



The Ecological Value of Feral Livestock Popula- tions in Europe

Overview, situation and development of a
network for management of wild and semi-
wild livestock populations, Final Report

Waltraud Kugler, Elli Broxham

2014



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Author: Waltraud Kugler, Elli Broxham

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*Figure credit title page: Livno wild horses on the Livno Plateau, Bosnia-Herzegovina
E. Broxham, SAVE Foundation*

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Figure 1: de-domestication in the Netherlands; Figure: Renée Meissner, NL

The live conservation of traditional breeds and varieties is anchored in the work of dedicated owners and breeders. In recent years, SAVE Foundation has been made increasingly aware of feral populations of farm animals. These are populations that are either traditionally wild such as the Camargue horses and cattle, or populations that were released into the wild, for example, as farms were given up in armed conflicts such as occurred in the Balkans. The cattle, horses, goats or sheep have often adapted very well to their environment and survive with little or no human help. Could this type of "farming" be a cost

effective alternative to maintain a genetic reservoir for autochthonous livestock breeds? What impact do these populations have on the ecosystem? Under what conditions can feral populations be helpful for maintaining large-scale protected areas? What type of use and conservation makes sense for such populations? These and other questions have been addressed in the context of the project "The ecological value of feral livestock populations in Europe". The aim of the project was to record the breeds and breed groups, their situation, problems and opportunities for management. Another stated goal of the project was the networking of actors from different disciplines. Studies of this type have rarely been performed up to now.

In this project there were many ideas that needed to be addressed in an interdisciplinary way. In the field of nature protection there are two main approaches: on the one hand, a return to the "wilderness" is being promoted and, within this framework, experiments are being conducted with retro-breeding, reintroductions or populations deliberately left alone to find out what the animals need for their survival in the wild. The basic idea here is to replace the missing large herbivores in the landscape. This approach is not always met with approval. The concern that diseases spread through such populations could spill over to the domestic stocks, is one problem, another is the lack of understanding of the population, as it is very uncommon today to see a cadaver in the landscape or seemingly "suffering" animals. In addition to more research, educational work is also necessary, as was noted in this project.

Another main approach is the semi-wild livestock management of large protected areas. In many regions of Europe large areas of land fall, for various reasons, out of agricultural productivity. The diversity of our European flora and fauna, however, is often based on the ecological stresses of mowing or browsing. To keep meadows open to prevent or undo scrub encroachment, we need to use new methods as mechanical management is, in the long-term, hardly economically viable. Livestock breeds that are adapted to their environment graze largely free-range and need only sporadic supervision by humans seem to be a good choice for managing these areas.

The project presented here provides a first overview of feral livestock populations in Europe and shows possibilities and opportunities for the conservation of our unique, traditional, cultural landscapes and, simultaneously, the conservation of locally adapted, traditional livestock breeds.

INTRODUCTION

Feral populations can be found both in the cold north of Europe and in the dry south. As long as these populations do not conflict with other interests, such as agriculture, they are mainly ignored. They are also largely ignored by researchers. Observations in various countries in the Balkans led to the project “The Ecological Value of Feral Livestock Populations in Europe”. For



Figure 2: Sandsoya goats in Norway; Figure: Norsk Gensressourssenter

the first time, an attempt has been made to systematically search for and document the feral and semi-feral populations in Europe as well as to network key persons from nature protection, research and husbandry of traditional livestock breeds.

Feral livestock populations play an important role in the conservation of large natural areas. Many millennia ago, large herbivores influenced the evolution of plant communities. The Aurochs (*Bos primigenius*) lived on open floodplains and thus kept the species-rich meadows and plains open. The influence of large herbivores on the ecological balance of an area can be seen in recent investigations (Bunzel-Düke et al 2001, 2009). Regular disruptions promote diversity. Damage by and the need for space of the animals is, however, only one component. The dung of large herbivores is also an important factor in the diversity of fauna and flora of an area. This is due to the fact that they promote the existence of small creatures such as beetles and worms. These make use of the dung and also turn it into humus. They also exist as a food source for larger animals. The ecological services of large herbivores are, therefore, more complex than was previously thought (Krawczynski, R. et al 2008, 2012).

Scrubby vegetation is not necessarily a precursor to a natural forest. On the contrary - it can even prevent the emergence of forest trees. This is observed not only in the Mediterranean but, increasingly in the Alps, where higher-lying pastures are abandoned and lie fallow. In the Alps, the emergence of green alder (*Alnus viridis*) is a problem as it disrupts the natural forest development. Attempts to combat bush encroachment mechanically are complicated and expensive. An adapted grazing is therefore useful. However, since many areas are difficult to access, controlled grazing in the transhumance system as it has traditionally (and sometimes still is) operated both in the Mediterranean and in the Alps is no longer feasible everywhere. Areas upon which wild animal populations graze, have a rich mosaic of tree, shrub and meadow vegetation. Appropriate management plans with semi-feral, locally adapted, livestock breeds can therefore promote a sensible solution for use and conservation of environmentally sensitive areas.

SUMMARY

The aim of the project was to collect and record the situation of feral or semi-feral livestock breeds and to make the documentation widely accessible. As even the basics were lacking, empirical research was required. In a publicly accessible database found at http://www.agrobiodiversity.net/topic_network/feral/breedatlas_feral.asp more than 100 populations of feral animals in Europe have been listed with notes on occurrence, inventory, history, action and contact persons or institutions. In addition to the database and project information, a list of "best practice" examples has been made available.

The proposed networking with actors, that was a part of the project, was successfully carried out through workshops, personal contacts and the website. The information was passed to places that work on the conservation of livestock breeds and also the wider public were informed through the SAVE eNews, the SAVE Activity Report and other media. Networking with internationally active nature conservation experts and those involved in the conservation of traditional livestock breeds acts as a path to other future projects and plans. The approach used to gather information and to develop practice notes, was very well received.

The status of feral livestock populations in each country depends on the common traditions but also of scientific interest. For centuries, feral populations of cattle or horses in the UK or Germany experienced a correspondingly interested public. Projects such as "Rewilding Europe" are, up to now, received rather hesitantly by the public. There is a great educational and information need especially for explaining this particular form of conservation and its environmental effects.

The evaluation of the data and information collected shows that large herbivores such as horses and cattle play the biggest role in grazing and reintroduction projects. It is surprising that most populations can be clearly attributed to a breed, because the populations are often geographically isolated and hardly selected in terms of breeding. The definition as a breed can also be genetically detected in some cases. The regional focus of feral livestock populations is clearly attributable to the Mediterranean region. This is partly due to the traditional husbandry, such as island populations that have been released and not fully recaptured; on the other hand, the recent Balkans wars play a role. Most clearly defined populations were found in Spain. The scientific interest in these populations is very large, in addition to traditional forms of husbandry in isolated areas. But the touristic "marketing" of feral and semi-feral populations, especially in Nature or National Parks works very well. In the Alpine countries there are hardly any feral livestock populations. Here it is becoming apparent that they play an important role in the maintenance of keeping alpine pastures open.

Feral or semi-feral livestock populations not only have advantages. Epidemics and disease prevention, in particular the spread of diseases to wild and domestic animals in controlled grazing, is a big issue. EU legislation on traceability of food needs to be considered for a possible marketing of products. In the context of feral livestock populations problems often occur where the habitats overlap with regular farming, hunting, tourism and living. Lynx, wolf and bear are widely accepted as the "new wilderness", feral animal populations often generate controversy.

Together with representatives from the field of nature conservation the basis for management plans for grazing in nature reserves were developed. As a kind of practical guidance, various instruments were combined so that the correct species and breed can be found for a given area. The guidelines developed serve to combine, at the earliest possible opportunity, the management planning with the realities of the region. This includes the human factor, with its traditions and realities. Existing instruments found online, such as breed-descriptions by country, to be found in the Balkans Breed Atlas, Breed Atlas Greece and Romania on www.agrobiodiversity.net offer opportunities to locate adapted livestock breeds for the region and find, at the same time, owners and breeders. On the website www.arca-net.info farms and stations that keep old breeds can be discovered.

The results of the project clearly show that a great need for action lies in lobbying for feral livestock populations. This is required at local and national level and at European level. The importance of (large) herbivores in our natural environment is still far too little acknowledged. Rural exodus and depopulation in some regions of Europe also offer the opportunity to "return" areas, so to speak, to nature. However, this will only be possible without any human intervention in exceptional cases. Traditional semi-feral or "extensively managed" grazing are the topics of the future for the conservation of large natural areas and the use of locally-adapted, robust livestock breeds. The elimination of prejudice and closer cooperation between people involved in nature conservation or the conservation of old livestock breeds is therefore urgently necessary.



Figure 3: The diversity of feral populations in Europe

GOALS

The goal of the project was to collect and publish data and information about the occurrence and situation of feral livestock. Up to now, there has been no information that could be used as a basis for judging the situation of the feral and semi-feral livestock breeds in Europe. These empirical foundations had to be created through intensive research. The interdisciplinary network of key people from the fields of *in situ* - on farm conservation, nature conservation and research was another important milestone in the project. It was important to contact professionals currently working in the relevant fields. "Best practice" methods and the development of management plans provide concrete applications and show ways on how this important natural and, simultaneously man-made, resource can be used. The data and information has been published on the website www.agrobiodiversity.net/regional → Networks → Topic Feral Populations. Not all occurrences of feral livestock populations could be assigned to a specific breed. Often, the populations are named according to the region in which they live, as is usual in traditional breeds and varieties. Especially difficult to find is the data of specific stock numbers. The semi-feral livestock populations are subject to some control. Therefore, more precise information can be given to the stock numbers. In the feral populations only guidelines and estimates can - if at all - be given.

