A Case Against Polar Bears in Captivity

by

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INTRODUCTION

Polar bears are among the most controversial animals kept in captivity because their biological and behavioural needs are difficult, if not impossible, to satisfy in captive conditions.

As the widest ranging terrestrial mammal on earth, polar bears are uniquely adapted to survive in enormous home ranges and cold weather conditions. Their natural conditions and lifestyles cannot be replicated in even the best captive situations.

Most polar bears are exhibited in antiquated, artificial and unsuccessful exhibits. Even most new zoo enclosures are not much better as most of them are nothing more than slightly modified versions of the exhibits that preceded them. To my knowledge, no polar bear enclosures have yet been constructed that provide a decent quality of life free from the development of aberrant behaviours and that allow polar bears to achieve a high standard of welfare. Polar bears rank among the worst candidates for life in captivity.

THE NATURAL HISTORY OF POLAR BEARS

Distribution

Polar bears (*Ursus maritimus*) are circumpolar in distribution, inhabiting the majority of Arctic seas and coastlines. They range across territory owned by Canada, the United States, Russia, Sweden, Finland, Norway and Denmark.

In Canada, polar bears can be found from Labrador to the Alaskan border, and from James Bay to northern Ellesmere Island. During the summer, bears in the Hudson and James Bay areas spend several months inhabiting terrestrial landscapes, sometimes traveling as much as 150 km (90 miles) inland.

An estimated 20,000 to 40,000 polar bears remain in the wild. The United States Alaskan population is thought to number around 2,000, while Canada's polar bear population is estimated at between 13,000 and 15,000 individuals.

Origins

Polar bears are thought to have evolved from brown bears between 70 - 100,000 years ago. During the Pleistocene period, brown bears were isolated by the advance of glaciers. This resulted in a series of rapid evolutionary changes to adapt to arctic environments, including the development of a number of unique physiological attributes. In evolutionary terms, polar bears should be viewed as bears first, and as arctic inhabitants second.

Physical Characteristics

Polar bears are the largest living land carnivore, with males reaching a weight of up to 650 kg (1,433 lbs.) and a length up to nearly 3 m (9.9 ft). Females are smaller, weighing up to 250 kg (551 lbs.) and reaching a length of 2.5 m (8.2 ft). The largest polar bear ever recorded weighed 1,002 kg (2,209 lbs.) and measured 3.7 m (12 ft) in length.

Polar bears can achieve an age of more than twenty-five years in the wild, and more than thirty-five years in captivity.

Adaptations to Cold Weather

The body shape of polar bears differs from other bears in that they have elongated bodies and relatively long, slender necks, a streamlining adaptation conducive to swimming. Their heads are small when compared to their overall body size, and their snout is arched. Their ears are small and rounded, and are laid flat when swimming underwater.

Polar bears have thick stocky legs, with the hind limbs being longer than the forelimbs. The paws are very large, sometimes reaching more than 30.5 cm (12 inches) in diameter, and serve as snowshoes, spreading out the bear's weight as it moves across ice and snow. Each paw has one non-retractable claw, used for grasping prey and for traction on slippery surfaces.

The sole of each foot has a thick black pad covered with tiny bumps, and long hairs grow between the pads and the toes. Both of these characteristics help create friction between the foot and the ground preventing slippage. Their physical characteristics and swinging method of locomotion cause polar bears to use more energy to move at a given speed than other mammals. Their average walking speed is about 5.5 kph (3.4 mph), but they can reach speeds of 40 kph (25 mph) at times.

Polar bears have black skin, a broad black nose, and a small tail. The black skin facilitates the retention of heat from sunlight that reaches the body surface.

Fur covers the entire body of polar bears, except for the nose and footpads. Dense underhair serves to insulate the body, and is covered by a thinner layer of stiff, clear, hollow guard hairs. The guard hairs reflect sunlight down the shaft of each hair to the body surface. The fur is oily and water repellent, and shakes dry.

