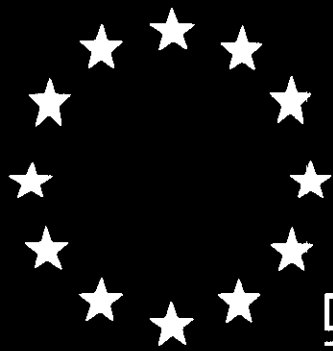


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CONSEIL  
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Workshop  
on the situation and protection  
of the brown bear (*Ursus arctos*) in Europe



Environmental encounters series, No. 6

Strasbourg 1989

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CONTENTS

Page

|   |    |
|---|----|
| Introduction .....  | 7  |
| Biological and symbolic importance of the brown bear for nature conservation by Claude Dendaletche (France) .....             | 9  |
| Regional reports : Northern Europe, by Erkki Pullaininen (Finland) .....  | 11 |
| Regional reports : Central and Eastern Europe, by Rudolf Rösler (Federal Republic of Germany) .....                           | 15 |
| Regional reports : Mediterranean basin, by George Mertzanis (Greece) .....  | 27 |
| Regional report on the status and protection of bears in Turkey by Bahtiye Mursaloglu (Turkey) .....                          | 31 |
| Ecological requirements of the brown bear by Anders Bjarvall (Sweden) .....   | 35 |
| Monitoring of bear populations by Christopher Servheen (USA) .....  | 39 |
| A case study : the population of the Cantabrian Mountains by Javier Naves and Guillermo Palomero (Spain) .....                | 47 |
| Management of small populations in protected areas by Franco Zunino (Italy) .....   | 53 |
| Human impact on brown bear occurrence by Kaare Elgmork (Norway) ..  | 55 |
| Social aspects of the conservation of the brown bear :  |    |
| - an NGO approach by Roberto Hartasánchez (Spain) .....   | 61 |
| - a governmental approach by Juan Carlos del Campo (Spain) .....  | 63 |
| Legislative aspects of brown bear conservation by Cyrille de Klemm (International Union for the Conservation of Nature) ..... | 67 |
| Conclusions of the workshop .....   | 71 |
| Appendix I : List of participants .....   | 75 |
| Appendix II : Programme of the workshop .....   | 79 |

## INTRODUCTION

Article 1.2 of the Bern Convention commits the contracting parties to give particular emphasis to the conservation of endangered and vulnerable species. This is one of the main reasons why the Standing Committee to the Convention, following a long tradition of the Council of Europe in this field, decided in 1984 to start the study of a series of species which were particularly threatened and significant for nature conservation in Europe. In 1986 a group of experts met to coordinate work and research on the Mediterranean monk seal Monachus monachus and the following year another group of experts held a meeting in Strasbourg to study in detail the conservation problems of marine turtles, mainly Caretta caretta and Chelonia mydas.

When, in 1987, the Council of Europe and the Bern Convention Secretariat proposed to the Spanish conservation authorities to co-organise an international workshop on the brown bear (Ursus arctos) in Europe, they reacted with enthusiasm to the idea and suggested the region of Asturias to hold the event. Soon the regional authorities approved the idea and joined as organisers. This region is really a most suitable one, for there exists there one of the last remaining populations of brown bear in southern Europe and the greatest in number in the Iberian Peninsula. The Regional and Central Conservation Authorities had organised the previous year two other meetings (on a regional and national scale respectively) on the species, which proves their high interest in its conservation.

This workshop was held in the National Park of Covadonga from 18 - 20 May 1988. The first day was dedicated to a visit of the interesting bear areas in Somiedo (Asturias). The Secretariat to the Bern Convention wants to express its gratitude to the Instituto Nacional para la Conservación de la Naturaleza, to the Consejería de Agricultura y Pesca del Principado de Asturias, to the National Park of Covadonga and the local authorities of the Consejo de Somiedo for their hospitality and the work they did for the preparation of this workshop.



**BIOLOGICAL AND SYMBOLIC IMPORTANCE OF THE BROWN BEAR  
FOR NATURE CONSERVATION IN EUROPE**

by

C. Dendaletche (France)

Any developed country must be able to present an authentic and attractive face to its visitors. I did say a face, not an empty, media image. In addition, the respect for life (and therefore wildlife) is a timeless feature of any civilisation.

The bear and man have the same face, they emerged from evolution together at the dawn of the quaternary age. In his innermost self, man is a bear and the bear is a wild man, as has been shown by anthropological studies of brown bears in various civilisations.

We live in societies where symbols are important. The image of the bear is not neutral but has a very great media value. A brief survey of its use in advertising shows this clearly. The example of southern European countries where there are small bear populations demonstrates the problem in an original fashion: the rarer bears become, the greater use is made of them as an image. That would be an interesting feature of civilisation to analyse.

This process also goes for the animal itself and its populations. Various types of group (associations, authorities, research institutions, universities, etc) claim to have priority in studying the biology and eco-ethology of the bear. That shows a kind of cultural will to appropriate the study and protection/management of the largest mammal in Europe by one element of society. This sometimes leads to conflict.

As an object for study, the brown bear is a fringe concern of the various research units involved.

The study methodology of small bear populations must be perfected and applied clearly by all the researchers from various countries so that comparisons and correlation can be correctly carried out. The methodology must be different in part from the one used for large populations (North America, Central Europe). Close co-ordination must be employed.

Biological and ecological study of the bear must form part of an overall ecological study of large biocenoses in the mountainous areas concerned. The ursology researcher absolutely cannot be isolated.

It is true that the study method used depend on prior conceptions of the type of management envisaged: the bear as a wild animal in a traditional type agrosylvopastoral ecosystem, the bear as game, the bear as a wild animal in a biological reserve or a national or regional park. These very differing conceptions are further diversified on the European scale by the administrative systems and legal framework, the nature of the managing bodies, the diversity of researchers and the varying tones of awareness of each people. Adopting a single solution may have different consequences according to whether it is applied in Asturias, the Basque Pyrenees, Pindus, the Trentine Alps or more Nordic countries.



Study of the bear cannot be merely a technical affair. It must rest on a real scientific team including not only the various naturalist aspects (biology, ecology, ethology), but also aspects linked to human ecology and landscape ecology and, of course, legal, socio-economic and administrative problems. Since the bear is a residual creature in many countries, its study cannot be separated from that of conservation of its present and potential biotopes. The importance of conserving forest biotopes seems obvious and there is immediately a problem of spatial planning which may lead to conflict between political and economic interests and biological conservationist precepts. The necessary negotiations must solve problems case by case. In a certain way, the action of protecting the bear goes along with protecting other large endangered animals: the capercaillie, the lynx and the very large number of forest phytocoenoses which might be a future source of food for man. The presence of the bear is a sort of "biological indicator" of the diversity of high altitude biocoenoses which it is desirable to conserve.

A brief survey of biological research on the bear and of conservation attempts - particularly at the southern limits of its Western European distribution area - shows the difficulty of reaching satisfactory results at present.

We should in fact press forward faster and bypass the contradictions of social treatment (social and economic) and technical treatment (which belong more properly to hunters' associations) of conservation of the bear. We are no longer at a stage where half measures will suffice. The bear is an important biological element of the European heritage. But for many many reasons it is also a cultural value (in the highest sense of the term). Future action must be an integral part of global action to preserve the heritage.

This assumes that an effort must be made for popular education (a good start has already been made in some countries), to co-ordinate an all out effort at documenting the bear and to make a concerted effort in the various technical and scientific action fields.

## **STATUS OF THE BROWN BEAR IN NORTHERN EUROPE**

by Erkki Pulliainen (Finland)

A century ago, brown bears were common in forested areas (incl. larger islands off the coast of the Atlantic Ocean) throughout Norway, Sweden, Finland and northern Russia.

In Norway government bounties on bears were paid from the year 1845, and between 1846 and 1850 bears were shot in all of the 18 counties of the country. Increasing human kill resulted in declining bear numbers the following years. By 1940, the only regular resident bear populations were found in the central and northeasternmost parts of the country. Only very few scattered individuals were reported from the rest of Norway. Thus the total Norwegian bear population in 1965 was assumed to consist of only 25-50 individuals. Regular occurrences were recorded in nine counties. This situation led to the total protection of the species in 1973, and in 1976 the population estimate was about 100 bears.

In the most recent studies (Overskaug et al.) Norway has been divided into 23 bear-areas, which together constitute 5 bear regions. Population estimates are then presented for each region and area. A total of 2536 reports of various types collected from 16 of the 18 Norwegian counties between 1978 and 1982 indicated a minimum population number of 157 individuals, and a probable minimum of 230 bears were estimated. The reports involve direct reports of sightings, droppings and footprints as well as newspaper-reports and reports published by various authors.

In 1987 the bears inhabited a wide, but discontinuous range distributed over 23 different areas of Norway. Concerning the viability; one really viable, four viable border populations, eight populations of questionable viability and four of unknown status were registered.

Historically the brown bear occurred also throughout the Swedish mainland. Many old provincial laws required hunting of the species, and thus bounties were high even as early as the 17th century. Effective hunting resulted in decrease in bear numbers. The species disappeared in southern and central Sweden. By the end of the 19th century the southern limit of its range lay at 60°N. North of that, populations were drastically reduced and bears were mainly confined to remote areas.

Beginning around 1890, steps were taken to protect the brown bear. Particularly important was that all hunting on state land was prohibited from 1912. Under this protection the population recovered and since 1943 bear-hunting has again been allowed in Sweden.

The Swedish bear population was surveyed in the mid 1970's. Results have shown a large but discontinuous area of distribution in northern and central Sweden. There has been no follow-up of this survey, but information from hunters and others indicate that slight changes have occurred during the late 1970's and 1980's. The area of distribution has expanded a few thousand km<sup>2</sup> to the south and southeast. Furthermore, a slight eastward expansion towards the Gulf of Bothnia has been reported from Norrbotten and Västerbotten in the north.

In the 1975/76 survey, the total Swedish population was estimated to be between 400 and 600 bears. A comparison with some earlier surveys, published and discussed by Bertil Haglund, suggested that the population has been slowly increasing for at least 40 years. Relations between population estimates and yearly harvest during these 40 years are difficult to study because hunting regulations have been changed several times. Since the present licence system was introduced in 1981, the official shooting statistics have predicted a slowly growing population. Seventy-one bears were shot during the first three years, 89 during the following three years.

A number of bears inhabit the border district between Norway and Sweden. Thus the Norwegian situation reflects that of Sweden, and vice versa. There are more small isolated populations in Norway than in Sweden. Because of high mountain plateaux which cover 70% of the country, bears occurring in more or less isolated populations are to be expected to be a fact also in the future.

Although the brown bear is protected in Norway, certain bears killing livestock can be shot by special licences from the Directorate for Nature Management, females with cubs being, however, always protected. Since 1981 a maximum bag-limit has been settled by the state authorities for certain regions of Sweden. Hunting is allowed in autumn in these districts. Yearly harvest level is attempted to be kept below 5% of the supposed total populations.

In Norway the new management regulations for large carnivores declare that (1) viable populations of brown bears (wolverines and wolves) should be maintained within the country, and that the loss of livestock due to damage caused by large carnivores should be kept at a reasonable level. Licence to kill individual problem bears, among others in cases of documented severe damage to livestock serves this purpose. In the period 1978-1987, 17 bears were thus shot in Norway, all except three, being males (often subadults).

Population minimums of 50 + 20 bears have been regarded as viable populations in Norway, although the most recent studies suggest that this minimum size should be at least 70 + 20 bears. In order to reach these levels much attention should be directed to area-management in the Scandinavian Peninsula in order to avoid isolation of bear populations, through urbanization processes like highway construction, hydropower development, tourist industry in remote areas, and further urban development in agriculture and settled valleys.

The history of the Finnish bear population has been very similar to that of the other Nordic countries. The brown bear was exterminated in southern, western, and central Finland at the end of the 19th century. This declining trend was continued after the Second World War, the populations of the eastern and northern parts of the country declining due to overkilling. In this situation the remnant Finnish brown bears constituted the western edges of the vital bear populations of the northwestern part of the European USSR. The changes in these core populations, especially that of Soviet Karelia, have led to an expansion of bears to the west within the last 18 years or so.

The Finnish Border Patrol Establishment has systematically corded crossings of the 2574-km-long frontier by brown bears and estimated or calculated their numbers in the areas under their surveillance three times a year since 1968. According to these statistics there were approximately 80 bears in these survey areas in 1970 and approximately 230 in 1985, the estimated total populations in the whole country being about 150 and 450 respectively.

There has been a continuous immigration of bears from the east since 1970. This has resulted in further dispersal of the bears from the eastern frontier areas to the inland parts in the west in the years 1977-1988. This phenomenon has appeared as further recolonization in central, western and southern parts of the country. When the immigration of bears from the east has been greatest, the catch of males has been especially high. An average of 64% of the bears killed in Finland in 1970-1984 were males.

According to the report of P.I. Danilov there have been about 2500-3000 brown bears in Soviet Karelia, adjacent to the eastern frontier of Finland. The duration of the continuous immigration of bears from the east into Finland indicates that the bear population of Soviet Karelia must have been in a saturated state now for 18 years in order to produce extra individuals for emigration. There are only 150-200 bears in the Kola Peninsula. There has been only a little emigration of bears from this population to the west to Finnish Lapland.

The hunting of bears is allowed in the reindeer husbandry area of northern Finland in the spring and in the autumn, and in the easternmost parts of the country in the autumn. Hunting is free during the open season with a few exceptions (for instance, females with cubs are protected as well as those bears feeding at artificial feeding sites and oat fields), and no special licences are needed. The human kill figures are nowadays so high that if immigration from the east should cease, a crash in the population would be inevitable sooner or later. Thus Finland needs an alternative hunting strategy and policy for the situation when there is no immigration of bears from the neighbouring countries.

The brown bears of northern Europe clearly prefer coniferous forests as their habitats where also the overwintering dens are often to be found. The majority of the food of the bears is constituted by plant matter (berries, roots, cereals, etc.), especially during the latter half of the summer. During the recovery period in the first half of the summer animal matter (fresh flesh, ants, etc.) is also remarkably used. The use of animal matter seems to increase from south to north in northern Europe.



THE BROWN BEAR IN CENTRAL AND EASTERN EUROPE

by

Rudolf Rösler

1. Introduction

3,000 years ago brown bear occurred throughout Europe. Now its range is fragmented and only in northern Scandinavia and much of the Soviet Union is it found over a wide, continuous area. This paper deals with the European Comecon countries (Bulgaria, Poland, Romania and Czechoslovakia) and the European part of the Soviet Union (see Table 1), an area of 6,360,000 km<sup>2</sup> - 64% of the European continent (including the large islands of Europe).

Table 1

Surface area, population size and population density: the Comecon countries and France

| Country   | Bulg. | Cz.   | Pol.  | Rom.  | S.U.    | Fr.   |
|---|-------|-------|-------|-------|---------|-------|
| Surface area (in thousands of km <sup>2</sup> ) | 110.9 | 127.9 | 312.7 | 237.5 | 5,571.0 | 547.0 |
| Population (in millions)                        | 8.9   | 15.4  | 36.2  | 22.7  | 184.7   | 54.1  |
| N° of people per km <sup>2</sup>                | 80.6  | 120.4 | 115.8 | 95.6  | 33.2    | 98.9  |

2. Distribution

In the region we are concerned with the brown bear is found in the mountain ranges of the Balkans, the Carpathians as far as the Tatras and, in the north, from the wooded hills of Byelorussia and Northern Russia to the Urals and the North Russian plain. It is also found in the Caucasus (Figure 1).

Its survival now depends on preservation of its biotope and on a rational approach to hunting it. Table 2 gives statistics on hunting and forestry in brown bear areas.