SCOPE OF THE PROJECT

The focus of the data collection, as well as dealing with conflicts and possible uses, lay on populations that were largely let go feral unintentionally. Important places of intentional reintroduction of animals (such as the natural area Oostvaarders-plassen, Flevo-land, The Netherlands) were included in the data and the actors within these initiatives were included in the project. The knowledge and experience, in particular, the observations of the behaviour of the animals from such projects are very valuable for the assessment of feral stock and their management.



Figure 4: Wild Axios ponies in Greece, Figure M. Konstantinidou

Livestock populations in nature protection are increasingly put to targeted use. In Germany there are some former military areas that are grazed with cattle Galloway and/or the Polish Konik horses. But smaller nature reserves are also grazed to keep them open. In Bavaria alone, 151 objects were listed in the "database of grazing" (<http://www.anl.bayern.de/forschung/beweidung/datenbank/index.htm>). The spectrum ranges from the year-round grazing with sheep, targeted short-grazing by goats through to the semi-feral keeping of water buffaloes and horses. In Switzerland, too, the use of farm animals for grazing is valued differently today than 10 years ago. These forms of semi-feral livestock management were not covered exhaustively within the scope of the present project - especially as they are not usually "feral populations" in the sense of this project, but are managed with shepherds or by regular grazing routines.

Right from the beginning of the work it was clear how controversial the topic is: The stakeholders from the field of agriculture often responded with a shrug. As long as no conflict with agriculture occurs, the populations are hardly noticed. However, once the settlement or pressure of use increases, the feral populations are a problem and the demand for management of stock numbers or even eradication is loud.

From the point of view of animal welfare the animals have freedom, but over-population should be avoided. It is difficult, however, to establish specific figures. Attempts are made to vaccinate feral animals and simultaneously inject a contraceptive, such as is in the Danube Delta Romania, where the so-called Letea horses that are captured only when needed by the farmers, but otherwise live completely free, increasingly destroy the emerging forest vegetation.



Figure 5: Letea horses in the Danube-Delta Romania; Figure: S. Küker

The destruction of natural areas is often cited as a reason why feral livestock populations should be kept out. Often images of barren landscapes, as today, for example, can be found in Albania and Greece, are presented as an argument. It is interesting, however, that where populations are effectively left alone, a kind of self-regulation takes place and the vegetation ultimately has a diverse mosaic of open land and forest and found a rich variety of plants and animals.

Due to this reason a re-consideration is taking place: earlier, areas were kept clear with mechanical mowers and large herbivores were kept out of protected areas, so today these herbivores are being used as "natural lawnmowers". Putting this into practice is not so easy, but the idea that an adapted form of grazing can be planned and carried out, slowly arrives within these expert groups. The exact procedure is, however, still under discussion and is sometimes very controversial. In this context the choice of species and breeds is important. Each species has a particular eating behaviour, which must be matched to the vegetation. In old breeds it is observed that they are particularly well adapted to the vegetation at the site of their origin (=selection). In addition, robust breeds are asked for a semi-feral husbandry in protected areas, as they are largely self-sufficient.

OCCURENCE AND REASONS FOR FERAL STATUS

In farming systems such as transhumance, where the herds are driven from one place to another depending on vegetation and season, it can happen that individual animals or small groups remain in one place and run wild, if they can find suitable living conditions. Animals were perhaps isolated from the rest of the herd and not found again by the shepherds due to a canyon or weather events. It is and was usually assumed that these animals do not survive in the wild. But it repeatedly happens that in relatively inaccessible regions groups of "rewilded" animals suddenly appear.

Animals escaped or were left to themselves, if the farm had to be abandoned, such as during the Balkan wars or because an area has been abandoned (e.g. Swoona Island, UK). There are several projects in Europe, in which farm animals in the sense of "Rewilding Europe" will be released and their behavior is observed. The basic idea of this rewilding project is to restore a natural balance without human intervention in large-scale protected areas. In addition to these "real" wild populations, there is a wide range of semi-feral husbandry with only some human control through to controlled husbandry in free-range enclosures. This form has been used in Germany traditionally since the Middle Ages, such as the Senner and Dülmener horse, but also the Liebenthaler horses in Liebenwalde, Brandenburg that are the result of crossbreeding of Norwegians and Koniks with the aim of retrobreeding a "Wild Horse"

The hypothesis that, without human influence, a closed forest would grow in Europe is largely refuted: herbivores have already contributed to shaping the plant communities in their evolution. 7000 years ago, at least in the lowlands, there was mainly open parkland. The aurochs as ancestor of cattle did not live in the forest, but in low-lying, open floodplains. They thus kept these areas open and contributed to the development of species-rich meadows and floodplains. Recent studies show that large herbivores can have a much greater positive impact on a conservation area than was previously thought (Bunzel-Drüke et al 2001; Harmon 2006; Reck, Huckauf 2010).

The deliberate introduction of animals into the wild is not always accepted without reservation by the public, because reintroduction includes seeing dead animals or animals that, for example, during the winter months appear to be “starving”. Data also indicates that feral breeds behave differently than domestically grazing animals: usually they are, in accordance to the natural behaviour of wild animals, rather shy. If they are, however, disturbed, they may well attack. Hikers and nature lovers therefore need to adapt their behaviour as well, which is not always understood.

The diversity of flora and fauna in Europe is the result of traditional and long-lasting use of the natural environment by humans. Repeated disturbances are necessary to ensure diversity in forest clearings or open parklands. Particularly in the Mediterranean regions that were used for adapted extensive grazing for the centuries, these disturbances have been an important contribution to the conservation of biodiversity (Seligman & Perevolotsky 1994). Semi-natural pastures and meadows are now the most diverse habitats in Europe and therefore – because of the disturbances - a haven of biodiversity and natural genetic resources (Hönigová et al 2012.). Historically, species-rich meadows and pastures were created through grazing or mowing.

In the Alpine region unused Alpine meadows lead to serious problems: The colonization of the Alpine region started 5000 years ago and led to large areas of meadows and pastures being established. Today, easily accessible land is used more intensively, remote areas are extensified. In the Alpine region, according to the National Forest Inventory, approximately 1000 ha annually turn to scrub forest that contains up to 85% of green alder (*Alnus viridis*). The symbiosis with nitrogen-fixing bacteria, this fertilizer is released and leads to greater growth of the Alder wood. Other species become extinct, biodiversity decreases. In addition, the sliding of topsoil can be triggered by the waterlogging in green alder stands. The grazing of the areas with goats and Engadine sheep is an economically and ecologically useful measure (Bühlmann 2013).

Within Europe about 20% of the Natura 2000 sites are located on grassland. In Germany it has been demonstrated that more than half of the plant species occurring on meadows and pastures biotopes. About one-eighth of the Swiss land area consists of alpine meadows. With an average of 42 species per ten square meters of this biotope have the highest species richness of all landscapes of Switzerland. Species richness is Europe by the agro-structural change - the abandonment of land on one side and stepping on the other side - at risk: During production faint and low-yielding sites like wet, extremely dry or too steep pastures fall, overgrown or eroded from the management, are already intensively used grassland sites further intensified or e.g. converted to biogas production in arable land. In animal husbandry also a structural change takes place: The cultivation is unbroken in the direction of larger and more leistungsfähiger breeds. This need concentrate from soy or wheat and barely more roughage lean pasture sites. Modern high-performance breeds are less suitable for grazing because they are either too heavy or simply too sensitive for the grazing (Ruppaner, 2010).

In order to conserve important grassland habitats, a semi-feral management with appropriate livestock can be a useful alternative to manual measures such as clearing or cutting.

METHOD

WEBSITE: DATA AND INFORMATION COLLECTION

The available sources and information were gathered from the internet, available literature, evidence from experts and SAVE network partners. Based on this information a simple questionnaire was created and

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Feral Populations

The project is kindly supported by: Margarethe & Rudolf Gsell-Stiftung, Basel; Parrotia Stiftung, Zurich (both Switzerland) and Gerda Tschow Stiftung, Vaduz, Liechtenstein.

Feral Populations: Breeds and Occurrence in Europe

Search Feral Populations: Please choose a selection from the menu or click on a picture to search the species. If you don't select anything, all breed-entries will be shown.

Search Breed

Select species: All Species

Select countries: All countries

Select Management type: All

Search for "Breed name", "Local name" or "Location"



Thumbnail	Country	Species	Local name	Location	Description
	Austria	Pig	Güssinger Waldschwein	South Burgenland	This pig breed once was bred from wild boar and domestic pigbreeds "Duroc" and "Schwabisch-Hällische"
	Belgium	Cattle	Heck Cattle	Parc animalier de Bouillon, SW Belgium	...

Figure 6: www.agrobiodiversity.net/regional/: Feral Populations

formation. Through various articles e.g. in the SAVE eNews, attention was directed to the website.

