservation status (FCS) of populations of the protected species (D.P.R. 357/97, article 11.1).

In the course of 2018, **Provincial Law No. 9/18** was put into effect, on the basis of which the **President of the Province is responsible for authorising exceptions to the ban on capturing or killing of bears or wolves, according to the aforementioned European regulations**, again after having consulted ISPRA. This law was deemed valid by the Constitutional Court in 2019.

In the event that public security and safety is at risk, the capture or killing of an animal can be ordered by the **President of the Province with an extraordinary emergency order**, according to articles no. 52.2 of the DPR of 31/8/1972, no. 670 and no. 18.2 of the L.R. of 4/1/1993 no. 1, as specifically also provided for by the **PACOBACE**.

Operational management is based on the use of staff from the **Corpo Forestale Trentino (CFT)**, to which the Forestry and Wildlife Department makes recourse, through a **special emergency team which is on call**. The system of on-call availability in the wildlife sector is based on weekly shifts involving a coordinator, and from 1 March to 30 November two emergency rangers (on call 24 h/day), along with veterinary staff from the **Azienda Provinciale per i Servizi Sanitari (APSS)** – the provincial health services – whenever necessary. The latter is indispensable for all activities providing for the manipulation of animals (wounded bears or wolves, capture or other operations).

In 2019, the coordinators of the on-call Special Forest Wildlife Unit received more than 600 calls reporting possible **damage, sightings, predation on wild animals, reports of indicators of presence and critical situations involving bears, wolves or lynx**.

With resolution no. 1,523 of 7 **September 2015**, the provincial government set up a **Technical Committee** including representatives of MATTM, ISPRA and APT and a **Technical Operations Group** (with APT, MUSE, FEM and the provincial parks) to manage the bear and other large carnivores present within the province (hence in relation to all fields of action, not just for the management of emergencies). Both were also operational in **2019**.



The case of the bear M49

In 2019, particularly significant problems were caused by **M49**, a **young male bear** (born in 2016), involved in numerous critical and potentially **dangerous** situations, in particular **7 cases of entry** to dwellings or mountain huts (3 in the western part and 4 in the eastern part of the province), a further **12 attempts to enter** dwellings or mountain huts (all in western Trentino), which were unsuccessful thanks to the solidity of the windows and doors, and one case of **man-bear interaction** taking place at Malga Arnò in Val di Breguzzo.

As regards **damage** caused by the bear (the less problematical aspect of his behaviour), in 2019 no less than **44 events** involving damage can be linked to M49, of which 26 involving damage to livestock, 11 to beehives and 7 to various forms of infrastructure (doors, windows, furniture inside dwellings etc.). With reference to livestock damage alone, 14 cases involved cattle (with 13 dead animals and 4 injured), 4 equines (7 dead animals and 1 wounded), 7 sheep and goats (17 dead animals) and 1 involving poultry (3 dead animals). **€ 45,016.53** of compensation was paid out for **damage** involving M49 (photo 17). This represented **30%** of the overall compensation paid out in 2019 for all **damage by bears** (82-93 animals present).



Photo 17 - M49 over a cattle carcass (I. Vinante - APT Forestry and Wildlife Department archives)

In the course of the spring-summer, **activities** were organised to **deter** the bear, leading to activation of the emergency team and the bear dog unit in 16 cases. In **6 cases** forestry staff came into **contact with the bear**, carrying out **2 aversive operations** with bear dogs, 2 with exploding darts, 1 with bear dogs and rubber bullets, and 1 using light and noise deterrents. None of the attempts at conditioning and deterring the bear had **any effect on his behaviour**.

Following the numerous cases of damage to livestock, in particular cattle, on a further 9 occasions intervention was necessary to set up **prevention works** (electric fences). In some cases, action was taken to protect stable buildings (at Malga Rosa, Cengledino and Arnò) or mountain dairies (Malga Rosa), whereas in the other cases semi-permanent mobile electrified enclosures were set up to stable the animals at risk (calves under the age of 15 months).

Furthermore, to minimise the risks of predation on cattle, **special teams** were organised to follow the movements of the animal every evening from 18 June to 14 July, thanks to the satellite collar fitted, seeking to intercept him before he approached sensitive locations (mountain huts, farms or dairies).

