

Penguin Puzzle

Antarctica's chinstrap penguins are in decline, their demise a sign of greater changes at play. Now, scientists are trying to find out what's ailing this feathered trekker.

By Olive Heffernan

It is one of the most desolate places on Earth. The ice-capped mountain of Elephant Island is an inhospitable crag whose sheer cliffs feel the full force of the Southern Ocean on all sides. Yet, each December, this tiny Antarctic outpost transforms into a riot of sound and colour as tens of thousands of chinstrap penguins gather here to breed.

Nesting in rookeries almost 200m above the sea, these charismatic birds – named for the thin black line that gives them a helmeted appearance – stain huge swathes of the island pink with guano. The stench is matched in intensity only by the noise. “It’s like being in a football stadium – it’s an assault on your senses,” says Noah Strycker, one of four penguin biologists that I accompanied to this remote outpost in early January.

Elephant Island – so called because of the elephant seals that sprawl on its beaches, plus its distinctive, elephant-like shape – lies within the South Shetlands, an archipelago just north of the Antarctic Peninsula. The team from Stony Brook University, New York, sailed

to this chinstrap stronghold to survey the breeding population. The chinstrap may be the most abundant of Antarctica’s penguins, with an estimated 7.5 million breeding pairs, but their populations have plummeted in the past 40 years. Signy, Deception and Penguin Islands, for instance, have experienced declines of 50–70 per cent. By carrying out counts on Elephant Island, last surveyed in 1971, plus a string of other, little-studied islands, the team wanted to find out if the pattern was true elsewhere.

Bird’s-eye view

Day one involves scaling a 70m cliff to count one of the island’s largest colonies. Thousands of penguins gather in the amphitheatre-like space below, watching over their fluffball chicks, while others splash in an acrid pool. One solitary individual stands guard on a raised pinnacle, surveying the Southern Ocean like a sentinel. Occasionally, a brown skua descends and threatens to steal a youngster, its presence provoking piercing, murderous cries. At least once, it succeeds. ▶

James Lowery/FLPA

A quick glance at their markings and it's easy to see how chinstrap penguins got their name.



Protecting maritime Antarctica

Nations are currently considering a proposal to protect the waters around the western Antarctic Peninsula, where chinstraps live and forage for krill. The proposal for a marine sanctuary will be considered by CCAMLR (the Commission for the Conservation of Antarctic Marine Living Resources) in December 2020. One of the main goals of CCAMLR is to establish a network of nine marine sanctuaries in the Southern Ocean, to protect the thousands of unique species that live there and are found nowhere else – such as bioluminescent worms and pastel starfish as well as the better-known seals and penguins. ● bit.ly/pew-trust



“You have to hold poses, balanced on one toe on a slope greased with guano.”

Chinstraps, unlike the ice-loving emperors and Adélies, are built for a life at sea, spending nine months of the year fishing in the open ocean. They are agile swimmers, able to dive to 100m and venture up to 30km offshore. But when the breeding season rolls in, they transform into sturdy monochrome mountaineers.

We watch them waddle, hop and jump in twos and threes from their rookeries at the summit of tall, exposed cliff-faces, down ‘penguin highways’ to the frigid waters below, where they feast on krill to later regurgitate to their raucous chicks. “Chinstraps are tough – they can handle a real pummelling,” says team leader Steve Forrest, a veteran biologist with more than 25 Antarctic seasons under his belt.

When it comes to breeding, chinstraps have a classic co-parenting arrangement. Typically, the male builds a fresh circular nest from pebbles, and, once the eggs have hatched, the parents take it in turns to hunt and mind the chicks. They return to the same nest site each year to breed, which makes them monogamous by default. “It’s more a case of shared

real estate,” says Steve. “They’ve essentially bought a house together, which they return to year after year – so, in all likelihood, they’ll end up with the same mate.” After several weeks, the chicks are large enough to enter a crèche, huddling with other youngsters while the parents hunt for food.

Tracking and tallying

To survey the breeding population, the scientists count the nests, not the birds themselves. The task is easier when family groups are still together, so timing is key. The chicks are just a few weeks old when we arrive and only slightly smaller than their parents, who average

Clockwise from above: the dramatic landscape of Half Moon Island in the South Shetlands; gentoo penguins fish from an iceberg; a southern elephant seal is an unwelcome visitor among nesting chinstraps; creating a nest from stones – the arrangement needs to be just so.

just 70cm in height. But what chinstraps lack in size, they make up for in aggression. “They are fierce birds,” says Steve. “They’ll fight over anything... a pebble, a space or access to a penguin highway.”