Polar bear hair reflects light, giving the bears their white coloration. Depending upon the angle of the sun and the season, polar bears may appear yellowish or light brown in colour.

Thermoregulation

In addition to their thick fur and tough skin, polar bears are equipped with a layer of blubber, up to 11 cm (4.3 inches) thick, to help them maintain a body temperature of 37 degrees C (98.6 degrees F). Polar bears are so well insulated, they easily become overheated. To prevent this from happening, polar bears move slowly and rest often, and will swim to cool down on warm days. Excess heat is released from the body through areas where fur is absent or minimal such as the snout, footpads, ears, and inner thighs, and by panting.

Sight, Hearing & Smell

Polar bears have hearing and eyesight comparable to humans. Their sense of smell is acute, and is extremely important in detecting food sources. Polar bears are able to smell a seal from a distance of more than 32 km (20 miles). Little research has been conducted regarding the polar bear's sense of touch, but bears in captivity and in the wild have been observed manipulating small objects with great dexterity.

Adaptations to Aquatic Environment

Polar bears are exceptionally strong swimmers, often swimming long distances for hours at a time. They've been tracked swimming continuously for more than 100 km (62 miles). They can reach a swimming speed of close to 10 kph (6 mph).

The polar bear's large paws serve as paddles and help propel them through the water. The ears fold back and the nostrils close while swimming underwater. They swim at depths of up to 15 feet and can remain submerged for up to 2 minutes.

Behaviour

Each polar bear has its own home territory which varies in size depending on food availability and weather conditions. Individual bear territories may overlap with the territories of other bears.

Polar bears mate and give birth every two to three years, with pregnancies lasting approximately eight months. Females seek out maternity dens as early as August, but most enter sometime in October. The majority of dens are situated on land, within 16 km (10 miles) of the coast, but dens have been found as far inland as 100 km (62 miles). Polar bears of both sexes will occasionally occupy dens and shelters to overcome severe weather, food scarcity or to escape from summer heat and insects.

Cubs are born in the den from November to January, and emerge with their mother sometime in March or April weighing approximately 10 to 15 kg (22-33 lbs.). The most common litter size is two.

The major area of social interaction for polar bears is between females and cubs. Polar bear cubs learn many of their behaviours, including hunting, by following along and observing their mother. At about 30 months of age, when their mother is ready to breed again, she chases the cubs away.

Polar bears feed mainly on seals, but also scavenge for carcasses of whales and walruses. They will also consume reindeer, small mammals, birds, fish, eggs, vegetation and human refuse. They are capable of eating as much as 20% of their body weight at one time.

Polar bears utilize several methods for hunting. The most common is remaining motionless by a breathing hole or ice edge, and grabbing a seal when it surfaces to breathe. Other methods of hunting include stalking on land, stalking in the water, and searching for seal birth dens.

Polar bears are most active during the morning hours, with activity levels decreasing as the day progresses. Adult female bears with cubs spend about 19% of their time hunting during the spring, and about 38% of their time during the summer. For adult males, it's about 25% and 40% respectively.

GENERAL POLAR BEAR HUSBANDRY CONSIDERATIONS

SPACE

Providing appropriate amounts of space is a critical, but often overlooked, ignored or dismissed aspect of polar bear husbandry. Space allocation in zoos and other captive situations is arbitrary and is usually based more on convenience and finances than on the bear's biological and behavioural requirements.

All captive animals must be provided with space appropriate to their needs. A good rule to follow is the bigger the better. There is no upper limit. It is far better for an animal to have more space than it needs, than for it to need more space and not have it.

In determining whether or not a specific amount of space is appropriate, several questions must be asked. First, how much space does the animal actually need to facilitate engagement in natural movement patterns and behaviours? Second, how much space does an animal need to feel secure; so that it's fight or flight response isn't triggered or to escape from assault or the threat of assault by cagemates? Third, what are the consequences to the animal of not providing an appropriate amount of space?

