



# book of abstracts



*International conference*

## **Wolf Conservation in Human Dominated Landscapes**

*25 – 27 September, 2013  
Postojna, Slovenia*

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International conference:  
Wolf Conservation in Human Dominated Landscapes

# **Book of abstracts**

**University of Ljubljana, Biotechnical Faculty**  
Ljubljana, September 2013

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**Wolf Conservation in Human Dominated Landscapes**

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## Rewilding Europe with the wolf: can we turn controversy into coexistence?

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The last 40 years have seen some major changes in the status of many species in Europe. Wild ungulate populations have expanded in most areas, and large carnivore populations have increased in their historic strongholds as well as recolonizing (either on their own or through reintroduction) to many areas from which they had long been absent. Parallel with these developments in the status of wildlife species have been changes in both the legislative structures and in the heuristic frameworks within which we view both the means and goals that govern the human relationship with wildlife. In the wake of these changes a number of diverse conflicts have emerged both between humans and wildlife and between diverse stakeholder groups over issues of wildlife management and conservation. The wolf is probably the most controversial, best studied and symbolic animal at the centre of these conflicts. This talk will examine the diversity of ways in which wolf centric conflicts are manifesting across Europe. It will then relate this to the related discourses and controversies around the different conservation heuristics that exist, with special emphasis on the recent emergence of rewilding and wilderness as themes in Europe. Finally, the talk will explore the potential for turning controversy into coexistence.



## **LIFE Ibrewolf and LIFE Medwolf: two LIFE projects for wolf conservation in central Italy – preliminary results and future activities**

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LIFE projects Ibrewolf and MedWolf are being implemented in the Province of Grosseto in Central Italy, and the latter also includes a project area in Portugal. The extension of the project area in Italy is 450.000 ha. The two projects target two main threats to wolf conservation: wolf/dog hybridization and conflicts with human activities in rural areas.

Preliminary information from a survey on wolf-dog hybrids suggest the presence of at least 3 packs in the area, and in each of them at least an individual with phenotypical characteristics of hybrids was detected with camera traps.

The high rate of attacks to domestic livestock in the area suggests that predators include a diverse community of canids that can potentially be involved in attacks to livestock. This has been confirmed by the capture of 8 free ranging dogs, one killed individual with hybrid genes, and one hybrid. The territory of the Province has been re-colonized by wolves in recent times (few decades) and the risk of hybridizations is high, also given to the fact that dogs are often left free-ranging.

Furthermore, the systematic lack of adequate preventive measures, coming from a tradition of extensive free-ranging livestock management, and the presence of a relatively new system for compensation of damages apparently result in a very critical situation that calls for an immediate and integrated intervention. The regional administration has adopted an insurance system for damage compensation, unique case in Italy. According to the current law a total of ca. 1.200.000€ was paid in the period 2007-2012 for damage compensation and prevention measures. However, such system seems not to be appreciated by livestock owners as suggested by the majority of livestock owners not declaring damages suffered. LIFE Ibrewolf aims at increasing the awareness on the impact of hybrids wolf/dog and implements some pilot actions for the removal of such individuals from the local packs, while LIFE MedWolf aims at implementing means for mitigating the existing conflicts through the use of different preventive measures and/or combinations of them. The two projects, implemented in collaboration with representatives of environmental organisations such as WWF Italy and Legambiente, as well as representatives of the livestock owner associations, represent an excellent example of shared responsibilities towards the mitigation of conflicts of interests.



## Evaluating management effectiveness: Does wolf management in Croatia support long-term survival of wolf population?

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Evaluation of management effectiveness is a tool used to understand adequacy of existing management practices and indicate possible improvements for future management planning.

In last two decades significant efforts have been invested to maintain viable wolf population in Croatia. Are they sufficient? The protected areas management effectiveness evaluation methodologies were adjusted to evaluate wolf management in Croatia. Assessment was exercised based on assessors' involvement and good insight into wolf problem area, stakeholders' opinions expressed through wolf management planning processes and inputs from relevant experts.