Following the **capture** of M49 for permanent captivity (see reference in the specific section) and his subsequent **escape** from the Casteler enclosure on the **night between 14 and 15 July**, **emergency teams for the area** concerned by the bear's presence were organised, with the scope of minimising the potential risks of dangerous interaction with man (new intrusions in mountain huts/dairies or new cases of preying on domestic animals), informing the population.

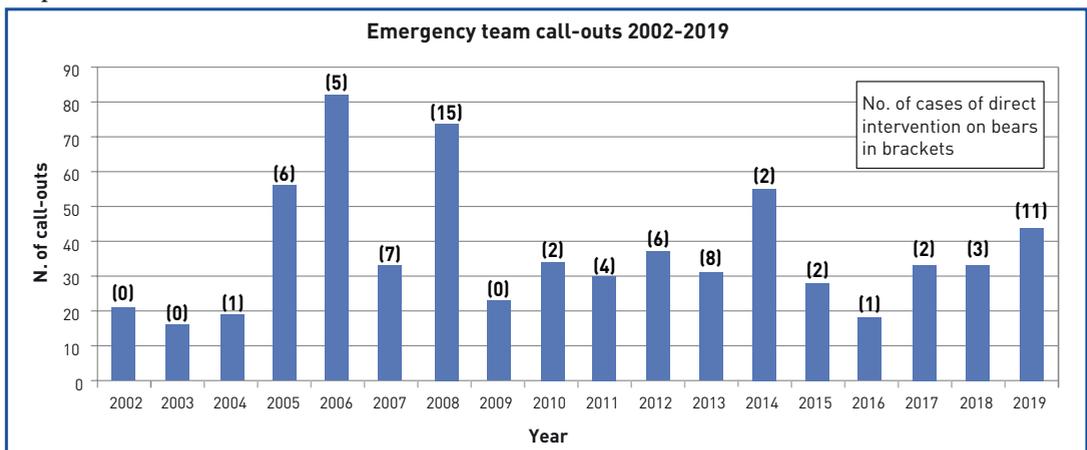
Activities of the emergency teams

The activities of the emergency team took place from 4 March to 2 December 2019, with a total of **44 call-outs**, all regarding **bears**, of which 3 given code red status, 32 code yellow and 9 code white (Graph 16). In 10 cases the team intervened to manage situations linked to M49, in 4 cases involving M56 (the orphaned cub), in 2 cases KJ1, in 1 case F20 and in 1 case F36, whereas in the remaining cases it was not possible to identify the bear responsible for the problem.

The team members carried out direct action to **deter** the **animal** in **11 cases**, 5 of which using bear dogs (1 regarding M49 and 4 for unidentified bears), 3 with rubber bullets (1 on F20 and 2 on unidentified bears), 2 with scare darts (1 on M49 and 1 on KJ1) and 1 with rubber bullets and bear dogs (M49). The other 3 deterrent events involving M49 were carried out by the defence teams.

The emergency team rangers were never called on to intervene to manage critical situations linked to the presence of **wolves**.

Graph 16



Close encounters between men and bears

In the course of 2019, there was only **one potentially dangerous episode** of interaction between man and the bear, again involving **M49**.

On 17 June 2019, at around 10 pm, close to the stable at **Malga Arnò**, a shepherd outside the building heard noises coming from inside and looking through the window found himself at a very short distance (around 1 m) from **M49** (identity via satellite fixes), who was on his way out. Terrified, the shepherd backed away and fled, also falling over, while the bear moved away, after a few minutes' hesitation. The shepherd did not receive any direct injury, but suffered from serious shock.

Capture of bears



Photo 18 - Phase in the capture of a bear (APT Forestry and Wildlife Department archives)

During **2019**, 6 bears were captured using **culvert traps**, of which 3 males, 2 females and 1 of undetermined sex (photo 18).

The captures took place in the context of activities to remove **M49** and recapture the female bear **F36** to detach the collar fitted in 2018. Indeed, after a few months it had stopped working and attempts to remove it from a distance using the drop-off mechanism were vain, as this was not functioning properly.