When considering the spatial requirements of polar bears in captivity, it is important to consider the fact that polar bears inhabit enormous home ranges in the wild. In his book *Bears, Majestic Creatures of the Wild*, biologist Ian Stirling comments on the range of wild polar bears,

> *In some areas, such as the inter-island channels of the Canadian High Arctic Archipelago, sea ice is present for most or all of the year, so bears do not need to travel great distances to remain on it. Some of these bears have a home range of only a few thousand square kilometers [emphasis mine]. In contrast, the southern edge of the Chukchi and Bering Seas, where seals are most abundant, moves enormous distances north and south between summer and winter every year. Some female polar bears in that region need home ranges in excess of 300,000 square kilometers (116,000 square miles) in order to be able to find enough suitable sea-ice habitat for hunting throughout the year.*

According to *The Great Bear Almanac* the range of a single polar bear is more than 51,800 sq km (20,000 sq miles). In fact, polar bears inhabit the largest home ranges of any terrestrial animal species.

With new knowledge and changing attitudes, many of the antiquated accommodation standards of the past are now being challenged by animal welfare organizations and even by some progressive members of the zoo industry. According to zoologist Dr. Ronald Orenstein, "Many of the old standards aren't really taken seriously anymore. Even zoos currently housing their bears in substandard enclosures know they're too small."

Recognizing that the ubiquitous concrete grotto exhibits of old are spatially inadequate and biologically irrelevant, a few zoos have been experimenting with larger, more stimulating environments for polar bears in captivity. Some of these are old, reworked designs with all the bells and whistles, while others are just larger, more naturalistic paddocks. Unfortunately, even the largest enclosures constructed to date have proven inadequate in addressing the needs of polar bears.

While many polar bears spend a great deal of time in terrestrial habitats, they may also spend considerable time in aquatic environments. In fact, polar bears are capable of swimming enormous distances in the wild

and are classified as marine mammals in the United States. In 2005 scientists reported that they had tracked a tagged polar bear as it swam a distance between 74 km (46 miles) and 99 km (62 miles) in a 24 hour time period. While it has long been known that polar bears swam great distances, this was the first time such a long swim had been scientifically tracked.

According to Gary Brown in *The Great Bear Almanac*, "The polar bears are without question the 'swimmers' of all bears. Their shape allows them to move through the water with relative ease, propelled with strong, powerful strokes. Swimming approximately 300 miles between ice floes, they display enormous endurance in the water .... They can apparently swim for days without hauling out to rest."

Another almost universally ignored aspect of polar bears is their ability to climb a variety of natural features. In *The Great Bear Almanac*, Gary Brown states that the polar bear is an "... agile climber of ice ridges; climbs to travel and pursue prey. Can jump/scale over six-foot high ice barriers; can jump down ten feet; can scale a thirty-five foot ice wall". Yet zoos the world over ignore this fact and house polar bears on predominantly flat surfaces.

Natural Substrates

Polar bears have traditionally been kept in barren concrete floored enclosures (grottos) surrounded by walls, often with a dry moat in front so spectators can view them at eye level. These exhibits were constructed this way for several reasons, including security, ease of maintenance and erroneous ideas about the pack-ice environments that wild polar bears inhabit. The practice of maintaining polar bears permanently on hard floor surfaces is widespread and persistent, even though hard surfaces are detrimental from a health and behavioural perspective.

Nothing in nature has prepared polar bears for living on concrete. Exhibit designers often think that concrete simulates the look and feel of pack ice, but they don't seem to realize that pack ice differs dramatically in appearance, texture and consistency. Unlike real pack ice, the surface consistency of molded concrete tends to be uniform and alien. In the wild, polar bears walk over a broad range of ice and snow substrates, as well as natural rock and earth substrates. They will construct nests and dig burrows when given the chance. Simulated concrete ice is not biologically or behaviourally relevant to polar bears.