Six elements of management cycle were analyzed: context, management planning, inputs, management processes, outputs and outcomes.

The existing management supports maintenance of wolf population at biologically and socially acceptable levels. This is mostly a result of high motivation and efforts of nature conservationists and scientific community, good level of stakeholders' participation in planning, inflow of substantial EU funds in the past and fair allocation of finances from the State budget (until 2009's financial crisis most of financial needs were fulfilled) as well as existence of standing advisory body to the ministry responsible for nature conservation.

Several issues should be improved, including human capacities for communication with stakeholders at local level, monitoring and law enforcement; funding availability and diversity; capacities for coordination of overall wolf management plans' implementation; participation of particular stakeholders in management planning – such as livestock breeders; and awareness about development of large carnivores' based tourism. Transboundary cooperation should be improved as well, particularly with Bosnia and Herzegovina.

The results of this evaluation are useful to decision-makers providing a clear insight about cost-efficiency of the decisions and warning about possible and potential problems. Stakeholders involved in management process can learn whether their efforts are used sufficiently. On the broader scale, used methodology and results could be beneficial to wolf managers and conservationists at European and global level. Methodology could also be applied for evaluation of effectiveness of management of other species, including those that are less complex to manage.



## Foraging ecology, economics and conservation of Arabian Wolf in Asir region of Saudi Arabia

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We determined the food availabilities of the large carnivore in Asir region of western Saudi Arabia using camera traps of more than 1000 nights. The key predators, we photographed including Arabian Wolf *Canis lupus arabs* and several others. The estimating prey availability and by monitoring camera trapped large carnivores shows that the frequency of occurrence of livestock mainly Domestic goats (*Capra aegagrus hircus*) and Domestic sheep (*Ovis aries*) were of most abundant in the whole region where above mentioned carnivores are distributed. Other important wild prey-bases were Rock hyrax (*Procavia capensis jayakari*), Mountain gazelle (*Gazella gazella cora*), Nubian Ibex (*Capra ibex nubiana*), Hamadryas baboon (*Papio hamadryas*) and some areas Donkey (*Equus africanus asinus*) might have been attacked by wolves. The frequency of food items recorded by camera traps of different wolf packs reflected their relative availability that also includes partridges and other birds. For carnivores' distinction between scavenging and predation was only possible through continuous monitoring through camera traps. The average feeding interval obtained from monitoring was 3.6-0.7 (S.E.) days and the average consumption/ wolf /day was 1.8-0.3 (S.E.). Livestock carcasses and killed by wolves contributed that contains sheep and goats formed most (70%) of the biomass consumed by wolves whereas wild animals such as mountain gazelles, hyrax and other 30% respectively. Predation on sheep and goats therefore was much higher and translated in an estimated loss of Saudi Arabian Riyal 1,200 per sheep/goat and on an average the loss of cattle is estimated to be 20-30 animals per village per annum that constitute SAR 30,000. We propose that landscapes such as the Asir with high wolf density, low natural prey availability and consequently high human-wolf conflict levels should be prioritized as prime sites for these two large carnivores' conservation efforts.





