

## P R E F A C E

In the early 1990s, I spent two years studying Laysan and black-footed albatrosses caught as bycatch in the squid driftnet fisheries. The albatrosses had become entangled in miles of plastic threads, drowned as they tried to pluck out squid eggs to feed their chicks. Albatrosses are enormous birds with wingspans of up to 11 feet, and these graceful wings allow them to fly thousands of miles in a single flight. They breed on the leeward Hawaiian Islands and feed in the North Pacific Ocean, a place as remote from industrial civilization as any spot on earth.

My colleagues and I examined the stomachs of hundreds of albatrosses. Much to our surprise, nearly every bird we dissected contained plastic fragments in its stomach. Styrofoam was the most common contaminant. Many of these birds had incomplete molt patterns in their primaries—their main flight feathers—which reduced their ability to complete their long flights and breed each year. Parasites clung to their throats, indicating that their immune systems had faltered.

All those bits of plastic we were finding in the birds' stomachs may have been leaching toxins which led to immune and reproductive

failure. A toxic sponge of trash was gumming up their bodies, even in the most remote of environments distant from human industry.

The abundance of plastics in human bodies, in water bodies, in wildlife bodies, highlights that synthetic chemicals found in the air, water, and soil are now being detected *within* us. The chemical composition of our bodies and wildlife bodies is being altered in ways that reflect the transformations of our everyday environments. No matter how remote we think we are, no matter how wild the wildlife we encounter seem to be—we are all intimately entangled in the Anthropocene, an era where humans have become the dominant force on the planet, wreaking havoc with fossil-fuel extraction, toxic debris, and rapid climate change.

*Climate Ghosts* explores the histories and possible futures of three iconic migratory species of the Upper Great Lakes: one bird (the common loon); one mammal (the woodland caribou), and one fish (the lake sturgeon). I chose these three species because human cultures have formed close relationships, both material and spiritual, with each in the boreal north. Each has been the target of decades of restoration, yet their populations continue to fall. They are on the verge of becoming ghosts on the landscape, with dwindling numbers of their populations able to persist. Why?

In these essays, based on the Mandel Lectures in the Humanities that I gave at Brandeis University in 2019, I try to answer this simple question. I argue that the complex relationships different human cultures have developed with migratory wildlife are being rapidly transformed in the Anthropocene. Focusing on climate change and its interrelationships with toxics and habitat loss, I ask: How have the relationships between humans and other migratory animals been influenced by Euro-American settlement, energy extraction, industrial development, and climate change? How do animal migrations influence the mobilizations of toxic materials into distant spaces, and how does climate change in turn affect animal mobility? How can

attending to history, in particular to Indigenous history, help us devise better restoration strategies?

Two chapters explore the challenges faced by woodland caribou in a warming world that favors their predators. Caribou evolution has been profoundly shaped by an ecology of fear, for they are vulnerable to wolf, bear, and lynx predation. Migration was one strategy they evolved to deal with the threat of predation. Grace, speed, wariness, an ability to thrive in the harshest winters and deepest snows—and a willingness to become partners with humans and become semi-domesticated—were strategies caribou across the circumpolar north evolved to persist in the presence of predators. Yet now their populations are dwindling across North America, in part because industrial extraction has altered the landscape to the point where they can no longer escape from predation. We celebrate the return of wolves, and we honor the devoted efforts of many wildlife biologists who reversed centuries of predator persecution. But the irony is that the species that wolves prey upon, particularly caribou, are now faltering. To save woodland caribou, wolf culls or caribou translocations—at least in the short term—may be necessary. If woodland caribou become ghosts over much of their range, people’s memories of them may fade, and they might no longer be willing to do the hard, heartfelt work necessary for restoration.

The next migratory species we encounter is the lake sturgeon, a fish once on the verge of ghostliness, extirpated from a large fraction of its former range, yet still powerful in memories, stories, and art. This ghost story is more hopeful, for Indigenous communities have taken a key role in sturgeon restoration, and the results are promising.

The final species is the common loon, a long-distance migrant much beloved by northerners. Most people in the north have no idea that loons could become extinct, because we see our favorite pairs return to their lakes, year after year. More than a quarter-million common loons still breed in North America, so surely they’re fine? But as

long-distance migrants, like other waterbirds, they are vulnerable to environmental chaos in multiple places, not just at their breeding sites. Energy production on shores far distant from their northern breeding lakes affects them. They bear the ghostly traces of industrial extraction—mercury, PCBs, oil, lead—in their bodies, and those toxics are killing them.

Traditional perspectives within the humanities have placed humans at the center of the story and viewed humans as exceptional. In contrast, research within the environmental humanities focuses our gaze on the agency and interconnectivity of all things, displacing the human as the core source of value at the center of the universe. Environmental humanities doesn't give up on humans as a core part of the story, but instead sees humans as part of complex relationships—what theorist Bruno Latour has called “hybrid networks.” The material and the cultural weave our world together, yet these weavings have often become invisible to us—they are, in effect, ghosts that haunt our attempts to heal relationships within a traumatized world.

My core argument in this book is that relational ways of knowing are critical, for we live in multispecies relationships. Humans are never all alone, making meaning in an empty world. Indigenous communities in North America have created collaborative relationships with loons, woodland caribou, and lake sturgeon, blending science and cultural practices in “two-eyed seeing.” Such visions are critical for ethical restoration of ghost species in changing landscapes if we want to sustain hope in the Anthropocene.