



## Life Cycles

### IN THE FILM

**earth** is filled with enchanting, intimate, and dramatic scenes in which three of the great mammals rear and care for their offspring. **earth** shows, in all its intensity, the power of an animal's instinct to nurture and protect its offspring. From the mother Polar bear ignoring her own hunger as she patiently waits for the right moment to coax her cubs out on the Arctic sea ice, to the weary and parched African elephant mother on her long trek for water, turning back along her tracks to urge on the exhausted calf behind her, to the mother Humpback urgently slapping her fins on the ocean's surface to keep contact with her calf in the stormy waters of a southern ocean. As well as this, **earth** shows some of the most engaging and comic behavior found among bird species: the elaborate mating displays of the Birds of Paradise and the high-diving antics of Mandarin duck chicks.

### LIFE CYCLE FACTS...

- all living things have a life cycle, from the tiniest bacteria to the gigantic Blue whale
- a life cycle is a series of stages a living organism goes through from its birth to its death
- a life cycle includes birth, life as a youngster, adolescence, adulthood, mating, caring for offspring and death
- throughout this cycle, each individual's aim is to develop, grow and learn enough to survive, and pass on its genes to its young
- the life cycles of many animals are intricately linked with the planet's seasons



## THE AFRICAN ELEPHANT

### AFRICAN ELEPHANT FACTS...

- the age at which elephants reach maturity varies with the environmental conditions
- female elephants generally become ready to mate when they are about 14 years old, but have been known to mate until they are nearly 60; males are around 20 before they mate
- the peak of breeding is in the rainy season though elephants can breed at any time
- female elephants have one of the longest pregnancies of the animal world: 22 months
- elephants give birth to a single calf and have to wait a minimum of 2 to 4 years between pregnancies
- calves measure about 3 ft. (0.8 - 1.05 meters) at the shoulder at birth and weigh about 200-260 lbs (90-120 kg)
- elephants grow to become the biggest animals on land, and can reach 13 ft. (4 meters) in height and weigh up to 10 tons
- elephants can live for 70 years

### THE NEWBORN CALF

Other females often gather around a calving elephant. When the calf is born they sometimes give assistance to the mother as she uses her feet, trunk and tusks to help the calf stand. Newborn elephant calves try to

stand almost immediately. On average it takes them about 30 minutes. They are born with their eyes open and functional, and as soon as they are on their feet they search for their mother's nipples. A calf's mother may bend her legs to help the calf reach her and start suckling. Elephant calves suckle frequently: at least every hour.

When they're first born, calves can have poor trunk control and they may be shaky on their legs for a few days but, by the time they're two days old, they can usually move with the herd.

### THE GROWING CALF

Elephant calves are entirely dependent on their mothers for milk at first, but they begin playing with the vegetation they will eventually eat – leaves, bark, shrubs and roots – very early. They learn about it by investigating and tasting food taken from their mother's mouth, although they don't actually swallow any grass until they're about four months old.

Elephant calves have to learn everything from eating grass to how to drink water using their trunk. It can take up to six months for a calf to learn how to use its trunk to bring water up to its mouth. By six months, elephant calves are eating a significant amount of vegetation, and, by the time they're two years old, they spend as much of their time eating as the adults do. They continue suckling until they're at least two years old, but after six months they do it

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less often. If a calf loses its mother before the age of two it is unlikely to survive. Some calves go on suckling to three, four or older.

Calves stay very close to their mother for about the first six months of their lives and then begin to move further away, to explore and play with other calves. Young calves play enthusiastically! They chase around rolling over each other, having pretend fights and generally rough and tumbling with each other. As they get older they do this less.

## MOTHER AND CALF

The bond between a mother and her calf is strong. For the first few months of its life the mother watches her calf very closely and is very protective. She helps it whenever necessary, but she will also give it a slap with her trunk if she needs to discipline it. As a calf gets older its mother pays it less attention, but elephant calves remain dependent on adults for several years. In times of danger, the adults in a herd will form a ring around the young, facing out to protect them. All the mothers share the caring responsibility for an older calf with its mother. These surrogate mothers are young female elephants who are usually the calf's aunts or older sisters. They form strong bonds with the calf and will look after it while the mother feeds. In caring for the calves, the non mothers learn the mothering skills they will eventually need.

## THE MATRIARCH

A female calf is likely to stay with the herd for the rest of its life. Male calves stay with the herd until they are old enough to mate and then they leave. At first, the males form small herds of their own called bachelor herds, but eventually they become solitary. Although males grow to be bigger than females, a female becomes the leader of the herd: the matriarch.



