BBC

planet earth

as you've never seen it before

A **STUDYGUIDE** BY ANDREW FILDES

1

FROM POLE TO POLE

AUSTRALIAN TEACHERS OF MEDIA INC.

www.metromagazine.com.au

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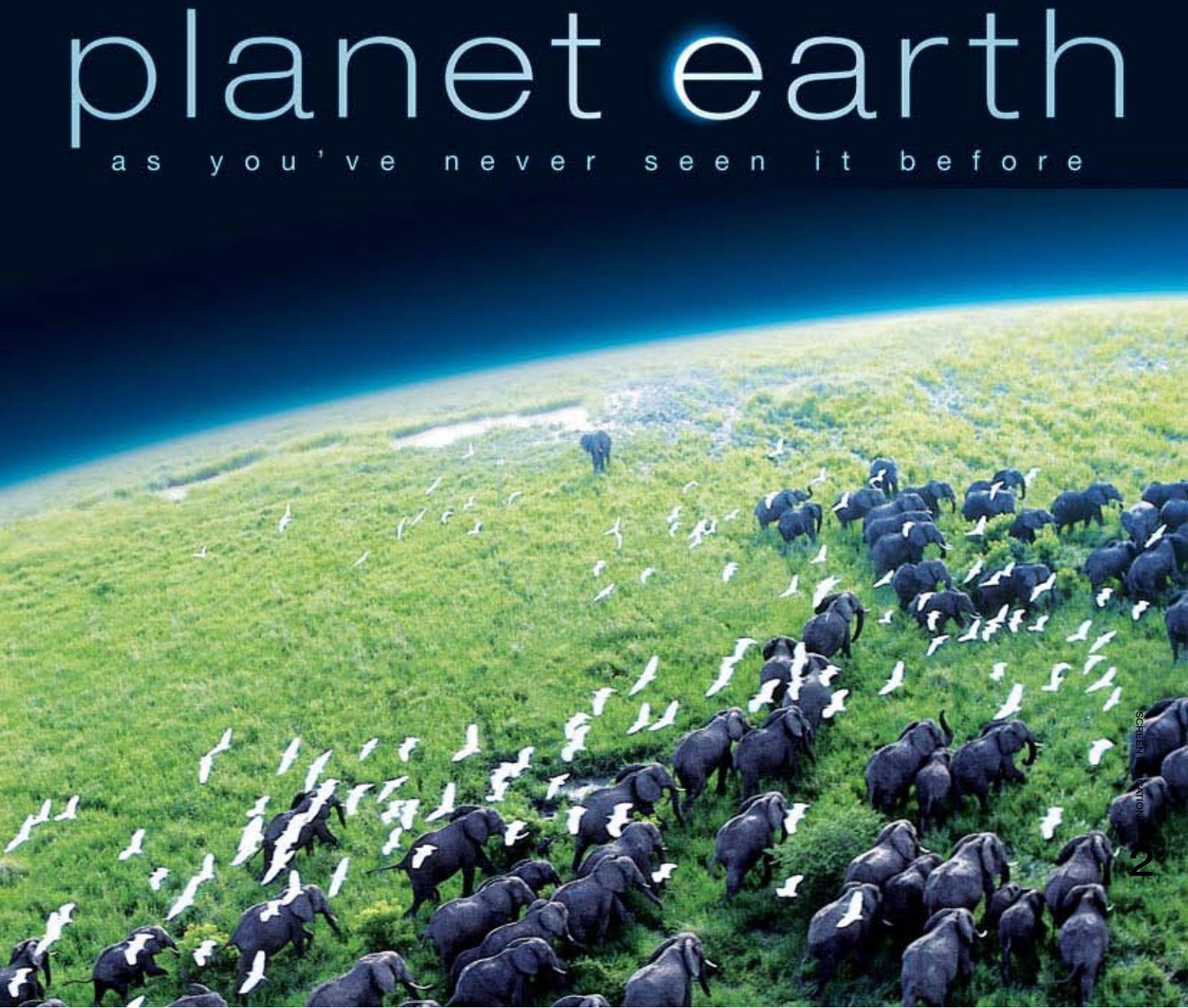
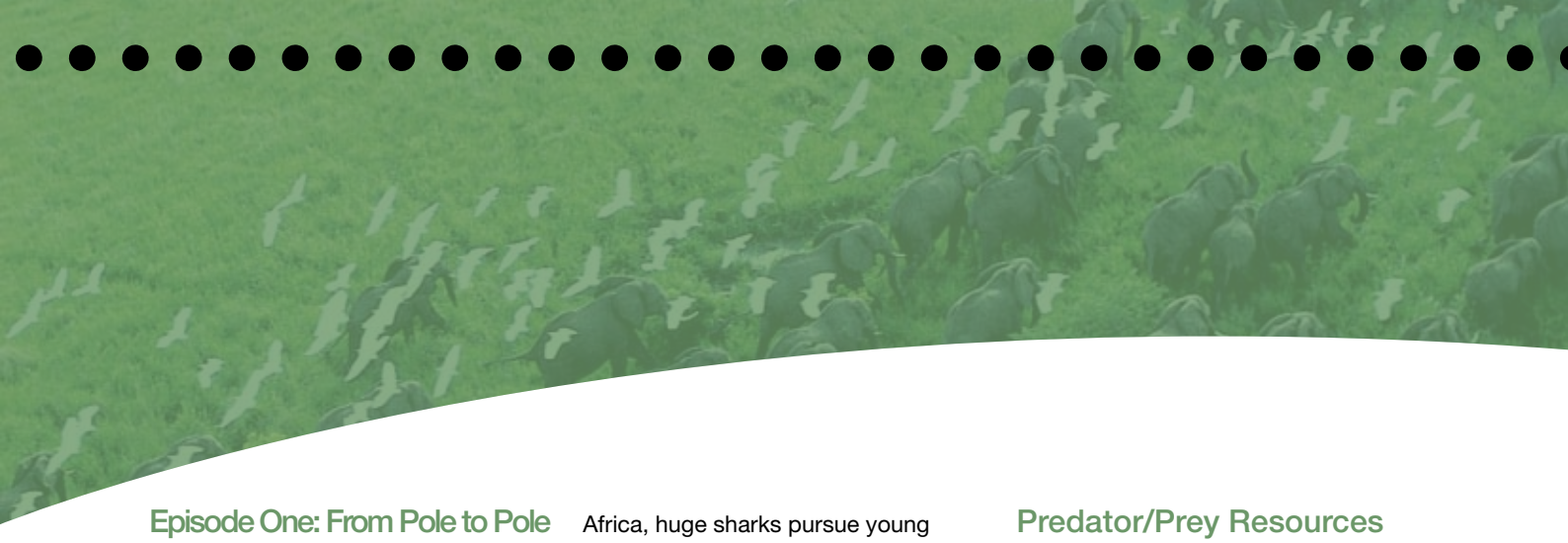
Overview