A general description, geographical indications, information on species, breed and population was collected on the data pages. Particular emphasis was placed on information on history, origin and action.

This labour-intensive approach often meant that an interest for the populations occurring in their area of the contact person was awakened and more attention was paid to the question of the situation of feral populations.

sent to approximately 200 individuals and institutions throughout Europe. In particular nature protection institutions, nature and national parks were considered. Where the information was incomplete, individuals and institutions were approached individually to learn more. Thus, the data and information has been continuously updated and expanded. Meanwhile, 106 occurrences were recorded in an online database (see Annex I). Continuously there are additions and updates.

In order to make the data and information widely available, a special web page was developed under "Topic Networks" on www.agrobiodiversity.net/regional/.

Alongside the database a collection of information about the occurrence and keeping of feral livestock populations was published. Presentations from the workshops complete the information. Statistics from the website show that there are many visitors making use of the in-

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Feral Populations

Livno wild horses

Breed: no

Details:

Country	Bosnia-Herzegovina, BA
Location	Mountains 10km north of Livno
Species	Horse
Management	feral
Population size	100-200
History	Living free for 50+ years, but also horses left free during the Balkan wars in the 1990s
Need for Action	feeding in winter
Contact	NGO Vodomar Davorita Kifonic Crepina2, 20355 Opuzen, Cro crepina2@gmail.com
Remarks	the horses are under control of the rangers of the livno region
Source of information	http://www.divljikonji.org/

Livno wild horses free ranging spring 2013



<< back to the results
<< New Search

Livno Wild Horses



<http://www.divljikonji.org/>, <http://www.facebook.com/divljikonji/photos>

Livno wild horse



Figure 7: Example of a data page



Figure 8: Hutovo Blato horses Bosnia-Herzegovina. Figure: www.hutovo-blato.ba

Thus there are now ongoing observations and stock counts e.g. the Hutovo Blato horses in the Nature Park, one of the most important nature reserves for marsh birds in Europe in the south of Bosnia-Herzegovina, near the Croatian border.

The database and the website are available in English. In the category "Best Practice" relevant German-language titles were also included as, in Germany, the state of research and practice, particularly in the semi-feral management of adapted livestock is well advanced.

TERMINOLOGY

On the subject of „Feral Populations“, there is much possibility for confusion about terminology. The definitions used by the IUCN (IUCN Species Survival Commission, 1996) are:

Feral population: *A population that has escaped or been released from cultivation or domestication and maintains itself in the wild state.*

Semi-domesticated population: *A population that reproduces with human assistance but otherwise lives freely in naturally-regenerating habitats to which it is not native.*

Semi-wild population: *A population that reproduces with human assistance but otherwise lives freely in naturally-regenerating habitats to which it is native; or that reproduces without human assistance but requires supplementary feeding to ensure survival because its habitat cannot support it throughout the year.*

As part of this project it was necessary to create clear definitions in order to simplify the information exchange between stakeholders in the various European countries. Within in the framework of this project

"Feral" = a state without any human management.

"Semi-feral" = periodic management, such as controlling numbers of male offspring and conducting health checks.

"Extensively managed" = the animals live freely all year round, but with controlled breeding and health and the animals are subject to more or less constant care. This is the case particularly the large-scale grazing in protected areas.

Especially the category "extensively managed" plays an important role in conservation and is already used in some countries. There is also the term "free ranging" that is used in the sense of "extensively managed" and is easier to understand, particularly in conservation circles.

WORKSHOP SEVILLA 2012

In November 2012, a workshop entitled "Problems, Chances and Pitfalls of Feral Populations in Europe" was conducted with professionals from different disciplines in Seville, Spain. Needs and the possible solution for a better recognition of the populations and their value for nature and the environment were discussed. The acceptance and public perception is much differentiated in the various European countries. Hence the situation of (known) populations in feral or semi-feral management is also very different. Problems and controversies with state bodies often occur when it comes to sickness and disease prevention. The use of meat products from feral or semi-feral farm animal populations is another problem, since the European labelling requirements for traceability of the meat is not or only partially given in these populations. There is still much discussion and action necessary.

A networking of information and actors as well as subject-specific links has already been launched by the above mentioned website. Ideas for further networking have been postulated that are only partially implemented in the various countries:

- Nomination of country experts
- Small internal networks in the countries for processing national specificities
- Meetings of stakeholders
- Joint publications



There is a great interest in an interdisciplinary exchange and discussion. Among the participants an exchange of DNA material and study results already took place. The identified problems and conflicts are discussed in more detail in the "Results". The results of the workshop and a list of participants is available on the above website. At the workshop it was suggested to hold a further meeting in the Balkans in cooperation with nature conservation. This took place in 2013 in Livno, Bosnia-Herzegovina.

Figure 9: Workshop Seville 2011. Figure: SAVE Foundation

WORKSHOP LIVNO 2013

In the Balkans, many questions arise especially in connection with livestock released during the Balkan wars. On the other hand, there are regions that are hardly managed (or cannot be managed because of landmines) for which solutions need to be found. The traditional pasture lands need to be kept open to maintain diversity, so that the unique, partly endemic flora and fauna of the region can be maintained. The karst areas, especially, are of international importance. Large areas have been placed under protection. However, the management of extensive natural areas is often a problem. Therefore, close cooperation with the field of Nature Conservation is a good idea in connection with feral and "free ranging" livestock populations.



Figure 10: Dinaric Karst Konferenz 2013 Livno. Figure SAVE Foundation

As part of the conference, "Dinaric Karst Poljes as Wetlands of National and International Importance" in Livno, Bosnia-Herzegovina, in autumn of 2013, a workshop "Ecological value of free ranging livestock" took place. Livno is located in the area of Livansko Polje. This region in south-west Bosnia-Herzegovina, with more than 458 km², is the largest continuous karst area in the world.

Workshop participants were practitioners in nature conservation and keepers of semi-feral populations. The karst regions of the Balkans are subject to particular pressures: on the one

hand, traditional agriculture in the transhumance system now rare, on the other hand, the water

regime is influenced by increasing bush encroachment. The regrowth of areas does not necessarily prompt a succession to the development of forest, as is shown by the extensive Garrigues and maquis in the Mediterranean. In the shallow Polje a strong intensification of use by leads to building, industrialization and, also, an intensification of agriculture takes place. Sustainable and cost-effective protective measures to conserve valuable natural areas e.g. Biokovo Nature Park in Croatia, near the border with Bosnia-Herzegovina, are therefore in high demand. The approach of using livestock in semi-feral grazing to conserve the valuable flora and fauna was, therefore, received with interest by the conference participants and led to lively discussions. The aim of the workshop at the conference was to develop a user-compatible framework for managing protected areas in karst regions with free-ranging livestock.



Figure11: A clearing in the Maccia made by donkeys. Figure: SAVE Foundation

The problems are very similar in all the karst regions of the Mediterranean and not restricted to Livansko Polje. Specifically, the following problems were identified:

- Change of use is leading to a modification of habitats by succession.
- Scrub encroachment promotes the risk of (natural) fire
- Legal issues: Who owns the land? Who has the right of use?
- Conflicts of interest such as between hunters (more forest for hunting) and birds (loss of nesting habitat for birds that nest on the ground), tourism and agriculture

Undesirable succession and shrub encroachment in particular can be countered by adequate grazing by "extensively managed" or "free ranging", local adapted livestock populations. A framework was developed with questions that must be answered before a specific management plan can be created. As an example field of Biokovo Nature Park in Croatia, near to the border with Bosnia-Herzegovina, was chosen.

RESULTS

DATA ANALYSIS

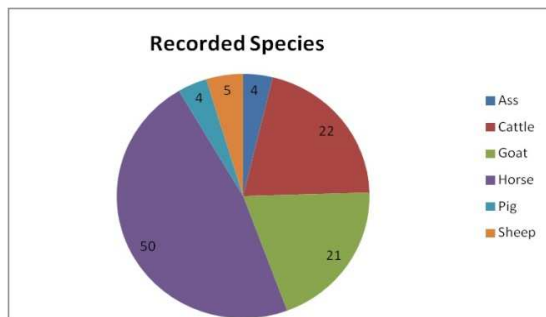


Figure12: recorded species

assumed that most of the feral livestock populations are not allocated to a breed. Especially in the case of horses, there are populations that have lived in a region for decades are named correspondingly to the region. Such populations are likely to have already developed specific and separate characteristics. It is amazing however, that the vast majority of populations are clearly assigned to a breed or variety, as Figure 13 clearly shows.

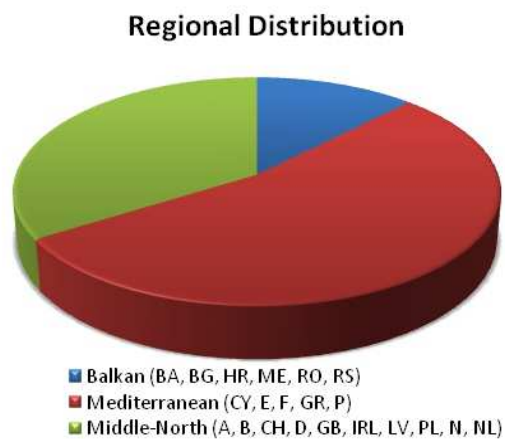


Figure 14: regional Distribution of the recorded populations

The number of feral livestock populations collected is highest in Spain. This is due to the traditional form of husbandry in many regions such as the Marismeña cattle and horses in Doñana National Park in Andalusia.

