

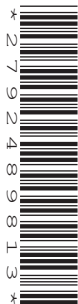
**For issue on or after:
Monday 17 November 2025**

**Level 3 Alternative Academic Qualification
Cambridge Advanced National in Applied Science**

H151 Unit F181: Science in society

Pre-release material

**To prepare candidates for the examination taken on
Wednesday 14 January 2026 – Afternoon**



INSTRUCTIONS

- Do **not** take this insert into the exam.
- Do **not** take any notes into the exam.

INFORMATION

- A clean copy of this pre-release will be given to you with the question paper.
- A wider understanding of the topics and issues raised in the pre-release material would be beneficial for the assessment.
- You are not required to understand any detailed scientific explanations beyond that outlined in the pre-release material, and in the mandatory units of the specification (Units F180, F181 and F182).
- We recommend that you spend approximately 3–4 hours detailed study on this pre-release material.
- This document has **8** pages.

Source A

Adapted from 'Climate change: polar bears face starvation threat as ice melts'

**(By: Matt McGrath, Environment correspondent, BBC News
<https://www.bbc.co.uk/news/science-environment-68253819>, published 13 February 2024)**

Some polar bears face starvation as the Arctic sea ice melts because they are unable to adapt their diets to living on land, scientists have found.

The iconic Arctic species normally feed on ringed seals that they catch on ice floes offshore.

But as the ice disappears in a warming world, many bears are spending greater amounts of time on shore, eating birds' eggs, berries and grass.

However the animals rapidly lose weight on land, increasing the risk of death.

The polar bear has become the poster child for the growing threat of climate change in the Arctic, but the reality of the impact on this species is complicated.

While the number of bears plummeted up to the 1980s this was mainly due to unsustainable hunting.

With greater legal protection, polar bear numbers have risen. But increasing global temperatures are now seen as their biggest threat.

That's because the frozen Arctic seas are key to their survival.

The animals use the sea ice as a platform to hunt ringed seals, which have high concentrations of fat, mostly in late spring and early summer.

But during the warmer months many parts of the Arctic are now increasingly ice-free.

In Western Manitoba where this study was carried out, the ice-free period has increased by three weeks between 1979 and 2015.

To understand how the animals survive as the ice disappears, researchers followed the activities of 20 polar bears during the summer months over a three-year period.

As well as taking blood samples, and weighing the bears, the animals were fitted with GPS-equipped video camera collars.

This allowed the scientists to record the animals' movements, their activities and what they ate.

In the ice-free summer months, the bears adopted different strategies to survive, with some essentially resting and conserving their energy.

The majority tried to forage for vegetation or berries, or swam to see if they could find food.

Both approaches failed, with 19 of the 20 bears in the study losing body mass, by up to 11% in some cases.

On average they lost 1 kg per day.

"Regardless of which strategy they were trying to use, there was no real benefit to either approach as far as being able to prolong the period that they could survive on land," according to lead author Dr Anthony Pagano, from the US Geological Survey in Alaska.

“Polar bears are not grizzly bears wearing white coats,” said co-author Charles Robbins from the Washington State University Bear Centre.

“They’re very, very different.”

Two of the three bears that took to the water found carcasses of dead animals but spent only a short time eating, as they were too tired from their exertions.

“One sub-adult female found a dead beluga whale, she took a couple of bites from it, but she mostly used it as a buoy to rest on,” Dr Pagano told BBC News.

“It really suggests to us that these bears can’t eat and swim at the same time.”

An intriguing finding in the study was that one bear gained 32 kg in weight.

The researchers believe that this bear, who had spent much of his time resting and conserving his strength, was fortunate to stumble across an animal carcass.

While previous research has outlined the challenges that climate poses over the decades to come, this new work raises important questions about the species’ ability to adapt.

However other researchers say the impacts of climate change on polar bears would differ, depending on location.

“It is likely polar bears will disappear from areas where sea ice will be lost in future, but difficult to say just when and where,” said Jon Aars from the Norwegian Polar Institute who was not involved in the study.

“Some areas will have good conditions for bears also many decades from now.”

“The area of this study is one where conditions may be very difficult for bears within a short time, if sea ice continues to disappear as predicted.”

The study has been published in Nature Communications.

Key polar bear facts

- There are about 26 000 polar bears left in the world, with the majority in Canada. Populations are also found in the US, Russia, Greenland and Norway.
- Polar bears are listed as vulnerable to extinction by the International Union for Conservation of Nature (IUCN), with climate change a key factor in their decline.
- Adult males can grow to be around 3m long and can weigh close to 600 kg.
- Polar bears can eat up to 45kg of blubber in one sitting.
- These bears have a powerful sense of smell and can sniff out prey from up to 16 km away.
- These animals are strong swimmers and have been spotted up to 100 km offshore, they can swim at speeds of around 10 km per hour, due in part to their paws which are slightly webbed.

