

THE HUNT

N E V E R C E R T A I N O U T C O M E I S Η

The Arctic environment transforms between seasons, with extremes in temperature and in the abundance of prey. During winter, open seas become vast expanses of ice and the darkness is continuous. With the approach of summer the landscape shrinks as sea ice breaks up and melts, and days lengthen.

Resident polar bears, wolves and foxes are vulnerable for much of the year in this harsh environment. Polar bears feed mainly on seals, which are abundant from April to July, and hunt by stalking seals on ice or ambushing them at breathing holes. With plentiful food, they only consume the energy-dense seal blubber before moving on to the next kill, leaving the carcases for scavengers. Polar bears accumulate adipose (fatty) reserves to survive through winter; pregnant and nursing females can survive on body reserves alone for many months. Once sea ice starts to melt in August, polar bears must resort to other food sources on land, including small rodents, waterfowl, fish, eggs and berries. Food is scarce in summer and bears must withstand prolonged periods of fasting.

IN THE GRIP OF THE SEASONS

On the open plains of Africa there is nowhere to hide and the challenge for many predators is to catch prey that are hyper-vigilant and in many cases can outrun a predator when in full flight. Predators have several strategies to overcome these challenges.

BBC



Cheetahs are the fastest land mammal, reaching speeds of up to 93 kilometres per hour. They use this speed and their spectacular deceleration and acceleration abilities to catch prey. Cheetahs launch an attack in the open from 125 metres and can run down their targeted prey within ten seconds. Lions use their size and strength and often hunt together in coordinated groups consisting of two or more individuals, usually females. In some prides, individuals take on specific roles when hunting. Lighter, faster animals initiate the attack from within 30 metres of prey while heavier, more powerful animals ambush fleeing prey and bring it down. African wild dogs depend on stamina and the ability to track prey using sight, sound and scent. They are highly social, living in packs consisting of two to over twenty individuals. They hunt in teams that are often led by a dominant male. Once a chase begins, they can pursue prey for up to an hour and reach speeds of 66 kilometres per hour. Of all the large predators on open plains, African wild dogs are the most successful hunters with 80 per cent of their hunts ending in success.

NOWHERE TO HIDE

Forests are dense and complex, with survival for both predators and prey deper on the ability to hide. The light and shadows formed by sunlight filtering through the tree canopy on to the forest floor, makes the striped coats of forest-dwelli cats almost invisible, which is ideal for animals that hunt by stealth. Cats are adapted to hunting in low-light conditions as they have a greater den of light-sensitive cells and a reflective layer behind the retina that reflects light back into the eye.

Bats and other small mammals, snakes, lizards, chameleons, frogs and insects inhabit the forest understorey. Both predators and prey are superbly camouflaged, blending in with the background forest foliage. Chameleons are able to move their eyes independently, so are able to sight and gauge distances to prey or predators using one eye at a time and with minimal head movement.

The high forest canopy is inhabited by monkeys and birds that rarely go down to the forest floor. Monkeys are adapted to life in the trees with grasping hands and feet and prehensile tails. They are a major source of food for birds of prey such as the harpy eagle.

HIDE AND SEEK

Out on the exposed rocks and shores, for limited time periods each day, prey are exposed to hunters converging from land, air and sea. Seasonal changes are marked by changing tide and weather conditions, and spectacular annual events that take place along the coasts. During the 'salmon run' millions of migrating adult fish move from the salty marine environment to far inland freshwater rivers to breed. Salmon undergo major physiological changes to cope with the transition to fresh water. Many fish make it back to their original freshwater spawning place, which is thought to be achieved by their impressive sense of smell and ability to determine their location using the earth's magnetic field.

Salmon mostly only breed once and then die, a reproductive strategy also used by some octopus species and capelin (a type of fish). This strategy maximises the

chances of successful reproduction and increases offspring survival rates. The synchronous spawning of thousands of salmon during the annual migration provides an opportunistic feast for a multitude of predators including bears, wolves and birds. There are also wider impacts on local ecology with such a large movement of nutrients from the marine to terrestrial environments.