Table 2

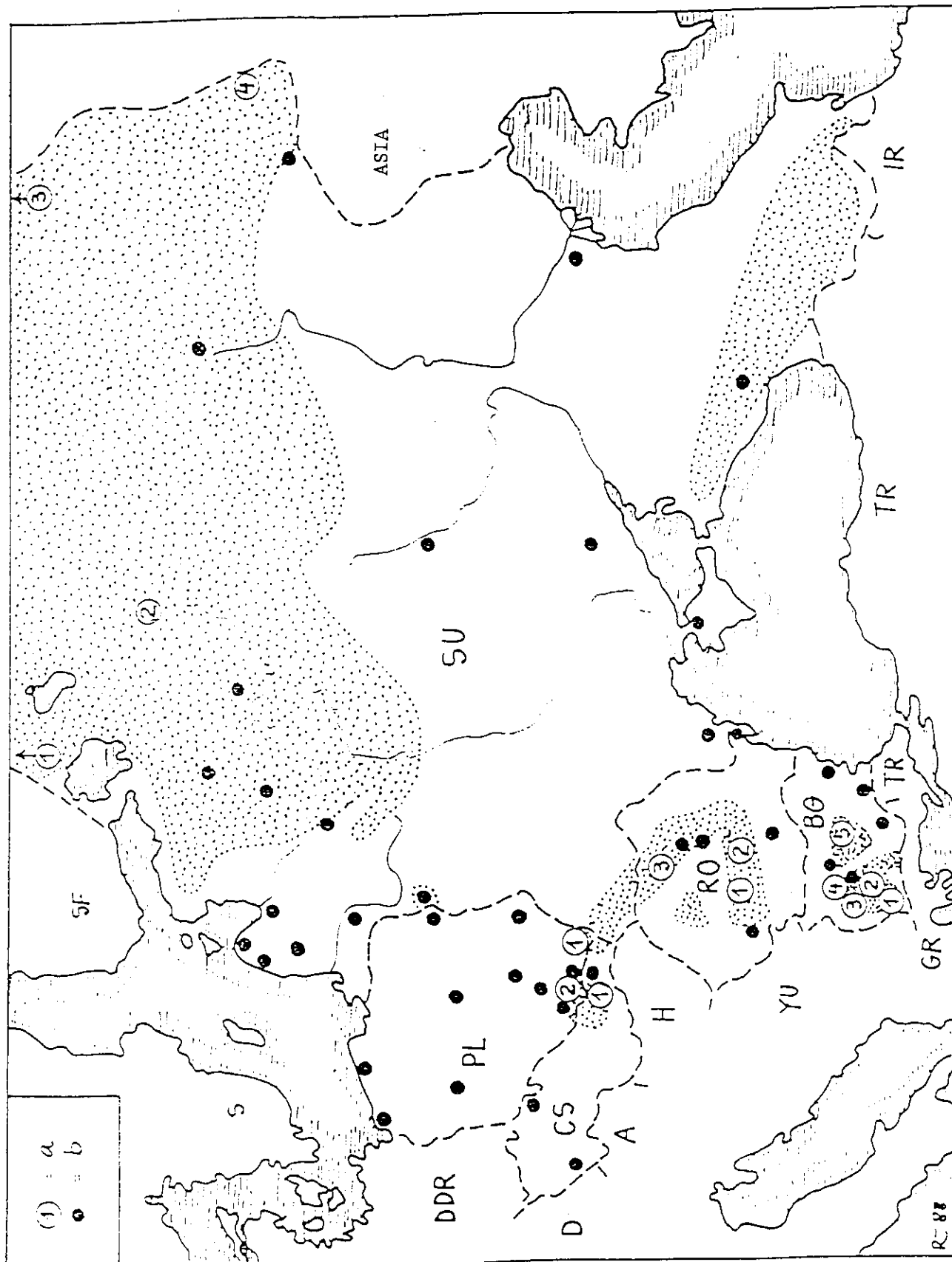
Main hunting data

| Country                             | Bulg. | Cz.  | Pol. | Rom. | S.U.  |
|-------------------------------------|-------|------|------|------|-------|
| Area hunted (as % of total area)    | 91    | 90   | 93   | 87   | 87    |
| N° of ha of hunting per hunter      | 135   | 77   | 434  | 405  | 557   |
| N° of hunters (in thousands)        | 75    | 150  | 67   | 51   | 3,500 |
| N° of hunters as % of population)   | 0.83  | 0.98 | 0.18 | 0.23 | 1.38  |
| N° of people per hunter             | 120   | 102  | 547  | 429  | 72    |
| Area of forest (as % of total area) | 30    | 38   | 28   | 27   | 40    |

Figure 1

Distribution of brown bear in the European Comecon countries (dotted lines); a, b: national parks and forest nature reserves (a: see Table 4)

Original



By way of comparison with Western Europe, the area hunted (per hunter) in the FRG is 100 hectares, in Austria 88 hectares, and in Italy 15 hectares.

### 3. Biology and ethology

Although omnivorous, the European brown bear is mainly herbivorous. It is sedentary although there is considerable autumn migration for food.

The biotope of the brown bear needs to have a number of features which are essential to its survival:

- extensive, thick, undisturbed forest giving a varied diet;
- large windfalls, snowbreaks or clear-cuttings with berry-yielding bushes or shrubs;
- extensive alp;
- accessible, well situated wintering areas;
- areas with plentiful wild fruit for autumn feeding;
- adequate cover in summer and in the autumn congregating period;
- cover in the form of continuous woodland for migration from summer to winter grounds and back.

Fairly large, uniform numbers in the Romanian Carpathians for example (see Figure 2), indicate that brown bear biotopes so far remain reasonably intact. The same is true of Bulgaria, Slovakia and the Soviet Union.

### 4. Population growth

Until 1979 there was a great deal of disagreement about brown bear numbers in Europe because there were no reliable data for some areas. In 1979 the International Council for Game and Wildlife Conservation (CIC) Committee on European and Asian big game held a symposium in Romania which put brown bear numbers in Europe at around 33,000, 23,000 of them in the Soviet Union alone, the other 10,000 being distributed as follows: Romania 5,700; Yugoslavia 2,600; Sweden 600; Finland 400; Czechoslovakia 400; Bulgaria 400; Italy 110; Spain 100; Poland 40; Albania 30; Greece 30; and France 20 to 30.

Since this 1979 estimate, numbers have grown considerably:

#### Bulgaria

850 (1930, 300; 1934, 340; 1940, 445; 1954, 440; 1979, 400)

#### Poland

40

#### Romania

6,300 (c. 1900, 3,000; 1942, 1,500; 1950, 860; 1955, 2,000; 1960, 3,200; 1965, 3,800; 1968, 4,600; 1976, 5,000; 1979, 5,700)



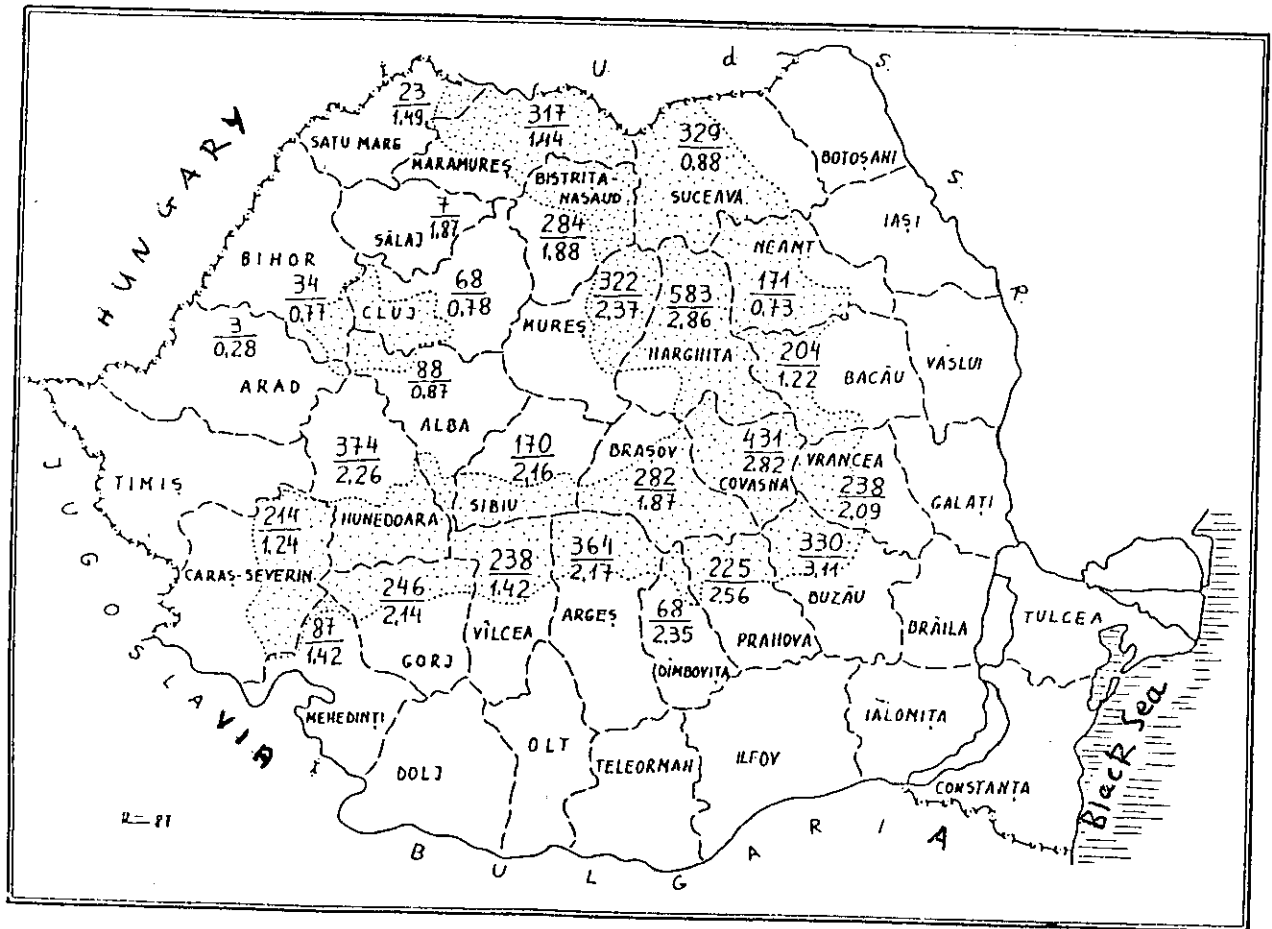
Figure 2

Brown bear distribution in Romania (per county):

$$\frac{284}{1.88} = \frac{a}{b}$$

a = number of bears in the county,

b = number of bears per 1,000 ha of forest (1979 figures)



Czechoslovakia

700 (1912, 120; 1920, 80; 1932, 20; 1950, 135; 1960, 270; 1965, 300; 1970, 347; 1979, 400; 1985, 580)

Soviet Union

32,000 (1979, 23,000). In Okhota i okhonitcheskyi khoziaistvo ("Hunting and the Economics of Hunting"), N°s 10 and 11, 1983, quoted in Unsere Jagd, N° 2/1984), A. Sitko calculated that in 1983 there were 32,000 brown bear in the European part of the Soviet Union.

At present there are reckoned to be from 35,000 to 40,000 brown bear in Eastern and South-Eastern Europe - 35% more than in 1979. Brown bear population trends over the last 50 years are shown in Table 3.

Table 3

| Country | Numbers in | 1979    |          | 1986/87 |          |
|---------|------------|---------|----------|---------|----------|
|         |            | Numbers | % change | Numbers | % change |
| Bul.    | 445/1940   | 400     | - 10     | 850     | +112     |
| Cz.     | 135/1950   | 400     | +196     | 700     | + 75     |
| Ro.     | 1500/1942  | 5700    | +280     | 6300    | + 11     |
| S.U.    | ?          | 23000   | -        | 32000   | + 39     |

These numbers and the upward trend guarantee population stability. The brown bear population in Poland is mainly in the Tatra Mountains, where it is protected right up to the border and into Czechoslovakia.

5. Hunting and hunting regulations

Down the centuries the bear was regarded as a harmful predator and was always ruthlessly destroyed by every possible means. The best evidence of this is the bounty that was paid for every bear killed. In Transsylvania in the 16th century the bounty was large. Until 1903 Bulgaria also encouraged extermination of the brown bear by paying 20 leva in gold for every female killed and 10 leva for every male.

In the region we are dealing with, numbers suffered in the post-war periods (1919-30 and 1945-50): many hillfarmers, foresters and shepherds had acquired army rifles and - shepherds especially - decimated the age-old enemy with them.

The main causes of the sharp fall in bear numbers during those periods were:

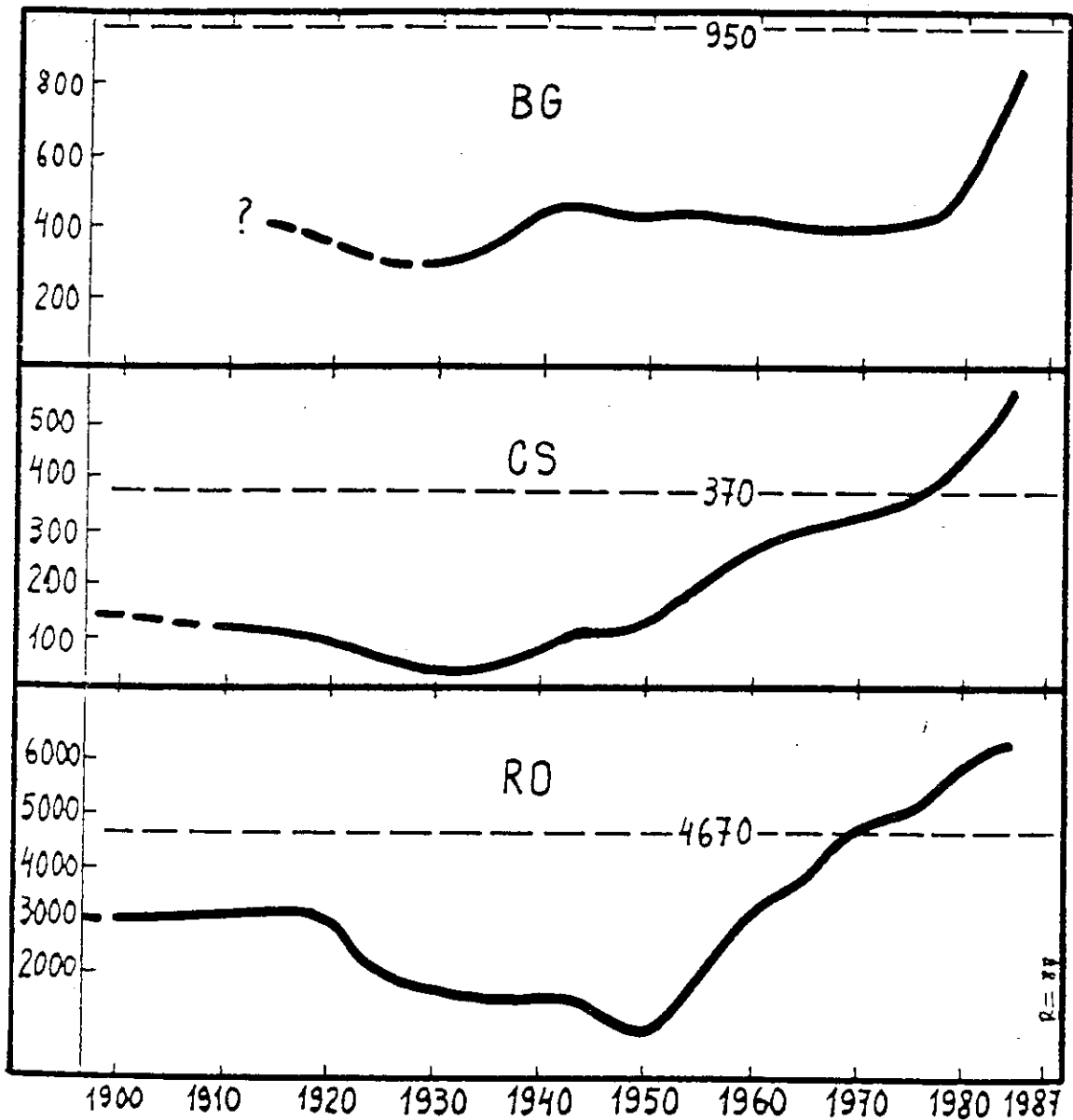
- illegal shooting or trapping;
- taking of she-bears and their cubs;
- strychnine poisoning of wolves and, indirectly, of large numbers of eagle and bear.

Figure 3

Brown bear population trends in Bulgaria, Czechoslovakia and Romania

(dotted lines = optimum numbers)

Original



*Immediately after the First World War we see a change of heart towards the brown bear.*

In Bulgaria bear hunting was prohibited in 1941 and by 1954 numbers had risen to 440. Since the 1981 Hunting Act, which introduced a total annual authorised kill of 50, the population has further increased and stood at 850 in 1987.

