



BROWN
BEAR
Ursus arctos

INTRODUCTION

This document aims to describe the living conditions of the species Brown Bear in its natural habitat, as well as the consequences of captivity on the physical and psychological health of the individuals living in Barcelona Zoo.



According to the International Union for Conservation of Nature (IUCN), the Brown Bear is categorised as being of 'Least Concern' on the red list of endangered species:

<http://www.iucnredlist.org/details/41688/0>

Nevertheless, as indicated on the Barcelona Zoo website, despite the fact that the species is still common in some of its areas of range (Europe, Asia and North America), in others (such as Spain), it is at serious risk of extinction:

<http://www.zoobarcelona.cat/ca/coneix-el-zoo/animals-per-categories/mamifers/detall-fitxa/animal/os-bru/>

Barcelona Zoo belongs to the European Association of Zoos and Aquaria (EAZA), which establishes two different levels of breeding programme: the European Endangered Species Programme (EEP) and the European Studbook (ESB¹) for a species facing a lesser threat level.

The bears at Barcelona Zoo are included in the second breeding programme level for endangered species, the European Studbook (ESB). Even so, they are not encompassed in any reintroduction programme.

¹ ESB programmes compile information about births, deaths, transfers, and movements from all EAZA zoos and aquaria. This information is used to determine whether there is a healthy captive population, or whether a more intensive management is necessary, proposing that the species be managed as an EEP programme.

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CURRENT STATUS



Image of one of the female bears in her enclosure

At present, there are three bears living at Barcelona Zoo:

- **Echea:** Female born in captivity in 1994. She arrived at Barcelona Zoo in November 2013 from the Parque de Cabárceno in Cantabria.
- **Orma:** Place and date of birth unknown. She arrived at Barcelona Zoo with Echea; the two of them lived at the Parque de Cabárceno in much more spacious facilities than their current ones.
- **Misha:** Male. No further data.

THE BROWN BEAR IN THE WILD

Information sourced from Wilson, Don E.; Mittermeier, Russell A. (ed.) (2009-2014)

- **Range:**

Brown bears live in the northern forests and mountains of North America, Europe, and a large part of northern Asia.



- They can live up to the age of **25 years**.

- Weights vary by region and season, based on age and the availability of food. Adult **males (130-550 kg)**; very rarely up to 725 kg) weigh more than adult **females (80-250 kg)**, but occasionally up to 340 kg).

- **Height** can be between **1.5 and 2.8 m**.

- **Their pace of life depends on the seasons:** in autumn they accumulate fat to spend the winter hibernating in their dens, while in spring (as the temperatures rise) they wake up; in summer they seek out the freshest spots in the forest and look for mates.

- **The total time active per day (40-80%)** varies according to local conditions (food, day length, etc.).

- Although bears in North America are active during the day, **in most areas in Europe they are active at night**, possibly due to more frequent contact with humans, both historically and today. Young bears in Europe are active throughout the day, but apparently learn to be more nocturnal as the result of negative experiences with people.

- Adult brown bears are powerful predators at the top of the food chain. Food habits vary according to region; they are mainly herbivorous or mainly carnivorous depending on the habitat. **Plant food** includes grasses, reeds, horse's tail, herbaceous plants, roots, berries and nuts; whilst **animal food** includes insects, rodents, ungulates and fish.

- While most of the water they need can be obtained via their diet, especially fresh fruit, they also **drink from ponds, streams or wells**.

- **They are both predators and scavengers:** they kill ungulates and also find cadavers and eat carrion.

- During the **salmon spawning run**, when the fish are struggling to swim upriver, brown bears hunt them with teeth or paws, or trap them in the air. At first, bears are extremely hungry and completely indiscriminate with their fish. But later on, they may become more selective, choosing the parts that supply the most energy, such as the brains of male fish and unlaidd eggs from the females. As well as the protein, fatty acids, vitamins and minerals obtained from the fish, bears also need carbohydrates, so they also feed on fruit. Interestingly, salmon fishing is beneficial to the environment, as the bears add marine nitrogen to the ecosystem by defecating close to the river current.

- **They inhabit forest environments** (boreal, temperate and tropical), from the tundra to the semi-desert; they also have a species in the Arctic.