2 further captures of a motherless bear cub (**M56**, captured twice) took place manually. See the relative box on page 13.

Below there is a brief description of the **captures** taking place in **2019**:

- 221/05/2019 - a **motherless bear cub (M56)** was captured manually near the village of Padergnone, to take him away from a busy, populated area where he had been moving around for some days, seriously risking being hit by a vehicle;
- 27/05/2019 - **the same cub**, by now in a poor state of health (very debilitated and underweight), precluding any possibility of survival in the wild, was once again picked up close to the town of Molveno. He was temporarily transferred to the Casteler recovery centre, with a view to rehabilitating him and subsequently releasing him into the wild again (see the relative box on page 13);
- 25/06/2019 - a **young male** was captured in Val di Breguzzo and immediately released without anaesthetic;
- 03/07/2019 - at Malga Rosa (Porte Rendena), a **young bear of undetermined sex** was captured and immediately released without anaesthetic;
- 07/07/2019 - at Malga Rosa (Porte Rendena), a **young female (F37)** was captured and immediately released without anaesthetic;



- 14/07/2019 - at Malga Rosa (Porte Rendena), **M49** (male, aged 3.5) was captured to be transferred to the Casteler enclosure;
- 29/08/2019 - in Val di Breguzzo a **young male (M40)** was captured and immediately released without anaesthetic;
- 12/09/2019 - at Malga Rosa, **F36** (a young female aged 2.5) was captured in order to remove her radio collar. Once again, the animal was released immediately without anaesthetic, the radio collar having come off by itself inside the tube trap; the on-demand drop-off mechanism had indeed worked at close quarters. In this case the capture activity involved the team for a total of 59 trap-days (2/3 traps active simultaneously for 24h/day).

In total, **39 captures** of bears (24 involving females, 14 males and 1 of undetermined sex) have taken place **since 2006** and have concerned **27 different animals**. Of these captures, 24 were carried out with tube traps, 8 on free-ranging bears, 4 with an Aldrich snare and 3 manually for cubs born that year.

Finally, it should be noted that on 7 April at Credada in val Algone, the **collar** of the female bear DG3 was **removed** remotely using the on-demand drop-off mechanism, as it was no longer working.

Capture of wolves

To respond to the possible need to control bold wolves, in spring 2019 the Ministry for the Environment, Land and Sea (MATTM), having consulted ISPRA and as an exception to DPR 357/97, **issued a permit to capture and fit radio collars to up to five wolves** for the purpose of monitoring and management, to take place over a period of three years.

The main objectives motivating the capture activities authorised were as follows:

1. To obtain an effective control tool assisting with action to **deter**, or **in extreme cases remove** animals, in relation to possible conflict that could arise following frequentation of urban and semi-urban areas, or places frequently used by man;
2. To **increase knowledge** about the wolf population present in Trentino, in order to improve the efficacy of conservation, management and communication activities;
3. To carry out **health treatments** on any wolves affected by mange.

In 2019, the bear **capture team**, active for some time, **was supplemented** to ensure it was also operational for **wolves**, guaranteeing the specialist skills of the staff involved. For this purpose, activities were carried out **to train staff, acquire materials** and **organise** procedures. Specifically, action was taken to set up and monitor potential **capture sites** (preparation of snares at the capture sites and weekly checks aimed at understanding how wolves react to the presence of scent bait, camera traps, snares and the odour left by workers).

Road accidents

During 2019 there were **two cases** of **road accidents** involving bears in the province of Trento, bringing the total number of the **accidents recorded to date** to **35** (of which 3 in the province of Bolzano). The drivers involved were not injured. It was not possible to fully ascertain two further possible episodes.

The first case took place on **20 March 2019** in the Municipality of **Sporminore**, on the SS 43 Val di Non road at Rocchetta. The staff of the emergency team and the bear dogs intervened



at the scene in order to guarantee the safety of the persons involved and to collect any indicators of the presence of the bear. Some hairs were recovered from the car making it possible to identify the bear involved as **M22** (an 8-year-old male). The animal survived the impact and was detected genetically at three damage sites, in April, June and August.