In Romania there was still provision in the 1921 and 1923 Hunting Acts for payment of bounties. It was not until 1927 and 1932 that strict measures were brought in which made the killing of bears subject to ministerial warrant. The 1947 Hunting Act prohibited trapping of brown bears and the 1953 Hunting Act introduced a closed season (15 January to 1 March) and made it illegal to take she-bears with cubs or to hunt bears in their wintering dens. Under the 1976 Act, hunting is prohibited from 15 May to 1 September and from 1 January to 15 March and poaching offences are punishable by a fine of 10,000 lei - the fine rises to 20,000 lei during the closed season (the average working wage is 1,800 to 2,000 lei) - plus up to four years' imprisonment.

In Czechoslovakia the brown bear was unprotected until 1932. It had been exterminated in Bohemia by 1956 and in Moravia by 1893, while in Czechoslovakia as a whole poaching was so relentless that at one point the total population fell to 20. The brown bear has had full protection since 1932 and numbers have recovered considerably.

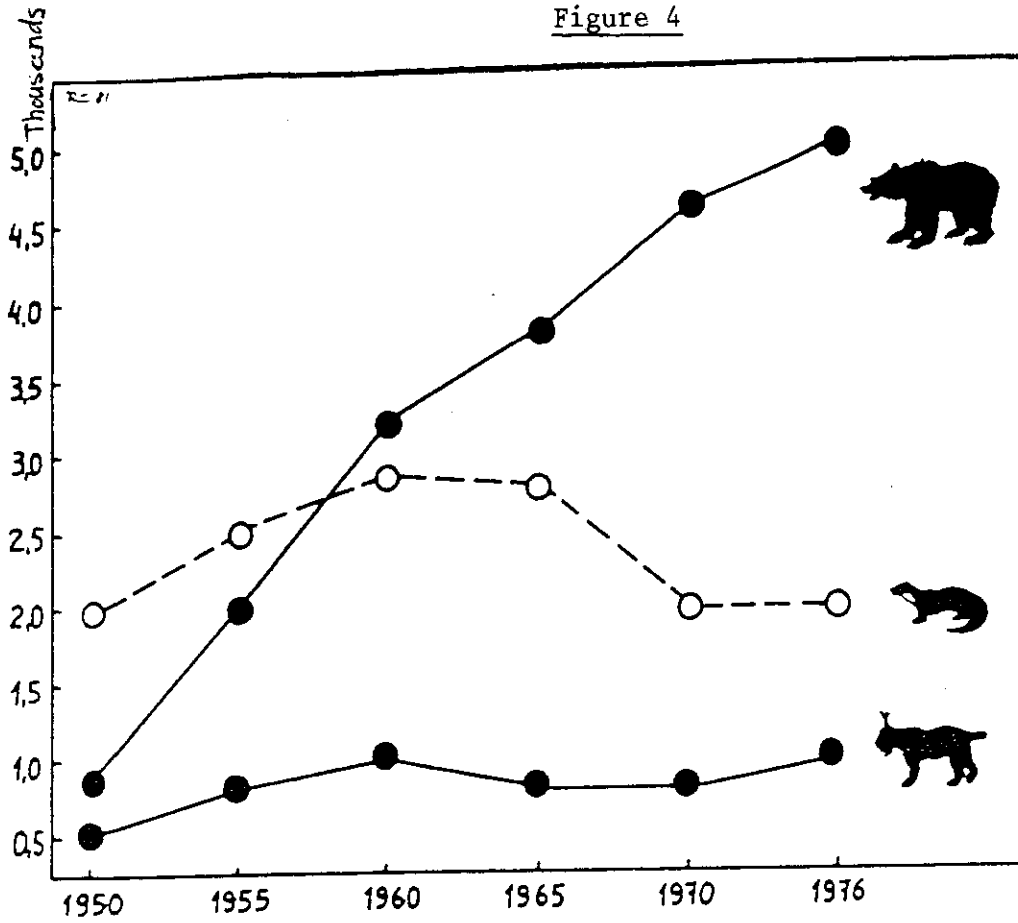
In Poland hunting of brown bear is prohibited, the brown bear population being mainly confined to the Tatra National Park and the Bieszczady forest nature reserve. Brown bear were exterminated in the ancient Bialowies forest between 1863 and 1868.

In the Soviet Union a number of nature conservationists now think brown bear hunting should be prohibited all year around (see Semenov, Tian and Shansky in "Okhota", November 1978), although brown bear have become extremely common in places and often cause serious damage.

It is close co-operation between the nature conservation and hunting authorities that has been responsible for the large increase in brown bear numbers in the European Comecon countries. In Romania and Czechoslovakia the optimum number (relative to biotopes mapped) has already been exceeded (see Figure 3 - the optimum number for Romania is 4,670, for Czechoslovakia 370). The Bulgarian authorities put the maximum sustainable number at 950.

#### 6. Nature conservation and the brown bear

Animal habitats have always been to a greater or lesser extent under threat, large mammals (bison, bear, wolf, lynx) being hardest hit because man has consistently regarded them as his competitors. Since man started colonising these areas, conditions for the bear have worsened. Manifold human exploitation of the land has had its impact, and the retreat of woodland in particular has driven the brown bear into the hills and denser forest.



Population trends for bear, otter and lynx in Romania, 1950-76.

Original

The first attempts to protect the bear date back to before the hunting legislation we have referred to. While, under the Austro-Hungarian monarchy, total war was being waged on the bear, huntsmen were beginning to take protective action. In the Southern Carpathians (Transsylvania), self-firing devices were prohibited and the annual kill was restricted to one bear per hunting association member. A closed season was introduced from 1 May to 15 September and in 1930 the Hunting Association regulations forbade shooting a bear while it was devouring its prey.

The first nature conservation legislation in the Comecon countries dates back to the 1930s (Romania passed a Nature Conservation Act in 1930, for instance). This led to the first national parks, such as Retezat in Romania (1935), Tatra in Czechoslovakia (1948) and the adjacent Tatra National Park in Poland (1955).

Thus a huge network of nature reserves and national parks took shape (see Figure 1). Only the reserves and parks in Table 4 are shown on the map (Figure 1).

The brown bear inhabits large continuous areas of forest containing clearings, large areas of windthrow, and areas of rock or marsh (in the north). Table 4 gives some idea of the great variety of brown bear biotope in Europe.

The at times considerable nature conservation efforts and the rational adaptation of forestry and hunting to landscape type in Eastern and South East Europe justify confidence that brown bear biotopes will be preserved. That they are largely intact for the Rhodope Mountains to the Tatras and on to the Urals is evident from brown bear population growth and this is partly due to the importance of hunting in the region and the special protection the bear is given.

## 7. Prospects

Despite constant agricultural and forestry expansion which threatens the bear's remaining fastnesses and despite the sophistication of present-day hunting equipment, the bear population in the European Comecon countries is largely Secure. Co-operation between the nature conservation authorities and hunting bodies has produced a welcome increase in numbers.

While in Western Europe (Italy, Spain and France) the concern is mainly to preserve the bear population, the aim in Eastern Europe is to manage it rationally so as to maximise revenue from hunting while minimising damage caused by bears.

Relatively intact biotopes make it possible to control numbers as necessary, as in Romania's bear and lynx management approach after the Second World War (see Figure 4). But when the biotope of a particular species deteriorates (as the otter's biotope has done in recent decades), that species is endangered in the long term.

It must on no account be forgotten that the great forests and the low density of human population in the region are the main reasons for the brown bear's preservation.

TABLE 4

Selected nature reserves and national parks in the brown bear's range, giving type of forest

| Country | Name                                      | Area in ha | Height in m   | Type of forest   |
|---------|---|------------|---------------|--|
| BG      | 1. Baevi douпки/<br>Pirin                 | 848        | 1300-<br>2100 | Mixed spruce and fir   |
|         | 2. Vassil Kilarov/<br>Phodope Mountains   | 420        | 1600-<br>1850 | Scots pine and spruce  |
|         | 2. Vihren/<br>Rhodopes Mountains          | 6376       | 1100-<br>2915 | Fir, pine and spruce; pinus peuce and Pinus leucodermis              |
|         | 3. Parangalitz<br>Rila Mountains          | 1580       | 1400-<br>2050 | Scots pine, fir, spruce and Pinus peuce                              |
|         | 4. Bistrichko/<br>Branichte/<br>Vitosa    | 22800      | 700-<br>2260  | From oak/hornbeam forest to subalpine spruce forest with Pinus peuce |
| ROM     | 1. Retezat/<br>Southern Carpathians       | 13000      | 784-<br>2484  | Beech, fir and spruce  |
|         | 2. Bucegi/Southern Carpathians            | 4775       | 845-<br>2509  | South Carpathian beech, fir and spruce forest                        |
|         | 3. Pietrosul Mare/<br>Eastern Carpathians | 2700       | 800-<br>2303  | Mixed Carpathian forest (spruce, beech, fir, sycamore)               |
| CZ      | 1. High Tatras                            | 50000      | up to<br>2663 | Mixed spruce, fir and beech  |
| PL      | 1. Bieszczady                             | 5726       | -             | Spruce, fir and beech  |
|         | 2. Tatras                                 | 29973      | up to<br>2499 | Fir and beech; spruce  |

| Country | Name                     | Area in<br>ha | Height<br>in m | Type of<br>forest   |
|---------|--------------------------|---------------|----------------|---|
| SU      | 1. Kandalakshsa          | 22000         | 0-             | Taiga (pine, spruce, birch cladonia and pine; tundra          |
|         | 2. Darwin/<br>Kalinin    | 112600        | 450            | Pine, beech   |
|         | 3. Petchora/<br>Ilytch   | 721322        | 250-<br>1200   | North Ural forest (Scots pine, Swiss pine, knee pine); tundra |
|         | 4. Ilmen/<br>Cheliabinsk | 32100         | 500-<br>1000   | Pine, mixed deciduous with abundant larch and birch           |





CONSIDERATIONS ON THE SITUATION OF THE BROWN BEAR  
(URSUS ARCTOS) IN MEDITERRANEAN AREAS

by

George Mertzanis  
(Greece)

1. Introduction

The brown bear (*Ursus arctos* L.) still inhabits large areas of the northern hemisphere but its distribution shows that in some areas of the European Continent the species is very much in decline.

Thus, while the range of the brown bear remains broadly the same on a worldwide scale, particularly in western and central Europe we find a marked pattern of discontinuity which has led to the formation of population pockets where the species has been driven back into the most inaccessible mountainous and wooded regions.

This isolation of bear populations, a phenomenon particularly pronounced in the Mediterranean countries, makes the species even more vulnerable to the two major causes of its decline:

- intensive hunting which has been illegal for several years in the majority of the countries concerned
- destruction of its habitat (deforestation to provide land for agriculture, extensive forestry, mass tourism, fires).

2. The evolution of brown bear populations (numbers, distribution) in the Mediterranean countries with reference to various authors

The age-old colonisation of the Mediterranean basin by successive human civilisations has no doubt had a considerable impact on the evolution of the natural environment (itself widely varied) and particularly on the survival of various species of plants and animals.

The brown bear has been no exception, its distribution and numbers have developed in inverse proportion to the spread of human settlements and the resulting destruction of its habitat, as well as to the rapid development of firearms and methods of exploiting natural resources. A brief survey of the (Mediterranean) countries where the species is still present will give us a more tangible picture of this phenomenon.

France : Throughout history the species inhabited almost the whole of the country, its preference being however for the mountain ranges of the Vosges, Jura, Alps, Massif Central, Cévennes and Pyrénées (COUTURIER, 1954). Today the bear is only to be found in the Pyrénées where it forms two small separate population nuclei, west and east (Parde, 1984), both areas being sparsely populated. Chronological decline 150-200 (1937, BOURDELLE); 72 (COUTURIER 1953); 20-28 (1987, CAMARRA).

Spain : In the 14<sup>th</sup> century the distribution of the bear still covered the whole of the Iberian peninsula (CAMPO et al. 1986). In the 17<sup>th</sup> century the species disappeared from the south and centre of the peninsula and withdrew for good into the north of the country, in the Pyrenees and the Cantabrian mountains (COUTURIER, 1954). In the Pyrenees, small scattered population groups are in contact with those on the French side. In the Cantabrian mountains there are two distinct population groups (west and east), which no longer have any contact with each other (CAMPO et al. 1984).

Italy : In the past, the bear inhabited almost all the forests and mountains of the peninsula, as far south as Sicily. As early as 1500 A.D., it had been exterminated from the majority of the country and today it is confined to the Apennines (the Abruzzi region) and the Trentino Alps, two groups very far apart (ZUNINO-HERRERO, 1971). Chronological decline: 70-100 (1970, ZUNINO); 45-80 (ZUNINO 1981); 50 (1983 ZUNINO). (This refers to the population group in the Abruzzi region). The bear population in the Trentino region numbers approximately 10 individuals (ROTH, 1976).

Yugoslavia : The bear disappeared from Slavonia a long time ago (COUTURIER, 1954), though it is still common throughout the Dinaric Alps. This apparently continuous population has contact in the south of its range with the populations in the border regions of Albania, Greece and Bulgaria (PARDE, 1984). Chronological increase: 700 (COUTURIER, 1954); 2,000 (ISAKOVIC, 1970); 2,600 (TRENSE et al., 1979).

Albania : Very little recent information is available, though the bear is very common (COUTURIER, 1954). According to HAINARD (1961) the population is sizeable. However, recent personal observation in the border region has established that there is significant deforestation (for agricultural purposes) which seems to be a serious threat to the species' biotope.

Greece : In the 2<sup>nd</sup> century A.D. the bear still occupied almost the whole of continental Greece. Between the 19<sup>th</sup> and 20<sup>th</sup> centuries there was a dramatic reduction in its range. Today it still inhabits the central and northern areas of the Pindus mountains and the western part of the Rhodope mountains in two very distinct and permanently separate groups (MATSAKIS et al. 1981). The population of Greek bears are linked to the southern Balkan populations via the Dinaric range and the Rhodope mountains and the population group in the central Pindus region is at the most southerly point of the distribution of the species in Europe (MATSAKIS et al. 1981). According to my own recent data, numbers estimated at approximately 100 are clearly diminishing.

### 3. Present situation - Discussion- Proposals

The situation of the brown bear in the Mediterranean countries as described above is summarised in the figures given by TRENSE and ALLEMAGNE in 1979:

- France: 25-30 bears; severely endangered.
- Spain: approximately 100 bears; endangered.
- Italy: (Trentino), 10 bears; severely endangered.
- Yugoslavia: 2,500 bears; safe.
- Albania: ? (no information).
- Greece: ? (severely endangered).

Additional remark on the above data:

In Italy, the population in the Abruzzi could also be considered endangered on the basis of the figures put forward by F. ZUNINO.

General and specific remarks:

As far as numbers are concerned:

1. The western part of the Mediterranean basin is clearly less populated by bears than the eastern part (PARDE, 1984).

2. In practically all the counties already mentioned (except Yugoslavia) numbers are obviously declining.

As far as distribution is concerned:

1. With the exception of the Balkan peninsula where bear populations form a zoogeographical unit which is almost continuous, populations tend to be remote, isolated enclaves, entailing a direct risk of deterioration of their genetic stock. Some secondary fragmentation appears to be beginning (Spain, Greece).

As far as actual protection of the species is concerned:

1. In practically all the countries in question (apart from Yugoslavia where hunting of bears is controlled) the bear is protected as an endangered species under a special law with severe penalties for breaches of it. However, there is widespread poaching which is difficult to control (due to inadequate surveillance in the majority of cases) causing significant losses whose harmful effects (eg unbalanced structure and sex ratio, low reproduction rates) are greatly aggravated in small populations (for example, the Pyrenees and the eastern population group in the Cantabrian range).

As far as the protection of biotopes is concerned:

1. Although the majority of countries (except Yugoslavia and Albania) have ratified the Bern Convention, it is hardly applied in practice.

2. At first sight, it would seem that overall protection of the species is more effective in areas where bears are specifically protected (national parks, nature parks, hunting reserves etc.). Nevertheless, in some cases (especially as far as national parks are concerned) the location of these areas, the coming and going of tourists (which can cause a serious disturbance depending on scale, the Abruzzi being one example) and their size (which can be insufficient, for example national parks in Greece) can become limiting factors.

Legislation

Proposals: It would be desirable to enact a series of laws (at national level) providing for any human intervention or activity (forestry and its infrastructure; tourist amenities and movements; hunting etc) within the biotopes of the species to be subject to more stringent rules. This would no doubt reduce somewhat the disparity which exists between fully protected and freely accessible areas and would enable the bear to move inside the latter more safely.