- They are found at **elevations above sea level**, including above the forest tree line. There have been sightings at elevations above 5,500 m (possibly 5,800 m) in the Himalayas.

- **The surface area of individual territories** varies in relation to the food supply and density of bears, fluctuating **between 7 and 30,000 km²**. The males' territories are typically three to four times larger than those of females; both sexes increase their territories during mating season in order to maximise overlap with potential mates. During the mating period, which lasts approximately one month, they can mate with several individuals.

- **Overlapping of territories is positively associated with relationship**, because the offspring of the females normally settle close to the mother, assuming part of its birth territory.

- **Multigenerational and matrilineal** couplings occur in established **populations**, while females may be more likely to disperse and settle among non-related individuals in growing populations. Males disperse at the age of 1-4 years, based on their growth rate, and dispersal distances are inversely density-dependent.

Individual territory range fluctuates between 7 and 30,000 km². Journeys of over 20km in 12 hours have been recorded.

- **Seasonal movements** are common for both sexes. In mountainous terrain, regular altitudinal and seasonal changes correspond to changes in food conditions at different altitudes and habitats. Lateral movements towards abundant seasonal food sources may prompt large numbers of bears to travel along established routes, similar to a **migration**.

- Movements towards **food** areas, followed by a return towards dens, are typically direct and rapid: **journeys exceeding 20 km in 12 hours** have been recorded.

- Although adults in North America cannot **climb trees**, in Europe they can and do so often.

- **Bears of the same age, sex and social status are more inclined to be aggressive among themselves.**

THE BROWN BEAR IN CAPTIVITY

According to Barcelona Zoo's 2012-2020 strategic plan, 100,855 euros' worth of improvements have been made to the bears' sleeping quarters.

However, in order to gain a better idea of the bears' facilities, here we attach an aerial image from Google maps. The facilities housing the three bears are outlined in brown.

Thus we can compare it, for example, to the surface area of the lake in the Parque de la Ciutadella, or to

any island around the city.

As noted in the previous section, let us be reminded that the average individual territory of a bear ranges from 7 to 30,000 km².

Barcelona Zoo aims to maintain the bears on the second level of the breeding programme for endangered species, the ESB (European Studbook). Despite this, they are not included in any reintroduction programme.

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Comparison: surface area of bears' facilities in relation to the rest of the Parque de la Ciutadella

STEREOTYPIES AND OTHER BEAR DISEASES AT BARCELONA ZOO

The following information is derived from the research paper "**Study of Stereotypies in Two Female Brown Bears (Ursus arctos) at Barcelona Zoo**" carried out by university student Sandra Bals Casellas, from the University of Girona, in 2005-2006.

Supervising the study and observations was Ana Isabel Soriano, Doctor of Biology who specialises in animal wellbeing. Doctor Carmen Maté, former director of Barcelona Zoo, designed the study for the collection of data. The data obtained by Ana Isabel Soriano in this study formed part of her doctoral thesis.

The most common stereotypies observed in captive bears (Van Keulen-Kromhout, 1976) are:

- **Abnormal locomotion:** Fixed route in time and space; there is wide variation in this behaviour, as a single individual may present different versions.
- **Body balance:** The animal in quadruped and static position moves from right to left, shifting weight from one side to the other.

- **Abnormal head movements:** There are many variations in a single individual and among different individuals. They can cause cervical and balance problems.

- **Licking surfaces:** The animal puts out its tongue and touches the surface that is the object of the stereotypy.

- **Abnormal yawning:** This behaviour occurs more often than usual.

- **Abnormal biting:** The animal systematically bites different surfaces in its surroundings.

This study observes two females of the species *Ursus arctos*, Echea and Orma, who live in the same den at Barcelona Zoo. These bears present the following stereotypies:

- **Echea:** Abnormal head turning
- **Orma:** Abnormal biting.

The data obtained from the period February 2004 to September 2005 look at when these stereotypies are exhibited. In order to make the observations, the facility has been divided into 16 zones, collecting 156 hours of recordings.