Source B

Adapted from ‘Polar bear population decline the direct result of extended “energy deficit” due to lack of food’

(By: University of Toronto, Science Daily

<https://www.sciencedaily.com/releases/2025/01/250130161621.htm>, published 30 January 2025)

Study finds polar bears are struggling to get enough to eat in face of dwindling sea ice due to climate change. Researchers have directly linked population decline in polar bears living in Western Hudson Bay to shrinking sea ice caused by climate change.

University of Toronto (U of T) Scarborough researchers have directly linked population decline in polar bears living in Western Hudson Bay to shrinking sea ice caused by climate change.

The researchers developed a model that finds population decline is the result of the bears not getting enough energy, and that’s due to a lack of food caused by shorter hunting seasons on dwindling sea ice.

“A loss of sea ice means bears spend less time hunting seals and more time fasting on land,” says Louise Archer, a U of T Scarborough postdoc and lead author of the study.

“This negatively affects the bears’ energy balance, leading to reduced reproduction, cub survival and, ultimately, population decline.”

The “bio-energetic” model developed by the researchers tracks the amount of energy the bears are currently getting from hunting seals and the amount of energy they need in order to grow and reproduce. What’s unique about the model is that it follows the full life cycle of individual polar bears – from cub to adulthood – and compares it to four decades of monitoring data from the Western Hudson Bay polar bear population between 1979 and 2021.

During this period, the polar bear population in this region has declined by nearly 50 per cent. The monitoring data shows the average size of polar bears is also in decline. The body mass of adult females has dropped by 39 kg (86 lbs) and one-year-old cubs by 26 kg (47 lbs) over a 37-year period.

The researchers’ model provides a close match to the monitoring data, meaning it provides an accurate assessment of what is happening and will continue to happen to the polar bear population if it keeps experiencing sea ice loss and a greater amount of time in energy deficit.

“Our model goes one step further than saying there’s a correlation between declining sea ice and population decline,” says Péter Molnár, an associate professor in the Department of Biological Sciences at U of T Scarborough and co-author of the study.

“It provides a mechanism that shows what happens when there is less ice, less feeding time and less energy overall. When we run the numbers, we get a near one-to-one match to what we’re seeing in real life.”

Polar bear mom and cubs particularly vulnerable

The researchers, which include co-authors from Environment and Climate Change Canada, noted that cubs face the brunt of these climate-induced challenges.

Archer says that shorter hunting periods result in mothers producing less milk, which jeopardizes cub survival. The cubs face reduced survival rates during their first fasting period if they fail to gain enough weight.

Mothers are also having fewer cubs. Monitoring data shows cub litter sizes have dropped 11 per cent compared to almost 40 years ago, and mothers are keeping their cubs longer because they aren't strong enough to live on their own.

"It's pretty simple – the survival of cubs directly impacts the survival of the population," says Archer, whose research is funded through a Mitacs Elevate postdoctoral fellowship and the non-profit organization Polar Bears International.

Broader applications for the model

Western Hudson Bay has long been considered a bellwether for polar bear populations globally, and as the Arctic warms at a rate four times faster than the global average, the researchers warn of similar declines in other polar bear populations.

"This is one of the southernmost populations of polar bears, and it's been monitored for a long time, so we have very good data to work with," says Molnár, who is an expert on how global warming impacts large mammals.

"There's every reason to believe what is happening to polar bears in this region will also happen to polar bears in other regions, based on projected sea ice loss trajectories. This model basically describes their future."

The study, which is published in the journal *Science*, received funding from the Natural Sciences and Engineering Research Council of Canada and the Canada Foundation for Innovation.

Journal Reference:

1. Archer, L.C., Atkinson, S.N., Lunn, N.J., Penk, S.R., & Molnár, P.K. (2025). Energetic constraints drive the decline of a sentinel polar bear population. *Science*, 387(6733): 516–521. DOI: [10.1126/science.adp3752](https://doi.org/10.1126/science.adp3752)

**Copyright Information**

Cambridge OCR is committed to securing permission to reproduce all third-party content that it uses in its assessment materials. If Cambridge OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, Cambridge OCR will be happy to correct its mistake at the earliest possible opportunity. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the Cambridge OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

For queries or further information please contact The Cambridge OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

Cambridge OCR is part of Cambridge University Press & Assessment, which is itself a department of the University of Cambridge.