Yugoslavia has taken interesting initiatives in this matter, with the zoning of regions inhabited by bears where forestry methods now take account of the rhythms of the animal (PARDE, 1984). These laws should be complied with at every political and administrative level whatever the economic or political cost.

On a practical level

1. Improvement in the efficiency of monitoring networks.
2. Possible increase in the size and number of sanctuary areas governed by specific regulations.

On a scientific level:

In cases where populations have reached a critical threshold, methods such as radiotracking and artificial feeding can have positive effects.

Concerning the media:

1. A public relations campaign geared to the social context and attitudes in each country.
2. Consultation between countries so as to define a joint strategy and to ensure a permanent exchange of information.

The present precarious situation of the brown bear in European countries makes it clearer than ever that we need to take urgent steps, not only to slow down its decline but also to make its survival and proliferation possible.

REGIONAL REPORT ON THE STATUS AND PROTECTION OF  
BEARS IN TURKEY

by

Bahtiye Mursaloglu

The forests in Turkey have been diminishing in size, as in the rest of Europe, and the human population is increasing. This has led to the rapid decrease of the bear (Ursus arctos) population over the last 30 to 40 years in Turkey, a situation similar to that in Europe much longer ago. This decrease is so visible that it has not escaped the attention of nature lovers, although it was not so obvious in Turkey until 1940-45 ; after 1950 it became quite clear.

The study of the wildlife stock of Turkey was undertaken by the Faculty of Sciences of Ankara University in 1959, but came to a halt in 1972 due to the anarchy in the country. However, the data collected during this period is sufficient to give an idea of the situation of the bears, while studies made by the General Directorate of Forestry of the Ministry of Agriculture, Forestry and Rural Affairs (1988) give information on the present situation in Turkey.

In this paper the present status of the bears will be evaluated with reference to the data collected before 1972: past and present situations will be compared, reasons and results will be discussed and protection measures will be mentioned.

Taxonomy

Ognev (1931-1962) and later J.R. Ellerman and T.C.S. Morrison-Scott (1951) have given different subspecies names to the bears living within the Turkish borders. But G.B. Corbett (1978) stated that "it is doubtful whether even the few subspecies separately listed... have any validity". The results of our observations in Turkey support Corbett's view. Bears living in humid forests with rich undergrowth tend to be grizzly and big-built, while bears living in the same area but in sites without trees and with rougher landscapes are of smaller build and of dark yellowish color. This gives the impression that these variations are not geographical, but ecological. 30 years ago a trustworthy hunter reported a grizzly bear with a white collar 12 km south-east of Ankara where there are only unforested mountains. Another young hunter reported having heard of a grizzly bear with a white collar 13-14 years ago in the North Black Sea region, where there are humid and dense forests with rich underbush. It would be logical to leave aside the problem of subspecies and to deal only with Ursus arctos in general, since at present there are very few bears left for the collection of sufficient sample series.

Distribution and status of stocks

The General Directory of Forestry published a distribution map for Ursus arctos isabellinus in 1988. There were bears 30 or 40 years ago in the same regions where they are found at present, but at that time, it was not possible to visit these high isolated regions, due to the lack of roads and the threat of bears except during the summer months. There are still people who can remember the export of the hides of grizzly bears from western Black Sea Coasts (Inebolu) between 1900 and 1910. These bears had been hunted in the dense deciduous forest with rich undergrowth, and from the open spaces in these forests.

In comparison to the past, although there is a decline in the bear population in Turkey, the situation seems quite good in the following areas: Artvin (No.7) and its vicinity (see fig. 1) , Hakkari (No.9) and its vicinity, the Cilo and Sat mountains, and the region between Tunceli (No.12) and Erzincan (No.13) where the Munzur mountains are located. These regions, which are far away from human beings, have quite a good population of bears (Fig.1). Although the population in the rich forests of the Black Sea region is less dense, relict groups have not yet been formed. In the striped areas on the map below, there are still reports of bears, but unless they are protected with strict conservation measures they will soon be extinct. As can be deduced from the information above, bears in Turkey have dramatically decreased.

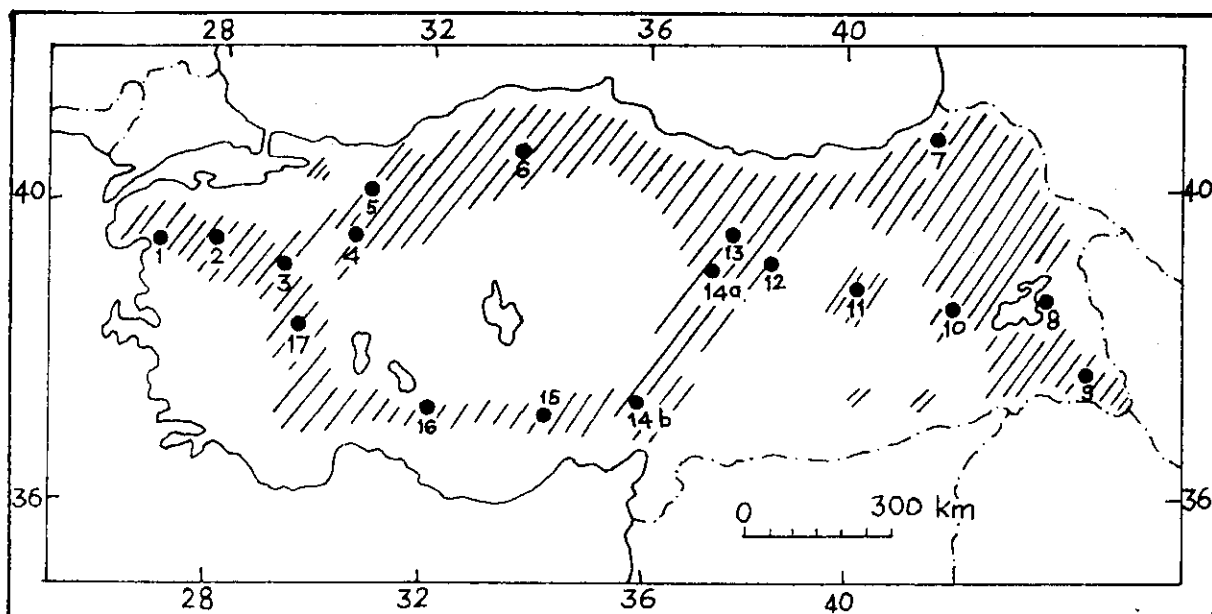


Fig.1 - Map of Turkey showing recent distribution of Ursus arctos.

|           |   |         |    |                |      |
|-----------|---|---------|----|----------------|------|
| Edremit   | 1 | Artvin  | 7  | Erzincan       | 13   |
| Balikesir | 2 | Van     | 8  | Kemaliye       | 14-a |
| Kütahya   | 3 | Hakkari | 9  | Pozanti        | 14-b |
| Eskisebir | 4 | Mus     | 10 | Bolkar Daglari | 15   |
| Bolu      | 5 | Bingöl  | 11 | Isparta        | 16   |
| Kastamonu | 6 | Tunceli | 12 | Boz Daglari    | 17   |

#### Reasons for regression

- the construction of roads, even to the highest and the most isolated regions, which enables the public to invade these areas and disturb the bears;
  - the threat to human safety and livestock from bears;
  - the destruction of orchards by bears;
  - the high prices offered for the skins
- all lead to the persecution of these animals.

## Conservation legislation

The laws relating to hunting in Turkey date from the 1930's and are therefore very insufficient. The prohibition and punishments prescribed by these laws have become outdated. Since other problems in Turkey have priority, these laws have not yet been revised or changed. However, forestry engineers and wildlife lovers have found a practical solution. At the end of the 70's, a committee of specialists fixed a heavy fine, based on present-day values, to be paid as compensation by a hunter if he kills an animal belonging to the endangered species. For example, the fine to be paid for the skin of a bear in Turkey is very high for any Turkish hunter, and he is not allowed to keep the skin. Moreover, it is forbidden to sell the fur of wild animals in Turkey. These measures are very effective in preventing Turkish hunters from killing these animals.

The inhabitants of the localities south west of Artvin (No.7) ie, Yusufeli province and its vicinity, have repeatedly complained of the harm done to their livestock and their orchards by bears. As a result, since 1982, the General Directory of Forestry has had to permit bear hunting from August to April, but only by foreign hunters. Experienced guides from the villages in the vicinity are assigned to these tourists and the high fees paid to them have encouraged the protection of the species. The decision of whether to allow the hunting of bears rests on an evaluation of the number of bears hunted and the stock of live bears.

Since 1970, under the strict protection of the staff of the General Directory of Forestry (which is very well organised and carries out its duties successfully all over Turkey), the decrease in the number of the bears in Turkey has been visibly slowed down, although not completely stopped. It must be stated that this is a true victory, on which the General Directory of Forestry must be duly congratulated.

We may conclude that if at the end of this workshop a recommendation to review and update laws relating to wildlife can be formulated and sent to the governments of the member countries of the Council of Europe, it will be of great help to all wildlife species by arousing the awareness of all the high government executives in these countries.

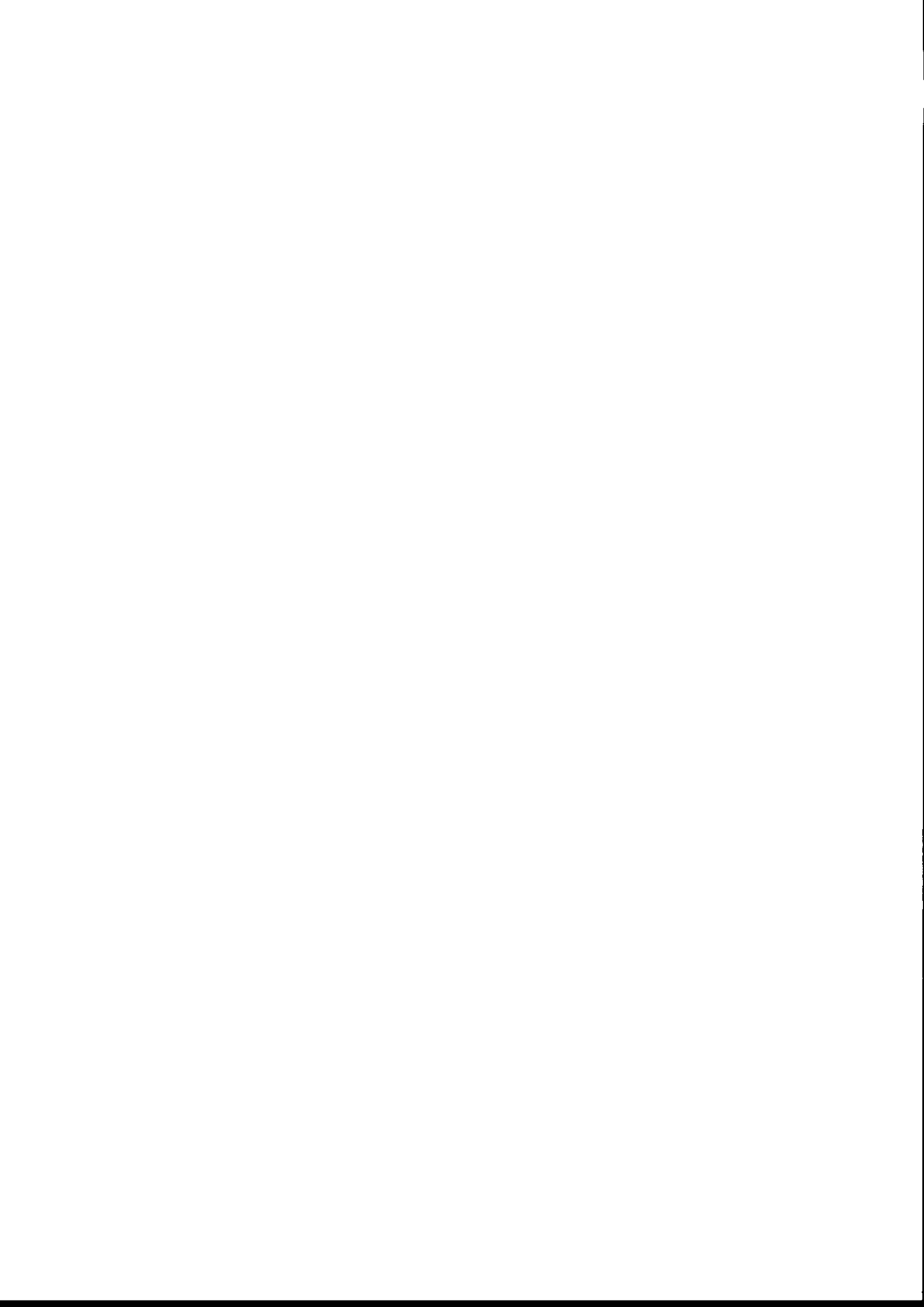
## Acknowledgements

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ECOLOGICAL REQUIREMENTS OF THE BROWN BEAR

by

Anders Bjärvall

The distribution of the brown bear in the northern hemisphere is related to forests. From northern Fennoscandia east through the Soviet Union the whole taiga is an important brown bear habitat. The remnant bear populations in south and east Europe are all confined to forested areas. Only in northern North America are there bears that live in an open habitat; the tundra.

The connection between the brown bear and forests of different kinds has been studied in the Soviet Union. In an area outside Leningrad, where forestry had been practised for a long time and forests of different types were available, more than 400 observations of bears were plotted against type of forest. More than 50% of the observations were made in coniferous forests although this type of habitat constituted only about 30% of the area. Similarly about 30% of the observations were made in deciduous forests, which comprised close to 45% of the area. So the preference for coniferous forests was obvious.

However, this does not mean a preference for all kinds of coniferous forests. Mature spruce-forest was overrepresented, while young spruce-forest as well as pine-forests of all ages were under-represented.

Similar results were obtained in a study of the last few bears in the European Alps. In summer instrumented bears were found to spend most of their time in spruce-forests 1400-1800 meters above sea-level. The larch-tree zone above and beech-tree zone below were much less frequented.

Not only in summertime but also for winter denning the importance of spruce-forests was emphasised in the aforementioned studies. In the Leningrad area more than 50% of the discovered dens were found in the old spruce-forest (which covered about 30% of the area). And in the Alps more dens were found in the upper part of the spruce-forest and the lower part of the larch-forest than in any other zone.

The classification method used in both these studies could be called informal - habitat units have been subjectively stratified only on the basis on dominant vegetation. More formal classifications - built on precise field and analytical methods - do not seem to have been used in any European study.

Such formal classifications, however, have been frequently used in bear studies in North America. In several of these studies around 20 different habitat types have been identified and seasonal use by radio-collared bears of these habitats investigated. Direct comparisons with European habitat types seem difficult, but it has been found in different areas - e.g. the Yellowstone ecosystem and the Mission Mountains in Montana - that forested areas were used less than expected, at least during part of the year. So in North America the brown bear seems to be less connected with forests than in Europe.

It is well known from Europe that bears frequently use specific food-items during limited parts of the season. In Fennoscandia for example, blueberries are a highly preferred food in late summer. However, close relationships between food habits and seasonal habitat use, like those described in several North American studies, seem essentially unknown here. In the Yellowstone ecosystem, for instance, areas in which ungulate concentrations occur, support most of the grizzlies in spring. In summer the distribution of the bears can be explained primarily by the distribution of either specific vegetal diet or spawning trout. And in the autumn bear tend to concentrate in areas where they can feed on Pinus albicaulis nuts. Whether there are similar patterns also among European bears, will be discovered in the projects that recently have been started in several countries.

The home range of a brown bear must contain all the components necessary for its survival. The separate components, however, might be very difficult to reveal. Therefore, information only about the size of the home range is of great importance. It is however vital to study the home range over a sufficient period - to establish something that could be called a life time home range. The monitoring of the first instrumented bear in the Swedish-Norwegian project can be mentioned as an example.

During 1984 and 1985 that bear utilized a home range of approximately 120 km<sup>2</sup>. She was never found outside that area. The situation seemed very stable and if the project had been interrupted after those two years, it would have been easy to conclude that this was the area she needed. That would have been a false conclusion. In 1986 she made a couple of tours over an area about twice as large and in 1987 she suddenly made a long tour that brought her over an area at least 4 times larger than the original one. During the tour she was observed together with another, much bigger bear, and although in 1987 she was only 4 1/2 years old, we believe that the behaviour was related to breeding. After the meeting with the other bear she returned to her original area and stayed there the whole autumn.