## **Wolf feeding strategies in agricultural landscapes: lessons from two areas in Portugal**

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In Portugal, wolves have survived in a profoundly modified landscape which humans and livestock have been shaping since thousands of years ago. Living in a human-dominated landscape has moulded several biological traits of Iberian wolves, such as feeding habits. This study aims to address wolf diet (frequency of occurrence in wolf scats, F.O.), selectiveness towards domestic ungulates (Ivlev's electivity index, E) and kill rates using official statistics of wolf depredations on livestock (n° kills/wolf/year and Kg/wolf/day) in Portugal. Two study areas were selected (Peneda-Gerês and South Douro River), both characterized by an almost depletion of wild ungulates and a high density of several domestic animals under different husbandry systems (extensive grazing vs. intensive production farms). In both study areas, wolves feed on several species of domestic animals (cattle, horses, goats, sheep, pigs, rabbits, birds of poultry and dogs), being ungulates the most important food item (F.O. > 75 %). In Peneda-Gerês, wolves rely mainly on cattle, horses and goats, with a high positive selection for free-ranging horses (E =0.9). Kill rates on domestic ungulates are higher on goats and sheep (up to 25 kills / wolf / year) than in adult cattle and horses (4 kills / wolf / year). In this area food intake by wolves is mainly obtained by predation, which raises a huge economic and social conflict with livestock production. In South Douro River wolves mainly feed on cattle and goats, with a positive selection for cattle (E=0.5). Regional dissimilarities in kill rates on domestic ungulates (> 100 kills to < 1 kill / wolf / year) reflect that in this area wolves rely not only in predation but also in scavenging on livestock products, which are a localized and unpredictable food source. Results show a high dependence of Iberian wolves to anthropogenic food resources, which are exploited through different strategies: predation vs. scavenging. The implications of these feeding strategies will be discussed in relation to wolf biology (e.g. energetic requirements, foraging behaviours) and management actions to achieve a sustainable coexistence between wolf populations and human interests.



## Use of electric nettings as night time enclosures to prevent wolf predation on kart pastures in Slovenia

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Electric fencing is a well accepted method of controlling domesticated stock. Electric fence represents almost no physical barrier, but instead relies almost entirely on the fact that the animal gets shocked whenever it touches the fence. In recent years also in Slovenia many livestock farmers, who graze animals in the area of permanent or occasional presence of wolf found electric fencing (permanent or temporary) a highly efficient and low cost method to stop the conflicts between this carnivore and their property. In the framework of LIFE project SloWolf we tested in South Western part of Slovenia a novel approach in minimizing damage on pastures on small ruminants due to wolf predation. We donated 5 prevention measure sets in 2011 and 3 sets in 2012 to farmers who raised from 70 to 250 sheep and had wolf attacks in the past. A prevention measure set consisted of 5 high (170 cm) electric nettings, battery energizer (1,5 J), four galvanized earth stakes, battery energizer box and digital volt meter. With such sets farmers set up night time enclosures on pastures to gather sheep to stay inside over the night or their livestock if a flock was of small size stayed all day behind the nettings. It was important that during the night all animals were kept inside the enclosure, no gaps were present under the nettings and nettings needed to be erected. We made regular visits or called farmers to get returned information if attacks appeared. After the commencement of using night time enclosures on pastures, no wolf attacks appeared on those flocks and no damage was compensated. The visibility and the design of night time enclosure, the high power in electric nettings, shifts of enclosures during the grazing season, and proper grounding of energizer are rules that have to be obeyed to make effective electric netting for the need of wolf damage prevention. Large carnivore can survive in the long term on freedom throughout natural habitats of Europe only if they get enough strong fear to people and their property as livestock is.



## A new way of protecting livestock against wolves' attacks

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Two types of tools have been used to protect flocks from predation: disruptive-stimulus tools (i.e. disrupt the predatory behavior) and aversive-stimulus tools (i.e. modify the predator behavior). However, none of them modify permanently predator behavior and prevent them from attacking and from coming back to predate on the flock.

The aim of the present project is to create a new tool for livestock protection against wolves that will at the same time protect sheep and permanently modify the predator behaviour toward the equipped flocks.

We will consider the feasibility and effectiveness of three interconnected working hypotheses:

1. Wolves alarm semiochemical (WAS) release is supposed to provoke an instinctive response of flight without passing through any learning process. WAS will be sampled and analyzed. We will study wolves' behavioural response elicited by the semiochemical in order to assess its effectiveness as a protective tool for livestock.

2. Wolf presence or attack triggers in sheep stress or fear that is measurable through heart rate variability (HRV). Sheep will be equipped with a special belt to permanently measure HRV. When the system will detect a sudden fear or stress, it will trigger an alarm to warn the shepherd and a frightening stimulus for the wolf.

3. The frightening stimulus can be associated with a conditioned stimulus that will be then permanently placed on the flock to provoke a conditioned avoidance response.