RACE AGAINST TIME

The vastness of the open ocean supports a diversity of life forms with extraordinary abilities to locate sources of food, and to find and communicate with others of their own species. Marine organisms range in body size from microscopic phytoplankton, through crustaceans, fish, pinnipeds and cetaceans to the largest living mammals (baleen whales). In addition to penguins, many birds are dependent on the ocean for food. Locating congregations of fast-moving prey, that may only be available briefly before moving down to inaccessible depths, means that the timing of feeding events is key to the survival of animals in the expanse of the ocean. Successful hunting often involves cooperation between predators with diverse hunting skills.

Unlike light, sound is transmitted very effectively underwater and travels faster and further than sound in air. This is one reason why acoustic signals have evolved as the principal means of information transfer in fully aquatic mammals like whales and dolphins that use echolocation to detect prey. They also make use of noise created by leaping from the water and flippers or flukes striking the water surface to disorient prey or to keep them tightly schooled together.

Noise generated by human activities, such as shipping, is propagated for many kilometres and interferes with the natural behaviours of marine animals, including migratory movements and detection of sounds that are important for survival.

HUNGER AT SEA

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THE HUNT

OUTCOME IS NEVER CERTAIN



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CAN WE SURVIVE IN EMPTY LANDSCAPES?

The history of life on earth has been punctuated by several mass extinction events, during which time global biodiversity has been sharply reduced. Recent evidence suggests our planet is in the early to middle stages of a sixth mass extinction event, which like others before it will separate out those that survive, from those that do not. However, this event is unique as it is the result of the actions of a single species, *Homo sapiens*. It is characterised by the loss of apex predators (carnivores at the top of the food chain) such as the big cats, and of large keystone megaherbivores that include elephants and rhinoceros.

BBC

PREDATORS ON THE BRINK

Many of the world's large carnivores are the most threatened species on earth. Humans have persecuted them for hundreds of years, resulting in local eradication or severe range restriction. More recently their decline has been precipitous, with many species now confined to small, isolated populations. Major conservation efforts to stop this decline are underway worldwide, but are they extensive enough?

Food webs are highly complex, consisting of direct 'carnivores eat herbivores' relationships and indirect interactions that affect whole ecosystems.



THE PLIGHT OF LIONS

Only a century ago there were as many as 200 000 lions living in Africa; today there are fewer than 30 000 and lions are extinct in 26 countries that they formally occupied. They once inhabited the entire African continent, except for the Sahara desert, and the dense rainforest of the Congo Basin. Today they have vanished from over 80 per cent of their range in Africa and in the last 21 years (i.e. three lion generations) have undergone a reduction of 42 per cent. Lions once inhabited Asia from the Middle East to eastern India – they are now extinct in their entire Asian range except for a small population of 350 individuals in India's Gir Forest.

WHY ARE LIONS DISAPPEARING?

HABITAT LOSS AND

COMPETITION FOR PREY Rapidly expanding human populations in Africa have resulted in the appropriation of large amounts of land that was once available to wildlife. Lion populations have become fragmented and confined to reserves close to human habitation so that movement between populations is almost impossible. Large herbivores, the lion's principal prey, are under threat from the unsustained and increasingly commercialised bushmeat trade leading to the collapse in prey populations in large parts of Africa.

CONFLICT WITH LIVESTOCK

As the human population in Africa expands further, lions are increasingly coming into conflict with people over livestock depredation. Lions are shot, speared and poisoned and often retaliatory killings occur where no distinction is made between animals that are actually responsible and those that are not. Deliberate poisoning is one of the most serious threats to carnivores and has increased over recent decades. One study in South Africa showed that 21 per cent of farmers used poison to kill carnivores, mostly illegally.



This complexity makes the task of anticipating how wildlife communities react to human disturbance difficult to study. However, it is clear that both large carnivores and large herbivores play a crucial role in maintaining ecosystems as their loss causes cascading effects to many other species, habitats, and the functioning of ecosystems.

