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# Birds with Fins, Fish with Wings

**Pondering Penguins' Prospects** BY CHERYL LYN DYBAS  
PHOTOS BY ILYA RASKIN

The days are darkening in the Northern Hemisphere, but (way) down south, it's summer. Life has emerged from the austral winter, including those ambassadors of the Southern Hemisphere, penguins.

Few creatures have so captured our imaginations as these ungainly, flightless seabirds that dwell in some of the most inhospitable and inaccessible regions on Earth.

Penguins' evolutionary history is an incredible tale of success. The birds thrive in areas where most animals would quickly perish. But penguins are supremely well adapted to life in the deep freeze.

Explorers have long known that the closer one looks at penguins, the more fascinating they become. With that in mind, herein, a patchwork of penguinabilia—anecdotes about the birds, and scientists' unending quest to understand them.

**Don't look north.** All the world's 18 penguin species live in the Southern Hemisphere. Penguins have taken up residence in Antarctica, South Africa, South America, Australia, New Zealand, and the Galápagos Islands. There are no penguins at the South Pole, however, which lies 1,300 kilometers from the nearest ocean and a supply of penguin food.

**The krill-seekers.** An abundance of krill in south polar waters is largely responsible for the success of many penguin colonies in Antarctica. Small shrimplike crustaceans, krill swarm by the millions during the short austral summer, providing food for much of Antarctica's wildlife, including its penguins.

**King of the squid-eaters.** Another popular penguin dish is squid, which some penguins can't seem to get enough of. A king penguin chick, for example, can eat more than 2.5 kilograms of the cephalopods in one feeding. Its parents may take as long as four days, and more than 1,000 dives, to gather that much food, which they deliver to the chick in a regurgitated slurry. In the Falkland Islands, a British Overseas Territory, gentoo penguins are especially fond of Patagonian squid. One recent study—by Jonathan Handley of the Percy FitzPatrick Institute of African Ornithology in Port Elizabeth, South Africa, and colleagues—showed that Patagonian squid make up as much as one-quarter of

these penguins' diets. The results were published online on September 7, 2015, in the journal *Polar Biology*.

**Penguin nations.** According to Falklands Conservation, an organization in the Falkland Islands that works to conserve the region's biodiversity, places with the most penguin species are the Falkland Islands (five) and New Zealand (eight).

**Penguin omelet, anyone?** Once each year, Falkland Islanders are allowed to collect gentoo penguin eggs under a government license. Timing coincides with egg-laying dates in November. The egg-collecting is for personal consumption only, but the effects of eggging, as locals call it, on penguins are unknown. If their first eggs are swiped, penguins will go on to lay additional eggs. If penguins produce eggs too late in the season, however, the chicks may not survive.

**Where the penguin got its name.** The word penguin, first recorded in English in 1588, was probably given to the bird by early Spanish sailors because of the amount of fat (*penguigo*) on its body. The Welsh, however, claim the name comes





Penguins like these rockhoppers can “fly” through the water at speeds of more than 16 kilometers per hour.

from the Old Welsh expression *pen gwyn*, meaning “white head,” a reference to the now-extinct great auk of the Far North.