UK veterinarian Samantha Lindley is especially critical of hard substrate exhibits. She states, "Many exhibits are still the concrete bunker type, which are wholly unsuitable for bears and indeed for all captive species. Many try to incorporate token sandpits or shavings which are largely ignored. There is, of course, no snow and ice, and muddy paddocks are no substitute for the frozen James Bay."

In *The Behaviour of Captive Polar Bears*, Alison Ames indicates that all polar bears, including those in captivity, actually prefer soft substrates:

> *Substrate preference of a captive, male/female pair of polar bears was recorded following the addition of natural substrates to their concrete enclosure. A total of 60 hours of observations were collected. The substrate on which these bears were lying, rubbing, feeding, or digging was recorded. For all of these behaviours, the male spent at least 78% of the total activity time in the natural areas. The female was observed to use the natural pits for 19% and 21% of feeding time and lying time respectively. 75% of the male's foraging time occurred in either the water or a natural area while 60% of the female's foraging occurred in these areas. The female's use of the natural pits was much reduced because the*

male monopolized the areas. The captive animals' preference for softer substrates was supported by observations collected on the ecology of wild polar bears in the Churchill area of Canada's Hudson Bay. Wild bears were observed over a three month period during the autumn of 1991. Over 77% of the bears seen on the inland tundra were found in either heavily wooded areas along the sides of streams or lakes or in areas covered in lichens and berries. Along the coastline, over 80% of the polar bears were on sand banks or tall grass areas. As snow began to accumulate, the majority of bears rested in snow banks, kelp or willows.

Some populations of wild polar bears spend up to five months of the year moving across beaches and through regions of inland tundra. Nothing in a polar bear's biology or behaviour has prepared them for living permanently on hard, unyielding surfaces.

Complexity, Choice and Control

The antiquated notion that polar bears should live their lives according to pre-arranged schedules in easy to clean, sterile surroundings is gradually being challenged and rejected. Polar bears should be given an opportunity to express natural movements and behaviours and to make a meaningful contribution to the quality of their own lives by exercising choice and having control. Unfortunately for polar bears, achieving this situation in captivity is next to impossible, especially with regard to normal foraging and predatory behaviours.

In an ideal world, all polar bears currently held in captivity would be moved to expansive, complex, naturalistic paddocks that allow them to roam and behave normally. Unfortunately, those kinds of captive situations are few and far between and many zoos resist any suggestion that their facilities are inadequate. Many claim their existing old-style enclosures are still adequate because their polar bears are stimulated through programs of environmental enrichment.

Environmental enrichment is a process for improving captive animal environments within the context of their behavioural biology and natural history. Enrichment can involve the introduction or provision of structural enhancements, furnishings, objects, sensory enrichment, temporal changes, and other strategies and tactics that are meant to encourage the expression of species-typical behaviours and increase behavioural opportunities.

While environmental enrichment is often touted as a solution to a broad range of problems and can be a useful strategy for improving zoo animal welfare in some cases, it tends to address the symptoms of the problems rather than the problem itself (i.e., inherently deficient captive environments).

Veterinarian Samantha Lindley warns against seeing environmental enrichment as a panacea for polar bears in captivity: "... there is a fundamental misunderstanding at work here. Firstly, the enrichment has to be frequent, constantly changing and unpredictable for it to maintain its effects. Yet routine is the backbone of a zoological garden - feeding, cleaning out, feeding again, etc. Throwing the odd ball or traffic cone in to the bears may well stimulate transient activity, but this is soon lost. Many an enclosure has so much trash floating around ignored by the bears because the novelty value has been lost after half an hour or less. Secondly, there is nothing which can substitute for the ranging-hunting-waiting-surviving lifestyle which a polar bear has in the wild."