ECOSYSTEM DYSFUNCTION

There is rapidly growing concern that the disappearance of iconic apex predators and other species from ecosystems will have extensive and more profound consequences on ecosystem functioning than previously thought possible. Species interactions are likely to affect diverse processes such as dynamics of disease, control of invasive species, occurrence of wild fires, and biogeochemical exchanges between soil, water and the atmosphere. Many of these consequences have been unforeseen due to our lack of detailed understanding of the complexity of interactions between different levels of the food chain, as well as species.

'DEFAUNATION' is a term that has been introduced to represent the global loss of both species and populations of wildlife as well as local declines in biodiversity and the abundance of individuals

PREY IN DECLINE

Prey species, although generally perceived as more abundant than predators, are likewise at risk of extinction owing to habitat loss and excessive hunting, often related to competition with expanding populations of farmed livestock. Biomass of global livestock and humans far outweighs wild land mammals and is predicted to keep rising.

Many wild animals have experienced massive contractions in their habitat ranges. African elephants are long-lived, reproduce slowly and their ranges have reduced from the green to red fragmented areas on the map over recent times.

Large adult herbivores, especially elephants, are rarely prey species although their carcases are scavenged.

Their existence has direct and indirect positive effects on local predators such as large cats and their smaller prey species, the structure of their shared habitat and flow of associated nutrient cycles in the ecosystem.

Elephants across Africa (*Loxodonta africana*)

and Asia (*Elephas maximus*) maintain the biodiversity of open plains both by their continuous consumption of massive amounts of different plant species and the trampling of vegetation, ranging in size from grasses to trees. This consumption and trampling process

maintains and opens up areas that would otherwise turn to woodlands. Keystone species such as elephants travel extensive distances and this habitat conversion permits grazing by smaller prey species,



such as impala or deer that are vital for supporting populations of large predators that include cheetah, leopard, lion, tiger and African wild dogs.

. . . THE OUTCOME IS IN OUR HANDS. . .

Poisoning is indiscriminate and lions are particularly vulnerable because whole prides can be decimated at once.

BODY PARTS

A new threat to wild lions is emerging as a result of trophy hunting – the trade in lion body parts. In South East Asia wild lion bones and other body parts are increasingly sought after, perhaps to replace now extremely scarce tiger products. The demand for tiger-bone wine for use in traditional medicine in China is such that both wild and 'canned' hunted lion bones are being imported from South Africa as a legally obtainable and cheaper substitute.



TROPHY HUNTING

Trophy hunting is permitted in a number of sub-Saharan African countries and is considered by some governments as an important management tool for providing financial resource for lion conservation. However there is concern that current management regimes lead to unsustainable offtakes. In many areas wild lion populations have severely declined even in the absence of other threats. Trophy hunting is often subject to abusive practices such as luring lions from protected areas, exceeding quotas, and the taking of dominant males, leading to the killing of their cubs by other males. Shooting sub-adult males removes them from the future breeding population and reduces population growth.

There are about 3000 adult males in Africa, with approximately 40 per cent in protected areas, leaving 1800 vulnerable to hunters. Trophy harvests average 665 a year, an unsustainable offtake.

In recent years there has been a surge in so-called 'wildlife encounter' programmes that occur across southern Africa. Tourists pay to walk, pet or feed lions that have been bred and hand raised in captivity. Many of these lions end up in the 'canned hunting' industry where trophy hunters pay to shoot habituated lions confined to a small enclosed area, while the hunter stands on the back of a truck.

DISEASE

Canine distemper (a serious viral illness with no known cure) from domestic dogs resulted in the death of 30 per cent of the lion population in the Serengeti in one outbreak. Lions in the Kruger National Park in South Africa are currently under threat from bovine tuberculosis to the extent that it is estimated that by 2030, it will claim 75–80 per cent of the population. Lion populations can also be affected by endemic feline viruses.