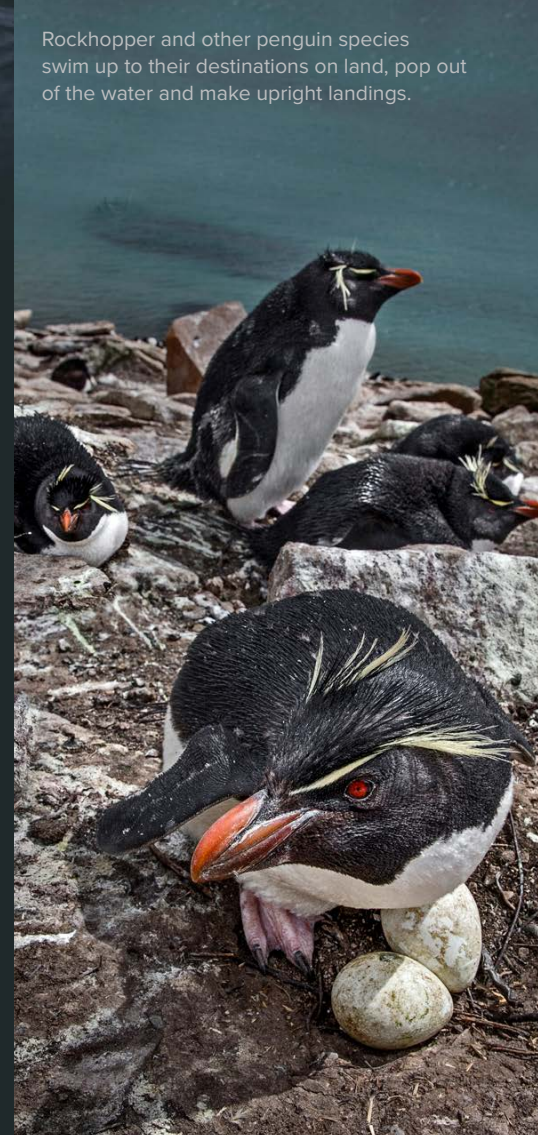
**First penguin in the literature.** The first penguin to find its way into the scientific literature was the African, also called jack-ass or black-footed, penguin. During a voyage to India in 1497, Portuguese navigator Vasco da Gama spied this species in Mossel Bay at the tip of South Africa. An anonymous writer aboard ship described the birds as being “as large as ganders and with a sound resembling the cries of asses which could not fly.” South Africa’s population of African penguins has been threatened by egg-gathering and oil spills from tankers that round the Cape of Good Hope. Some four million African penguins existed at the beginning of the nineteenth century. By 2000, that number had fallen to 200,000. In 2010, the total African penguin population was estimated at 55,000. If the decline continues, the penguins could go extinct in the next decade, scientists believe.

**Birds with fins, fish with wings?** Fossil records show that penguins could once fly but took to the sea 60 to 70 million

years ago. Over time, their wings evolved into narrow, bony flippers, a trait that understandably confused early Antarctic explorers, who classified the animals as fish, not birds. Though no longer capable of becoming airborne, penguins can “fly” through water. Using their finlike wings and rudderlike feet, they turn split-second undersea cartwheels and race at speeds of more than 16 kilometers per hour. Unlike other birds, whose hollow, lightweight bones help them fly, penguins have solid bones better suited to life in the water. The extra weight provides ballast for deep dives in search of prey such as squid.

**A penguin giant.** As far as scientists know, the largest penguin that ever waddled stood 152 to 178 centimeters tall and weighed between 100 and 109 kilograms. Now found only as fossils in New Zealand and Antarctica, *Anthropornis nordenskjoldi* lived between 11 million and 25 million years ago. Researchers don’t know why this very tall bird—for a penguin—disappeared, but it may have lost out to competition for food from the newly emerging toothed whales of the time.

Rockhopper and other penguin species swim up to their destinations on land, pop out of the water and make upright landings.





**Of emperors and fairies.** The largest living penguin is the emperor, which, standing almost 1.2 meters tall and weighing 40 kilograms, is big enough to knock down a person. That's exactly what one did in 1914. When cornered by a crewman on the research ship *Endurance*, the bird jumped on the purser's chest, landing him on the deck, and escaped. On the other end of the size spectrum is the 1.4-kilogram, 38-centimeter little blue, or fairy, penguin of South Australia and New Zealand, a bird often heard mewing like a cat along beaches at night.

**Rare find in New Zealand.** One of the rarest of all penguins is the shy yellow-eyed species, which nests in the deep, damp thickets and forests of southeastern New Zealand. The birds face threats such as introduced predators: cats, rats, and pigs.

**Peaceful, though noisy, coexistence.** Other than the occasional theft of nest-building stones, penguin society is relatively calm, especially when one considers the number of birds that inhabit some rookeries. Millions of Magellanic penguins live along the coasts of Argentina, Chile, and the Falkland Islands. In the breeding season, the birds gather in large colonies of 20 nests per 100 meters. And in the South Orkney Islands off the Antarctic Peninsula, more than 200,000 Adélie penguins nest side by side.

**Why do penguins flock together?** Physical features of the environment, such as limited breeding space or a very localized food supply, may force penguins together in large nesting groups.

Communal living also offers the birds increased safety from predators, and by watching each other, penguins learn where to find the best food sources.

**Suited up for survival.** Tuxedolike, two-toned plumage helps conceal swimming penguins from predators above and below the ocean's surface. The principle behind this natural camouflage is called counter-shading. The dark backs of most penguin species, viewed from above, are hard to distinguish from the surrounding waters. A penguin-hunting shark or leopard seal lurking in the depths might not detect the bird's white underparts in the bright glare at the sea's surface.