Counting penguin nests sounds serene, almost meditative, but comes with incredible challenges. A day’s work usually sees the scientists negotiating a tricky landing by Zodiac, often on an exposed, windswept shore, then – owing to the birds’ penchant for high and remote nest sites – scaling sheer cliffs, all the while keeping their distance, so as not to stress the birds. To complicate matters further, the penguins tend to cluster together, obscuring their stony abodes. “It is the most focused, exhausting and exhilarating thing you can do outdoors,” says Steve. “You have to hold statuesque poses, balanced on one toe on a slope greased with guano. You have to ignore the wind, the



snow and the racket of the thousands of birds around you and become part of the scenery. At any given moment, only one thing matters – nest or not?”

During a count, each scientist is allotted an area, which is then divided into smaller sections. Nests within each sub-section are counted three times using mechanical counters, with the figures only deemed valid if the variance is less than 5 per cent. “A good pace of counting is 1,000 nests an hour,” says Noah. “That’s when you’re really ticking along.”

It takes two weeks to survey and get a first estimate for the whole of Elephant Island, and the emerging numbers confirm the scientists’ suspicions: the chinstrap colonies here have also crashed. There are now just

52,786 breeding adults on the island, 56 per cent fewer than in the early 1970s. “This is the best window we have into the past 50 years for these birds,” says Steve. “It’s a very dramatic decline and it’s tragic.”

Departing Elephant Island, the team weaves around the South Shetlands, counting chinstrap nests at, among others, Low, Snow and King George Islands. Every day, the scientists trek across beaches and up cliffs, and everywhere the same pattern emerges, with breeding populations at about half their historic numbers. “There is no safe haven,” says Steve.

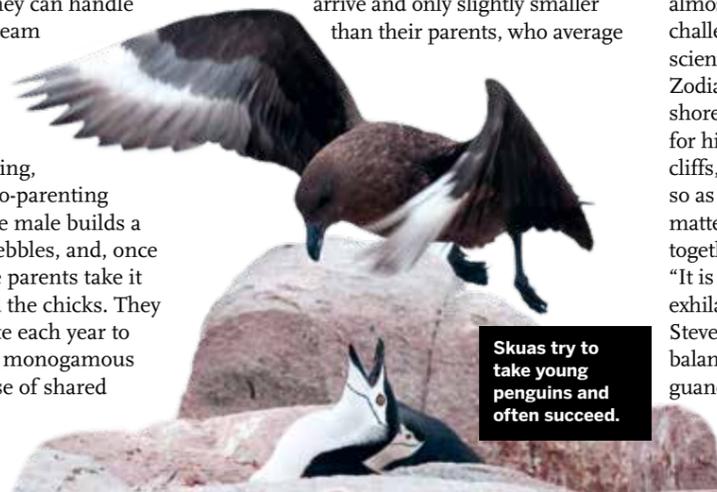
According to Heather Lynch, director of the penguin lab at Stony Brook University, the problem for these charismatic birds is that they exist in a sweet spot in offshore

Antarctica. Further north, they run out of krill; further south, it is too icy to build their stony nests. Heather thinks that chinstraps, considered a species of Least Concern, have remained off the radar because of their abundance. “People assume that there is safety in numbers – and there is, to a point,” she says. “But there have been spectacular collapses of species that we thought would never disappear, like the passenger pigeon. I think the term ‘collapse’ becomes a pretty reasonable description at this point – half of the population has disappeared in a very short period.”

Getting warm

There are several theories that could explain the decline of chinstraps, the most obvious being climate change. In fossil fuel terms, one of every eight carbon molecules emitted by a car’s exhaust ends up in the Southern Ocean, changing conditions for every living creature from plankton to blue whales. Around the Antarctic Peninsula, ocean temperatures have risen by 1°C since 1955, and the waters of the Antarctic Circumpolar Current – which flows west to east around the continent – are warming faster than the rest of the global ocean as a whole. On land, the situation is even more dramatic. Temperatures on the Antarctic Peninsula have soared by at least 3°C between 1950 and 2000, five times faster than anywhere else on Earth.

Chinstraps are part of a group known as the brush-tails, which includes gentoos (easily identified by their carrot-orange bills), and Adélies (the classic tuxedoed penguin of the cartoon world). Brush-tails have some commonalities, including a love of cold water



Skuas try to take young penguins and often succeed.

Skua: Graeme Snow/Alamy; Half Moon Island & iceberg: Abbie Taylor-Smith/Greenpeace; elephant seal: Otto Pantelina/Minden/PLP; nesting: Peter Barrett/Alamy

and a habit of building nests from stones. But warming temperatures are sending these species down very different paths.