## THE POLAR BEAR

### POLAR BEAR FACTS...

- for most of their lives, Polar bears are solitary, coming together only for the breeding season
- females have their first cubs at around 5 years old
- males are around 6 years old when they breed
- Polar bears breed every two to four years
- the female gives birth to 1-4 cubs, usually 2
- Polar bears are born with their eyes closed
- they weigh around 1.3 lb (0.6 kg) at birth and are around 12 in long (30 cm)
- by the time they leave the maternity den they weigh around 22-23 lb (10- 15 kg)
- females and their cubs usually stay together for 2.5 years
- Polar bears grow to be the largest land predator in the world; males can grow up to around 8 ft (around 2.6 m) and can weigh up to 1,800 lbs (around 800 kg)
- adult Polar bears can live to be 30 years
- a Polar bear spends most of its life doing nothing but sleeping or lying still

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### MATING

Adult Polar bears mate between late March and early May. This is the only time when bears come together in the entire year. A breeding pair will stay together for 1-2 weeks before parting.

### THE MATERNAL DEN

A pregnant Polar bear digs her maternity den in the snow around September or October. She chooses a site high up on snowy slopes to give her cubs protection from male Polar bears. The much bigger male finds it difficult to climb through the snow. While the temperature outside may drop as low as  $-58^{\circ}\text{F}$  ( $-50^{\circ}\text{C}$ ), the den will stay at around  $32^{\circ}\text{F}$  ( $0^{\circ}\text{C}$ ).

Polar bears begin life inside the den. The cubs, usually two, are born between November and February. They grow rapidly feeding on their mother's rich breast milk and remain in the den until spring. During all that time the mother doesn't eat, drink, or defecate.

### OUT ON TO THE SNOW

By the time the cubs leave the den with their mother, as they are seen doing in **earth**, they are strong enough to withstand the freezing temperatures outside. Their mother encourages them to take their first steps on the snowy landscape they will need to master by delaying feeding them until they are outside the den. Hunger is a powerful motivator. The cubs stay in the care of their mother for 2-3 years. The father plays no part in rearing them. By the time they are about three months old, they are starting to take solid food but they will not be fully weaned from their mother until they are 2-3 years old.

### THE CURIOUS BEAR

During the time they spend with their mother the cubs' main task is to grow and to learn. Polar bears are curious animals. They watch their mother as she hunts for seals on the sea ice. They don't hunt themselves, she provides all the food for them, but they are learning hunting techniques from her. Cubs won't leave their mother until they can fend for themselves. Even with all the mother's care, only 50% of the cubs survive their first year. More will be lost in that dangerous period when they first leave their mother to make their way alone.

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## THE HUMPBACK WHALE

### HUMPBACK WHALE FACTS...

- Humpback whales breed when they are around 4-6 years old
- gestation takes 11-12 months
- at birth they are 10-15 feet (4-5 meters) long and weigh up to 1 metric ton
- a female usually gives birth to 1 calf every 1-3 years
- calves drink 160 gallons (around 600 liters) of milk a day
- calves are weaned around 5 months
- calves stay with their mothers for at least 2 years
- Humpback whales grow to be about 52 feet (16 m) long, weighing 25-40 metric tons
- Humpbacks can live to around 45-50 years

### THE SINGING WHALE

Humpback whales breed in the warm tropical waters just north and south of the Equator. It's here that the male whales sing their long and complex, eerily beautiful songs. Why or how Humpbacks sing is still unknown. Both males and females do it, though only males sing the lengthy intricate songs. It seems possible it is related to communication and in the case of the songs sung in the breeding season, connected in some way with mating.

During the breeding season Humpbacks demonstrate courting behaviors like rubbing and stroking each other and slapping the water with their fins. Once they have mated, it is left to the females to raise the young.

### MOTHER LOVE

A Humpback calf is born near the surface and instinctively swims towards fresh air to take its first breath. Like all whales, Humpbacks breathe air. They breathe through two blowholes on the top of their heads and need to "spout" at the surface several times a minute or more after they've surfaced from a deep dive. A Humpback mother will use her flippers to help her calf to the surface, but within thirty minutes of being born, the calf will be able to swim.

The calf suckles on its mother in tropical seas for four to five months. During this time it grows rapidly. Its mother's milk is high in energy. For these months the mother cannot feed at all. The waters don't contain enough food. She survives on her blubber.

Once the calf is strong enough, it will join its mother on the yearly migration of thousands of miles to the polar waters in order to feed. The mother and calf stay together for up to 2 years. During that time the young whale will learn from its mother where the best feeding grounds are and the migration routes it will use in the future.



## THE MANDARIN DUCK

### MANDARIN DUCK FACTS...

- the Mandarin duck breeds in eastern Siberia, China, and Japan and winters in southern China and Japan
- there are some sedentary pairs residing in the United Kingdom
- Mandarins do not pair for life; males find new mates every breeding season
- a Mandarin clutch ranges from 9-12 eggs laid at daily intervals
- incubation lasts 28-29 days
- chicks fly when about 40-45 days old

Mandarin ducks breed in woodland areas near lakes, marshes or ponds. They always build their nests in a hole in a tree up to thirty feet from the ground. The female lines the nest with down.