Planet Earth is a BBC production with five episodes in the first series, and a second series to follow in 2007. Each episode examines a range of environments, focussing on key species or relationships in each habitat, the challenges they face, the behaviours they exhibit and the adaptations that enable them to survive. Recent advances in photography are used to achieve some spectacular 'first sights' – in particular, stabilized aerial photography gives us remarkable views of migrating animals and the techniques used by their predators to hunt them.

The series is suitable for middle secondary students studying Science and SOSE/HSIE, and for senior secondary students of Biology, Environmental Science and Geography.





Episode One: From Pole to Pole

The first episode draws us from one extreme to another, through a descending chain of environments that provide unique challenges and opportunities for the animals that inhabit them. Species that have adapted to climatic extremes of cold, aridity and flood that would soon kill even their close relatives.

As the Antarctic winter closes in and the emperor penguins prepare for the ordeal of endless night and cold, the sun finally lights up the Arctic Ocean and a female polar bear leads her cubs out of the den where they have hibernated and on to the icy slopes. They must hunt and kill soon but the sea ice is beginning to fracture and break under the sun's warmth. The cubs are too young to travel far but if they do not, they will die. There are many such dilemmas in nature.

Further south, the caribou begin their great migration across the Tundra, pursued by Arctic wolves also desperate for a kill. As so often, the animals are closely matched in a contest between speed and skill, agility and stamina. We descend into the Taiga, the northern forests which teem with life in summer but are barren in winter. The Amur leopard, rarest cat on earth searches the barren forest for a corpse or a kill to feed her precious cub, both of them thickly furred against the cold and among the last survivors of their species. Meanwhile the birds of paradise in New Guinea know nothing of this annual struggle to survive. For them, food is plentiful all year round and they are free to indulge in bizarre and lengthy courtship rituals instead.