In general, the collection and research of traditional breeds and, thus, also on the form of husbandry are advanced in Spain. In the national parks vast areas are available and the biological stations are very well organized for observations. Also in Greece and Italy many populations were detected. This has to do with the above mentioned forms of agriculture, in which the animals were placed on islands and are left to themselves.

The focus of the data collection was on the large herbivores: cattle and horses. They currently play the biggest role in grazing and rewilding projects. However, some populations of sheep, goats and pigs were included for various reasons and were also included in the data collection. This refers in particular to populations that have already lived feral or semi-feral in an area for generations. Figure 12 gives an overview over the collected species.

Previously it was

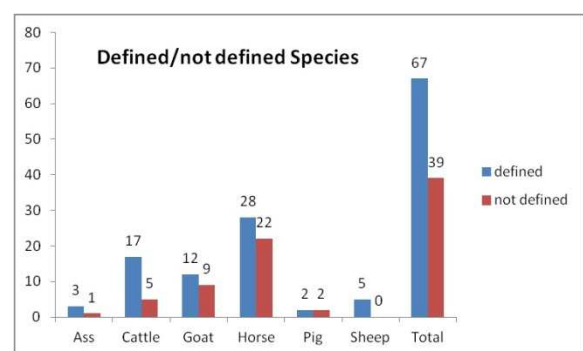


Figure 13: Number of defined/not defined breeds/varieties

There are no surprises in the regional distribution of feral livestock populations: It was already assumed that, not least because of the Balkan wars, the occurrence of feral livestock populations in the Mediterranean and Balkan area are more frequent than in Central and Northern Europe. Due to the climate in the Mediterranean transhumance systems are far more common than in Central or Northern Europe. The shepherding and general care of grazing animals is far less pronounced than in the north. It has, for example, been customary in Greece for a long time to place cattle, goats or sheep on an island and only visit sporadically to provide fresh water. Thus, isolated populations could develop over centuries from animals that were not recaptured. Figure 14 shows the regional distribution of recognized populations in Europe.

The effect of isolation is seen in the example of the Asinara donkey on the same island of the same name at the north-western tip of Sardinia, Italy. Asinara means "inhabited by donkeys". The island was a prison island for nearly a century. Due to this separation donkey evolved from the donkey imported to the island "Grigio Sardo" from Sardinia into an independent population, the white Asinara donkey, as has been demonstrated in genetic studies. To the north of the island there is also a grey donkey population that lives completely feral in the inaccessible rocky terrain. The genetic heritage of both types of donkey, developed through living completely separately, is now endangered by introgression since the closure of the prison in 1998 because now the two populations can mix.



Figure 15: white Asinara donkey. Figure D. Bigi

In the north, the United Kingdom is a pioneer in terms of grazing with adapted livestock breeds. The New Forest in Hampshire, England, is an example of centuries of grazing by horses, cattle, pigs and sheep. This the result of King William I of England declaring it as a royal forest for hunting deer. It was already reserved for grazing in the "Constitutions de Foresta" in the late 12th century under Henry II. Also, the Chillingham Forest, a park in Northumberland, England, has been grazed by Chillingham cattle since the Middle Ages

Also in the UK there is Swoona, one of the Orkney Islands, that is home to a feral cattle group: In 1974, the island was abandoned by the residents for economic reasons. There remained eight cows and a bull (



Figure 16: Swona cattle (Shorthorn X Angus). Figure: Internet

Shorthorn x Aberdeen Angus). Five generations later, the herd is still present and - due to their isolation - in good health. Animals brought to the mainland for scientific investigation died after a short time due to having little resistance to illness such as viral pneumonia. "Swoona Cattle" are now recognized as a separate breed. Observations by nature conservationists show that cattle make an important contribution to the conservation of the special birds of the island.

feral populations, because they are either shepherded or otherwise subject to a regulated monitoring. However, there is one example that has existed since the Middle Ages and follows the tradition of keeping horses in the so-called "Wildbahnen" where the horses live freely and only monitored once a year for marking and selecting for use. This is especially found in northern Germany. Various protected areas are grazed with imported breeds such as Konik horses and Scottish Highland Cattle. But the Heck cattle, a retrobreeding attempt by the Heck brothers in the 1930s and 1940s are increasingly being used. Rarely seen is the use of water buffaloes but this is often difficult due to water protection regulations.

In Germany there is a large number of grazing livestock projects, most of which cannot be regarded as

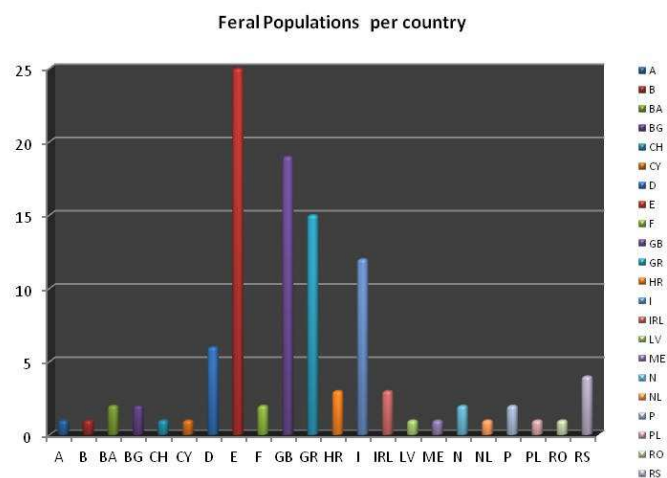


Figure 17: feral populations per land in Europe

In contrast to Germany and the UK feral animal populations in Switzerland and Austria are – if one discounts the transhumance system in the Alps - largely unknown. Recently promising experiments on extensive grazing in the sense of "free ranging" are also being run in Switzerland on abandoned open spaces. This is urgently needed as a Federal study revealed: In the Valais 32% of the dry locations are abandoned, in the Grisons 10% and in Ticino 33%. Conservation organizations such as Pro Natura and the WWF have been involved with promising grazing projects for several years. However, a feral or semi-feral management of livestock populations plays a very minor role. An exception is the "Cavalli del Bisbino", a group of Haflinger horses whose owner died in 2008, the animals suddenly had to live freely between the villages Sagno (Switzerland) and Rovenna (Italy). Now, a society takes care of the animals and provides enough food and free grazing. These Haflinger can now be classified in the group "extensively managed".



Figure 18: Bionda di Bisbino: feral Haflinger on Mont Bisbino. Figure: M. Zohner

conservation organizations such as Pro Natura and the WWF have been involved with promising grazing projects for several years. However, a feral or semi-feral management of livestock populations plays a very minor role. An exception is the "Cavalli del Bisbino", a group of Haflinger horses whose owner died in 2008, the animals suddenly had to live freely between the villages Sagno (Switzerland) and Rovenna (Italy). Now, a society takes care of the animals and provides enough food and free grazing. These Haflinger can now be classified in the group "extensively managed".

In Austria, a nationwide collection of grazing projects by established and rare livestock breeds was made as a part of the project "NuTiLaKat" by the Institute of Organic Farming and Farm Animal Biodiversity on Raumberg-Gumpenstein at the end of 2013 (www.netzwerk-land.at/umwelt). It is assumed that also here a more controlled form of grazing of livestock is meant rather than a feral or semi-feral husbandry. Since the 1980s projects have been carried out in Austria for nature protection. Here also the success factors, spatial coverage and long-term perspectives for the use of robust breeds was looked at. Thus, for example, in the National Park Neusiedler See, Galloway cattle, as well as Przewalski horses and light horses, are used for keeping open important wetland areas.

Management of Feral Populations in %

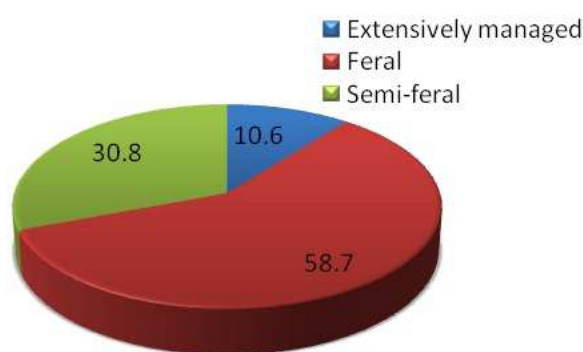


Figure 19: type of management of the populations

More than half of the detected populations were referred to as "feral", living wild without human influence.. Slightly more than 30% of the populations are in the group "semi-feral", i.e. exist with little human influence. The smallest recorded group form the "extensively managed" populations. In the maintenance and reactivation of important protected areas such as Ramsar protected areas (habitats for waterfowl and waders) or the Habitats Directive (Flora-Fauna-Habitat Directive of the EU, Directive 92/43 / EEC) and its three annexes where "wildlife species, their habitats and to safeguard the European networking of these habitats and are to be protected" feral or semi-feral livestock populations play an increasingly important role. The examples cited above show that the animals keep not only the grasslands open, but also have a large influence on ecosystem an area, as will be explained below.