## HIGH DIVING DUCKS

In **earth** the Mandarin chicks are seen leaving the nest in spectacular style! When all the eggs are hatched, the mother calls to them from the ground. Each chick crawls out of the hole and launches itself into a free fall. Astonishingly, all the chicks land unharmed and head for the nearest feeding ground. A Mandarin duck's diet is made up of water plants, rice and grains. Once they can fly the chicks will leave to join a new flock.



## THE BIRD OF PARADISE OF PAPUA NEW GUINEA

### BIRD OF PARADISE FACTS ...

- there are around 40 different Bird of Paradise species in Papua New Guinea, each with a different display
- males of some species take up to 5 years to mature and acquire their spectacular plumage: feathers ruffs, elongated and elaborate sets of feathers, head plumes and breast plates, etc.
- females breed in their second year
- after mating a female builds a nest and raises the 1, 2 or perhaps 3 young alone
- it is thought that Birds of Paradise are relatively long-lived birds, with some species living for more than 12 years

### PUTTING ON A SHOW

Courtship for Birds of Paradise has been elevated to an art form: a piece of theatre. Fruit is relatively abundant in the Papua New Guinean rainforest that is their habitat. As a result, the birds don't need to spend a lot of time searching for food and females don't need males to help them feed or protect their young. This has left the males with time to spend on the business of courtship, which has evolved into gaudy visual and auditory displays worthy of the most spectacular musical on stage or screen!



Some males display alone and some in groups. **earth** has a front-row seat for the display of the male Six Plumed Bird of Paradise. Technical developments in filming have made it possible to see the details of this display, which takes place in the low light of the forest floor. Every showman needs a stage, and the Six Plumed is no exception. He first builds his dance floor, clearing a small patch of forest floor of leaves and twigs, and pruning the surrounding branches of leaves. He doesn't want anyone to have a restricted view! He needs all visiting females to get a good look at his performance. If any undesirable leaf lands on his stage he will jump to remove it just in case it deters a choosy passing female!

The Superb Bird of Paradise, also seen in **earth**, takes a different approach. He relies on sound to advertise his show before he even begins. Once he has a female's attention he uses a combination of sound and his newly revealed iridescent plumage to woo her: with, or without, success!



## LIFE CYCLES: ACTIVITIES

### GRADES K-2: ALL KINDS OF BABIES

#### Learning objectives:

- to understand that humans are animals
- to understand that animals grow and change as they get older

**earth** features charming and fascinating sequences of animals caring for their young and can provide younger children with an exciting springboard from which to begin thinking about animal reproduction and growth.

#### Tasks

1. How many different animals can children remember seeing with their babies in the film? Who can remember the most? Can they make a list of them? What do they remember about what they saw them doing? Draw pictures of scenes from the film and write captions describing what is happening.
2. Using this list of animals in **earth**, begin collecting pictures for a scrapbook of the animals and their babies. Compare the adult with the baby animal. How are they different? How are they the same?
3. Choose one of the animals featured in the film and find out more about it to add to the scrapbook. What is it like when it's born? Can it see? How big is it? Can it walk?
4. Write a story about a baby animal that loses its mother. How does it find her again?
5. Many children will already have knowledge of animal reproduction and rearing that they have acquired perhaps from working animals if they live in an agricultural context, from pets, or from observation of wildlife in their immediate environment. They can include information on "Animals I Know" in their scrapbook.
6. The baby animals in **earth** all resemble the adults physically, but this is not true of all babies. Can children think of any baby animals that do not look at all like the adult animal? (tadpoles and frogs, caterpillars and butterflies)
7. Can the children compare themselves and their brothers and sisters with the animals they see in **earth**? In what ways are human babies like the animal babies and in what ways are they different?





## GRADES 3-6: GROWING UP

### Learning objectives:

- to understand that animals produce offspring that grow from young animals to adults and then reproduce themselves
- to understand that in every life cycle there are distinct processes and stages

The animals in **earth** shown with their young are mainly mammals and birds. The film provides a good opportunity for older children to explore the nature of mammalian reproduction and contrast this with bird reproduction.