**Protection for chilly waters.** Penguins are designed for life in cold waters. Their feathers are small and stiff, almost like scales, overlapping tightly so they can't be ruffled by wind or wave. The feathers are more dense than those of any other bird and cover a penguin's entire body. Like thermal underwear, a coat of woolly down beneath this waterproof shell traps air in a layer about 2.5 centimeters thick, retaining much of the bird's body heat, whether in waters just below freezing and or in frigid outside air. A thick lining of blubber adds extra insulation.

**Built-in heating and cooling.** Penguins are so well protected against the cold that their biggest problem usually comes not from getting too chilly but too warm. When they overheat, their bodies respond by expanding the small blood vessels in their skin and blubber to dissipate warmth from their cores. Their feet and the barely feathered undersides of their bony wings

flush bright pink with blood, ridding them of excess heat. They also fluff up their feathers to let air flow, as well as pant and eat large beakfuls of snow.

**Protective coat of oil.** A large, pear-shaped gland at the upper base of a penguin's tail secretes a fine oil that the bird spreads over its body using its face and bill. This oily coating keeps its feathers watertight and dry, and allows some penguins to spend months in the open ocean without coming ashore.

**Off with the old.** Rather than molting a few feathers at a time like most birds, penguins shed their entire coats once each year during the austral summer. First they fatten up, increasing their normal weight by as much as 50%. Then they fast for several weeks on shore while their new feathers develop.

**Record-holding divers.** The emperor penguin holds the record for the deepest dive, at 535 meters, according to Falklands Conservation. King penguins have been known to dive to 323 meters and gentoos to 201 meters.

**Not so ungainly after all.** Stubby legs make walking difficult and give penguins their waddling gait. The birds have other ways of getting around, though. When traveling long distances at sea, they leap in and out of the water in a behavior called porpoising. While still underwater, penguins can gauge the height of shore ice or rocks. They swim right up to their destinations, pop out of the water and—most of the time—make upright landings.





**From toboggans to pogo sticks.** Emperor and Adélie penguins—which can run faster than humans through soft snow—travel great distances by tobogganing on their smooth bellies. Magellanic penguins escape predators by running on all fours, paddling with their stiff wingtips and their powerful feet. When rockhopper penguins are in a hurry, they leap along with feet held together like children on pogo sticks; to climb steep rock faces, they dig in with their sharp claws and use their beaks as ice axes.

**Day care decisions.** To protect their eggs and chicks from the elements, some penguins—little blue, or fairy, and Magellanic penguins, for example—dig underground burrows. Galápagos penguins seek shelter in natural caves, while most other species construct bowl-shaped nests of pebbles or clumps of grass. Two species, emperor and king penguins, don't build nests. They balance their single egg or chick on top of their feet, then cover it with a flap of loose belly skin. By shuffling their feet, they can walk without disturbing the passenger.

**Babysitter needed.** To raise their young, all penguins share parental duties, though various species have different ways of handling the demands. Soon after laying her one egg in mid-May (winter in Antarctica), a female emperor heads out to sea for an extended period, leaving her mate in charge of incubation. She returns two months later to feed the new chick, giving the male a rest.

**Vigil by dark of night.** As they incubate their eggs during the long, dark Antarctic winter, male emperor penguins endure



Gentoo penguins are partial to Patagonian squid, which make up as much as one-quarter of the penguins' diets.

the coldest temperatures of any animal on Earth. These fathers-to-be wouldn't survive if each were exposed to the elements, so they huddle together to stay warm in conditions that can drop below minus 57 degrees Celcius. Without food, they live off fat reserves until the incubating eggs hatch and their mates return from the sea.

**Penguins at the equator?** While emperor penguins spend their lives in the cold, penguins in the Galápagos Islands have it made—sometimes. An upwelling of cold, nutrient-rich waters brings an abundance of small fish to the equatorial Galápagos, home of the most tropical of all penguin species, the Galápagos penguin. The nesting success of Galápagos penguins is closely tied to regular fluctuations in weather conditions, with the

highest rates happening in cool, dry years and the lowest during warm, wet years. When an El Niño brings unusually warm waters to the region, it signals bad news for the penguins' piscine prey—and for the birds themselves.

