

**INSIDE:  
FREE MAP  
AMERICAN INDIANS**

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# NATIONAL GEOGRAPHIC

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INDIANS**

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BADGERS WITH ATTITUDE**

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BY FEN MONTAIGNE

PHOTOGRAPHS BY PETER ESSICK

**B**iscoe Island is a small outcropping of rock and ice lost amid the epic landscape of the western Antarctic Peninsula. Looming above the island is the Marr Ice Piedmont, a massive glacier cleaved by 9,000-foot Mount Français. To the east, a few miles away, the sheer, jagged peaks of the peninsular chain—a checkerboard of black granite and broad glacial fields—plunge into the ocean. The blue waters of the Bellingshausen Sea are studded with icebergs and streaked

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with sea ice. On a clear summer day the entire landscape—water, ice, rock—sparkles.

Ecologist Bill Fraser has been coming to the Antarctic Peninsula, an 800-mile finger of land that pokes upward toward South America, for 23 of the past 30 years. He can attest that the only thing that remains unchanged is the magnificent vista. In this corner of Antarctica, the land, the sea, and the creatures that inhabit them are all in flux as a result of some of the most rapid warming on Earth: Average winter temperatures have risen nearly 9°F in the past half century.

The most noticeable change has been the retreat of the Marr glacier, but most unsettling to Fraser—who came to Antarctica for adventure, solitude, and a Ph.D. on polar



### **Uphill Climb**

**Daniela Hohenwallner of the Global Observation Research Initiative in Alpine Environments (GLORIA) takes samples of mosses above 10,000 feet on Schrankogel, a peak in Austria. Rapid warming in high mountains may be forcing alpine flowers like *Helianthemum alpestre* (above) to compete with taller plants inching up from below. GLORIA has set up more than a hundred sites globally to document this upward shift.**

AUSTRIAN ALPS (LEFT);  
SWISS ALPS (ABOVE)

birds—has been the effect of the warming on Adélie penguins, his life's work. One day in January, at the height of the Antarctic summer, Fraser and I hiked to a promontory on Biscoe to census a nearby Adélie colony, a patch of pebble nests stained brick red with guano. Adélies commuted to and from the ocean in single file, transporting shrimplike krill to feed hundreds of downy, peeping chicks on shore.

Twenty years ago Biscoe was home to 2,800 breeding pairs of Adélies, one of only two ice-dependent polar penguin species (the other is the emperor) in Antarctica. Today the number of Adélie breeding pairs on Biscoe has dropped to about a thousand, mirroring a 66 percent Adélie decline on nearby islands, where numbers have plummeted in 30 years from 32,000 breeding pairs to 11,000. As Fraser's work has documented, the disappearing Adélies are being replaced by gentoo penguins, a subantarctic species that has begun migrating toward the Pole from more temperate climes, such as the Falkland Islands. A dozen breeding pairs of gentoos arrived on Biscoe in the early 1990s. Since then, their numbers have increased to 660 pairs.

Surveying Biscoe's western ridgeline, where gentoo numbers had risen by about a hundred since the last breeding season, Fraser looked like a person watching his block mutate into a slum.

"Man, oh, man, this is absolutely unbelievable," said Fraser, who works out of Palmer Station, a U.S. research base. "This whole area used to be Adélie colonies. Now the gentoos are using the same nesting sites. I think Biscoe will soon be Adélie free. These birds are doomed."

Just behind us, the Marr Ice Piedmont calved with a thunderous rumble, sending a wall of blue ice cascading into the ocean. This continual booming, I was beginning to understand, was the soundtrack accompanying the disappearance of Bill Fraser's Adélies.

"A century ago this was basically a polar environment," he said. "The area embodied Antarctica. Now we have this subantarctic system impinging. I've watched the confrontation over the past 30 years, and the polar system has really disintegrated at Palmer. I'm in awe that it has taken such a short time to happen. Lesson number one for me has been the realization that ecology and ecosystems can change"—he snapped his fingers—"like that. In geologic time it's a nanosecond."