### Tasks

1. Focus on one of the mammals in **earth** and explore how the baby changes as it grows. Then, write the mammal's life story from birth to the time when it reproduces itself. Tell the story in pictures with each stage of the growing animal's life shown in a different frame and captioned. Turn the drawings into a picture book.
2. Focus on the sequences featuring the mammals (Polar bear, caribou, elephant, whale). What do the cubs and calves have in common and what is different about them (e.g., they are born 'live', they suckle their mothers, they stay with their mothers for extended periods, they are warm-blooded, but they are very different in size when born, their mobility is very different etc.)? Create a chart of similarities and differences.
3. Focus on one of the mammals and compare the baby with a human baby. Create a timeline for the first five years in each of their lives. How are they similar and how are they different? Make a list of the similarities and differences.
4. Use the Mandarin duck sequence as the focus for studying a bird life cycle. How is it different from that of a mammal?
5. How do the mothers in the film care for their young? What needs do the offspring have that their mother must fulfill? The film shows how well a mother animal cares for her offspring. Why do children think this drive in a mother animal is so strong? What would happen if it was not? This will introduce the idea of survival of a species.
6. Design a new Bird of Paradise. How will it display? Create the bird using brightly colored art materials.



## **GRADES 7-12: ENDANGERED**

### **Learning objectives:**

- to investigate how a species becomes endangered
- to explore the role of international cooperation in the protection of endangered species

For a species to survive it must reproduce. These species provide an ideal focus for a discussion of how a species' population can begin to fall, become endangered and can recover. These stories demonstrate how human actions can both threaten and save another species.

### **A GIANT UNDER THREAT: THE AFRICAN ELEPHANT**

For thousands of years elephants have been exploited for their ivory tusks. Humans have been hunting elephants ever since the two came into contact, but it became widespread in the 19th and 20th centuries with the use of guns. In just one country, Kenya, the elephant population fell from 167,000 in 1973 to 19,000 in 1989. Although hunting has decreased since the ivory ban came into effect in 1990, it still continues.

Hunting fundamentally changes the structure of elephant populations. The adult males and the matriarchs of a herd are most frequently

the target of hunters because of their large tusks. This has left so few males in some areas that female elephants may be unable to find a mate in order to breed. The death of a matriarch impacts the herd as a whole since she is the holder of so much knowledge. She needs to pass that on to younger members of the family unit she leads if it is going to survive and members are going to reproduce.

Loss and fragmentation of their habitat is also putting elephant populations at risk as human settlement takes over land that was once the elephants' range bringing elephants and humans into direct conflict. Where elephants do damage to agriculture, water supplies or even people, they may be killed.

### **ON THE VERGE OF EXTINCTION: THE AMUR LEOPARD**

The territory of the Amur leopard is in north-east Siberia near North Korea. A census of the Amur leopard in February and March 2007 showed that less than 40 of these animals remain in the wild. The census recorded four leopard litters, which means that the existing population can still restore itself. However, for the long-term survival of the species a population of one hundred animals is needed.

A series of factors are quoted as being responsible for this catastrophic decline in numbers: the encroachment into the leopard's territory of human settlement, the building of

## Life Cycles – Activities



roads, poaching of the leopard for its beautiful pelt, the intensive exploitation of forests through logging and the impact of climate change. The Russian World Wildlife Fund is calling for the establishment of a protected area with national park status to protect the leopard. The difficulty is that large predators need large tracts of land on which to live. An adult leopard home range can be up to 200 sq miles (around 500 sq km) and typically includes forested land and deer. Deer, along with hares and badgers, are now found in lower numbers on the Amur leopard's range reducing the availability of its prey.

In early 2007 the Russian government decided after years of discussion and campaigning by wildlife groups that it would not permit an oil pipeline to be driven through the territory of the Amur leopard saying that the impact of the pipeline would have too damaging an impact on the Amur Bay and its wildlife populations.

### **BACK FROM THE BRINK: THE AMUR TIGER**

In the 20th century the Amur tiger nearly died out. By the 1940s just 40 remained. But according to recent data from the World Wildlife Fund, the tiger population in the Sihote-Alinn mountains on the Russia-China border is now up to somewhere around 500. The tiger has made its recovery following a co-operative effort between Russia and China. The Soviet Union, as it then was, introduced

a ban on poaching tigers in the 1950s and the Chinese government supported a global ban on tiger products.

However, tiger's hides can still command good prices in the black markets of northeast China. Therefore, poaching continues to be a source of income for impoverished local populations. The Russian World Wildlife Fund recently warned that the species continues to be critically endangered and would be at risk if China succeeded in lifting the global ban on tiger products.

### **Tasks**

- 1.** Compare the plight of the African elephant and the Amur leopard. What factors have threatened the survival of these animals? Are the factors affecting the elephant and the leopard the same or are there differences? Taking each of the factors in turn, discuss which are easier or more difficult to deal with.
- 2.** Discuss the case of the Amur tiger. How did the actions taken internationally restore the tiger population?
- 3.** What strategies do students think could be used to bring about an increase in the Amur leopard or African elephant populations? Students can investigate conservation projects mounted in the past and present to safeguard and renew the population of other endangered species to see if they could be applied to these animals. Which might be appropriate and which would be discounted?
- 4.** Having investigated strategies, students can write their own 10-point plan to secure the future of the Amur leopard and/or the African elephant.

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