FERAL LIVESTOCK POPULATIONS: EFFECTS AND PROBLEMS

Workshops, conversations and discussions relating to feral livestock populations and their ecological value, depending on the particular interests of the parties involved lead quickly to the list of impediments and problems. In publicly accessible nature reserves there are often misunderstandings leading to harsh reactions from visitors: Depending on the season, they can see the animals, if they are not hiding in the bushes, more or less emaciated, with no stable or shelter there may even be carcasses around. There is still much work to do in the field of educating the public. Movements such as "Rewilding Europe" (www.rewildingeurope.com/) are trying to raise more awareness and understanding among the general public. In addition to the educational work, concrete projects are promoted that will re-wild traditional livestock breeds with the aim to replace the missing large herbivores in the ecosystem. Thus, in March 2014 a group of Boskarin cattle, a Steppe cattle breed was taken to the biosphere reserve Velebit Mountains in Croatia. The goal is to completely re-wild the animals after a period of acclimatization. In a Europe where laws and obligations across national borders must be observed, the hurdles and problems that such projects are confronted with cannot be overlooked. This is also the case for smaller projects, where the purpose of the semi-feral animals is for nature conservation and management, these need stock management by shooting or similar measures, here numerous obstacles exist for this form of husbandry:

Predatory mites live on other insects and are transported by them from one resource (dung, carrion ...) to the next. There, they prey on nematodes and eggs. Also, for some dung beetle species, nematodes are prey. Therefore, deworming agents are unnecessary in natural grazing systems, because mites and other insects take care of the parasites. Herbivores will still have some parasites, but not at a critical level. The situation is even better if ducks are also present, because they eat the snails, which are carriers of liver flukes. Ducks disturb the chain of infection (Krawczynski 2012)

EPIDEMIC AND DISEASE PREVENTION

Common grazing pastures of wild animals, feral animals as well as of domestic animals can lead to health interactions. Disease transmissions are less through direct contact, but via the faeces, especially in the cases such as parasites and paratuberculosis, which seems to have increased in recent years. Vectors such flies can spread the Gembblindheit (infectious keratoconjunctivitis), a highly contagious eye disease of sheep, goats, chamois and ibex which kills about 30% of the wild animals. It should be noted that the actual source of infection is not yet entirely clear: the wild animal or the livestock.

The EU laws and obligations must be met in every case. Improved cooperation between the various veterinary services is necessary. Problems occur when the wild populations come in contact with domesticated herds. If diseases such as tuberculosis (as in Spain) occur more accurate observations are needed rather than applying general rules such as immediate culling, which is difficult to comprehensively carry out, particularly in wild populations. Studies have shown that feral animal populations recover well from diseases and can adapt to their environment and build resistance. However, they are usually eliminated too quickly for this to occur as a part of disease control measures to prevent transmission to domestic animals. Island populations that do not come into contact with domestic herds should be better protected.

HYBRIDIZATION

Another problem, particularly in free-grazing goats, is hybridization with wild animals. In the southern Swiss Alps hybridization of feral goats and ibexes could be observed. The goats had escaped from a herd and spent the winter in the wild, where they mated successfully with ibexes. There is a concern, therefore, that ibex populations could be endangered by hybridization (Giacometti et al 2004).

REGISTRATION (TRACEABILITY)

Usage for meat is possible only with registered animals. Non-registered animals may not be sold as game meat, since these populations are not included in the hunting laws of the countries. Ear tags, although difficult in practice, are necessary to prove the origin of an animal and perform health checks, if the meat is being sold. As long as the animals are not declared as game, registration is required. If they are declared as wild animals, they cannot leave their ancestral territory. This also applies in the case of natural deaths. Experiences in the recognition of feral populations as wild animals have been made in the case of the Chillingham cattle in England. It is important to check the hunting laws of the countries and to discuss an appropriate adjustment.

ANIMAL WELFARE

Misconceptions about animal-friendly husbandry systems occur often due to lack of communication. Particularly robust traditional breeds do not require stables. Simple shelters or even the protection of trees or groups of trees serve the animals well. However, there are often concerns from the public about animals outside in the rain and snow. Therefore, the public must be well informed regarding the specific conditions. Alleged or actual animal suffering provokes protest and interaction.

ENVIRONMENTAL PROTECTION AND EFFECTS

It is newly possible in Germany that the owners using semi-feral animal populations for landscape care can claim subsidies. Feral or semi-feral livestock populations play an important role in ecosystem services.



Figure 20: Dung is an important player in increasing diversity.
Figure: SAVE Foundation

These are, for example, in the control of unwanted small rodents such as rats and rabbits. Young born in the wild also provide food for wildlife such as birds of prey (Herrero et al.2013) and thus promote their stock numbers. This aspect has not been communicated much to the public, as a sufficient acceptance is lacking – often the love of young animals leads to a lack of understanding of or blindness to the entire ecosystem.

Another important but little-noticed ecosystem contribution is played by the dung of the animals. The faeces of grazers is very important for dung-processing organisms, because it has a different composition to that of, for example, the red deer. This results in the development of a richer insect fauna, additional, undigested seeds can germinate. Thus, the food chain will be expanded and more bats and birds such as the lapwing and the red-

backed shrike or small mammals such as badgers will profit from this steady supply of manure with its beetles and other insects, their eggs and larvae. Just the year-round grazing by horses and cattle can promote the establishment of rare species. Seasonal grazing, as is found within agriculture, is not so effective.

The Anthelmintics (Wormers) used in normal grazing practice causes a dramatic decline of bats and birds due residues in manure, which then pass through the insects into the food chain. Antiparasitic treatments are also routine in organic farming. Semi-feral or feral livestock populations receive far less, or none of these drugs, according to the type of farming. This means that habitats that are grazed by these populations can be colonised by many of today's endangered species (Xiaoying et al 2011). The same applies to animal carcasses. Today carcasses are largely removed from the landscape. This is required by law and happens primarily for disease prevention and hygiene reasons. Carcasses, however, also play an important role in the ecosystem performance and in the promotion of biodiversity (Xiaoying et al 2014).



Figure 21: young Greatbustards need about 100g of insects per day. These can be found in two "portions" of horse dung. Figure: R. Krawczynski

FOREST GRAZING



Figure 22: Axios horses in Greece: forest grazing. Figure M. Konsantinidou

Forest grazing is grazing in a wooded area with trees. Various forms of this type of use are possible. New forest pastures are usually not possible for nature conservation reasons. Most large nature protection areas in Central Europe contain forestry. The protection of forest or tree groups is important for animals free-ranging the whole year round so that they can retreat and find protection from the weather and insects. Forest grazing was the main form of use of the forest in the Middle Ages. The foraging of livestock in the winter has a major impact on the woody vegetation, because the buds are then a high-quality food.

The agricultural use of forests for grazing, leaf harvests of deciduous trees to the use of dry leaves and needles as bedding has contributed to the emergence of a variety of sparse forest types (Ellenberg 1996). With the beginning of forestry regulations in the 19th century, forest and pasture was separated by law. According to the Forest Act, the Forest grazing is considered "adverse use". In many European countries, forest grazing is not permitted. Too high game densities on the other hand observed in many forests and their feeding damage widely accepted and paid for by the hunters. In order to keep these losses low and to regulate settlements, a "Convention for the evaluation of game damage in the forest" was published in 2013 (Duhr, 2013). In some protected areas, there are special rules. Recent studies show that forest grazing can enhance biodiversity. In addition, positive effects on soil structure and water holding capacity are determined. So the wooded pastures of the Swiss Jura, the chestnut groves of the Southern Alps and many other alpine forest pastures are traditionally dual purpose and of high biodiversity (Königslow 2013). In Austria the forest grazing is not prohibited, but applied only marginally.

An ecosystem service of grazing, the prevention of fires, is largely ignored. Especially in the dry Mediterranean climate, the prevention of naturally occurring fire through the Maccia



Figure 23: Fire clearing Livansko Polje Bosnia-Herzegovina. Figure: B. Stumberger

vegetation is an important factor to preserve the ecosystem. In recent decades, both the frequency and the intensity of natural fires in the Mediterranean region have increased, not least due to management or use changes. Traditions such as collecting firewood and just grazing marginal land have been abandoned. This led to homogeneous (bush) vegetation and the accumulation of dry material. The situation is exacerbated

by the current climate forecasts as well as by intentional fires to prevent the shrub encroachment (Ruiz-Mirazo J. et al 2009). By the grazing of feral, semi-feral or extensively managed, locally adapted livestock populations a heterogeneous habitat is created: open areas with herbaceous vegetation alternate with shrubs and bare ground without vegetation. With a year-round grazing buds and leaves are also eaten in the vegetation poorer time. This promotes a mosaic-like landscape that provides a niche for many animals and plants (Bunzel-Drücke et al 2009).

PROTECTED WETLANDS

In areas of water conservation,, grazing is generally not allowed. Nevertheless, there are fallow, wet grassland sites where grazing makes sense. However, cattle and horses (eg the robust Heck cattle or Exmoor ponies, which are often used in landscape management) are not suitable for grazing such damp locations.



Figure 24: Water buffalo in wetlands. Figure: R. Krawczynski

Water buffalo as herbivores, however, are well adapted to moist sites. They also eat rushes and alders, which the other herbivores ignore and thus create as open space. Furthermore, they create through their wallowing ponds that provide amphibians and aquatic insects with a habitat. Experience shows that a mixed husbandry of water buffalo with cattle, horses, sheep and goats is easily possible, which may be relevant for large protected areas.