Even if bears within an area can establish home ranges that are large enough, that offer cover, sufficient food during different seasons, suitable denning sites etc., there is one more factor that is very important to their ecology. That factor is man.

As mentioned, forests are vital to bears particularly in Europe and it has been found in Norway and the Soviet Union that human activity in an area results in reduced bear activity. Such human activity was increased road development, increased logging and in Norway probably also development of recreational areas. Also in the Italian Apennines increased tourist activity in an area was found to result in reduced bear use. In severe cases in the Soviet Union, small populations were heavily reduced or even completely exterminated.

As to logging in North America reports are more conflicting. There are studies that have documented reduced bear use of logged areas but other where no changes in bear populations have been documented in spite of increased logging pressure. However, in this latter case bear home ranges were substantially reduced. It has been concluded, that while bear numbers may not be immediately affected by logging activities, their behaviour is almost certainly modified. This indicated difference between Europe and North America might be caused by the obviously stronger connection between bears and forests in Europe. It should however be observed that the North American studies are much more comprehensive and detailed than the European ones.

In these North American studies several other human impacts on bears have been documented. Important such areas are hydrocarbon exploration, hydro-electric development, aircraft disturbance and conflicts with livestock or other agricultural activity.

As far as aircraft disturbance is concerned no effects seems to have been demonstrated on bear populations, but individual bears have been found to react. Interesting for us in northern Scandinavia is the fact that most grizzlies in Glacier National Park displayed a strong reaction to an approaching helicopter despite the fact that scenic helicopter flights had been conducted there for several years. All the other of these factors have been found to have a negative impact on brown bear populations.

It is likely that the different European bear projects will be concentrated on questions concerning movements, home range and other related subjects. However, I will finish this presentation by urging all biologists working within these projects not to forget the factors concerning human impact on bears. Particularly in the countries where only small populations exist, these factors might be critical for the future of the populations.



## MONITORING OF BEAR POPULATIONS FOR CONSERVATION : SUMMARY

by

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### Background

The conservation of bear species is dependent on knowledge of the status of the population. Information on the status of the population is necessary to realize the intensity and type of management effort needed. Monitoring is necessary to measure the response of the population to management under way. Effective management strategies should improve demographic parameters and distribution of the animals throughout the available habitat. If monitoring demonstrates these results then such management efforts can be continued and the cost and importance of such efforts can be better justified to the public and the funding agencies.

Appropriate and scientifically sound monitoring is necessary to convince the public and government agencies that conservation efforts are warranted. The management efforts necessary to conserve small bear populations are often costly and may involve significant changes in human use of the habitat of the bear. Such actions are not casually accepted by the general public and credible data are necessary both to implement such activities and to maintain them over the time period necessary to achieve results. The credibility of methods to monitor bear populations are often the first data challenged by those who are skeptical about the need to conserve the species or those who believe bear conservation would threaten their interests.

To be effective and scientifically credible, monitoring must be repeatable and implemented annually in most cases. The annual application of monitoring efforts is the most effective way to measure changes in populations over time. Considerations relating to the annual application of any monitoring effort should be a major part of an efficiently designed system. An elaborate monitoring system that generates precise data but is too expensive and complicated to be applied on a regular basis is much less desirable than a system that generates repeatable data and can be sustained annually.

The repeatability of monitoring efforts is related to the financial and personnel cost necessary for completion, the dependence of the method on suitable weather or other environmental conditions, and the intrusiveness of the monitoring method on the animals themselves. Application of any monitoring method requires acceptance of the annual cost of the effort by funding agencies. Of particular importance is the need to minimize monitoring that requires large numbers of specially trained personnel. Methods that allow the use of personnel from other projects for certain periods of time are most desirable as they promote the availability of the personnel to complete the annual monitoring effort.

Methods requiring special conditions such as clear weather for aircraft surveys at specific times each year are likely to be disrupted when conditions are not favorable. Since annual monitoring should be repeatable in time and effort for maximum consistency, any effort requiring certain environmental conditions for its application has a lower probability of producing repeatable and comparable data and should be avoided.

Particular concern should be given to using monitoring methods that minimize disturbance to the population and that do not increase the probability of habituation of the population to human activities. Such methods have been termed intrusive methods. Examples are annual capture programs, the use of consumptive baits such as carcasses to attract animals for census purposes, repeated low-level aircraft flights, and excessive personnel seeking animals so as to potentially cause them to abandon favored habitats during the census period. A special concern is the use of methods which may attract animals to specific sites where illegal killing is possible. Such attractive sites may result in increased potential for mortality and attract people due to the location of the bears becoming predictable.

Given the fact that most habitat and population monitoring for brown bears will not yield precise data and that variability within data sets will likely be high, monitoring efforts will be optimum if they rely on data from several independent methods to judge changes in populations. Changes in any one data set would presumably be reflected in data from other sources. This congruence in data sets from year-to-year increases the reliability that the monitoring does indeed reflect the condition in the population. If data from one method are markedly different from other data sets during one season it is likely that some sort of bias related to that method was responsible. If that particular method was the only one used, however, its sole use might lead to false conclusions. The use of several types of monitoring methods becomes increasingly important in small bear populations because the data sets get smaller and smaller and the probability for imprecision is inversely related to the size of the annual data set.

In summary, successful monitoring requires annual application of several monitoring methods that can be funded by management agencies and that offer minimal disturbance to the population. Data from monitoring can be used to convince the public of the need to conserve the species and to direct and refine management actions so they efficiently address the problems facing the species.

#### Population monitoring

##### Background and objectives

Population monitoring involves measurement of the demographic and genetic characteristics of a population with a reasonable degree of confidence that the data generated accurately reflect the population. Such data cover a wide range of variables having different acceptable confidence intervals. Research on monitoring bear populations in North America has shown that a high degree of confidence in data on bear population trend is difficult to obtain given the nature of the animals as solitary and inhabiting forested habitats where they are difficult to count (Harris 1986). As a result, management of the threatened grizzly bear in the United States is no longer dependent on population trend data, but instead now relies more on achieving indicators of minimum population levels. The methods recommended here are those minimizing assumptions and producing data on minimum populations rather than precise population trends.

## Mortality

### Sources

Data on annual mortality are usually gathered from all sources including agency and nonagency personnel. Of particular concern is the verification of mortalities where the carcass of the animal cannot be obtained. The credibility of the reporter must be judged using standardized methods by the person recording the report. Levels of credibility for mortality reports are usually listed as: Known - carcass or photo, or pieces of the animal are available; Probable - no carcass, photo, or remains but a detailed report of the death; the description of the animal, and/or disappearance of a known animal from its area with some details of mortality in the same area; Possible - no direct evidence but a story related casually with questionable credibility.

It is important to detail the cause of the mortality as much as possible. The initial details of the mortality are if it is man-caused or natural and the age and sex of the dead animal. Beyond that the actual cause of death is important so as to highlight the causes of mortality for future management action. Natural mortalities are rarely seen and it should be recognized that only a small fraction of natural mortalities will ever be reported, even with intense monitoring. Human-caused mortalities are the most important to management in that the number of human-caused mortalities can be affected by management while natural mortalities are much less likely to be limited by management actions. One of the most important conservation steps is to minimize human-caused mortality from all sources.

Survivorship data, especially for adult females, is vital to any assessment of the status of a population and the application of demographic modeling techniques. Adult female survivorship information is the single most important parameter necessary to estimate the trend of a bear population. Survivorship information can be monitored by following the fate of a given number of animals over a period of time and recording their deaths over time by age and cause. In the United States survivorship data is currently available in the Yellowstone Ecosystem based on 12 years of monitoring. Only long-term research involving monitoring marked animals over time will yield useful survivorship data.

### Distribution

The distribution of mortality is useful in determining the overall distribution of the population. The most important use of mortality distribution data is the highlighting of bear/human conflict areas where management should be directed to minimize such conflicts.

### Known versus unknown estimate

Known mortalities are only a portion of all mortalities in the population. The actual number of human-caused mortalities is important to estimate in order to realize the scope of the human actions on the population. In most areas a correction factor is added to the known human-caused mortalities to realize a total estimate. In the United States in the Yellowstone Ecosystem it is estimated that known annual human-caused mortality may be only 50% of the total. In the Northern Continental Divide Ecosystem in Montana it is estimated that 7 bears are killed and unreported each year of the 21 allotted to be killed under the annual quota. Thus, the known annual mortality in this area is estimated to be 66% of the total human-caused mortality.



*When estimating unknown human-caused mortality, it is best to err on the side of the bear by overestimating this number. A reasonable estimate is probably that for each human-caused mortality that is known there is another that is unknown.*

### Fecundity

#### Numbers

Accurate estimates of the number of bears in a population are the usual goal of a management agency. The actual numbers in a population are difficult to measure with any degree of accuracy. The level of confidence in any estimate is related to the size of the range of the estimate.

There are two ways to measure numbers of bears, a point estimate with certain confidence intervals and a minimum estimate. In the United States we have spent considerable time and effort trying to develop and test methods to give us a population estimate (see Harris 1986). To date our efforts have lead us to the conclusion that we cannot ever obtain a point estimate with reasonable confidence intervals without massive, intrusive methods involving capturing a significant portion of the population in question. We have decided that the costs to the bear population and to the agencies are not worth the pursuit of such a point estimate.

In lieu of a point estimate we have directed our efforts to developing methods to determine a minimum population size. This minimum population size is based on data from reports of females with cubs reported annually. This method along with the other methods used to determine the viability of the population will be detailed below.

#### Females with cubs

Females with cubs of the year are the most important segment of the population for monitoring purposes because by knowing a minimum number of females with cubs a minimum population estimate can be made. Work on other brown bear populations has shown that in a healthy population approximately 10% of the population on average will be females with cubs of the year. Estimates of the unduplicated number of females with cubs in a population is facilitated by the smaller home range and more limited habitat use of such females and by the unique characteristics of family units that often have cubs of different sizes and unique markings. Knowing the minimum number of females with cubs is also important because their existence demonstrates that reproduction is occurring.

The unduplicated number of females with cubs seen annually is the best measure of the minimum population size using the 10-12% figure noted above. The objective of this monitoring effort is the minimum population size based on the actual number of animals seen and known to be unduplicated. There is no possibility of making a point estimate of the population with confidence intervals using minimum, unduplicated counts of females with cubs annually.

A minimum of three years of intensive monitoring is necessary to generate the average minimum number of females with cubs due to the fact that brown bears have a three year reproductive cycle and the average female will only be with cubs once every three years. Given the relatively small sample sizes of females with cubs in small populations, the longer the number of years of data, the more representative the data become.

Data on the minimum number of females with cubs can come from sightings by qualified observers and from track measurements. The objective is to have a minimum unduplicated number of females with cubs each year. It is known that all the females will not be reported. All sighting reports should be verified by a single responsible individual using rigorous criteria to eliminate any possible duplicate sightings and any sightings of females with yearlings. Sightings should have detailed descriptions of the color and size of the cubs and the females along with the date and precise location of the sighting. The compiler of the sightings can use these data to eliminate possible duplicate sightings. If there is any possibility of duplication, the sighting should not be counted. Track data can be used if it is from an area where there are no visual sightings and there are measured tracks of an adult bear accompanied by cub tracks.

In summary, the minimum unduplicated number of females with cubs can be used to estimate the minimum number of adult females in a population. These data are only relevant if a conscious effort is made to eliminate any possible duplicate sightings and to include only sightings or tracks of females with cubs. The objective is to achieve a minimum number and not as many sightings as possible. Using a minimum of three years and preferably six years of such reports, an average minimum number of adult females in the population can be estimated and used to estimate a minimum population size based on the fact that an average of approximately 10% of a healthy brown bear population should be females with cubs each year. Caution should be used in the minimum population estimate because it assumes a "healthy population" which may not be true in small isolated populations.

Reproducing females are the most important segment of a population and their monitoring assures available data on this important portion of the population. Finally, monitoring of females with cubs can be accomplished without capture and handling of animals.

#### Females with young

Data on females with young are useful to show that reproduction is occurring in the population and for distribution of the population. Sightings or track data that cannot be determined to be unduplicated or to be females with cubs can be added to this data set. Further use of these data will be discussed in the section of monitoring distribution.

#### Litter size

Litter size data can be gathered from all sighting data on females with young. Pooled samples of such data are useful to generate an average litter size. If sufficient data are available, a comparison can be made between cub and yearling litter sizes. Statements as to the relevance of these comparisons in terms of survivorship by age class are limited until large data sets are available. While litter size may be indicative of the age of the females, the nutritional status of the females, the relative loss of genetic diversity of a population, and the mortality factors operating on the cubs and yearlings, no firm conclusions can be drawn solely from such litter size data. Average litter size is important when modeling the dynamics of small populations.

### Reproductive interval

Reproductive interval is one of the most important demographic parameters of a population. Data on reproductive interval can only be monitored by having marked animals over a long period of time. The best way to obtain such data is by continued radio-tracking of a portion of the adult female population segment. Data on the reproductive interval is one of the most important pieces of information necessary in demographic population modeling.

### Age at first reproduction

The age of first reproduction of females is also important to demographic modeling of a population. Such data can only be obtained by capturing animals prior to their first reproduction and monitoring them until reproduction occurs. As with litter size, average age at first reproduction can be an indication of nutritional condition of the population because it is related to the relative productivity and severity of the habitat (Bunnell and Tait 1981, Stingham, 1984).

### Distribution

#### Females with young

The distribution of females with young is an important indication of the viability of the existing population. Successful brown bear management requires the delineation of a certain area as the management zone where the maintenance of the population and its habitat will be focused. The establishment of this management zone is useful to the general public so they know where to expect bear habitat and population management. It is intuitive that if the animals occupy all of the habitat given to them in the management plan, then this is a strong indication of successful management. This indication can be more significant if the most important segment of the population, the adult females, occupy all the habitat managed for bears. The distribution of adult females with young is a strong indication that the management of the habitat is adequate to allow successful reproduction and that there are females capable of reproduction remaining in the population.

The presence of females with young also is a strong indication of future occupancy of the area where a family group is observed because the young will be weaned in the area and they have learned the habitat use patterns that allowed successful reproduction for their mother. Future reproduction in the area by female offspring is likely if they survive in that subadult females often tend to occupy a portion of their mother's home range after weaning.

Data on all verified sightings of adult females with young can be plotted cumulatively to yield data on the distribution. Since brown bears have a three year reproductive cycle, every third year each adult female will be weaning her young and breeding and will likely be solitary. Thus, it is necessary to monitor adult female distribution for a minimum of two years to have the greatest probability of seeing each female at least one year with either cubs or yearlings.

If the habitat values and the average adult female home range is known, the management zone can be divided into subunits for monitoring of distribution. These subunits should be approximately the size of the average adult female home range. A target occupancy level could be that a certain portion, say 90-95%, of these subunits will be occupied by verified reports of females with young. In order to assure that the distribution data reflect the present situation, all cumulative sightings could be plotted on a rotating basis so that every year sightings from 4 years previous would be removed and the new year's data plotted. Maps with these female distribution data within the management area would be a valuable tool for managers to judge progress in the conservation effort, to identify areas of existing population, and to key more intensive management and sighting efforts to those areas having no reports of females.

#### Human-bear conflicts

Areas of human/bear conflicts are useful for highlighting the types of locations and human activities that result in conflict and bear mortality. Such areas can act as population sinks where bears from a wide area can be lost due to human activities at a localized site. Management efforts should be intensified in such areas if the population is to be maintained. Such conflicts can be site-specific as in a town or village, or type specific as in domestic sheep grazing. The identification of these areas by plotting such conflicts is an important management tool.

#### Biology. Habitat use

Data on the habitat use of the population are vital to successful management and must be part of a monitoring effort. Knowledge of seasonal habitat use is vital to know in order to direct management efforts to conserve those areas that are seasonally important, limited in distribution and area, and are subject to human activities that may limit use by bears. Because there is so much variation in habitat use by bears between populations, by different sex, age, and reproductive status animals, and during different years when food supplies and environment conditions vary, it is important to institute a program to monitor habitat use for several years in order to obtain the data necessary for proper management. Of particular importance is the habitat use of adult females during the various stages of reproduction - with cubs; with yearlings; and when breeding.