**Songs for penguins.** Many a lonely explorer has tried to charm penguins with music. In 1904, for example, a piper from the Scottish National Antarctic Expedition posed for a photo in full Scottish regalia, playing his bagpipes for a lone emperor penguin. The penguin, tethered by a leash, seemed deaf to the tune and, it was said, wanted only to return to the sea.

**A matter of taste.** Sailors venturing into the frozen south also regarded penguins as possible sources of food. According to some accounts, the meat resembled



Among king penguins' favorite foods are squid; a chick can eat more than 2.5 kilograms of the cephalopods in one feeding.



## TOO COLD FOR PENGUINS?

Can it ever be too cold for penguins? The answer is surprising.

Changes in sea surface temperatures that are much colder (or warmer) than average influence seabirds like penguins through the availability of their prey, and can trigger harmful algal blooms that poison the birds.

In the Falkland Islands, a decline in gentoo and southern rockhopper penguins between 2000 and 2005 was linked to a harmful algal bloom, according to Sarah Crofts, Conservation Officer at Falklands Conservation.

Regular observations carried out under the Falkland Islands Seabird Monitoring Programme showed that gentoos and southern rockhoppers recovered between 2005 and 2010, says Crofts, likely due to more favorable oceanographic conditions. Monitoring efforts showed stable to increasing population trends for Falklands seabirds through 2015.

But change was on the horizon.

From late 2015 into 2016, an ill wind blew—a strong El Niño had arrived. It was marked by colder than normal ocean waters, which led to food shortages for penguins. A major prey species, the Argentine shortfin squid (*Illex argentinus*), didn't migrate to Falkland waters, and another choice food, Loligo squid (*Dorytheuthis gahi*), was much smaller than usual due to slower growth in the colder waters.

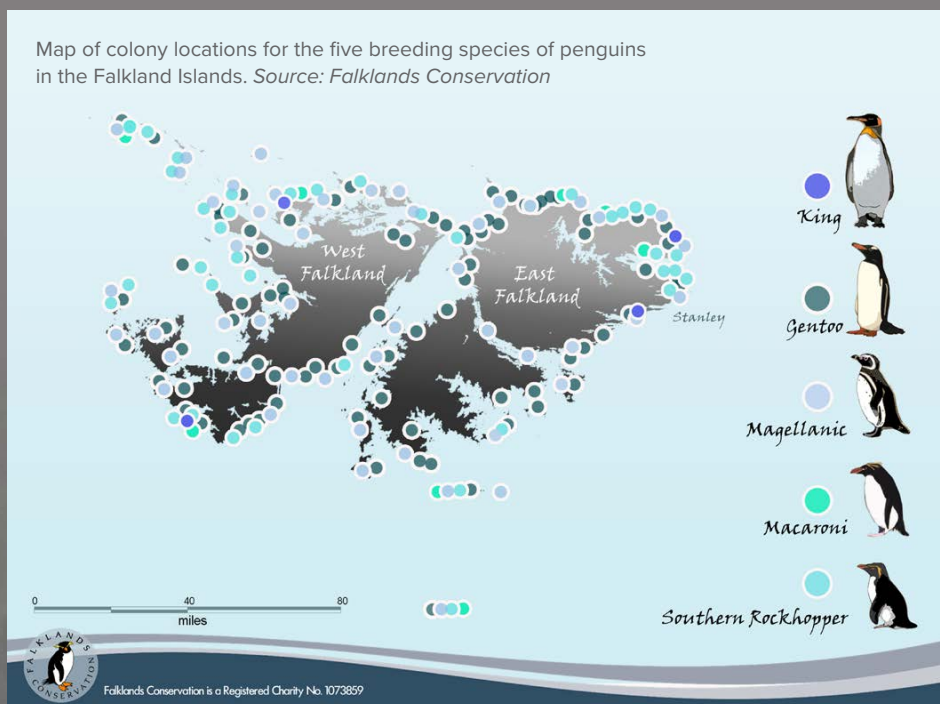
The lack of food coincided with the penguin molting period (March through May), and forced some penguins to begin molting without enough body fat to fast the three to four weeks they needed to remain on shore. Penguins are unable to feed at sea during their molt as they're not fully waterproof; they must wait until their new plumage is complete.

A wide swath of the Southwest Atlantic was affected, says

Crofts, with reports of southern rockhoppers coming ashore to molt in unusual places along the coast of Patagonia. Many of the birds died of starvation. The situation was the same in the Falklands.