Wolves will lastingly learn to avoid approaching the protected flocks and through social learning this behaviour will be transmitted to other wolves in the pack.

We expect this new device to become an effective way of protecting livestock where LGD cannot be successfully used.



## Development of new methods to protect sheep against wolf attacks

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The usual measures of livestock protection against wolf attacks are night enclosures, electric fences and guarding dogs. We compared characteristics of Slovene sheep farms which experienced wolf attacks with characteristics of those farms that did not have wolf attacks in the pasture seasons 2008-2010 (Van Liere 2013). Electric fences and guarding dogs did not prove effective: they did not prevent wolf attacks or reduce killing rates. Night enclosure, together with moving the sheep there before dusk, proved to be an effective measure, however, not all attacks happen during the night (in our study 78 % of 288 were night attacks). Furthermore, some studies reported that a shift from night to day attacks can happen. One of the alternative strategies we suggest is to apply new sensor technology and automation to one or two animals in the flock with the aim to detect and immediately deter an approaching big predator. Approach of a big predator causes acute stress in livestock, which sensors can monitor. The principle is already tested by Swiss researchers, using increased heartbeat, but in a different context. Beside increased heartbeat we would consider sudden drop of the ear's temperature as a second stress indicator and a combination of both. Moreover, robust sensors contacting the skin would measure these sudden anxiety-induced changes and subsequently transmit this to a small logic board at the fence, which would then immediately activate deterrents as big lights (in case of night attacks) and sounds of gun shots. This would induce operant learning where the wolf links his approach to sheep with unpredictable negative events. The immediate response to a wolf's approach would prevent reinforcement of chasing, killing and consuming livestock and thus prevent wolves to appreciate livestock as an 'easy pick'.



## Wolf damages in Slovenia

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Sheep grazing is common land use in wolf range in Slovenia. The sheep are usually not properly protected against wolf attacks and consequently that results in frequent conflicts among wolves and humans. Regular damages result also in negative media reports. Additionally, frequent depredations can result in calls for higher culling quotas and even illegal killings of wolves. Therefore good understanding of circumstances, in which damages occur, is crucial for damage prevention in human dominated landscape in Slovenia. Only good understanding of this problem can result in proper and effective prevention of wolf attacks.

In Slovenia we annually recorded in the last 5 years around 400 damage cases, 300.000 EUR paid compensations in region with approximately 31 – 41 wolves. However, little is known about the circumstances when damage cases occur. For this reason we analyzed registered damage cases in Slovenia since 2007 till 2012. In addition, we documented installed protection measures in the field within core area of wolf presence in Slovenia and filmed the use of installed protection measures.

We will present GIS analysis of effects of different spatial parameters on occurrence of damages, such as: distance from pasture to human settlements, distance to forests edges, size of forest complex, size of sheep herd and biomass of natural prey. In addition, we will present a comparison of breeders with frequent damages and those with little or no damages, obstacles in damage prevention and possible solutions.



## Marginal livestock practices favour coexistence: An example with wolves and free-ranging horse husbandry

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Wolves preying on livestock fall into a permanent conflict with humans. However, predation seems to be tolerated differently across livestock practices. Although traditional prevention methods are the most effective tools used to mitigate wolf-livestock conflicts, marginal extensive livestock practices –on the verge of economic viability– can play an overlooked role attenuating conflicts and favouring coexistence. We illustrate it using wolves and free-ranging mountain ponies husbandry in Galicia (NW Iberia), a traditional livestock system providing important ecological and socioeconomic services, which has persisted because it entails negligible costs for farmers. Mountain ponies make a significant contribution supporting wolves in an area with low abundance of wild ungulates (26 out of 33 packs occur where wild ungulates are absent or their density is low) with ponies appearing in at least half of wolf faecal samples collected in eleven wolf territories (range 51%-92%, 70% of the samples overall, n=673). Wolf predation upon ponies does not threaten farmer's economies and seems to be tolerated better than attacks to more valuable stock (cattle). Assuming that the number of hunting permits (hunting requires administrative permission and is used to manage the conflict) reflect the claims of farmers, the low rate of legal control between 2004 and 2007 (three wolves) would suggest a remarkable tolerance of wolves by farmers. However, despite a number of policies promoting the persistence of mountain ponies, recently European Union's regulations on animal welfare or meat production put new economic and administrative burdens on farmers, make free-ranging horse rearing economically unsustainable, and incentivise its abandonment. Among the potential consequences of the decline of this extensive livestock practice, we highlight the rise of a currently attenuated conflict with farmers due to an expected increase in the rates of predation on valuable livestock (cattle). To ensure the long-term persistence of mountain ponies we encourage authorities to implement profitable incentives based on the environmental and socio-economic services they provided, and to assume the ownership and legal responsibility on ponies in key mountain areas of Galicia for biodiversity conservation.