The second case took place on **29 November 2019** in the Municipality of Madruzzo, on the SS 45 BIS road at Km 134.1, close to Ponte del Gobbo, near **Pietramurata**. Once again in this case, the staff of the bear dog unit intervened at the site, clearing up the area and recovering hairs making it possible to identify the bear involved as **M54** (male bear, 1.5 years old). Despite the relatively violent impact, he moved away from the road and probably survived. However, only genetic testing will make it possible to confirm this in the future.

The bear dog unit



Photo 19 - Bear dogs (A. Stoffella - APT Forestry and Wildlife Department archives)

The bear dog unit (photo 19), now operational for 13 years, intervenes around fifty times a year. The activity, which involves considerable commitment and cooperation from the dog handlers, is permanently guaranteed throughout the province by **six dog units**.

Despite rapid technological development and the creation of increasingly sophisticated instrumentation, the **olfactory ability** of dogs has not yet been equalled. This was demonstrated, for example, when M49 escaped from the Casteler area, where despite repeated inspections of the perimeter by technical experts and the intervention of drones with thermal imaging cameras, it was only possible to accurately construct the escape route followed by the bear using the dogs of the special unit.

During 2019, control and recovery operations were carried out following **road accidents** (two cases). The number of operations to **deter** bears increased compared to the last few years, almost exclusively in relation to young animals that had recently left their families. Specifically, there were a total of **42 call-outs** with dogs in **2019** (12 for activities to **deter** bears, 6 of which involving **M49**) to which it is necessary to add **12 outings** for the purpose of **training**, various meetings etc.

Several European countries intend to follow APT's experience, including **Greece**, which in 2019 sent a delegation of technical advisers to Trentino to observe and gather important information on the activities of the unit.

The handlers' work with their dogs also continued in terms of **training**, with a recent refresher course to try out new training techniques.



Bear-proof bins and warning signs

Given the importance of correct management of organic waste in the area where bears are present, in the first few months of 2019 the Forestry and Wildlife Department carried out a series of **checks on bins** for the collection of organic waste equipped with **bear-proof** closing mechanisms (photo 20), distributed in the Paganella and Valle dei Laghi areas since 2009 (see the 2009 Report, pages 40 and 41). This monitoring made it possible to identify bins that were no longer working, requiring maintenance or replacement. The checks concerned all the **96 sites** where APT had carried out distribution, with a total of **181 bins**. The checks showed it was necessary to obtain new bins to replace those that were no longer efficient. In collaboration with ASIA, the company responsible for waste management in the area, 45 120 litre HDPE bins with bear-proof closing mechanisms were acquired, which were used immediately in the area to replace those that were broken, while a small number were stockpiled for possible emergencies. Given the importance of the problem, in order to avoid bears potentially making a habit of approaching waste bins, thus creating critical situations, further inspections and intervention to supplement the bins were scheduled.



Photo 20 - Bear-proof bin with signs of attempted forcing (M. Zeni - APT Forestry and Wildlife Department archives)

As regards this, it should be noted that in 2019 the Large Carnivores Division worked with the Valley Communities of the Giudicarie Valleys and Upper Lake Garda and Ledro to manage and sort out any further critical situations regarding the management of organic waste (at **Nembia di S. Lorenzo in Banale** and **San Giovanni al Monte di Arco**).

In summer 2019, **checks on the state of warning signs informing people how to behave in areas frequented by bears** were carried out by forestry Department rangers, in collaboration with forest wardens and the staff of the Adamello Brenta Nature Park. The checks concerned the areas where the bear is present in a stable manner in the Val di Non, Val di Sole, Giudicarie Valleys, Valle dei Laghi, Adige Valley and the Paganella tableland, where APT had organised the distribution and placement of **around 300 signs**. On the basis of the checks, a further **110 new signs were purchased** to replace those that were no longer usable (broken, missing or no longer legible), the work being carried out by staff of the Forestry and Wildlife Department.

4. COMMUNICATION

The main activities carried out during 2019 are summarised below.

Evening lectures and meetings

Table 3 lists the **meetings/lectures** organised by the Forestry and Wildlife Department (**around 700 participants** overall). Most of these meetings were organised in response to local requests for information and dialogue.