In the coastal waters of Southern Africa, huge sharks pursue young seals and 'breach', hurling themselves clear of the water in an astonishing display of speed and power. Above the sun-warmed ocean, the storm clouds rise and move inland, bringing torrential rains to the dry lands and filling the swamps again. Herds of elephant migrate across the desert in search of water and the Okavango swamp while packs of hunting dogs chase down impala in the Kalahari.

At last we return to the penguins huddled on the Antarctic mainland, eggs and chicks on their feet and out of reach of predators at last – but at what cost?

Episode 1: From Pole to Pole	Time Log
Intro and Penguins	00:00 - 03:10
Polar Bears	03:10 - 08:35
Caribou and Wolves	08:35 - 12:50
Taiga (Boreal Forest)	12:50 - 14:40
Broadleaf Forest Summer	14:40 - 16:30
Amur Leopard	16:30 - 18:10
Cherry Blossom to Autumn	18:10 - 20:25
Migration of Baikal Teal	20:25 - 21:05
Tropical Rainforest	21:05 - 22:20
Birds of Paradise	22:20 - 25:05
Sharks and Seals	25:05 - 29:45
Storm and Monsoon	29:45 - 32:00
Elephant Migration	32:00 - 35:30
Okavango Swamp	35:30 - 39:30
Dogs and Impala	39:30 - 43:45
Elephants Arrival	43:55 - 46:25
Emperor Penguins	46:30 - 48:12

(TIMINGS ARE APPROXIMATE)

Predator/Prey Resources

Teacher links

http://www.globalchange.umich.edu/globalchange1/current/lectures/predation/predation.html
http://www.pbs.org/edens/etosha/cr_lesson_jackal.htm

Student Links

http://www.admin.mtu.edu/urel/PressReleases/feature/wolves/wolf.html
http://necsi.org/projects/evolution/co-evolution/pred-prey/co-evolution_predator.html
http://www.biologyreference.com/Po-Re/Predation-and-Defense.html

Species List

- Emperor Penguin – *Aptenodytes forsterii*
- Polar Bear – *Ursus maritimus*
- Caribou – *Rangifer tarandus*
- Arctic Wolf – *Canis lupus arctos*
- Amur Leopard – *Panthera pardus amurensis*
- Baikal Teal – *Anas formosa*
- Blue Bird of Paradise – *Parotia lawesi*
- Superb Bird of Paradise – *Lophorina superba*
- Great White Shark (White Pointer) – *Carcharodon carcharias*
- African Elephant – *Loxodonta africana*
- African Buffalo – *Syncerus caffer caffer*
- Wattled Crane – *Bugeranus carunculatus*
- Lechwe (antelope) – *Kobus lechwe*
- Baboon – *Papio ursinus*
- Hunting Dog – *Lycaon pictus*
- Impala – *Aepycerus melampus*

1

Blackline Master | *Planet Earth* | Episode 1: From Pole to Pole

Viewing Questions

1 a

1. What do the emperor penguins do to survive the winter?

2. What is the main problem for the polar bear mother?

3. What is a bear cub's chance of surviving its first year?

4. What is the size of the caribou herd?

5. In which nation do we see the bears and the caribou migration?

6. How far will the wolf chase the caribou calf before giving up?

7. What kind of trees are found in the Taiga?

8. How do the broad-leaf trees differ from the trees of the Taiga?

9. The Amur leopard is the rarest cat in the world. How many are left in the wild?

10. Where do the Baikal teal (ducks) migrate from … and to?

11. How many species of bird of paradise are there in New Guinea?

12. Why can they spend so much time dancing?

13. What advantage does a seal have when it is chased by a shark?

14. What proportion of the land area of the planet is desert?

15. Where is the Kalahari Desert?

16. What are the elephants searching for?

17. Why are the hunting dogs so successful?

18. The dogs have stamina – what advantage does the impala have?

19. How often does the dog pack kill?

20. Why do the emperor penguins break up the huddle?

Case Study | *Planet Earth* | Episode 1: From Pole to Pole

Ecology

2a

Moose and Wolves on the Isle Royale

Isle Royale is a large island, a 500 square kilometre Canadian National Park in Lake Superior. It is forested and supports populations of moose and wolves. It has become one of the best studies of the relationship between a predator and its prey – the wolves live off small mammals and off the moose population, taking young, old and sick animals – a full grown, healthy 400kg moose is too aggressive and strong for a wolf pack to bring down without injury to the dogs. Because neither the wolves nor the moose leave the park and new animals cannot easily reach it, it is an ideal study. The two populations are isolated. The moose had reached the island across the 30km channel in about 1900, either by swimming or across the ice in winter. They bred to high levels of several thousand over the next thirty years, without predators and ate all the available food – in the 1930's the population suddenly crashed to a few hundred until a fire helped the vegetation to recover.