## **Wolf re-colonization, distribution and population trend in three countries of northern Europe: results from 15 years of joint cross-border monitoring**

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During the 1960's, the historical wolf population became functionally extinct on the Scandinavian Peninsula, i.e. Sweden and Norway. However, during the next two decades, a new population was founded in south-central Scandinavia by long range dispersers from the large Finnish-Russian wolf population. During a 35-year-period of re-colonization and reproduction (1978-2013), a Scandinavian increase from less than ten individuals to more than 300 wolves was confirmed by continuous and highly cooperative Swedish-Norwegian monitoring of this joint, cross-border population. In 1998, this international monitoring was extended to a long-term ecological study and cooperation between three Fennoscandian countries in the northwestern-most part of the European wolf distribution range, i.e. Finland, Sweden, and Norway. This North-European, cross-border wolf monitoring has worked well in close cooperation for 15 years (1998-2013), and is still continuing. All three countries monitor wolves by similar and comparable methods, e.g. ground-tracking on snow, genetic analyzes, GPS-based radio-telemetry, and hunter surveys. For each of these 15 years, results and conclusions on Fennoscandian and national population status, distribution and trend are available in official annual printed reports. However, so far these annual monitoring data has not been analyzed and summarized for the 15-year-period in total. The first results from such analyzes will be presented at the conference together with the latest update on wolf population status in the three Fennoscandian countries, respectively.





## The wolf population in the Alps: past, present, and the future?

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The wolf recolonized part of its former habitat in the South-Western Alps through dispersal from the Apennines beginning in the late 1990s, after being extirpated throughout the Alps during the 20th century. Current wolf distribution, constructed by the Wolf Alpine Group (WAG), consists of settled wolf packs mainly present in the Western Alps of Italy and France. In the rest of the Alps, dispersers might be detected occasionally, and few settled solitary individuals are detected in the Central-Eastern Alps. The area occupied by wolves in the Alps is connected in the south-west to the Apennines wolf population, the main source for the current wolf recolonization. Recently, an interesting slight connection has been documented with the Dinaric population from Slovenia, and the first reproducing wolf couple composed by one wolf from each population has been documented in Veneto Region. In the future the connection between the Italian population, Dinaric population, and Carpatian population is a probable event of extreme interest that might be documented over the Alps. The spatially explicit, individual-based model (SE-IBM) produced by Marucco and McIntire (2010) allowed an analysis of part of this complex spatial and temporal wolf recolonization of the Alps, providing predictions on the development of new settled packs, and considerations on the future connectivity within the cited meta-population.