Table 3

| TYPE | DATE | PLACE | NO. OF PARTICIPANTS |
|--|------------|------------------|---------------------|
| Public meeting about the wolf | 18/3/2019 | Livo | 150 |
| Public meeting about the wolf | 22/3/2019 | Cembra | 150 |
| Public meeting about large carnivores | 12/4/2019 | Sfruz | 30 |
| Public meeting about large carnivores | 29/5/2019 | SAT headquarters | 60 |
| Public meeting about large carnivores | 3/7/2019 | Falesina | 30 |
| Public meeting about the bear when the film "The Bear" by J.J. Annaud was screened | 29/8/2019 | Predazzo | 60 |
| Meeting in the context of the Prosilva initiatives (on the prevention of damage) | 11/10/2019 | Malga Riondera | 30 |
| Public meeting about large carnivores | 25/10/2019 | Brentonico | 30 |
| Public meeting about the wolf | 6/11/2019 | Ala | 150 |

Other meetings with the population have been organised by the **Adamello Brenta Nature Park**.

Press releases and Provincial Council questions

With the support of the Press Office, **27 press releases** were issued regarding the **bear**, **3** regarding the **wolf**, **1** on the **lynx** and **9** on large **carnivores** in general (40 in total).

Furthermore, the necessary information was provided in order to respond to **25 questions raised at the Provincial Council** (standard or with an immediate response): **6** regarding **bears**, **8** concerning **wolves** and **11** regarding **both** large carnivores.



Activities carried out by SAT (Alpine Club of Trentino)

Informative evening sessions entitled “Bears and wolves, who are you?”:

- **24 January, Cembra** (organised by the Cembra SAT branch and the Network of Reserves of the upper Val di Cembra)*;
- **18 March, Lavis** (organised by the SAT San Michele a/A SAT branch)*;
- **10 May, Pergine** (organised by the Pergine Valsugana SAT branch)*.

Courses/visits (in the context of “BiodiversiTAM 2019”):

- **9-10 February**, “Valentine’s Day among the wolves”, **Vallarsa** (organised by the Vallarsa SAT branch)*;
- **17 and 26 May**, informative evening session entitled “**Brown bears, who are you?**” and a visit in the context of “**On the trail of the bear ... and nearby**” (organised by the Pressano SAT branch).

Other activities:

- **10 January**, “Wolves at school”, meeting at the “**Filzi**” comprehensive institute of **Isera-Rovereto** (together with the Trentino Forestry Service);
- **21 May**, participation in the “**Round table on information and participation in the management of large carnivores**” called by APT;
- **29 May**, status of large carnivores in Trentino (“2018 Large Carnivores Report”), **SAT offices** (APT Forestry and Wildlife Department);
- **31 July**, meeting on bears and wolves with children camping at **Malga Primalunetta** (organised by the Civezzano SAT branch).



(M. Vettorazzi - APT Forestry and Wildlife Department archives)



- **14-15 September**, accompanying the visit “On the trail of the bear” in **Val d’Ambiez**, organised by **Società Alpina Friulana (SAF)**;
- **17 October**, meeting with first year pupils at the middle school of the comprehensive institute in Arco, at the **Marchetti sullo Stivo refuge**;
- **6 November**, participation in the informative evening session entitled “The wolf, a problem or a resource?” organised by the **Municipality of Ala** in collaboration with APT;
- **4 December**, participation in the “**Round table on information and participation in the management of large carnivores**”, called by APT.

Collaboration in restyling (text and graphics) of the brochure “**Code of Conduct for Responsible Walkers**” issued by CAI-Italian Alpine Club (Large Carnivores Group)*.

Press releases:

- **28 June**, “What if you meet a bear cub?... User instructions”;
- **25 July**, assistance in drawing up the press release by CAI - Large Carnivores Group on “M49, information for CAI members to clarify the situation”*.

* initiative carried out in the context of the activities of CAI’s **Large Carnivores Group**.