Wolves reached the island across the ice in 1949 and quite quickly the two populations balanced at around fifty wolves and approximately 1,000 moose. The wolves were maintaining the moose population at a sustainable level by predation. In 1980 to 1982, the island's population of fifty wolves suddenly dropped to just fourteen or less. It is believed that hikers brought a canine virus to the island on their boots. The population was reduced to that level throughout the 1990's with only one successful breeding female left. Within fifteen years the moose population had exploded to 2,500 and then plunged to below half that, due to a combination of a severe winter and the feeding pressure on the food supply – they had eaten themselves out as their rate of consumption exceeded the rate of forest regeneration.

The wolf population appears to be recovering slowly as the virus has died out. It is hoped that a balance will be re-established between the predator and its prey but as all the young wolves are now descended from one female, there may be a problem with genetic variability.

Full story: **http://www.admin.mtu.edu/urel/PressReleases/feature/wolves/wolf.html**

Activities

- Graph the changing populations of the two animals from the figures on Table 1 on the same linear graph with the two in different colours.
- Write a short comment on the relationship between the two populations. What happens to the wolves as the moose population fluctuates?

Moose										
1960	1965	1970	1975	1980	1985	1990	1993	1995	1996	1997
500	520	1300	1350	1000	1050	1200	1800	2400	1400	650
Wolf										
1960	1965	1970	1975	1980	1982	1984	1988	1995	1996	1997
21	25	18	42	51	14	25	12	20	22	29

TABLE 1

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Predator/Prey Relationships (Senior Level Biology)

3a

Discussion Questions

Often we are fascinated and repelled by the skill and murderous power of the predator, the organization of the wolf pack or the sheer terror of a shark attack. We even sympathise with the cute victim. But the predators are less numerous, often endangered and struggling to survive.

1. Why are there so few predators compared to the animals that they hunt?

2. Why do predators tend to target the old, the young and the sick?

3. In what way does a predator actually help the species that it kills and eats?

4. What might happen if you took the predators out of a habitat – if the wolves disappeared from the Tundra or the sharks from the area of the seal colony?

5. Polar bears are a top predator – they are at the top of their food chain in this habitat. They eat seals. Complete the chain with three more levels below them