## Tracking wolves in Slovakia by sign survey and non-invasive DNA sampling

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The grey wolf (*Canis lupus*) in Slovakia is both game and a protected species. Species listed in European Union legislation must be maintained at 'favorable status'. However, there is no management plan for the wolf and no robust system for monitoring the population at the national level. Estimates of abundance vary between the hunting community and environmental NGOs by an order of magnitude. The annual harvest of 120–150 wolves has been the subject of official complaints from within Slovakia as well as from neighboring countries sharing the same population. In 2010 the Slovak Wildlife Society launched White Wilderness: Carpathian Wolf Watch. This volunteer program aims to bring together researchers, nature conservationists and hunters in order to produce more reliable estimates of wolf population parameters which are accepted by all key interest groups. Citizen scientists are recruited locally and internationally. New volunteers undergo two days of training in field techniques including sign recognition. Volunteers are subsequently assigned to groups of 2–4 and survey fixed transects for signs of target species. Positions are recorded using GPS; field signs are photographed to allow verification and samples of urine, feces, hair and blood are collected for genetic analysis. When possible, tracks are followed the next day to map movements and collect additional samples. Camera traps are installed at kill sites and on travel routes. During a 3-week period in January–February, volunteers usually survey a total of c.450 km. Out of 55 samples collected in 2010 and considered by the project team to have originated from wolves, the Molecular Zoology department of Munich Technical University obtained genotypes from 48 (87%). Fifteen different individuals were identified in the about 2,000 km<sup>2</sup> of study area.



## Wolf monitoring without snow – an example from Germany

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After 150 years of absence the wolf is back to Germany. The population is rapidly increasing and spreading. Of course the wolf monitoring should keep track with this population development. However, wolf monitoring in Germany faces several challenges. First, snow conditions are uncertain making a monitoring primarily based on snow tracking impossible. Second, Germany is a federalist country consisting of 16 States (Länder). Although large carnivores are listed by the federal nature conservation act as strictly protected the enforcement, hence the monitoring, relies on the States. So far there is no coordination in regard to wolf monitoring between the States. Third, Germany is sharing its wolf population with Poland therefore data evaluation should be comparable between both countries. During the last years we developed a combination of survey methods that are not snow depended. These survey methods have proofed to be applicable for population size and area of occurrence estimates for the current population status. This combination of methods also appears to be feasible with a further population increase in the next years. The monitoring fragmentation within the country made the standardization of data interpretation absolutely essential. In consequence national monitoring standards for LCs in Germany were developed and accepted in 2009 and revised in 2013. These standards strongly rely on the so called SCALP criteria thus categorizing data according to their verifiability. For population size and area of occurrence estimates only C1 (hard facts) and C2 (confirmed observations) are used. Furthermore we developed criteria to distinguish between adjacent territories – a task that becomes more and more difficult in areas saturated with wolves. Joint monitoring standards between Poland and Germany for the shared population are currently under development. So far Polish and German wolf experts agreed on common definitions, sampling units and sampling periods. However, joint data interpretation will still be a challenge in the next years since both countries still defer in regard to whether monitoring data should be classified according to their verifiability or according to their reliability. However, the first step toward a comparable data evaluation is done.



## Wolf pack rendezvous site selection in Greece is mainly affected by anthropogenic landscape features

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In wolves, most offspring mortality occurs within the first 6-8 months of their life. As wolf pups pass this entire period at either the den or rendezvous sites, their selection by wolf packs may affect pup survival and recruitment. Rendezvous sites are important for pup survival as they are used during summer and early autumn, when intense human activity may increase pup mortality. This study describes factors related to rendezvous site selection in order to enhance their protection and management. We studied the rendezvous site selection of 30 wolf packs in central and northern Greece between 1998 and 2010, after locating 35 sites using the simulated howling survey method with the aid of satellite and radio wolf telemetry. We considered 41 environmental and anthropogenic predictors of wolf rendezvous site selection at two spatial scales. At the landscape-population scale, wolves selected rendezvous sites below 1200 m.a.s.l. ( $w_i = 0.20$ ), with large inter-site distance (mean 12.9 km), and avoided partially forested or open habitats ( $w_i = 0.52-0.79$ ), indicating preference for forest covered and spaced areas. Wolves established rendezvous sites in a way to minimize intra-specific competition and maximize access to stable resource availability.