Other communication initiatives

- Article in the magazine “**Il Cacciatore Trentino**” (n. 11 - April 2019) regarding how to behave with female bears accompanied by cubs;
- **11 September**, interview on **Trentino TV** (broadcast via TV “**Buonagricoltura**”) at Malga Bocche on the management of pastures and the prevention of damage by large carnivores;
- **26 September**, interview/filming for an article on the bear in the weekly magazine “**Espresso**”;
- **7-11 October**, Support for the TV troupe of “**Arte TV**” (FRA-GER) for a documentary on bears in Europe.

Degree theses, internships and collaborative agreements

During 2019, collaboration with **research institutes and students** continued and new projects were initiated, to study issues relating to ecology and overcoming conflict with large carnivores in depth, and to support monitoring and experimentation activities.

- Thesis on “*Using the Bow Valley Model to improve Human-Wildlife coexistence in Trentino with crossing structures*” - **Francesco Del Greco** - master’s degree course in **Environmental and Land Engineering** - University of Trento - Department of Civil, Environmental and Mechanical Engineering;
- Master’s degree thesis on “*Analysis of the risk of predation and the impact of the wolf on animal husbandry in the area of the Paneveggio Pale di S. Martino Nature Park*” - **Marco Kanellopoulos** and **Paola Medici**, interns at the Park in the framework of the 1st level master’s degree in the “**Management and conservation of the environment and wildlife**”, promoted by the **University of Parma**;



- Thesis on “*Management of risk and the community: the case of the brown bear in Trentino*” - Jacopo Nicolodi - master’s degree course in Management of Organisations and the Territory - University of Trento, Department of Sociology and Social Research;
- Doctorate thesis - Andrea Corradini - Fondazione Edmund Mach, Department of Civil, Environmental and Mechanical Engineering at the University of Trento, Stelvio National Park. The project carries out in-depth study into aspects and possible strong and weak points related to functional **connectivity** and the ecological sustainability of the European environmental network, for a species with such vast spatial requirements as the bear. The doctorate programme, lasting three years, has the scope of examining possible future scenarios for the conservation of the brown bear in the Alps, analysing genetic, demographic and spatial data and information on interaction with man collected in the last twenty years, to evaluate the possibilities and **mechanisms for roaming and expansion of the population** currently distributed in western Trentino.

Round table on information and participation in the management of large carnivores

The “Round table on information and participation in the management of large carnivores” met twice in 2019, on 21 May and 4 December.



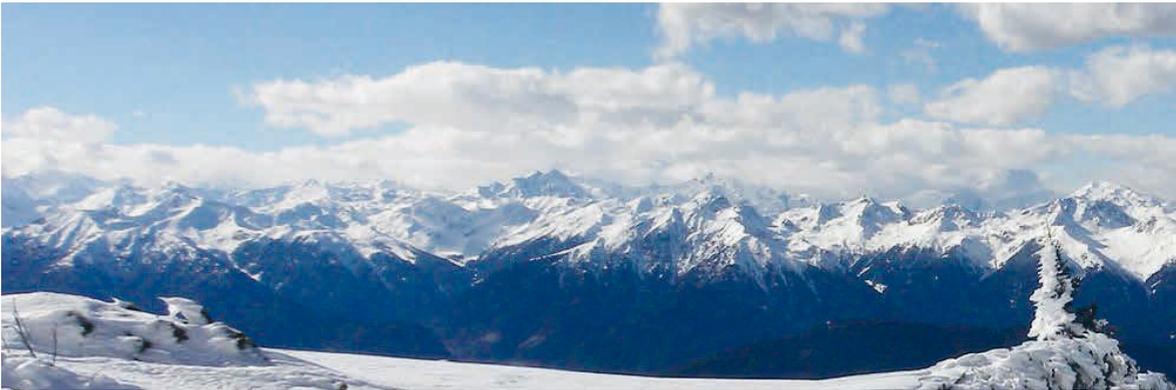
(M. Zeni - APT Forestry and Wildlife Department archives)

5. PERSONNEL TRAINING

Correct management of large carnivores is inextricably linked to the availability of specially **trained staff**, prepared to deal with any problems of a technical and non-technical nature that may arise during activities in the field, above all as regards the management of emergencies, dealing with damage and, to a lesser extent, monitoring. Training represents one of the six programmes of action referred to in the previously mentioned provincial government resolution no. 1988 of 9 August 2002.