The results of the studies are as follows:

ECHEA

- The number of stereotypies per session is influenced by **season**, presenting less during March and September, double during October to December, and reaching its peak between April and August.
- The number of stereotypies per session is also influenced by the presence or absence of **environmental enrichment**, with stereotypies significantly reduced during these sessions.
- According to the statistical method used, it is observed that the number of stereotypies increases with the **number of visitors**.
- The number of stereotypies displayed by Echea does not appear to be influenced by **the climate** (sun, clouds, rain).
- Observations of **head movements up and down** would require a more exhaustive study.

ORMA

In the following results, it must be taken into account that **Orma was sedated** on most observation days.

- The number of episodes of stereotypies per session is influenced by **climate**, increasing during cloudy days and remaining lower on sunny days and rainy days.
- The number of episodes of stereotypies per session is influenced by **large numbers of people**, increasing considerably with the number of visitors per day.
- The **time of day** was not significant in the number of episodes. The difference between morning, midday and afternoon was minimal, due to the fact that Orma was sedated on most days.
- The number of episodes of stereotypies displayed by Orma does not seem to be influenced by **season** (months), or by sessions of **environmental enrichment**.

Some common stereotypies in captive bears are abnormal locomotion, body balance or abnormal head movements.

Stress, which is associated with stereotypies, causes the animals' immune system to worsen. This can cause an increase in certain diseases.

The differences between the two bears may be linked to their different origins. Despite both arriving at Barcelona Zoo on the same date (6 November 2003), Echea was born in captivity on 1 March 1994, whilst it is not known where or when Orma was born. It is thought that she was probably born in the wild.

Both bears, however, (when not sleeping or sedated), are constantly on the alert for visitors and/or zookeepers in case they bring them food. In a study performed at six different zoos in Europe (Montaudouin, S.; Le Pape, G. <<Comparison of the behaviour of European

Brown bears (Ursus arctos) in six different parks, with particular attention to stereotypies>>. Behavioural Processes, 30 September 2004, Volume 67, Issue 2, Pages 235-244), it was demonstrated that all the bears had one stereotypy behaviour in common: repeatedly walking the same route, and, at one single point on said route, looking at the spot where food was supplied. This abnormal tendency is caused by the fact that bears need to exercise and at the same time search for food (in the wild, their daytime occupation is finding food). This stereotypy of alertness towards those who approach them is exacerbated by the zoo's negligence in controlling visitors who feed them.

PHYSICAL AND PSYCHOLOGICAL CONSEQUENCES OF STEREOTYPIES

The stereotypies observed in the study carried out between February 2004 and September 2005 can lead to:

- **Abnormal head movements:** May cause cervical and balance problems.
- **Abnormal biting:** May cause dentition problems, for example breakage and loss, abscesses in the oral cavity, etc.

However, as indicated in the same study, other consequences of stereotypies habitually seen in bears in captivity (some of them documented in recordings at Barcelona Zoo in 2015) include:

- **Abnormal locomotion:** May cause energy depletion, exacerbate concomitant orthopaedic problems, spinal column problems due to excessive turning, and podiatry problems such as lacerations to the paw pads.
- **Body balance:** May cause energy depletion, unequal wastage of the anterior claws, asymmetrical development of muscle mass on the neck, and exacerbation of concomitant orthopaedic problems.

- **Licking surfaces:** May cause lacerations to the tongue, as can be seen in the following recording made at Barcelona Zoo in March 2015: bit.ly/1E3PQjw

- **Captivity:** Impossible to develop natural behaviour, with severe repercussions for physical and psychological health. Images recorded at Barcelona Zoo in March 2015. bit.ly/1PovfeV

In general, presenting stereotypies may also cause (Vickery and Mason, 2005): reduction in behavioural diversity, reduction in response to environmental stimuli, reduction in exploratory behaviour, animals that are less competent in caring for cubs, reduction in physical condition and reproductive success, injuries, neurochemical changes: serotonin, dopamine, opioids.

Stress, which is associated with stereotypies, causes the animals' immune response to worsen. This can cause an increase in the incidence of certain infectious/contagious diseases, for example: leptospirosis, parasitosis, micosis, digestive and respiratory disorders (Castellanos, 1998), etc.

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