At the home range scale, wolves selected rendezvous sites away from forest roads ( $R = 0.232$ ) and villages ( $R = 0.152$ ), close to water sources ( $R = -0.209$ ), and in areas with low forest fragmentation ( $R = 0.172$ ). Avoidance of human presence and disturbance accounted more than factors related to habitat types or availability of prey. This strategy, adopted by wolves in Greece, may be a response to the long history of human persecution. In the summer of 2011, we tested the ensuing resource selection model (RSF,  $AUC = 0.818$ ) after successfully locate seven new rendezvous sites outside our previous survey area, verifying the utility of prediction maps. All new sites had their center at areas with 0.8-1 model probability. Rendezvous prediction maps can be used to reduce field effort when monitoring wolf populations, assess livestock predation risk, design protected areas, and reduce human disturbance on reproductive wolf packs.



## A study on general health status and potential disease risks in grey wolf (*Canis lupus*) of Slovenia

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In order to investigate general health status and the potential disease risks in Slovenian wolf population, 19 female and 16 male carcasses and internal organs were investigated. A detailed necropsy was performed and tissue samples for pathohistological, parasitological, microbiological and radiological investigations were collected. The majority of examined animals (n=31) were culled as a part of regular annual harvest. Three animals died of a massive internal *haemorrhage* as a consequence of collision with vehicles. One pup was found dead due to the interruption of the spinal cord induced by other carnivores. In one female the cause of death could not be determined reliably. Although study revealed good health status of wolves in four animals severe pathological condition of skin was confirmed namely sarcoptic mange and pyodermitis. With the parasitological examination nine common wolf parasite species, including zoonotic *Trichinella* spp. were confirmed. All wolves were negative for the presence of rabies virus and one was positive for the presence of parvovirus antigen.



## Local attitudes toward wolves: a case study in Abruzzo, Lazio and Molise National Park (Italy)

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We conducted personal structured interviews (n=1611) to assess perceptions of wolves (*Canis lupus*) among residents living in the different regional portions comprised within the Abruzzo, Lazio and Molise national park (PNALM) and its external buffer area (Italy). Furthermore, the PNALM portion comprising the Abruzzo region was divided into two geographically distinct study zones, Abruzzo Marsica (AM) and Abruzzo Fucino (AF), to reflect their different history as well as cultural and socio-economic settings. Principal components analysis (PCA) was carried out on the interview results, and it suggested 3 main components (general attitudes, wolves' impact on game species, and wolves' management options) that explained 69% of the variance. Based on these results, we developed models to identify the variables that most differentiated the regions. Step-wise logistic regression was performed using region as the dependent variable, and using the saved component scores of the PCA, questions regarding respondents' perceived damages from wolves and respondents' experience with wolves as predictors (model fit:  $\chi^2 = 396$ , df=27, p).



## Changing attitudes to wolves in a transhumant pastoralist community in Georgia

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Efforts to conserve biodiversity can be compromised where human–carnivore conflict is prevalent. The Georgian Carnivore Conservation Project (GCCP) studied carnivore–livestock conflicts in a semi-arid landscape in East Georgia. This included a written questionnaire survey to investigate public perceptions, attitudes and knowledge of large carnivores and their management among 10 target groups. The survey was conducted in 2010 (n = 784 respondents) and repeated in 2012 (n = 1,030). During the intervening period, the GCCP implemented a suite of conflict mitigation and awareness raising measures. Attitudes were consistently more negative towards wolves than towards bears across all target groups and in both surveys, with livestock owners and hired herders holding the most negative views. A large majority of most target groups was afraid of wolves. The baseline survey showed that more knowledge tends to equate with less fear, which in turn correlates with more positive attitudes to predators. Knowledge increased from a mean score of 4.37 (median 4) in 2010 to 4.58 (median 5) in 2012. Whereas 69% of rural residents in the baseline survey considered it bad or very bad that there were wolves in Georgia, in 2012 the proportion holding such views was 53%. The percentage of school pupils who thought it was good or very good that there were wolves in Georgia increased from 30% to 40%. The views of livestock owners on whether wolves belong in Georgia also appeared to mellow: whereas in 2010, 16 of them (22%) answered that they ‘strongly disagree’ and two (3%) answered ‘disagree’ with this assertion, in 2012 only four of them (7%) answered ‘strongly disagree’ while 13 (23%) indicated the milder level of disagreement.