Chinstraps and Adélies are stalwart krill feeders. These tiny shrimps thrive where there is plentiful sea-ice, feasting on the thick layers of nutritious algae that blanket its undersides. As the sea-ice surrounding the Antarctic Peninsula has receded southwards, so too have the krill, emptying the larder for the penguins that specialise on them. For gentoos, who've increased in number and range, a broader diet gives them a more competitive edge.

Food fight

But there may be other factors at play, also relating to chinstraps' restricted diet. One theory is that, in recent years, there's been an increase in competition for krill, and that chinstraps are being squeezed out of the buffet by their rivals. The humpback whale could be one such competitor. These voracious krill consumers were nearly hunted to extinction, but their numbers have recovered and are now close to pre-whaling levels.

There's no hard evidence that humpbacks are specifically invading traditional chinstrap

territories. But there is evidence of another invader – humans. Up to 20 nations fish the Southern Ocean. The most efficient vessels can now harvest up to almost 1,000 tonnes of krill in a day.

Scientists are divided on how much of a problem this poses for chinstraps. "The amount of krill that is allowed to be harvested is small in relation to consumption by penguins and whales," says Phil Trathan, an ecologist at the British Antarctic Survey. "So, the fishery will not affect the krill stock at the current level of harvesting."

But most krill fishing is concentrated around the maritime islands of Antarctica, where mammals and birds, including chinstrap penguins, live. And that could be a problem, says Jefferson Hinke, a penguin biologist with the US National Oceanic and Atmospheric Administration in La Jolla, California, whose own work has shown steep



declines in chinstrap populations around Livingston and King George Islands. "Fishing is tightly concentrated in areas where predators forage," he says. "So, the amount of catch being taken is actually not a small amount of what's available – it's enormous." Phil agrees that if fishers harvest intensely offshore of a particular penguin colony, those birds could be affected.

Some scientists feel that fishers should not be allowed to compete directly with wildlife struggling to cope with a changing climate. "Regardless of whether fishing is the cause, a 50 per cent reduction in chinstraps certainly suggests that a big change in management is needed," says Steve Forrest.

Whatever the cause of the chinstrap's decline, the demise of these creatures signals that something is severely amiss. "There used to be a lot more chinstraps, and that means that the ocean is now functioning in a different way," says Heather Lynch. "We need to understand this, because we depend on the ocean as much as the penguins do."



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FIND OUT MORE Facts about penguins: discoverwildlife.com/penguin-facts

Clockwise: chinstraps can swim at speeds up to 30kph; these birds typically have two chicks per brood; they might not be able to fly but that doesn't

stop them getting airborne above the waves; a leopard seal preys on a penguin – shaking it to separate the flesh from the skin – off Elephant Island.

Chinstraps are being squeezed out of the buffet by their rivals.

WARMING ANTARCTICA THE WINNERS & LOSERS

Antarctica is experiencing climate change faster than anywhere else on Earth, with profound impacts.

WINNERS

King penguin

Kings are adept swimmers, routinely diving over 100m in search of fish and squid. Preferring to forage in open waters, they are expected to benefit from Antarctica's retreating sea-ice. Already, these elegant birds are moving south, turning up in places such as Elephant Island.



Southern right whale

These large baleen whales feed on tiny copepod plankton. Once hunted to near extinction, their numbers are now on the rise and could rebound further still. As the waters around Antarctica warm and the sea-ice melts, conditions will ripen for plankton blooms, creating a veritable feast for these ocean giants.



LOSERS

Emperor penguin

The largest of penguins, emperors need ice for protection against predators, but too much ice is equally perilous, leaving them further away from their feeding grounds. If climate change continues at its current pace, more than 80 per cent of emperor colonies will have too few adults to successfully breed by 2100.



Antarctic fur seal

Committed krill eaters, these fur seals are expected to be particularly hard hit by the loss of sea-ice in Antarctic waters. A fur seal can eat more than 900kg of krill a year. Their changing environment is, however, taking a toll – fur seals are already showing signs of food stress, including females being born with a low birth weight and having their pups later in life.



Main image: Va Moratuk & John Eastcott/Mineral/NPL; chicks: Abbie Traylor-Smith/Greenpeace; leopard seal: Christian Islund/Greenpeace; swimming: Adam Cropp/Getty; king: Ben Crane/Getty; emperor: David Merron/Getty; fur seal: Michael Grant/Alamy; whale: Getty