In 2016–2017, biologists with the Falkland Islands Seabird Monitoring Programme detected a 30% decrease in breeding numbers of gentoo and southern rockhopper penguins. However, there may be other factors at play. Penguins skip breeding in some years and choose not to raise chicks if conditions aren't favorable.

Long-term monitoring of seabirds, including penguins, is critical, scientists say, to understanding how climate change and other factors threaten the future for penguins.



In the early 2000s, numbers of southern rockhopper penguins declined in the Falkland Islands, then rebounded. Are these penguins again at risk?





chicken. Frederick Cook, an American doctor aboard the ship *Belgica* in 1898, described penguin meat as a mixture of “beef, odiferous cod fish, and canvasback duck roasted together.” Whatever the birds’ taste, the 20 crew members of the Swedish research vessel *Antarctic* knew it well. When their ship sank in 1903, they survived the harsh winter by consuming 1,100 penguins.

**Beyond hungry sailors...penguins’ other predators.** Gulls, turkey vultures, striated caracaras, giant petrels, and especially skuas often snag penguin eggs and chicks. A rookery of 100,000 penguins can withstand the marauding flights of only 10 pairs of these scavengers, it’s estimated. Gulls and ibies in South Africa may devour up to 40% of African penguin eggs. Leopard seals attack Adélies, chinstraps, gentoos, and rockhoppers, and occasionally kings and emperors. Some 100,000 leopard seals off the Antarctic coast take a considerable toll on penguins every year, say scientists at Falklands Conservation, but penguins can swim fast and often outmaneuver the seals. In the Falklands, sea lions prey on adult penguins near the coast; orcas and fur seals also hunt penguins.

**Penguin land mines.** On the morning of April 2, 1982, the Argentine Navy landed at Yorke Bay just outside Stanley, the capital of the Falkland Islands. A full-scale invasion had begun. British forces retook Stanley 74 days later. By then, 907 people had lost their lives. One of the Argentine military’s first assaults was to place land mines along the Yorke Bay coastline. After the war ended, fences marked off these

mine-laden areas. Penguins moved in, seemingly oblivious to the danger. Some biologists think the birds don’t weigh enough to set off the mines. But penguins’ decades-long “protection” from habitat encroachment may soon be upended. The British government is looking at ways to clear the mines, including those that dot Yorke Bay shores. To date, none of the minefields that have been cleared overlap with penguin breeding sites, say scientists at Falklands Conservation, so there have been negligible effects on the penguins. Minefields at breeding locations are undergoing an environmental impact assessment.

**Antarctic penguins: A threatened future.** If it’s not minefields, it’s collapsing ice sheets, according to a 2017 report by the organization Oceanities: *State of Antarctic Penguins*. Antarctica’s five penguin species (emperor, Adélie, chinstrap, gentoo, and macaroni) total at least 5.7 million breeding pairs nesting at 660 or more sites on the continent. The Oceanities report is based on 3,176 records from 101 sources of on-the-ground colony counts and satellite photo analyses. “With the exception of the Arctic region,” the document states, “the Antarctic Peninsula has warmed faster than anywhere else in the world. Key concerns for penguins include ice sheet collapses in West and East Antarctica.”

**Lifespan of a penguin.** If a penguin survives its walk down the climate change plank, it may live up to 25 years in the wild. Penguins have been recorded breeding at 17 to 20 years old, say Falklands Conservation sources, and some birds don’t join the breeding population until they are nine. A penguin in captivity at the Edinburgh Zoo lived until at least age 28.

**Penguin protected area.** On September 9, 2017, Michelle Bachelet, President of Chile, announced the creation of a new marine protected area in Admiralty Sound in Tierra del Fuego. The new “Multiple Use Marine and Coastal Protected Area Seno Almirantazgo” will safeguard the area’s marine wildlife and its cultural heritage. It will also protect artisanal fisheries and promote sustainable tourism. The sound, along with two other marine parks—Francisco Coloane and Cape Horn—will become the core of a network of marine protected areas in the Magallanes Region. Admiralty Sound is a spectacular, 80-kilometer-long fjord adjacent to Karukinka Natural Park. The newly declared protected area is home to, among other species, Magellanic penguins.

Chile is “becoming the country with the largest marine area protected in the world—a developing country that can be a leader in conservation,” says Bachelet. “This is not a triumph of government, it is a triumph of reason.”

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