On the banks of water and muddy areas, grazing provides space for small reed beds and annual plants, especially pioneer species, often Red List species. Furthermore, hoofprints create germination spaces for other species such as orchids

SLAUGHTERING AND MARKETING MEAT PRODUCTS

Within the current rules slaughter is hardly possible, because the animals may not leave their ancestral territory, if they are not registered accordingly. The slaughter on pasture is also illegal in many areas. For cattle and horses that are kept outdoors all year round and are to be slaughtered for the own use of the owners, slaughter by bullet shot followed by blood withdrawal and a meat inspection by an officially designated veterinarian is the gentlest way of slaughtering (EU Regulation 853/2004 and 854/2004). A simplification of the approval process would be a great relief (Schroeder 2010).



Figure 25: mobile slaughter wagon Firma Peruz in Lettland (<http://www.peruz.lv>)

Even a mobile slaughter wagon, as for example are quite common for the slaughter in moose in Sweden, are only reluctantly approved in other countries so far. In every country there are different ways of dealing with dead animals: In Germany a healthy feral domestic animal which was shot may be sold as food. In the UK, the dead animals must be destroyed.

Marketing of this very valuable meat that is particularly tasty and, because of increased grazing, high in omega-3 fatty acids (Matthes et al 1999) is only possible if the corresponding traceability is ensured. In addition, it is difficult to reach the required minimum carcass weight in the desired age at slaughter, as the animals are slow-grown (Bunzel-Drücke et al 2009).

POPULATION CONTROL AND HERD MANAGEMENT

The documentation and collection of data about feral and semi-feral populations is very important. Only thus is an analysis possible as to how the populations react to various factors such as climate, predators, food resources and human activities. Thus possibilities and ways can be found for the control and management of populations.

PUBLIC ACCEPTANCE

Public acceptance is very important. The beauty and peculiarity of feral livestock populations and their important ecosystem services should be published in various media. Large efforts have been made by the "Rewilding Europe" movement and also in conservation circles. Through continuous information to the public, acceptance is growing that the natural balance requires large herbivores roaming in an area. But again, public controversy and misunderstanding occur. The deep rooted fear of "wilderness" makes many people uneasy, even if they encounter a mother cow herd. A herd of water buffalo can unsettle people even more. Also, there is the aforementioned incomprehension of the fact that carcasses and manure make a major contribution to biodiversity, this needs to be further discussed. Experience shows that a list of the types and species is already making a major contribution, as it encourages journalist to report about these "ambassadors". This is an intention of this project.

FERAL LIVESTOCK POPULATIONS: PROS AND CONS

The results of the questionnaires, discussions and case descriptions presented above make it clear that feral livestock populations occur widely in Europe and play an important role for the conservation of protected areas and the ecosystem. But there are also less positive aspects, which need to be considered. The following are some of the pros and cons:

Pros	Cons
Genetic resource	No public acceptance or awareness
Adaptation to marginal locations	Poor reputation due to conflicts with e.g. agriculture
Robust (can often recover from infection without medical attention)	Spreading of disease
Objects for scientific study (e.g. Behavioural studies)	Not registered
Nature conservation through large herbivores	Lack of understanding among nature conservationists and public
„Furnishing“ the landscape is attractive for tourism	Lack of public acceptance of the importance of secondary aspects such as dung, carcasses and young animals as prey.
Ecosystem services	Largely ignored
Quality meat that is rich in Omega 3 fatty acids	Human consumption of meat forbidden due to lack of traceability

Tabelle 1: Pros and cons of feral populations

BASIS FOR A MANAGEMENT PLAN

Habitat	Horse	Donkey	Pig	Goat	Sheep	Cattle	Buffalo
Salty grassland	✓		✓		✓	✓	
Dunes	✓	✓	✓	✓	✓	✓	
Heathland	✓	✓	✓	✓	✓	✓	
Oligophilic grass-land	✓					✓	
Wetlands	✓		✓✓			✓✓	✓✓
Mesophilic grass-land	✓✓		✓✓	✓	✓	✓✓	✓
Dry grassland	✓✓	✓✓		✓✓	✓✓	✓	
Scrubland	✓	✓	✓	✓✓	✓	✓✓	✓
Stony land		✓		✓✓	✓		
Sandy soils	✓	✓	✓	✓✓	✓✓	✓	✓
Shrubland	✓		✓✓	✓✓	✓	✓	✓
Leafy mixed forest	✓		✓✓			✓✓	
Deep leafy forest			✓				
Pinus forests	✓					✓	

Mostly horses and cattle are used in grazing and rewilding projects. Their typical grazing behaviour they keep the turf short and provide for their own nutritional resource. Only when food is scarce will they also eat buds and foliage. Feral goats and sheep occur around the Mediterranean, but also in Norway. All herbivores have their own feeding behaviour that has an effect on the vegetation. The extent of this effect, in addition to the species, the stockdensity and the duration of use is crucial. In natural or semi-natural herds, equilibrium is formed, which can be observed in the natural vegetation mosaic. Table 2 shows suitable livestock species for grazing in certain habitats, under the Habitats Directive Annex 1.

Tabelle 2: Habitats and suitable livestock

A MANAGEMENT PLAN USING THE EXAMPLE OF THE NATURE PARK BIOKOVO

One goal of the workshop in Livno in 2012 was to develop a framework for a model management plan. Due to the rural exodus and partly, also because of redevelopment in the Karst poljes, and in particular the neighbouring mountains, the traditional grazing has declined dramatically in the Balkans. The livestock in some areas dropped by up to 90%, such as Biokovo Nature Park in Croatia near the border with Bosnia-Herzegovina. In 1938, 23,000 animals were counted on 20,000 hectares there. Today, only 4% (less than 1000) remain. The progression of natural succession, the occurrence of Maccia vegetation, leads to a loss of habitat and an unwanted change in the ecosystem balance.



Table 3: decision making process in the management plan

local flora with their phytotoxins and the very harsh climate. Poor infrastructure is another argument for grazing with adapted local breeds. Apart from this, the animals enliven the landscape with and are thus attractive for tourists. Dairy and meat products of these breeds can also promote local and niche markets. Local breeds can restore the traditional cultural landscapes to the state that they have existed in for centuries. But it is important that the use of animals is carefully scheduled and monitored. Therefore, a total rewilding is less desirable, rather a management system such as "extensively managed" or "free ranging" is required.

Conflicts of interest may be hunting, breeding habitats for birds, agricultural, industrial and human habitation. This potential for conflict must be included in the planning. Furthermore, the ownership of the land and the animals are not entirely clear.

According to the Habitats Directive, habitats should be used with different densities of livestock units (a large animal unit is equivalent to a dairy cow) to maintain the status quo of the habitat:

- Evergreen Garrigue 0.1 LU
- Maccia 0.5 LU
- Meadows (1-1.5 LSU)
- Rocky pastures 0.1 LU

On this basis, opportunities for extensive grazing with as little as possible human influences were examined:

GENERAL INFORMATION:

Therefore, an improvement of the habitat is needed. This can be done inexpensively by the grazing of feral livestock that are adapted to the

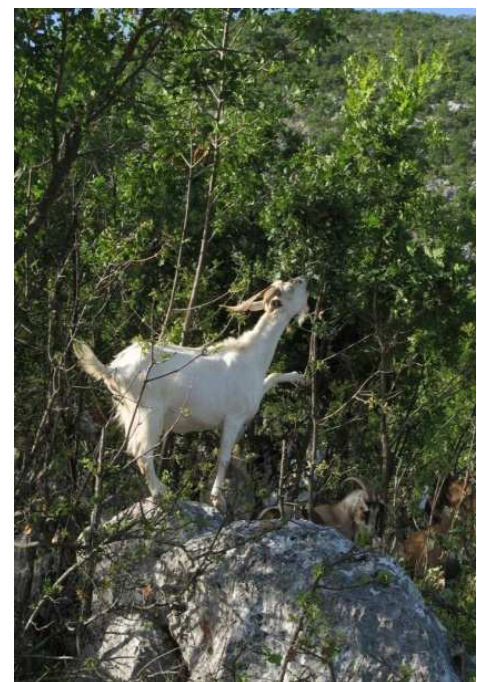


Figure 26: Beating back the bush using goats.
Figure Roman Ozimek

- *Habitat*: Karst landscape; Nature park Biokovo (hist. information available since 1938)
- *Country*: Croatia
- *Area*: 20'000ha Mountain, pasture, shrub, rocky pastures
- *Problems*: succession due to too little grazing. Increase in biomass, fire danger.