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## THE BROWN BEAR IN THE CANTABRIAN MOUNTAINS : A CASE STUDY

by Javier Naves and Guillermo Palomero  
(Spain)

The Cantabrian brown bear reached the legal consideration of protected species in Spain in 1973. It is included in the "Red list" of the vertebrates of Spain (ICONA, 1980) in the category "endangered", which means that its survival will be improbable if the casual factors (insufficient protection, habitat loss and illegal persecution) continue.

The taxonomic position of Cantabrian bears is an unresolved problem on which there is no recent information. Cabrera (1914) placed the Cantabrian and Pyrenean bears in the subspecies Ursus arctos pyrenaicus Fischer (1829). Couturier (1954) and Vericad (1973) discuss the validity of this subspecies and identify the brown bears of these areas as belonging to the subspecies U. arctos arctos.

### Distribution

Once present throughout the Iberian Peninsula, the brown bear has suffered constant regression. The break-up between the Pyrenean and Cantabrian populations seems to have taken place between the XVII and XVIII centuries (NORES, in press). The Cantabrian population split further, into two groups, during the first half of this century.

The distribution of the two populations has been described by Campo et al (1984).

- western population : extends over 2700 km<sup>2</sup> in the provinces of Lugo, León and especially Asturias ;
- eastern population : is present in the provinces of León, Palencia and, to a lesser extent, in Cantabria, over an area of comparable size to that of the western population : 2715 km<sup>2</sup>.

It is important to mention that two cases of recolonisation have been confirmed for the western population, both in Asturias. Since approximately thirty years ago, bears have recolonised the mountains of Courio (Concejos de Belmonte de Miranda and Salas) and the mountains of Concejo de Proaza, consolidating both occupation by the repeated presence of females with cubs.

### Ecological aspects

The size of both populations is rather different. The western population contains about three-quarters of the total number of bears. In 1982 and 1983 estimates were made of both populations (Campo et al, 1984). The eastern population was estimated at 29 the first year and 32 the second, while the western group was estimated at 82 and 88 individuals respectively. The study of family groups of females with cubs of the year shows that during the period 1982-84 the eastern population had a potential of about 4 cubs per annum, while during the period 1982 - 86 the western population produced an average of 20 cubs per annum.

Research on the brown bear's feeding in the Cantabrian mountains (Braña et al, in press) shows that the species is omnivorous, though it lives mainly on plants, and that its diet is of great diversity. The basic food for the four seasons are as follows : herbs in spring, berries and other fruits in summer, nuts in autumn and winter. The most frequent prey are social hymenoptera and wild or domestic big herbivores, mostly found as carrion and not actively predated. The seasonal dependence on these basic foods is not a reason for the instability of the bear populations in the Cantabrian mountains, in view of the steep gradient and the diversity of the ecosystems, which implies the existence of food resources at available distances.

For the conservation of this species it is important to know the environment characteristics and the location of dens used by the bear for critical periods of its life, such as wintering, rest and bearing cubs. In recent years, more research on this topic has been carried out with the financial support of ICONA and the regional authorities of Asturias and Cantabria (Naves and Palomero, 1986, 19897).

The analyses of 28 wintering dens (Naves and Palomero, in press) shows that they are mainly found in rocky areas with diverse vegetation and a predominance of lower plant stratum which makes for a very dense environment, thus guaranteeing security and isolation in a landscape which is relatively humanized, such as the Cantabrian mountains. In this respect, it should be noted that 50% of the winter dens studied were found less than 1 kilometre on the map from permanent human habitations.

Three types of winter dens were identified : natural caves, completely dug dens, and partially dug dens, their frequency of appearance of 60%, 33% and 7% respectively. The concentration of dens in relatively small areas was observed, for example, four dens were located in about 10 hectares, as well as re-use cases.

Since 1985 the activity of an adult male is being followed by radio-tracking. The bear was captured in the Riaño national hunting reserve (León) and during the first phase of the study (Clevenger et al, 1986) remained almost exclusively in forest areas, moving over an area of some 300 km<sup>2</sup> (Purroy et al, 1988).

#### Conservation problems

The small size of both Cantabrian populations makes their viability doubtful from a genetic point of view, as they are both below the numeric threshold theoretically established (125-150 individuals) required to avoid the effects of inbreeding, reproductive failure and reduced resistance to sickness (Allendorf et al, 1980 ; Servheen, 1987).

Thus a priority objective is to increase present numbers, which does not seem feasible unless the mortality due to illegal hunting is eliminated, or at least reduced. This is illustrated by the illegal hunting of six bears (directly confirmed), including a female with cubs, and by references obtained of the killing of three other individuals. All of these refer only to 1986 in the province of Asturias. This illegal hunting affects equally the important segments of the population of females with their cubs. In addition to the abovementioned case, since 1980, illegal hunting of three other complete family groups occurred in the western population.

It seems unlikely that the main reason motivating this illegal hunting pressure already denounced in the last few years (Braña et al. 1982), is the revenge attributed to peasants unsatisfied with the compensation policy regarding bear damage, which in fact is not very extensive. Damage caused to domestic cattle, beehives and crops, does not exceed a value of about 5.5 million pesetas a year for the whole of the Cantabrian mountains. Compensation is paid more or less rapidly and generously by the various regional authorities with bear populations. In this respect, it should to be mentioned here that the absence of compensation schemes for damage by wolves to some den sites is inciting the use of illegal, poisoned baits that have already caused the death of some brown bears.

The information collected shows that most killings are the result of planned hunting parties in search of a trophy, or for the economic value of the bearskin. Sometimes killings occur in the frequent hunting parties where the prime objective is not the brown bear. Traps and snares, especially steel snares, are also an important cause of death. Poaching is increasing in most of the areas where the bear is found, though there are some local exceptions. This is encouraged by the absence of a network of protected areas, anachronistic legislation and an inefficient system of control of poaching, even in national hunting reserves which cover a large part of the bear's distribution area.

Apart from these negative factors, decline of the species is also caused by the alteration of habitat in the Cantabrian mountains, with a high humanized level. The negative effects of human activities are clearly seen, though they vary in type. There are large public works, such as motorways and mountain roads, which have been designed without consideration of their impact on the natural environment. There is open-cast mining, which threatens to split in two the western population in the key corridor area of Leitariegos, thus increasing the isolation of reproductive groups. There is an unfortunate forest policy in some bear areas, with an excessive network of forest roads which favours access by massive tourism to key bear refuges. The degradation and destruction of the bear's environment compromises the future of any possible projects for the species recovery.

#### Towards a recovery plan for the Cantabrian bear

It is evident that the right policy for long-time conservation of the bear in the Cantabrian mountains should be based on a growth of numbers, in order to guarantee the genetic health of the populations. This growth can only be achieved through strict protection of the most important den nuclei, increasing density in peripheral sectors and the extension of the present distribution, favouring the connection between the western and eastern populations (Marquinez et al. 1986).

A meeting on the brown bear in the Principality of Asturias, held in Oviedo in October 1987, concluded, among other things, that bear conservation should focus on biotope conservation, based in particular on a network of critical areas managed so as to control human activities. Other measures proposed were to encourage ecological assessment studies for any development of bear areas, establishment of an efficient wardening system, and better compensation policies.



Finally, any attempt to rescue the Cantabrian bears requires coordination between the different regional authorities involved (Asturias, Castilla-León, Cantabria and Galicia). To this effect, the first steps in this direction have already been taken, with the participation of the central government conservation authorities (ICONA). Maps have been made of critical bear areas, a method has been devised for monitoring population trends, and a research plan has been drawn up to provide knowledge of eco-etological aspects unknown at present.

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## MANAGEMENT OF SMALL POPULATIONS OF BEARS IN PROTECTED AREAS

by Franco Zunino  
(Italy)

The needs of the bear are so many and so delicate that the fact that a population still survives in a mountainous European regions shows that the environment is in a good state.

Because of the bear's needs, almost all small populations of southern Europe are "protected" in national parks or equivalent protected areas.

In spite of this, in almost every European country where the Brown bear survives today, the species is limited to small and isolated populations. A long period of protection has not proved sufficient for an increase in bear populations.

In western Europe, in almost every area where it is still found, the species is declining. We must try to reverse this trend or in a few years we shall lose the last wild bears of southern Europe.

European national parks have frequently been established and managed for economic reasons, but such a policy conflicts with the environment and specifically with the bear's requirements. Many of the actions taken by governments and management authorities have caused serious damage to the bear's habitat. The thought that comes to mind is the following : a ban on hunting and the establishment of national parks have not been enough to protect this great animal.

Today the top priority for protection of the remaining Brown bear populations in western Europe is strict protection of the high environmental quality of the areas where the bears are found.

The most important reason why the establishment of protected areas does not in Europe guarantee environment protection (and bear protection where the species is present) is that in many such areas the park authority does not own the land.

The other reason for lack of protection is that the boundaries of the national parks have almost always been drawn without a thought of the bear or its environmental needs.

So the first urgent need for the managers of national parks is the implementation of a policy of purchasing or renting as much of the territory as possible. Only in this way would it be possible to establish strict reserves for denning, feeding and/or mating areas, where any human interference, including hiking, would be prohibited or strictly controlled. These areas should be managed solely for the bear.

A second urgent need is for almost all national parks with Brown bear populations to be extended to include territories of high environmental quality outside their present boundaries.

A problem for small bear populations is that they now need human resources if they are to feed themselves, and consequently they cause damage, for which compensation must be paid. Damage is the only real reason why bears come into conflict with man.

Throughout Europe, the bear has for a long time cohabited with man. This situation enabled the bear to obtain much of its food from cultivated land in the low valleys around the mountainous regions where it lived and from livestock grazing in pastures and woodlands.

This problem must be resolved by a policy which encourages countrymen and cattle breeders, and which gives them total compensation for damage done. Such damages must be paid in a rapid and uncomplicated way.

But why do bears die or are killed?

The problem of poaching is probably the most difficult to solve ; it is a phenomenon connected with the social mentality and such mentality is not always the same throughout Europe. In any case, any kind of poaching may be eradicated only by educational programmes for the local people and hunting associations. Furthermore, as mentioned above, there must be total indemnisation for damage done by the bears. Obviously, where poaching exists, a repressive policy must be strictly enforced.

An initiative that has recently been taken in both France and Italy is the installation of feeding tables, where meat is left for the bears. Careful study is required before this type of artificial feeding is used, because it may be very useful or quite the contrary. Probably the right course to be followed is to use it to a limited extent at the time and in the areas where it may really be helpful.

This is just a short summary of the management requirements for small populations of Brown bear in Europe. No doubt there are many other problems to be faced, perhaps limited to one particular population.

## HUMAN IMPACT ON BROWN BEAR OCCURRENCE

by

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In Europe, the Brown bear (*Ursus arctos* L.) is present in both coniferous and deciduous forests, from the birch forests of northern Finland to the beech forests of southern Europe. Its main habitat in Europe is, however, coniferous forests, and there are indications from studies both in the Alps and from the Soviet Union that spruce forests are preferred. The bear shows such various adaptations to life in forests as ability of climbing, various handling of trees and is nutritionally dependent upon forests. European Brown bear populations are found primarily in densely forested areas, and consequently one of the great threats is deforestation.

An overall task of conservation is to secure large enough forested areas to sustain a Brown bear population. The size of area required is, however, very difficult to ascertain, as the size is among other things dependent upon the quality of the habitat and the possibility of utilising neighbouring land. Bears are also extremely difficult to count, and population estimates are unreliable. Little is also known about the minimum size of a Brown bear population to secure survival over a longer time span. For all practical purposes therefore, conservation efforts in western Europe with small isolated populations should concentrate upon securing as large areas as possible in places where Brown bears are still present. Most West European populations are already reduced to critical levels and their areas should not be further diminished. A zonation of the landscape is recommended, in such a way that a core area is given maximum protection while areas around function as a more leniently protected buffer zone.

The greatest threat to Brown bear populations today besides illegal hunting is human encroachment upon the habitat. An important aspect in the conservation effort is therefore to trace factors of human influence that disturb Brown bears. The Brown bear generally avoids contact with man, and prefers areas with little human habitation and activity. This tendency may have developed as a consequence of man's hunting of bears from far back in prehistoric times. The tendency for shyness and seclusiveness may have been augmented in small isolated populations. These are remnants of previous larger populations which have suffered severe hunting in the last hundred years after the invention of more efficient weapons. Only the shyest and most seclusive individuals have survived (1). Such populations are expected to be more sensitive to human disturbance and activity than larger populations.

Studies of small Brown bear populations both in the Italian Alps and in Norway indicate that bears prefer the more highly elevated forests with little human traffic. In a population in Norway (2) this tendency was especially prevalent in the selection of denning area in early spring activity. Dens were concentrated in steep, rugged areas near the timber line in very inaccessible terrain. Activity areas during early spring were also in highly elevated areas with old irregular forests (Fig. 1).

In this area the main food of the bear in early spring was ants (Formicidae). Ants were, however, more abundant in lower areas than in the more elevated forests where the bears were present during early spring. This supports the theory of withdrawal during early spring from the lower areas more disturbed by man.

An important conservation problem is human disturbance and impact on bear habitat. That Brown bears react negatively to human activity in their area has been documented in a study of the same population in Norway (3), as mentioned above. In this particular study the bear area was divided into zones and the density (m/km<sup>2</sup>) of forestry roads was chosen as a parameter of human impact. This forest road index representing a common denominator of human impact, was calculated at the end of 5 five-year periods and correlated to the density of bear observations in the same zones and time periods. The results are presented in Fig. 2, showing a significant negative correlation. A similar calculation using lengths of timber line instead of forestry roads, gave a positive correlation. This corroborates the reliability of the study.

These results indicate a general negative influence of penetration of forestry roads into bear habitat. This introduces a considerable disturbance into previously undisturbed areas both during the construction of the roads and by the following forestry work. After this has been finished, secondary traffic on the roads maintains a certain disturbance.

A special problem is the influence of clear cuttings. It seems obvious that the first phase in the succession after a clear cutting is not beneficial for the bears. Cover is reduced and in many instances also food conditions are impaired. In later stages the situation is more difficult to evaluate. On a longer time scale the dense monocultures with trees of the same age and sparse ground vegetation do not seem to improve bear habitat.

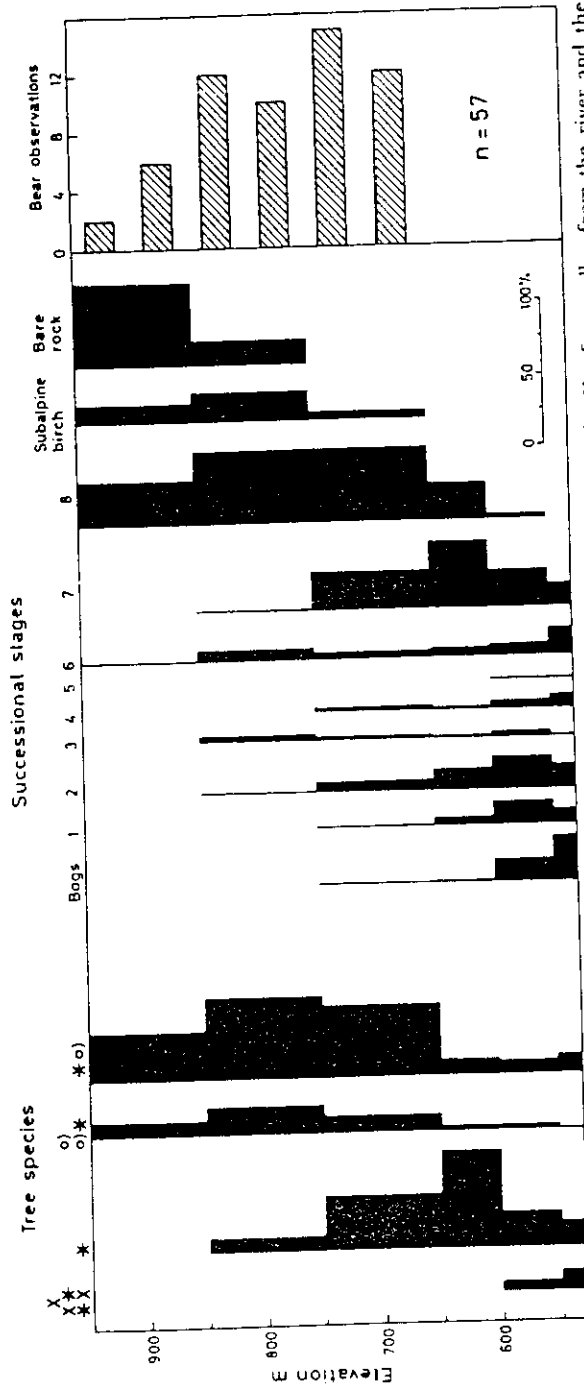
A consequence of the expansion of the net of forestry roads is the building of holiday cabins and other housing in areas without previous habitation. This leads to increased disturbance of bears and reduction of suitable areas. This was demonstrated by an analysis of bear observations within and outside cabin areas in the same population as above (4). The proportion of bear observations within the influence zones around cabin concentrations decreased gradually in 6 five-year periods, contrary to an increase in the number of cabins (Fig. 3).