Polar bear

↓

Seal

↓

_____ ?

↓

_____ ?

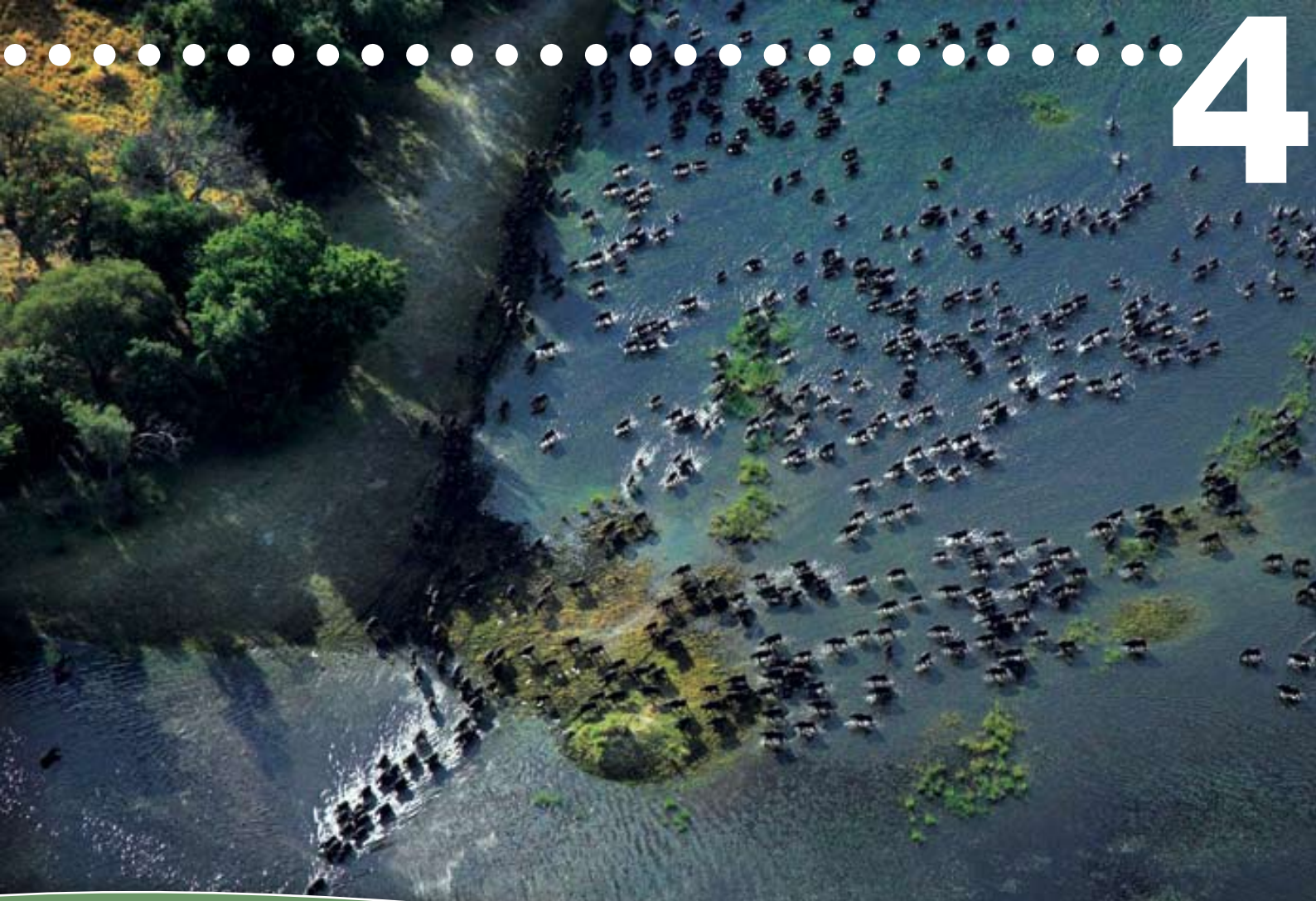
↓

_____ ?

3b

Extension Task

Construct a food web for the Okavango swamp. Research the predators and herbivores that live in southern Africa and add them to the ones that you saw in the film to build your typical web.



4

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SOSE – Geography

4 a

Use an atlas and a dictionary to find the habitats mentioned in the film and mark on the map above:

A. Where the polar bear might have her den
B. Where the caribou cross the Tundra
C. Where the Taiga grows
D. Where the Amur leopard lives (hint: look for the Amur River)
E. Where you could watch the birds of paradise
F. The position of the Kalahari Desert
G. The Okavango swamp
H. The rookeries of the emperor penguins

Research Activity

This is a wide range of habitats and climate zones. Australia and New Zealand also have a wide range of climates and habitats – list where these habitats might be found in this region with the help of your atlas and suggest a key animal or two for each one.

a) Desert
b) Winter snow above the tree line
c) Seal colonies and great white sharks
d) Tropical rainforests
e) Frozen areas with seals and penguins

ANSWER SHEET

Viewing Questions

1. The penguins huddle to keep warm
2. Leaving with the cubs before the ice breaks up
3. Around a fifty per cent chance of survival
4. 3 million caribou migrate
5. Northern Canada
6. One mile (1.6km) before giving up
7. Coniferous (pine) trees
8. They are deciduous – they shed their leaves in winter
9. Only forty Amur leopards are left in the wild
10. Teal migrate south from Siberia to Korea
11. Forty-two species of bird of paradise
12. Because food is easy to find
13. The seal can turn faster, it's more agile
14. One third is desert and growing
15. The Kalahari is in south-west Africa
16. Elephants march seeking water
17. Teamwork – dogs hunt together in an organized method
18. Speed, they are faster than dogs and can run further
19. Once every day the pack shares a kill
20. The penguin's eggs hatch

Predator/Prey Relationships

1. They are at the top of the food web/chain. Each individual top predator needs a large area to provide its food requirements.
2. They take less energy to catch, they are more likely to succeed and they are less likely to injure the hunter in the final struggle.
3. It removes the old, sick and injured, leaving more food for the healthy animals. It reduces the number of young, keeping the population under control.
4. The population of caribou or seal would boom, they would eat all the available food – exceed the carrying capacity of the habitat – and they would starve.
5. Polar bear
   Seal
   Large fish
   Small fish, Zooplankton
   Phytoplankton, Algae

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