Unfortunately, polar bears have historically been exhibited in some of the most environmentally

impoverished conditions in the zoo world. Barren enclosures, hard surfaces, small pools, and lack of stimulation have been standard practice for decades. Even when enrichment programs have been delivered, they may provide some short-term relief to the animals, but over the long-term they fail. Providing a consistently stimulating environment for polar bears in captivity has not yet been achieved.

Polar bears have long been known as a species that is especially prone to the development of abnormal behaviour patterns in captivity, including stereotypies and lethargy. The most obvious are stereotypic pacing and swimming patterns. Stereotypies are prolonged, repetitive, apparently purposeless, behaviours that do not occur in the wild. They are usually associated with substandard conditions and poor welfare.

Even zoos with the largest budgets have difficulty keeping polar bears free of stereotypic behaviours. Sea World San Diego has not been able to stop the development of stereotypies in their polar bears despite spending millions of dollars on their polar bear exhibit. Sea World Gold Coast Australia has had the same experience. Many zoos, including the Calgary Zoo in Alberta and the Central Park Wildlife Centre in New York have used pharmaceuticals (such as prozac and other drugs) to reduce abnormal behaviour patterns.

Zoo consultant Stephan Abbott Ormrod in his report *A Review of Captive Polar Bears in Great Britain and Ireland* is convinced that "... stereotypy is a clear indication that the animal suffered in the process of developing it. By suffering I mean a degree of stress that will perhaps, always remain impossible to define - but in many cases it is clearly an emotion that can reasonably be compared to chronic frustration in humans".

The unique biology and behaviour of polar bears make them extremely poor candidates for captivity. It is doubtful that an enclosure could be constructed (especially in an urban setting) that would satisfy their full range of needs and prevent the development of aberrant behaviours.

Captivity and Cold Weather Adaptations

Polar bears are specifically adapted to cold environments. They have thick heavy hair, dense underfur and a layer of fat up to 10 cm (4 inches) thick that serves to insulate them against the cold. According to Ian Stirling in *Bears, Majestic Creatures of the Wild*, "The combined insulation of fat and fur is so effective that, as long as the bear is not exposed to wind, its body temperature and metabolic rate remain at the normal level even if the temperature drops to -37 C (-35 F)."

Clear, hollow guard hairs comprise the outer layer of hair. These may serve to reflect light down the shaft of the hair where it is absorbed by the polar bears black skin, another unique adaptation to the cold.

Fur covers the entire body except for the nose and footpads, and the ears and tail are small and rounded to reduce heat loss. The nose is long and helps warm cold air as the bear inhales. Hair between the foot pads provide additional protection from the cold, while the large paws aid in swimming, traveling on and shoveling snow.

Captive polar bears in warm climates often develop greenish-tinged fur due to algae growth in the hollow sheath of the guard hairs. While this may not directly impact the physical health of the bear, it is unnatural, unsightly and an indication of inappropriate conditions. It also gives the visiting public a distorted perception of polar bears.

Other physical adaptations such as an elongated body, slender neck and relatively small head in proportion

to body size are adaptations to streamline the bear for swimming; papillae and vacuoles on the footpads reduce slippage on slick surfaces; and a highly developed sense of smell to aid in the detection of seals and carrion across miles of sea-ice and tundra habitat, clearly demonstrate how well-adapted polar bears are to cold environments.

Walking and swimming across large expanses of arctic terrain have also led to the development of behaviours specific to cold weather environments. One hunting behaviour involves the bear pushing a block or mound of snow ahead of itself for concealment during seal stalks. Another involves an underwater stalk below the sea ice.

Polar bears are very clearly adapted to a wide-ranging life in arctic conditions. Nothing in their physical or behavioural make-up prepares them for life in confined, consistently warm environments.

New Exhibit Bells and Whistles

In recent years, some southern zoos have attempted to mitigate the effects of inappropriate climate through air-conditioned dens, refrigerated pools, ice machines, specially-designed shade cloth, fans and other measures. While these measures may offer some short-term relief, they are stopgap measures that do nothing to address the larger problem of arctic animals being kept in inappropriate climates. The animals still experience consistently high temperatures and humidity that they would never experience in the wild.