AVAILABLE INFRASTRUCTURE:

- Shelter: no
- Shepherding: no
- Warden (1x per day): yes
- Predators: yes
- Predator protection: no
- Winter fodder: yes
- Water - Summer: yes but limited Winter: yes
- Restrictions on use : no, year round grazing possible
- Further factors: Nature park, Tourism, tenancy agreements

The following is a list of livestock species and their special needs and characteristics:

Species	Shelter	Shepherd/ Warden	Predator Protection	Winter feeding	Grazing/Browsing	Special needs	Together with	Problems
Cattle	Simple, dry area for lying down	Warden	No	Yes, in snow	Mesotrophic grazing	Parasite control	Horses	Trampling
Horse	Simple, dry area for lying down	Warden	No	Yes	More selective than cattle, bite damage on trees (not shrubs)	Plenty of space	Cattle	Dung in one place
Water buffalo	Simple, dry area for lying down	Warden	No	Little	Rough grazing	Wet areas, open spaces, forest	Cattle	Eutrophication
Donkey	Simple, dry area for lying down	Warden	No (can be used as predator protection)	Little	Rough grazing, salty grazing	Ideal in dry areas, need hard surfaces	Cattle, Sheep, not horses (cross-breeding!)	Do not eat bushes
Sheep	Simple, dry, warm	Shepherd	Yes	Yes	Close grazing	Shearing, Parasite control	Donkey	Non-selective grazing
Goat	Simple, dry area for lying down	Shepherd	Yes	Yes	Grazing and browsing, selective, bite damage, can also digest "poisonous" plants	Ideal in mountains, stony areas	Not sheep (parasites)	Can only be used for short periods
Pig	Simple, dry, warm	Shepherd	Yes	Yes	Omnivores In forest grazing, foraging	Mud baths	All	Cross-breeding with wild boars and transmission of disease therefore fencing at periphery

Table 4: Livestock breeds for grazing: needs and grazing behaviour

The list gives a first clue as to which livestock species will be suitable for grazing. Based on the questions and the list shown above suitable breeds can now be identified for habitats:

- Garrigue: sheep and goats
- Maccia: goats and donkeys, especially for clearing bush
- Pastures: Cattle, horses and sheep
- Rocky pastures: Sheep, small cattle breeds, small horse breeds, donkeys at low altitude, south facing slopes.

On the basis of this information suitable local breeds can be identified. This aspect has often been left out of previous management plans for protected areas. Often, suitable instruments are missing to aid finding the right breeds. In Central European countries, where there is already a long tradition of conservation of local livestock breeds nature protection organisation are increasingly turning to organizations concerned with the conservation of agricultural diversity for advice. In countries of Eastern and South-Eastern Europe

such organizations often do not exist (yet). Therefore, it is difficult to find suitable breeds and therefore



Figure 27: feral Busha cattle in the Former Yugoslavian Republic of Macedonia (FYROM). Figure: G. Bunevski

Exmoor ponies, Highland cattle, etc. are imported and used almost universally as natural "landscapers", which in some places causes problems for the animals as they are not adapted for the regions and thus the grazing projects fail.

SAVE Foundation has, in earlier projects, created suitable instruments that aid the search for adapted local breeds that can be used for this purpose:

Breedatlas Balkan: www.agrobiodiversity.net/balkan, Arca Net: www.arca-net.info, ELBARN: www.elbarn.net. In this example model, the following breeds have been chosen:

- Balkan goats
- Busha cattle
- Dalmatian Pramenka sheep
- Dinaric donkey
- Dalmatian Busak horse

A summary of this framework for a management plan can be found in annex 2.

FUTURE

This project has shown that feral or semi-feral livestock populations play a much larger role in the conservation of biodiversity in protected areas in Europe than was previously thought.

The deliberate reintroduction of livestock breeds is well advanced in some regions. Good contacts have been made especially with the movement "Rewilding Europe", such as the Taurus project (www.stichtingtaurus.nl). Synergies will be taken into account in future projects. Thus, a further step of linking agricultural and wild biological diversity has been made.

The use of locally adapted breeds for conservation and enhancement of biodiversity is particularly suitable in the countries of South and South-East Europe. In many places it is sensible to use a traditional breed in a free-ranging management system. But there is a huge shortage of experience and knowledge. The first steps in the direction of development of a management plan could be made as part of this project. The developed basics need to be tested in the field. In the area of Biokovo Nature Park, this will happen in the near future. It was clear that the impact of traditional farming systems on natural biodiversity still receives too little attention. During the project we were made aware again and again of traditional systems in danger of being forgotten. Here an important field of action for future projects is highlighted. In this context, the island populations of importance today receive too little attention - the term "island population" should not be understood only in a strictly geographical sense, but more in the sense of isolated populations. The network of the various actors started with the project should definitely be pursued if the feral populations in Europe are to have a stronger voice in political decisions and also in the general public.

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<http://www.pastoresmonte.org>

<http://www.pronatura.ch/allegra-geissenspeter>

<http://www.snh.gov.uk>

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EU Regulations

http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

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SAVE Foundation

<http://www.save-foundation.net/>

<http://www.agrobiodiversity.net/balkan/index.htm>

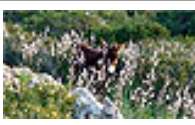
www.arca-net.info

www.elbarn.net

ANNEXES

ANNEX 1

OVERVIEW OF THE DATABASE FERAL POPULATIONS

Thumbnail	Country	Species	Local name	Location	Description
	Austria	Pig	Güssinger Waldschwein	South Burgenland	This pig breed once was bred from wild boar and domestic pigbreeds
	Belgium	Cattle	Heck Cattle	Parc animalier de Bouillon, SW Belgium	...
	Bosnia-Herzegovina	Horse	Hutovo-Blato Horse	Hutovo-Blato	...
	Bosnia-Herzegovina	Horse	Livno wild horses	Mountains 10km north of Livno	...
	Bulgaria	Cattle	Rhodope	Central and Eastern Rodopy Mountains, Smolian, Lovetch District, Central Balkan, Apriltzi, Teteven, Kaloffer	...
	Bulgaria	Horse	Karakachan Horse	Alpine mountain pastures of Rila Mtn., Pirin Mtn., central part of Stara planina Mtn., western part of Rhodope Mtn.	...
	Croatia	Pig	Black Slavonian Pig	E-Croatia, Slavonia, lowland regions	...
	Croatia	Cattle	Domestic cattle	Slivno, Neretva Delta	In winter the cows plunder olive plantations, tearing the reachable branches and eat the green leave ...
	Cyprus	Ass	Karpaz	Karpaz Peninsula	The impact on the vegetation is unknown but the population density is very high with 7 donkeys/km2.

	France	Cattle	Camargue Cattle	Parc naturel régional de Camargue	...
	France	Horse	Camargue Horse	Parc naturel régional de Camargue	...
	France	Cattle	Albères	Vallespir, the Albères Mountains and Eastern Pyrenees of France and Spain	In the prefecture Perpignan in some villages cattle attacks
	France	Cattle	Betizu	West of French Pyrenees : French Basque Country Department : Pyrénées Atlantiques	In winter isolated individuals (young males for example)
	France	Horse	Pottok	France	...
	France	Cattle	Marine Landaise	Aquitaine, SW France	The population has been protected and managed for 25 years.
	Germany	Horse	Heck Horse		...
	Germany	Horse	Dülmener Wildpferd	Dülmern	...
	Germany	Cattle	Fjällcattle	Müritznationalpark	...
	Germany	Horse	Przewalski	near Leipzig (also Parc du Villaret, Causse Mejean, Lozère, France)	...
	Germany	Horse	Senner Pferde	Paderborn, Westphalia	...
	Germany	Cattle	Heck Cattle	several nature reserves in Germany. e.g.: Falkenthaler Rieselfelder near Berlin, Nesseaue nature reserve near Jena, Thuringia and at the Grubenfelder Leonie nature reserve, Bavaria.	Heck cattle are a hardy breed of domestic cattle. These cattle are the result of an attempt to breed

	Germany	Horse	Liebenthaler Pferd	Brandenburg, Liebenthal	In 1960, the Bavarian farmer and ethologist Jürgen Zutz wanted to resurrect the European Tarpan to ...
	Greece	Horse	Serres	Serres: Menikio mountains (Bosdakos)	...
	Greece	Cattle	Agrinion Cattle	Etoloakarnania area, Western Greece	This particular breed receives very little attention from its
	Greece	Goat	Samothraki	Samothraki island, Northern Aegean Sea	A typical example for semi-feral or feral conditions of keeping
	Greece	Horse	Neochori Horse	Etoloakarnania area, Western Greece	conflict with neighbouring farms:
	Greece	Goat	Cretan Wild Goat	Crete	...
	Greece	Horse	Axios	Axios and Aliakmon rivers near Thessaloniki	Although Axios Delta has been declared a National Park..
	Greece	Horse	Amvrakikos Horse	Epiros, Amvrakikos	...
	Greece	Cattle	Acheloos	West Etoloakarnania, Epirus	...
	Greece	Horse	Acheloos	West Etoloakarnania, Epirus, Delta of Acheloos river	...
	Greece	Horse	Petala Mountain Horse	Mountainous region between cities of Amphiloikia and Agrinio	...
	Greece	Pig	Agrinion Pig	Etoloakarnania area, Western Greece	The breed will disappear because cross-ings
	Greece	Horse	Ainos Horse	Kefalonia Island, Ainos Mountains	...
	Greece	Horse	Kalamas Delta Horse	Delta of Kalama river near Igoumenitsa	...