## The role of public involvement in wolf conservation and management. Evaluating the effectiveness of public participation in the SloWolf project

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In wildlife conservation and management the need for public involvement is widely recognized. Public participation in environmental decision-making is a democratic right from a normative perspective and is believed to deliver higher quality decisions from the pragmatic perspective. Citizen science programs aim to improve knowledge and awareness of environmental issues. Local involvement in carnivore management is attended to raise the acceptance of carnivores. However, not every public involvement process is effective and evaluation that would identify recommendations for improvement lags behind the practice.

In the SloWolf project, the public and interest groups were involved in several activities that aim to mitigate conflicts related to wolves, raise their awareness and include them directly in wolf management. These activities engaged participants on different levels of involvement.

We carried out 19 semi-structured interviews with a range of participants that were involved in different actions in a wolf conservation project to explore what constitutes a good public participation process and how can it enhance the coexistence of wolves and humans in Slovenia. For the basis of the evaluation of the process, Reed's (2008) criteria were used. All participants agree on the importance of the criteria that we recommend as a basis for future evaluation. As outcomes and process influence each other in participation, we found positive evidence for improved coexistence between wolves and humans through increased social capital through different types of learning.





## Human dimensions of wolf-dog hybrids in the Province of Grosseto (Italy)

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Hybridization poses a threat to wolf conservation in areas where small wolf populations coexist with high numbers of feral dogs. In Italy genetic testing has ascertained the presence of hybrids throughout the wolf range, including the Province of Grosseto in central Italy. In 2011 the provincial administration of Grosseto, together with other partners, initiated the LIFE project “Ibriwolf”, aimed at developing techniques to identify hybrids and limit their presence. Considering the social implications of managing such an issue, we conducted a research study to investigate stakeholder knowledge and attitudes toward wolves, feral dogs and hybrids. Questionnaire interviews were carried out in 17 municipalities of the province, where wolf damages have been recorded. A total of 744 interviews were obtained from local residents (n=400), hunters (n=71), livestock owners (n=97) and high-school students (n=176). Results were analyzed by constructing linear regression models to predict attitudes toward wolves and hybrids using knowledge, experience and stakeholder group membership as explanatory variables.

Our findings indicate that wolf presence is primarily a concern for livestock owners and hunters, who consider them a threat to their activities and favour controlling the wolf population. In comparison, attitudes are more positive among local residents and students. Although knowledge regarding wolf biology is correlated with more positive attitudes, beliefs that wolves have been reintroduced are widespread and denote a general lack of communication and trust toward wildlife managers in the area. Knowledge regarding hybridization is also limited: the majority of respondents had never heard of hybrids, did not know they are present in the territory and were not aware of the risks they pose for wolf conservation. As a result, attitudes toward hybrids are confused and divided among students and residents. Our findings suggest the need to conduct information campaigns to increase awareness of wolf conservation as well as responsible dog ownership among the wider public. Moreover, they highlight the importance of developing communication strategies that ensure the information is accepted by those who receive it, and that promote trust and cooperation between wildlife managers and those most affected by wolf presence.





## Approaching a general social consensus – a national wolf management plan as framework in a federal country

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Successful wolf conservation requires large scale approaches due to the spatial behaviour of wolves. There is a consensus that populations should be managed across administrative borders. Austria, especially the Austrian Alps, provides large suitable areas for wolves and could be a core area for a future population comprising the entire Alps.

Austria is a federal country with seven states in the Alpine part. Each of them conducts nature conservation and game management on its own responsibility within the limits of the EU habitats directive. In order to reach common approaches among the states a national document on wolf management and conservation has been prepared. This was done in a participative approach with all relevant stakeholders involved in sometimes exhaustive discussions. The final document contains compromises between all stakeholders and has been agreed in the meetings, but not every part of this document will be supported in the public by each of the interest groups. Despite the disadvantage of having a final, but imperfect version, this document can be seen as a basis for future discussions in more detail. Next steps as explicit management plans on the state level and continuous round tables for land owners, hunters and farmers are discussed.