The results presented above are supported by observations in other countries such as the Soviet Union. Several studies there also indicate negative influences of forestry activity, clear cutting and general human disturbance upon bears (3).

Altogether, the Brown bear seems to prefer dense, old, irregular forests, with little human habitation and disturbance. Preferred habitats seem to be old, dense, rough and rugged forests, especially near the timber line. Activities such as forestry and tourism have been observed to have a negative impact. Other activities such as husbandry, mining, etc. are supposed to have a similar negative effect.

Fig. 1

K. ELGMORK et al.

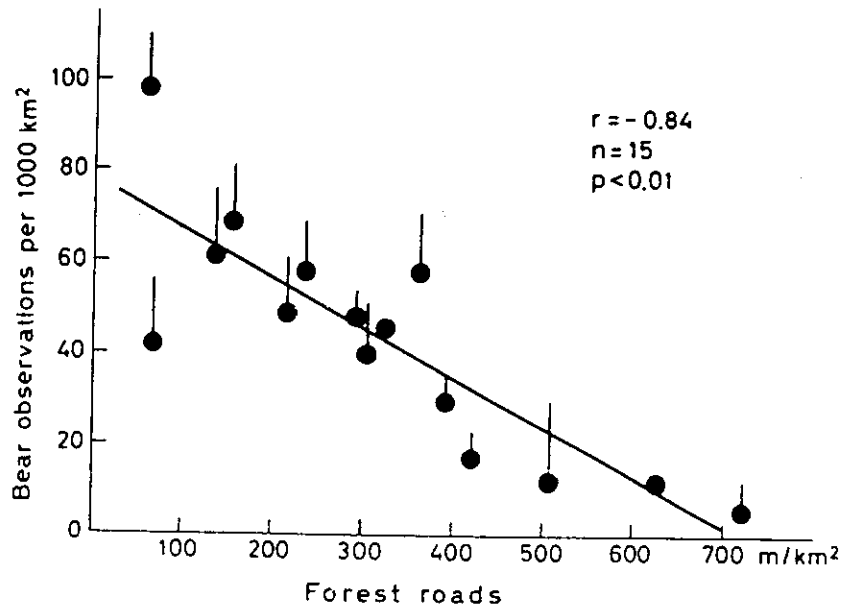


Specification of the habitat and bear observations on the slope facing north in the Vassfaret valley from the river and the lake at the bottom of the valley to the timberline covering the area between activity areas B and C, both inclusive (cf. Fig. 6). Per cent occurrence of areas at the different elevation zones.

*Left:* Tree species. x: Pine (*Pinus sylvestris* L.), o: Spruce (*Picea abies* (L.)), \*: Deciduous trees, mainly birch (*Betula pubescens* Ehr.).  
*Middle:* Successional stages 1. Recently clear-cut area. 2. Clear-cut area with young conifers and deciduous trees. 3. Young, homogeneous forest, dominance of conifers. 4. Medium to old homogeneous forest. 5. Old homogeneous forest. 6. Irregular, mainly young coniferous forest with a few deciduous trees. 7. Irregular forest of medium age, mainly conifers. 8. Irregular, mainly old forest, with some deciduous trees.

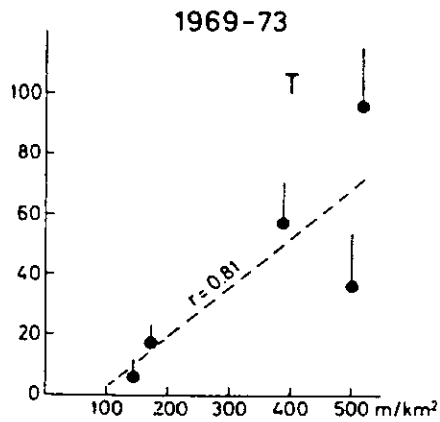
*Right:* Distribution of bear signs in activity areas B, C and D. (From Elgmork et al. 1978)

Fig. 2



Correlation diagram showing density of bear observations in relation to lengths of forest roads in the three zones during five five-year periods. Vertical lines over dots represent doubtful reports.

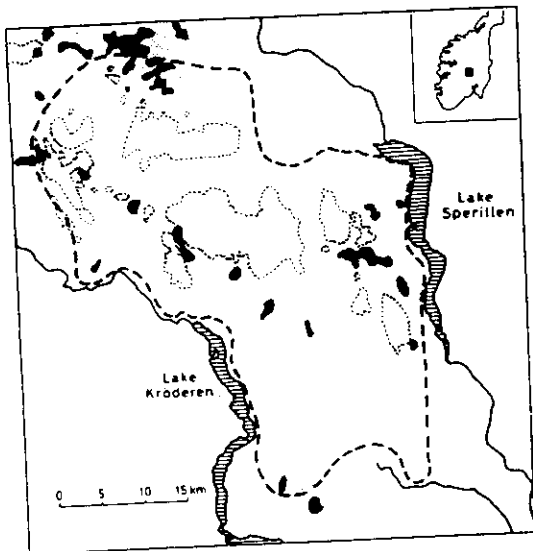
(From Elgmork 1978).



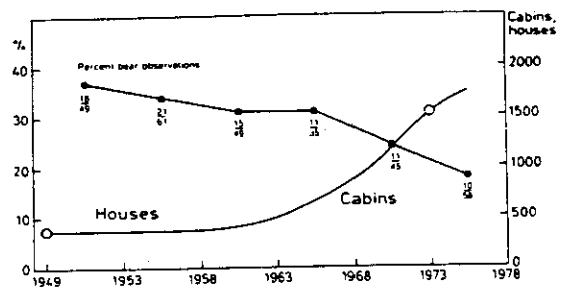
The same correlation for the length of the timber line.



Fig. 3



Location of study area, defined bear area (*coarse stippled line*) and cabin concentrations in 1973. *Black*: Houses and cabins outside areas of permanent habitation with more than 20 cabins less than 500 m apart. *Stippled areas*: 2 km influence zones. *Fine stippled line*: Timberline.



Percent of bear observations (*dots*) within the limits of 2 km influence zones (cf. Fig. 1) in relation to total number of bear observations given as 5-year means. *Curve with circles* indicates the approximate number of houses and cabins in the bear area. The *circles* indicate accurate countings on official maps.

(From Elgmork 1983)

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**PUBLIC PARTICIPATION : A SOCIAL ASPECT OF THE  
CONSERVATION OF THE BROWN BEAR IN SPAIN - AN ONG APPROACH**

by Roberto Hartasanchez (Spain)

In the seventies, thanks to private initiative, nature conservation acquired a lot publicity in Spain. The first non-governmental organisations (NGOs) were born and devoted most of their efforts to the building of a popular awareness of the need for the conservation of the natural environment.

The small conservationist initiative of the government was in those years encouraged - or, in some cases, obliged - to adopt new conservation positions on issues concerning ecosystems and plant and animal species.

From then onwards, public participation has been increasing year by year. All over Spain, an endless number of organisations have sprung up which lobby the administration on a large number of conservationist causes.

At present, there are about a thousand NGO's in Spain, a clear sign of the amount of public participation there is in nature conservation. However, most of these organisations are formed of small groups of people who devote themselves to conservationist tasks only in their free time at weekends or during the holidays. Thus their efficiency is limited to small issues : denunciation of attacks made on the environment or participation in the dissemination of information.

In 1982 this scattered situation of the conservationist movement in Spain was changed by the setting-up of a different kind of NGO - FAPAS - which went a good deal further than those of earlier days. It did not only denounce, but proceeded to take action, to enforce their claims. Thus it became necessary to channel NGO activity along more professional lines, to reach a greater capacity for action and improve its efficiency. Unfortunately, the financial means to carry out the work planned were lacking.

The existence of hundreds of organisations and thousands of supporters enabled FAPAS to mobilise, rapidly and unexpectedly, financial support from people all over Spain for the organisation's projects. FAPAS was soon able to begin long-term conservation programmes. This is how PROJECT-BEAR was born, in 1985. Its main objective was to help in the conservation of the Brown bear population in the Cantabrian mountains, which had suffered a sharp decline and faced an uncertain future.

At present 12,000 people support this project, which is yielding important results in public participation. It is difficult to determine, from a sociological point of view, why so many ordinary people have decided to support this conservation project. On the one hand, the Brown bear is a part of nature which arouses great admiration and so is considered as a priority for conservation by nature lovers. On the other hand, non-governmental participation gives the individual a feeling of efficiency - he is cooperating in a task that has not been properly carried out by the Administration.

The experience of the last few years has shown that people engaged in the conservation of the Brown bear have not been disappointed and that the large public participation has enabled decisions to be made more quickly and more activities to be carried out than those stemming from administrative initiatives.

The Administration itself has been supported and sometimes guided by the work of the organisation. The development of PROJECT-BEAR has led to close cooperation with the regional authorities of Asturias for controlling the payment of compensation for Brown bear damage. An efficient working system has been set up for this purpose ; it was accepted by the region of Cantabria and has noticeably helped bear conservation. However, the region of Castille-Leon refused the help of FAPAS, and its system for payment of compensation is still not very conducive to the conservation of the species.

Thus the public participation of NGOs does not mean that they should carry out their activities alone, but that they should set patterns that may be followed by the Administration, so that in the long run coordinated efforts may enable the bear population of the Cantabrian mountains to survive safely and undisturbed.

Up till now the work of FAPAS has been diversified. Once the problems of the payment of compensation for damage have been solved, the work will be oriented towards damage prevention. Thus besides conserving the species, it will work to preserve the natural resources of the rural communities that have to put up with the presence of bears.

There are many aspects towards which conservationists can work. Some aspects, such as the prevention of damage and the recovery of the traditional resources of mountain regions are very necessary for the conservation of the bear, and do not seem as yet to have been tackled by the authorities. It is important that a homogenous policy for all regions with responsibility for the conservation of the Brown bear in Spain should be achieved. It is absolutely necessary for a common strategy to be adopted. Here the initiatives of the NGOs, supported by the public, should be presented as a necessary requirement for the authorities and for the scientific community which possesses the information on how to protect the Brown bear.

LEGAL AND SOCIAL ASPECTS OF THE CONSERVATION  
OF THE BROWN BEAR IN SPAIN - A GOVERNMENTAL APPROACH

by

Juan Carlos del Campo (Spain)

The content of this brief report aims to give an overall view of the legal and administrative aspects of bear conservation in Spain, as well as to analyse briefly the main problems which affect the species and to suggest some ideas for group action.

The chronological list of the principal legal and administrative measures directly related to the conservation of the bear is as follows :

- 1949 - Temporary ban on bear hunting in the province of Santander (now Cantabria).
- 1952 - The prohibition of bear hunting in Spain for a period of 5 years, by Ministerial Order.
- 1967 - Final ban on bear hunting in Spain.
- 1973 - The declaration of the bear as a legally protected species.
- 1980 - The list of protected species is lengthened to include the bear and norms are laid down to ensure the effectiveness of the protection.
- 1986 - The bear is included in the group of species "in danger of extinction" in accordance with the "Red list" of vertebrates in Spain.

To these dates 1984 must also be added, as the year in which responsibility for nature conservation was transferred to the Autonomous Communities.

Other dates and measures connected with the conservation of the bear's habitat are :

- 1918 - Declaration of the National Park of Covadonga.
- 1966 - Declaration of several Natural Hunting Reserves where some of the main enclaves of the bear population in the Cantabrian Range are to be found : Somiedo and Degaña (Asturias) ; Ancares (Lugo) ; Mampodre and Riaño (León) ; Fuentes Carriones (Palencia) and Saja (Cantabria).

In the Pyrenees, Los Valles in Huesca and Alto Pallars-Aran in Lérída.

- 1982 - Declaration of the Biological Reserve of Muniellos.

In addition to these dates, and subsequent to the transfer to the Autonomies, new protected areas have been created, such as in Navarra and Catalonia which the bears visit occasionally, or, as in the case of Asturias, both Reserves and the Biological Reserve of Muniellos have been expanded.

In spite of this territorial protection, it is estimated that in the Cantabrian Range only 1 or 2% of the bears are actually in protected zones, and just over 50% settle in areas where the cynegetic management of the territory devolves upon the Administration.

Compensation for damages caused by bears in Spain

| Bear populations in:                                   | Cantabrian Mountains |               |          |           |           |                   | Pyrenees |         |
|--|----------------------|---------------|----------|-----------|-----------|-------------------|----------|---------|
|  | Asturias             | Castilla-Leon | Galicia  | Cantabria | Aragon    | Navarra           | Aragon   | Navarra |
| Province   | Asturias             | Leon          | Palencia | Lugo      | Cantabria | Huesca            | Navarra  | Navarra |
| N° of registered complaints per year (in last 7 years) | 55                   | 5.1           | 21.6     | 0.6       | 0.7       | 2.7               | 0.6      | 0.6     |
| Amount in thousands of pesetas per year (last 2 years) | 3,318                | 237           | 1,318    | 0         | 29.2      | 650               | 0        | 0       |
| Delay in payment (in months)                           | 1                    | 3             | 3        | -         | 1         | 1-2               | 1        | 1       |
| % compensation extra                                   | 12-20                | 15            | 15       | 0         | 12 - 20   | 20 <sup>(1)</sup> | 20       | 20      |

(1) plus 10,000 pesetas per case

### Damage caused by the bear

The bear poses such serious problems in its coexistence with man that steps have had to be taken to alleviate the damage it causes to rural property.

Although the Administration first made allowances in its budget for compensating bear damage in 1954, with the sum of 100,000 pesetas, widespread payments did not begin until 1972 and 1973. We have analysed the incidence of claims despatched for damage caused by bears, and the average is in the region of 81 per annum in the Cantabrian Range and 2.7 in the Pyrenees. In financial terms, over the past two years, these work out at just under 5 million pesetas per annum in the Cantabrian Range and 650,000 pesetas per annum in the Pyrenees.

Various solutions have been offered to resolve the problem of damage, which until recently was considered to be one of the main obstacles to the survival of the species, and generally, since the transfer to the Autonomies it has been possible in many regions to speed up payment and also to add a percentage or a fixed sum according to the damage sustained.

In the case of Asturias, an agreement was drawn up with a conservationist association which would be responsible for the complementary payment. However, this agreement has not been in force since the beginning of the year and it never fulfilled all its obligation.

It is clear from all this that it is necessary to adopt a uniform system of payment, which should at least include the sum total of the damage plus a percentage or a fixed quantity.

### Problems of the conservation of the species

At the October and February meetings which are held in Oviedo and Valladolid about the problems of the conservation of the Brown bear, the main factors conditioning the survival of the species and their possible solutions were discussed. Let us therefore take this opportunity to state them once again :

- Without going into the genetic problem, which is perhaps the key to the future of the bear population, such as the Cantabrian and Pyrenean populations which have only a very reduced, very concentrated number of specimens. We should like to point out, however, the need to preserve genetic purity and to prevent any accidental or voluntary cross-breeding.
- Loss of habitat : We are talking about the development of certain activities such as tourism, mining, intensive hunting, development of the infrastructure of the rural environment, etc, all of which can be very negative. Although these factors are very important, they cannot be seen as the reasons for the decrease of the species in the last decades since large areas (such as the nearby counties of Ponga and Caso) which were previously inhabited by the bear and are no longer, for no apparent reason.
- Although one must consider all the areas inhabited by the species, or which are likely to be so, and special attention should be paid to the so-called "sensitive" areas, which include the following :

. **Breeding grounds**

- . Zones where the distribution area is being reduced, which could cause new ruptures in the population
- . Zones which are, or could be, communication passages between existing nuclei of bears
- . Zones where recolonisation has recently taken place.

Therefore a basic map showing all these sensitive areas should be available, to prevent uneducated activities and to ensure that they receive proper protection.

- **Poaching** : This is the main cause of non-natural death in the bear and the overriding reason why their numbers are not increasing.