Veterinarian Samantha Lindley expresses concern about polar bears in warmer climates: “Temperature regulation places a huge stress on these animals, even if they ‘cope’. Whilst they are coping with temperature variations to which they are not adapted, they cannot cope with other stressors, such as boredom, captivity, and human proximity with no prospect of escape. Many polar bear enclosures become suntraps in the summer, and water facilities are often poor. Tropical facilities are totally unsuitable for polar bears. The chances of artificially maintained environments breaking down are too high and the need for greater restriction of the bears renders such a destination a potential disaster in welfare terms.”

COMMENTARY

According to British veterinarian/zoo inspector Dr. John Gripper, “In my visits and inspections of zoos around the world, I find that the polar bear is probably the most difficult animal to confine in a zoo enclosure without showing abnormal behaviour.”

Stefan Abbott Ormrod in his report *A Review of Captive Polar Bears In Great Britain and Ireland (1992)*, “It is clear that polar bears have great difficulty in adjusting to the conditions of captivity. This is especially clear when one examines the widespread incidence of aberrant behaviours.”

In his book *Last Animals At The Zoo*, Colin Tudge states that, “Polar bears have been a huge challenge to zoos. They are ‘easy to keep alive’, and they breed reasonably well these days but they are among the most notorious of all stereotypers: pacing and head-rolling. Even zoo enthusiasts have often doubted whether polar bears should be kept in captivity.”

David Hancocks, renowned zoo architect and former zoo director, in *Wild Mammals In Captivity: Principles and Techniques*, discusses the typical grotto style exhibit that many bears, including polar bears, are still displayed in, “These grottoes, like the equally ubiquitous pits of the nineteenth century zoos, were used

principally for large mammals, especially bears, or, when built in the round (with an island in the middle), for monkeys. Sometimes made of bricks or concrete, but most often with rocks, either real or artificial, these exhibits were heralded as naturalistic and humane. Yet, invariably these fanciful versions of caves and hills, devoid of anything alive except the pacing animal, were featureless and bland places. The rockwork was oppressive and pervasive, built as clumsy replicas of arbitrarily invented geological formations. The grottoes' lack of subtlety was worsened by their monotonous repetition in zoos all over the world. The animals were kept contained in the open air, but nothing else was achieved."

In *The Behaviour of Captive Polar Bears*, scientist Alison Ames writes, "Enclosure designs and husbandry routines for captive polar bears have been as stereotyped as the animals themselves. Preconceived ideas about the animals' abilities, antiquated facilities, and lack of financial support, have resulted in zoos providing their bears with extremely predictable and basic husbandry routines. This type of captive management can no longer be considered acceptable. To maintain wild-type behaviour in captivity, it is necessary to fit environmental conditions to the animal, rather than expecting the animal to adapt to the conditions imposed upon it."

Clearly, most, if not all, existing polar bear enclosures are inadequate. Undersized, hard and barren, many of them do little to encourage species-typical behaviours or to elevate animal welfare to an acceptable level. Even the new exhibits being constructed by zoos tend to be undersized and inadequate, with most of them designed to enhance the experiences of visitors, rather than the experience of the animals.

Of considerable concern is the fact that polar bears in many zoos cannot obtain proper relief from the heat. Polar bears have evolved to live in extremely cold climates and are physiologically and behaviourally adapted to cold conditions, so they suffer considerably in warm climates. While some zoos make efforts to address climate concerns, these efforts inevitably fail to address the core problems.

Polar bears are among the worst candidates for captivity. They require vast, natural spaces and consistently cool climates. Most polar bear exhibits are antiquated, artificial and unsuccessful. To my knowledge, no polar bear enclosures have yet been constructed that provide a decent quality of life free from the development of aberrant behaviours and that allow bears to achieve a high level of welfare.

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