The training initiatives carried out during 2019 are listed below.

- **27 February**, 2018 update (Report data) and **training for staff involved in the monitoring and management of large carnivores** (APT, Nature Parks, Associazione Cacciatori Trentini);
- **3 and 4 April** in the Canton of Ticino (**CH**), in the context of a training course for local supervisory personnel, the staff of the Large Carnivores Division reported on the **predation of wolves on cattle** in Trentino and activities for the management of bears;
- **10 April** at **Casteler**, training day directed at the staff of the forestry service, the Associazione Cacciatori Trentini, the Adamello Brenta Nature Park and the Paneveggio Pale di San Martino Nature Park involved in systematic and opportunistic **monitoring** of large carnivores and the prevention of damage;
- **20 May**, meeting with students of the **Istituto Agrario in S. Michele all'Adige**;
- **29 May** at **Casteler**, **wolf capture** training: the limitations and potential of the various methods (with staff from the Autonomous Province of Bolzano);
- **30 May**, training for **vets working for the provincial health service, at Casteler**;
- **4 June**, technical-practical meeting on methods for the **capture** of **wolves** and management of GPS collars (**Val di Fassa**);
- **19 - 20 - 21 June** in **Slovenia**, technical-practical training regarding methods for the **capture** of **wolves** implemented by researchers from the **University of Ljubljana**;



(D. Asson - APT Forestry and Wildlife Department archives)

- **18 June**, training for the Hunting Association of Trentino (ACT) on large carnivores - ACT premises, Casteler;
- **19 June**, training in **Longarone (Belluno province)**. in the context of the Life Dinalp Bear project;
- **6 and 8 August**, training on large carnivores for **new forestry staff** joining the service in 2020;
- **7 August**, visit to **Malga Sasso Piatto** for training on **preventing damage by wolves** (photo 21);



Photo 21 - Training for the prevention coordinators (P. Zanghellini - APT Forestry and Wildlife Department archives)

- **29 April - 5 May 2019**, study trip and training on the **French and Spanish Pyrenees**, in the context of the *Life Dinalp Bear* project;
- **5 November**, meeting with sociology students from the **University of Trento**;
- **8 - 9 November, 22 - 23 November, 6 - 7 December**, training for the **dog units** regarding anti-poison dogs;
- **11 December**, course on the **alpine farming production chain** organised by the Valle del Chiese Network of Reserves;
- **18 December**, updating for **prevention coordinators**, Casteler.



6. NATIONAL AND INTERNATIONAL NETWORKING

Networking with neighbouring regions and countries takes on strategic importance in the management of highly mobile species such as the brown bear, wolf and lynx. Bearing this in mind, relationships with other countries and regions have long been established and have been strengthened and consolidated over time.

Conclusion of the LIFE + “DINALP BEAR” project (2014-2019)

The *Life* “DINALP BEAR” project (Figure 14), within the context of the European Commission *LIFE* + *Natura* funding programme (with funds of euro 248,011 available to APT, the EU quota being euro 173,608), in which APT participated, concluded on **30 June 2019**.

Figure 14 - Logos of the Natura 2000 network and the *LIFE*+ “DINALP BEAR” project



The project set itself the objective of managing and conserving the brown bear population in the North Dinaric Alps and the Alps, through the involvement of partners in Italy, Austria, Slovenia and Croatia.

In 2019 working meetings were held on **3 and 4 April** in **Venice**.

The Alpine Convention Large Carnivores Platform

2019 saw continuation of the activities of the **Alpine Convention Large Carnivores Platform**, set up in 2009, the Autonomous Province of Trento also being represented within the Italian delegation. For the 2019-2020 two-year period, the Platform is chaired by Slovenia and specifically by its Forestry Department. The Platform met in **Bled (SLO)** on **22 and 23 October 2019**.