To combat poaching, the following measures could be indicated :

- Increased sanctions for illegal hunting or possession
- Reinforcement of guards in Reserves and free hunting areas, whilst at the same time increasing the guards' technology and specialisation
- Stepping up of vigilance by collaboration with the Guardia Civil
- Production of publicity aimed at changing the tolerant attitude towards poachers
- Continuation of publicity promoting nature conservation in the countryside.

The cost of adopting concrete measures should be higher, since saving the bear goes hand in hand with improving conditions among rural communities, the state of which has always affected the bear's habitat.

It must also be stated that the legal and administrative means do exist to protect both the species and its habitat, combining the participation of the communities and administrations involved and which allow the public to take part in the management. We are, of course, referring to specific protected areas such as the Natural Parks, though they in themselves are not the solution to the problem.



**THE LEGAL PROTECTION OF THE BEAR:  
PRESENT SITUATION AND FUTURE PROSPECTS**

by

Cyrille de Klemm

1. The legal status of the brown bear in Europe

The brown bear, Ursus arctos, is included in Appendix II to the Bern Convention. Under Article 6 of this Convention, the Contracting Parties are bound to take appropriate and necessary legislative and administrative measures to ensure the special protection of this species. The regulations must prohibit all forms of deliberate capture and keeping and deliberate killing, the deliberate damage or destruction of breeding or resting sites, the deliberate disturbance of wild fauna particularly during the period of breeding, rearing and hibernation, and the possession of and trade in these animals, alive or dead, including stuffed animals and any readily recognisable part or derivative of the animal. In addition, under the terms of the Convention, the parties must take appropriate and necessary legislative and administrative measures to protect the habitats of wild flora and fauna species, especially those specified in Appendix II, which includes the bear.

All the member states of the Council of Europe within the brown bear's breeding range, except for France, are now parties to the Convention.

However, Turkey made a reservation regarding the bear when depositing its instrument of ratification. As a result, the Convention does not apply to this species in Turkey. Finland, which is also a party to the Bern Convention, although not a member state of the Council of Europe, made a similar reservation.

Regarding international trade, all the European populations of Ursus arctos, with the exception of those in the USSR, are included in Appendix II to CITES, which means that international trade in these animals or any part or derivative of these animals, is subject to the prior granting of an export licence whose existence and validity must be checked by the importing country.

The brown bear is protected by the Bern Convention as well as by legislation in all the countries in Europe within the range of the species. In some countries such protection is total, notably in those countries where the species is threatened with extinction (Spain, France, Greece and Italy). Protection is partial, meaning that hunting of the species is controlled by very strict regulations, in most countries where the bear is still relatively common (Finland, Rumania, Yugoslavia). Such protection measures usually include the banning or regulation of the possession and transport of or trade in the animal or its parts or derivatives.

However, the protection of the bear from disturbance, and the conservation of its hibernation sites, its dens and its habitat in general are not provided for by current legislation.

It is always possible to create protected areas, such as national parks or nature reserves to prohibit or restrict access to areas frequented by the bears and thereby safeguard the habitats which are indispensable to their survival. This is one of the objectives of, for example, the Abruzzi National Park in Italy. However, where it is not possible to create a park, other legal measures must be sought which could be taken to provide an adequate level of protection for the species.

## 2. Threats

The bear seems to be threatened by two types of danger: illegal poisoning or killing because of damage caused to property; and disturbances and changes to the habitat as a result of human activities.

### a. Illegal killing

Bears attack livestock, particularly sheep, plunder beehives, and eat the fruit from fruit trees and cereals such as maize. As the species is protected, farmers who are victims of such damage are usually compensated. Compensation is usually granted on the production of evidence of actual damage. Legislation sometimes specifies that if the bear has been killed, the victim of the damage loses his right to compensation (Italian regional legislation: Campania, 11 November 1977; and Molise, 1 February 1983).

Despite bans and the compensation granted, it seems that bears continue to be killed or poisoned illegally.

### b. Disturbance or damage to the habitat

It appears that bears are disturbed more and more in the last refuges they have left. The main cause of these disturbances are the new roads being built for forestry and tourism. The bears' habitat can be altered by forestry practices or destroyed by the construction of ski resorts.

## 3. Possible solutions

### a. Preventing conflict between the bears and farmers

Special areas for the protection of the bear could be set up or, certain activities could be restricted and others could be encouraged, rather than providing compensation for damage caused by the bear. In other words, certain areas could be closed to livestock breeding and bee-keeping, and farmers compensated accordingly. Similarly, the public could be banned from picking mushrooms and wild berries in areas frequented by bears, to protect one of their sources of food.

In view of the gradual depopulation of mountain areas, these measures would probably not be very costly. Furthermore, as the habitat of the bear is usually found on land belonging to the state or to municipalities, these control measures would not, in most cases, affect property rights but simply rights of users and would be legally straightforward to implement.

However, these measures are unlikely to be welcomed by the local population since they would most certainly be regarded as an infringement of liberties based on very long-standing custom.

Another solution seems possible, the encouragement through financial incentives of certain activities favourable to the bear. When bee-hives, fruit trees or farmed land, particularly where maize is grown, are regularly pillaged by bears, they could be given up to the bear but still tended regularly. Instead of compensation, the farmers concerned would then receive an annual payment in return for services rendered for protection of the bear. In areas where these farming activities do not exist, they could even be introduced intentionally for the sole benefit of the bears.

It should also be possible to envisage a system of contracts between the state and the municipalities of regions frequented by the bears whereby the municipalities would undertake, as far as possible, to maintain the level of the bear population in return for an annual subsidy. The subsidy, which would be a veritable bear premium, could be reduced if the bear population on the municipal territory decreased, and increased if the population grew. If the bear population should become too large, one could even envisage the possibility of authorising the hunting of a few bears for which a high fee would be charged, all or part of which could be for the benefit of the municipality. The bear premium and possibly the fee could be used by the municipality partly to pay farmers introducing and maintaining bee-hives and crops for the sole benefit of the bear and partly to finance facilities for the municipality.

Regions inhabited by the bear could also, in EEC countries, be declared underprivileged areas, thus giving them the right to financial aids that could be used, at least partially, to pay the premium. In Spain, an area of influence is established around the national parks which means the park municipalities benefit from special subsidies to compensate for the restriction that they have to accept; this same system could be extended to municipalities whose territory includes areas inhabited by bears.

b. Preventing disturbances and changes to the bear's habitat

The Bern Convention only prohibits the deliberate disturbance of the species it protects. Thus it is illegal knowingly to disturb a bear in hibernation. However, intentional disturbances are rare and always difficult to prove. Most disturbances arise from an economic activity or leisure activities and are therefore not intentional.

The most frequent disturbances result from the construction of roads or forest tracks for removing felled trees. These roads are then used by tourists.

One solution to the problem could be to designate, where it is still possible, zones where all construction of new roads and the use of motor vehicles would be prohibited. Such "wilderness areas" have existed in the United States since 1964. Since that date, Canada, New Zealand and Sweden have adopted this idea and passed the necessary legislation for its implementation. Finland is in the process of examining this question.

These wilderness areas are not strictly speaking protected areas but are a form of regional planning aimed at the conservation of natural zones without requiring any special amenities or expenditure. They can, if necessary, cover the same area as a protected zone. The protection is provided not so much by the regulations applied, but rather from the fact that without roads and without motor vehicles most human activities that destroy natural habitats become impossible, although these areas can still remain open to hunting, walking, picking of plants, extensive livestock farming and even to forest working if the logs can be transported by cables.

Setting up areas without roads in Europe is now only possible in certain mountain regions which are still relatively inaccessible. Areas of this type should be created before it is too late.

As regards the destruction of habitats which are essential to the bear, more often than not the result of the increasing urbanisation of mountain areas, the answer is clearly for the municipalities, in their land use plans, to classify those zones frequented by the brown bear as areas where construction is not permitted.

#### 4. Conclusion

##### Conclusion

The brown bear is a species that is threatened with extinction in a large number of countries where it still survives and which requires special conservation measures adapted to its ecological needs, to its habits and to the dangers it faces. Banning hunting, intentional disturbance and the intentional destruction of its habitat will not suffice to conserve the species.

In every country where the bear is threatened with extinction, recovery plans should be drawn up, and possibly coordinated at European level, which would include a delimitation of critical habitats of the animal, including its hibernation and feeding sites, the identification of all present or potential threats which could affect the bear population and the completeness of their critical habitats and the creation of special protection areas where the bears would be sheltered from disturbances and where conflicts with human activities would be avoided or kept to a minimum, if necessary through a system of financial incentives.

### Conclusions of the Workshop

Participants to the workshop on the situation and protection of the brown bear (Ursus arctos) in Europe presented their conclusions in the form of a recommendation to the Contracting Parties to the Bern Convention. This recommendation, slightly modified by the Standing Committee to this Convention was adopted in 1988.

RECOMMENDATION N° 10 (1988) OF THE STANDING COMMITTEE  
OF 9 DECEMBER 1988 CONCERNING THE PROTECTION OF  
THE BROWN BEAR (Ursus arctos)

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The Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the Convention;

Having regard to the aims of the "Convention for the Conservation of European Wildlife and Natural Habitats" to conserve wild flora and fauna and their natural habitats;

Considering that the brown bear (Ursus arctos) is a fundamental part of the European natural heritage for its symbolic, scientific, educational, cultural, recreational, aesthetic and intrinsic value;

Recalling that Article 1, paragraph 2 requires that Contracting Parties give particular emphasis to the conservation of endangered and vulnerable species;

Considering that the brown bear is seriously endangered throughout western Europe, having become extinct in the countries of ten Contracting Parties and reduced to relic populations in some others;

Considering that habitat loss, excessive hunting in the past and present poaching have been the most significant causes of its extinction in Western Europe ;

Considering that the areas where the brown bear lives and also those areas which have the possibility of being recolonised by the species and may sustain stable populations (hereinafter referred to as bear areas) are of paramount biological importance and should be conserved and transmitted to future generations without irreversible degradation;

Referring to Recommendation (88) 11 of the Committee of Ministers of the Council of Europe on ancient woodlands and semi-natural woodlands.

#### RECOMMENDS THAT CONTRACTING PARTIES:

1. strengthen the basis of legal protection of the brown bear by making or enforcing specific legal instruments to enable the improvement of the status of the species and a more efficient treatment of the details of its conservation.
2. pay particular attention to habitat conservation by adopting preventive measures in bear areas, integrating them if required in existing networks of protected areas.

3. assess the impact on bear populations of projects of public works, reafforestation, touristic uses or other developments in bear areas; avoid as far as possible that public works affect these areas.
4. give priority to conservation activities in contact areas - both existing and potential - between different population nuclei, avoiding as far as possible the fragmentation of the area of distribution of brown bears and the resulting demographic and genetic isolation of populations.
5. moderate, as far as possible, the access to bear areas for recreational activities, and the opening of new tracks that may be used without restrictions; consider closing down tracks permanently, including those that are built for a precise temporary use.
6. encourage the use of indigenous tree species in the reafforestation of bear areas and the avoidance of inappropriate forestry techniques; favour as far as possible the return of forest to conditions closer to the natural state.
7. strengthen the vigilance of bear areas, paying particular attention to the fight against poaching and the use of poisoned baits, snares and traps, and penalizing transgressors in an exemplary manner.
8. establish, wherever absent, compensation schemes for damages caused by bears to the cultures, bee-hives and cattle of the rural population, improving the payment of compensation where such schemes already function, for instance, by simplifying and accelerating administrative procedures and increasing significantly the amounts paid, wherever needed.
9. favour the development of systems aimed at reducing the damages caused by bears to the rural economy, for instance by protecting private bee-hives or by offering alternative feeding sources through the planting of cultures or the installation of bee-hives for bears.
10. promote the establishment of funds to be used for financing conservation work, payment of compensation for damages caused by bears, and in the socio-economic development of rural populations in bear areas; these funds could channel aid through specific contracts with municipalities of bear areas, requiring in return environmental protection measures to favour the species.
11. promote new management practices based on the promotion, on an European scale, of products from bear areas in which significant efforts are being made to protect the species.
12. strengthen collaboration with the populations of bear areas, the scientific community, agricultural and conservational organizations on the discussion and solution of problems affecting the species.

13. undertake the organisation of awareness campaigns aimed at the populations of bear areas and other target groups (hunters, excursionists, school children).
14. encourage research on all aspects of the biology of the brown bear and other fields that may permit a more efficient management of the species; carry out, in particular, the monitoring of the size, biological characteristics and geographical distribution of populations.
15. pay particular attention to small populations and those of low density, controlling also their genetic viability.
16. whenever any introduction of new individuals to small populations is considered, determine in advance the need of such action and carry out extensive genetic studies of both the receiving population and the individuals to be translocated, in order to avoid possible negative effects of introducing individuals from genetically different stocks.
17. promote coordination at national and international levels among all authorities concerned with the conservation of the brown bear.





APPENDIX I

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APPENDIX II

**PROGRAMME**

|                     |  |
|---------------------|--|
| Tuesday 17 May 1988 | Arrival of participants  |
| Wednesday 18 May    |  |
| 8.30                | Departure from Covadonga for an all-day excursion to the Cantabrian Mountains (Somiedo Reserve) to visit bear areas. Lunch and dinner on the countryside will be offered by ICONA. The excursion will be guided by Mr. Marquinez (Spain) |
| 22.00               | Return to Covadonga  |
| Thursday 19 May     |  |
| 9.00 - 9.20         | Presentation of the workshop by Eladio Fernández-Galiano (Council of Europe)   |
| 9.20 - 10.10        | Biological and symbolic importance of the brown bear for nature conservation in Europe, by Mr. Claude Dendaletche (France) (Doc T-PVS (88) 6)  |
| 10.10 - 10.30       | Discussion   |
| 10.30 - 11.10       | Regional reports : Northern Europe, by Mr. Erkki Pulliainen (Finland) (Doc T-PVS (88) 15)  |
| 11.10 - 11.30       | Coffee break   |
| 11.30 - 12.10       | Regional reports : Central and Eastern Europe, by Mr. Rudolf Rösler (F.R.G) (Doc T-PVS (88) 19)  |
| 12.10 - 12.45       | Regional reports : Mediterranean basin, by Mr George Mertzanis (Greece) (Doc T-PVS (88) 16)  |
| 12.45 - 13.00<br>lu | Regional reports : Turkey, by Prof. Bahtiye. Mursaloglu (Turkey) (Doc T-PVS (88) 17)   |
| 13.00 - 13.30       | Discussion   |
| 14.00               | Lunch  |
| 16.00 - 16.50       | Ecological requirements of the brown bear, by Mr. Anders Bjarvall (Sweden) (Doc T-PVS (88) 18)   |
| 16.50 - 17.40       | Monitoring of bear populations, by Mr. Christopher Servheen (U.S.A) (Doc T-PVS (88) 21)  |
| 17.40 - 18.00       | Coffee break   |

- 18.00 - 19.00 A case study: the population of the Cantabrian Mountains, by Mr. Javier Naves and Mr. Guillermo Palomero (Spain) (Doc T-PVS (88) 22)
- 21.30 Dinner
- Friday 20 May
- 9.00 - 9.50 Management of small populations in protected areas, by Mr Franco Zunino (Italy) (Doc T-PVS (88) 23)
- 9.50 - 10.40 Management of large populations, by Prof. N.K. Vereschagin (USSR) (Doc T-PVS (88)...) )
- 10.40 - 11.00 Human impact on brown bear occurrence, by Mr Kaare Elgmork (Norway) (Doc T-PVS (88) 20)
- 11.00 - 11.20 Coffee break
- 11.20 - 12.40 Social aspects of the conservation of the brown bear :  
- an O.N.G. approach by Mr Roberto Hartasánchez (Spain) (Doc T-PVS (88) 11)  
- a governmental approach by Mr Juan Carlos del Campo (Spain) (Doc T-PVS(88)...) )
- 12.40 - 13.30 Legislative aspects of brown bear conservation, by Mr Cyrille de Klemm (IUCN) (Doc T-PVS (88) 4)
- 14.00 Lunch
- 16.00 - 17.10 Discussion on the guidelines for the protection of bears in Europe. Action to be taken by the Council of Europe.
- 17.30 - 18.00 Presentation of the conclusions of the workshop to the Director of ICONA and the Councillor of Agriculture and Fisheries of the Principado de Asturias
- 18.00 Close of the workshop
- 21.00 Asturian dinner offered by the Principado de Asturias. (Cangas de Onís)

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