	Greece	Horse	Evros	Delta of Evros river	...
	Greece	Horse	Drama	Pagaio mountain (Drama)	...
	Greece	Goat	Ikaria	E-Aegean sea, S-Sporades	...
	Greece	Horse	Rodope	Northern mountainous communities of Rodopi and Xanthi mountains in Thrace.	...
	Greece	Cattle	Prespa Cattle	Prespa	Colour: blond, dark-blond, reddish blond, all colours of brown and also black;
	Hungary	Cattle	Hungarian Grey Cattle	Sarród-Mekszikópuszta, Hanság, Tóköz	none ...
	Ireland	Goat	Feral goat	Killarney, the Burren and Glendalough, smaller populations in areas such as the Mournes, Connemara and Waterford.	...
	Ireland	Goat	Bilberry Goat	Bilberry Rock, Waterford, Ireland	1,000 feral goats have been destroyed in Ireland every week.
	Ireland	Goat	Burren Goat	Burren National Park	...
	Italy	Ass	Grey Asinara Donkey		The Sardinian breeds, Asinara and Sardo Grigio, shared some
	Italy	Goat	Caprera goat	Caprera Island, Maddalena archipelago	Group of feral goats with morphological traits
	Italy	Goat	Molara Goat	Molara Island; off the North-West coast of Sardinia	A group of feral goats very similar to Sardinian Goat breed
	Italy	Goat	Garganica Goat	Isole Tremiti are an archipelago in the Adriatic Sea, north of the Gargano Peninsula	Very little information about this goat population that could

	Italy	Sheep	Mouflon		Mouflon were introduced to the islands of Corsica,
	Italy	Horse	Sanfratello	San Fratello, Messina, Sicily, Italy	...
	Italy	Ass	Asino Asinara	Asinara island; Sardinia, Tuscany and Emilia	The Sardinian breeds, Asinara and Sardo Grigio, shared some
	Italy	Goat	Tavolara	Isleand of Tavolara, N of Sardinia	This goat are on the island of Tavolara (N-Sardinia).
	Italy	Goat	Argentata dell'Etna	Messina, Catania, Enna and Palermo	...
	Italy	Horse	Giara Pony	plateau of Giara - Sardinia south central, Sa Jara Manna	...
	Italy	Goat	Montecristo Goat	Montecristo Island, Tuscany Archipelago National Park.	...
	Italy	Pig	Nero Siciliano	North East Coast of Sicily	...
	Latvia	Horse	Konik polski	25 areas throughout Latvia and one in Estonia	Natural grazing is a new concept in Latvia as well as in big parts
	Montenegro	Horse	Scutari	Lake Scutari National Park	...
	Netherlands	Cattle	Heck Cattle	Oostvaardersplassen, Flevoland near Lelystad	...
	Norway	Sheep	Gammelnorsk sau	islands at the west coast from Bergen to Trondheim	...
	Norway	Goat	Feral goat	Selje (an island at the western coast of Norway), also a few herds at the islands Skorpa and Sandsøy county Møre, Romsdal	inbreeding ...
	Poland	Horse	Konik	forest of Białowieża (also found in the Netherlands, in Latvia, , UK and Germany)	...

	Portugal	Horse	Equino de Raça Garrana	Northern Portugal mainly in the regions of Minho, Tras-os-Montes and Geres as well as in parts of the Spanish Galicia	...
	Portugal	Horse	Sorraia		Year-round grazing
	Romania	Horse	Letea	Danube Delta, Romania	The horses are kept both feral and semi-feral,
	Serbia	Horse	Sampas	Region Vlasina, Vlasnia Lake, Central-Serbia, Eastern Kosovo	...
	Serbia	Horse	Stara Planina Mountain Pony	Stara Planina Mountain	...
	Serbia	Horse	Suva Planina Mountain Pony	Suva Planina Mountain, Stolovi Mountain	...
	Serbia	Horse	Vlasina Mountain Pony	Vlasina area	...
	Spain	Sheep	Sasi Ardi	Basque Country, Oiartzun to Leizaran and from Hernani to Goizueta between Gipuzkoa and Nafarroa	...
	Spain	Horse	Sorraia	Iberia, org. Portuguese river Sorraia	...
	Spain	Horse	Caballo de Pura Raza Gallega	Galicia	...
	Spain	Horse	Retuerta horse	Andalusia	...
	Spain	Horse	Jaca Navarro	Navarre	low population numbers ...
	Spain	Cattle	Marismeña	Andalucía, Nature Area Doñana	Conflict with other protected species, e.g Águila Imperial (Aquila adalberti) ...

	Spain	Horse	Caballo Marismeno	Andalucía, Nature Area Doñana	Conflict with other protected species, e.g Águila Imperial (Aquila adalberti) ...
	Spain	Cattle	Monchina	SW Viscaya, SE Santander, Bizkaia en Euskadi and Cantabria	...
	Spain	Horse	Monchino Horse	Cantabria	no interest in conserving the breed. No herd book, no conservation programme ...
	Spain	Cattle	Mostrenca	Donana Nat. Park, S. Huelva, Spain	...
	Spain	Horse	Losina	Northern Spain	low population numbers ...
	Spain	Horse	Pottock Horse	originally: Basque Country now found in :Spain, France. Switzerland, Germany	fragmentation of the landscape, changes in agriculture ...
	Spain	Cattle	Betizu	Basque mountains, Navarrese N-Spain	...
	Spain	Horse	Asturcon Pony	N. Spain, Asturia	...
	Spain	Cattle	Albéres	Albères Mountains and eastern Pyrenees of France and Spain	The intrusion of the indigenous cows Alberes into inhabited areas because they were hungry led to
	Spain	Horse	Burgette de Navarra	Region Burguete, Navarra	...
	Spain	Ass	Burro Majorero	Fuerteventura, Lanzarote, some on other Canary Islands	Population decreasing as donkeys are no longer needed for
	Spain	Horse	Caballo de las Retuer-tas	Andalucía, Nature Area Doñana	Conflict with other protected species, e.g Águila Imperial

	Spain	Horse	Caballo de Monte del País Vasco	mountains of Alava, Basque Country	lowering population numbers ...
	Spain	Goat	Cabra Majorera de Costa	Fuerteventura Island (Canary Islands, Spain)	...
	Spain	Goat	Cabra Mallorquina	Mallorca	There is some hybridisation of the wild goats with
	Switzerland	Horse	Cavallo del Bisbino	Monte Generoso, Italy/Switzerland	Need for extra food in winter otherwise they come down into villages to search for food ...
	United Kingdom	Cattle	Vaynol Cattle	Lonconshire	The herd was established in 1872 in Vaynol Park, North
	United Kingdom	Goat	Saanan-type	Scotland, Holy Isle	...
	United Kingdom	Horse	Howgills Hills	Howgills Fells, Cumbria, England	...
	United Kingdom	Goat	Feral goat	Scottish Highlands	...
	United Kingdom	Goat	Stackpole Feral Goat	Stackpole, Wales	...
	United Kingdom	Goat	Snowdonia Feral goat	Snowdonia, Wales	Free roaming dangerous for traffic, destruction of young trees and gardens,
	United Kingdom	Goat	Lynton Feral goat	Lynton, Exmoor, England	...
	United Kingdom	Goat	Bagot	Blithfield Hall, Staffordshire, England.	very small population ...
	United Kingdom	Sheep	Boreray	Boreray, Scottish Island, St Kilda Archipelago	...

	United Kingdom	Horse	Carneddau Welsh Mountain,	Wales, UK	...
	United Kingdom	Cattle	Chillingham	Northumberland	Lives in 134 hectares of parkland near the Scottish border.
	United Kingdom	Horse	Eriskay Pony	Holy Isle, outer Hebrides, Scotland	...
	United Kingdom	Horse	Welsh Mountain Pony	Wales, UK	...
	United Kingdom	Horse	Welsh Mountain Pony	Wales, UK	...
	United Kingdom	Sheep	Soay	Scotland, St Kilda Archipelago (orig.), island of Hirta, Holy Isle	...
	United Kingdom	Horse	New Forest pony	New Forest, England	All of the ponies found in the forest are wild in the sense they can roam freely but in fact they ar ...
	United Kingdom	Cattle	Swona Cattle	Swona island, Orkney	People left the island in 1974, tended the cattle there till 1978.

FRAMEWORK FOR A MANAGEMENT PLAN

Framework for a Management Plan

Specific problem (to be solved or to be avoided):.....

Country:

Habitat:

Area (ha):

Carrying capacity* (LSU/ha**):

Is there:

- Shelter: yes/no
- Shepherd: yes/no
- Warden: yes/no
- Predators: yes/no
- Predator protection: yes/no
- Winter feeding: yes/no
- Water – Summer: yes/no Winter: yes/no
- Habitat only suitable for seasonal use (e.g. summer grazing): yes/no
- Other.....

Suitable species: Suitable autochthonous breed (see national breed list):.....*Will breed have desired impact at that density? If no, think about species combinations!***Key:**

*Carrying capacity Karst (Habitats Directive “conservation of natural habitats and of wild fauna and flora” Council Directive 92/43/EEC): up to 0.6 LSU/ha

**LSU – Livestock Unit. Dairy cow = 1, Cow with suckling calf = 0.9, heifer or steer up to 2 years = 0.5, Brachycerous dairy cow = 0.5. Horse = 1, Donkey = 0.4, Sheep and goat = 0.1, Water buffalo = 0.7, Pig = 0.25