Figure 15



Other opportunities for national and international networking

- **22 - 24 January**, hosting of **Hungarian** colleagues at Andalo for management of emergencies/culvert traps;
- **30 July**, visit to **Parco Natura Viva in Affi (VR)** to exchange technical information on animals in captivity (and visit by the park managers to Casteler enclosure on **20 August 2019**);
- **27 September, technical meeting** with colleagues at the **Autonomous Province of Bolzano** (Hunting and Fishing Office) at Malghetto di Presson (Dimaro) in Val di Sole (photo 22);



Photo 22 - Technical meeting with colleagues from the Autonomous Province of Bolzano (APT Forestry and Wildlife Department archives)

- **8-9 October**, hosting of **Spanish** colleagues from *Life Pirois* for the management of emergencies;
- **16 October**, adoption of **Resolution no. 8** regarding “**Cooperation in the Euroregion regarding conflict between wolves and alpine farming**”, during the joint sitting of the legislative assemblies of the **Euroregion** (Autonomous Province of Bolzano, Autonomous Province of Trento and Land Tirol);
- **16 October**, visit by the **veterinary surgeon Frank Goeritz (GER)** to Casteler, in relation to keeping bears in captivity;
- **16 - 18 October**, hosting of **Greek** colleagues to study the dog units;
- **7 - 8 November**, study trip to the **Black Forest (GER)** to see bear/wolf enclosures.

The Large Carnivores initiative for Europe (L.C.I.E.) and the Bear Specialist Group of the International Union for the Conservation of Nature (B.S.G.-I.U.C.N.)

Once again in 2019, the provincial administration participated in the activities of L.C.I.E. with its staff (Figure 16).

Among other things, classification of wolf behaviour in terms of the possible level of boldness as regards man was defined, also establishing the most opportune measures to be taken to manage so-called “*bold wolves*”. This gave rise to a framework (Figure 17) drawn up using similar criteria to those adopted to define possible behaviour by bears contained in the PACOBACE. It is a document considered to be technically authoritative, also used for reference purposes in various parts of Europe.

Figure 16



Figure 17 - Assessment of wolf behaviour and evaluation of the risk potentially posed to human safety, with recommendations for action

| BEHAVIOUR | ASSESSMENT | RECOMMENDED ACTION |
|--|---|--|
| The wolf passes close to settlements in the dark | Not dangerous | No action necessary |
| The wolf moves around during the day within sight of settlements and scattered houses | Not dangerous | No action necessary |
| The wolf does not flee immediately when it sees vehicles or human beings. It stops and observes | Not dangerous | No action necessary |
| The wolf is sighted for several days at a distance of less than 30 m from inhabited houses (multiple events for a longer period of time) | Requires attention. Possible problem of strong habituation or positive conditioning | Analyse the situation. Seek possible sources of attraction and remove them if found. Consider deterrent action |
| The wolf repeatedly allows people to approach within a distance of less than 30 m | Requires attention. Shows strong habituation. Possible problem of positive conditioning | Analyse the situation. Consider deterrent action. |
| The wolf repeatedly approaches people at a distance of less than 30 m. It seems to be interested in people | Requires attention/critical situation. Positive conditioning and strong habituation can lead to increasingly bold behaviour. Risk of incidents/wounding | Consider deterrent action. Removal of the wolf if suitable deterrent action is not successful or is not feasible |
| The wolf attacks or wounds a human being without having been provoked | Dangerous | Removal of the wolf |

Among other things, IUCN's *Bear Specialist Group* provided an authoritative opinion regarding the most opportune management measures to be adopted in the case of the bear M49.

Conferences and meetings

The provincial administration attended the following international conferences, reporting on its activities for the management of bears and large carnivores:

- **7 May**, Meeting of central government and the regions on the Wolf National Plan in **Rome**;
- **28 June**, further meeting about the Wolf national Plan in **Brescia**;
- **18 - 22 September**, Life Piro conference regarding the bear in the **Spanish Pyrenees**;
- **28 - 29 November**, 2nd edition of the technical sessions organised by GLAMM (*Group for Large Mammals Conservation and Management*) in **Ferrara**, "Difficulties for man – the impact of the bear on anthropogenic activities and the possibility of mitigation".

NOTES

A series of horizontal dotted lines for taking notes.





AUTONOMOUS PROVINCE OF TRENTO

FORESTRY AND WILDLIFE SERVICE

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