Despite their destructive tree-toppling efforts, even the smaller forest elephant (Loxodonta africana cyclotis) has been recorded to disperse more than 300 large seeds per day from nearly 100 plant species, at considerable

distances from the original tree sources. After travelling through the elephant's digestive tract, seed cases are softened and expelled in dung that provides ideal conditions for germination, growth and regeneration. The enormous quantities of deposited dung



The continental-sized and permanent ecological effects revealed by scientific studies of mass megaherbivore extinctions from the last Ice Age can be investigated on a much smaller scale by temporarily removing mega/mesoherbivores from study areas. Field experiments where large wildlife species were fenced out have demonstrated the speed and effects of defaunation on ecosystem function. Defaunation quickly leads to biodiversity changes, altered interactions between plant and insect species, reduced herbivore defences, and a range of other altered ecosystem functions and services (e.g. increased wild-fire intensity, reduced photosynthesis and increased cattle production). But recovery is possible with concerted conservation efforts. The conservation of large herbivores that are key species for maintaining habitats for a multitude of other species, both predators and prey, can support population and range recoveries.

Successes have been demonstrated with the onservation of white rhinos,

merican/European bison, some antelope species, and Przewalski's

horse, amongst others.

MESOPREDATOR EXPANSION

A serious consequence of reducing apex predators is the phenomenon of 'mesopredator release' within ecosystems. Rapid increases in the density and distribution of mesopredators, smaller predators in the middle levels of food chains, occur in the absence of the apex predators that help control their

numbers, not simply because of direct killing but because they induce behavioural changes in smaller predators. Such population increases has led to the use of indiscriminate lethal methods by humans to control small carnivores such as coyotes, foxes, jackal and caracal. These include poisoning, gin trapping, shooting and hunting, sometimes with dogs. Thousands of mesopredators are killed each year by farmers but, because of the methods used, many large cats are also killed, which not only exacerbates growth in mesopredator populations but also threatens large carnivore survival.



LEOPARD: Nine subspecies recognised. Three are critically endangered. 100 000 left in Africa; 8000 in India.

TIGER: Less than 3500 worldwide. Three of the nine species are extinct.

CHEETAH: Africa: Reduced from 21 000 to less than 10 000 in 30 years. Asia: 70–110 individuals

JAGUAR: Reduced from over 25 000 to less than 15 000 in 30 years.

IBERIAN LYNX: Increased to 327 from 90 animals following reintroductions.

CALL TO ACTION

Action to halt and reverse defaunation is increasingly required as resultant cascading effects on wide-ranging global ecosystem functions are now impacting on the security of human survival.

ACTION TO HALT THE DECLINE

OMPENSATION FOR CONSERVATION Paying compensation to farmers for accepting the costs of livestock depredation as a result of living alongside predators has been shown, at least in the short-term, to reduce the decline in lion populations. In Kenya compensation resulted in an 87-91 per cent reduction in lion killing.

COMMUNITY INVOLVEMENT

In community-based conservation projects local people gain an economic benefit in protecting big cats. In Kenya the cultural values and knowledge of local people are drawn on to mitigate livestock-carnivore conflict. Respected members of the community (tribe) promote the tourism value of lions, help reinforce bomas (livestock corrals), retrieve livestock and inform communities about local carnivore movements. They provide a sense of community ownership of lions monitoring them on community land through traditionmethods and radio tracking. These projects have result-d in a significant drop in lion killing since implementation.

IMPROVED LIVESTOCK HUSBANDRY Conflicts between predators and farmers can be greatly reduced by improving livestock management practices. Securing animals in well-constructed bomas at night and he use of dogs to guard animals has been shown to reduce redation on livestock.

CESSATION OF TROPHY HUNTING rapid decline of lion populations in Africa that trophy hunting in many areas is no longer ble. Pro-hunting advocates claim that hunting is an nportant source of revenue and provides benefits for rural communities. However, a recent study showed that trophy unting revenue is only 1.8 per cent of tourism revenues and

unting companies contribute 3 per cent of their revenue







Using dogs to protect livestock





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