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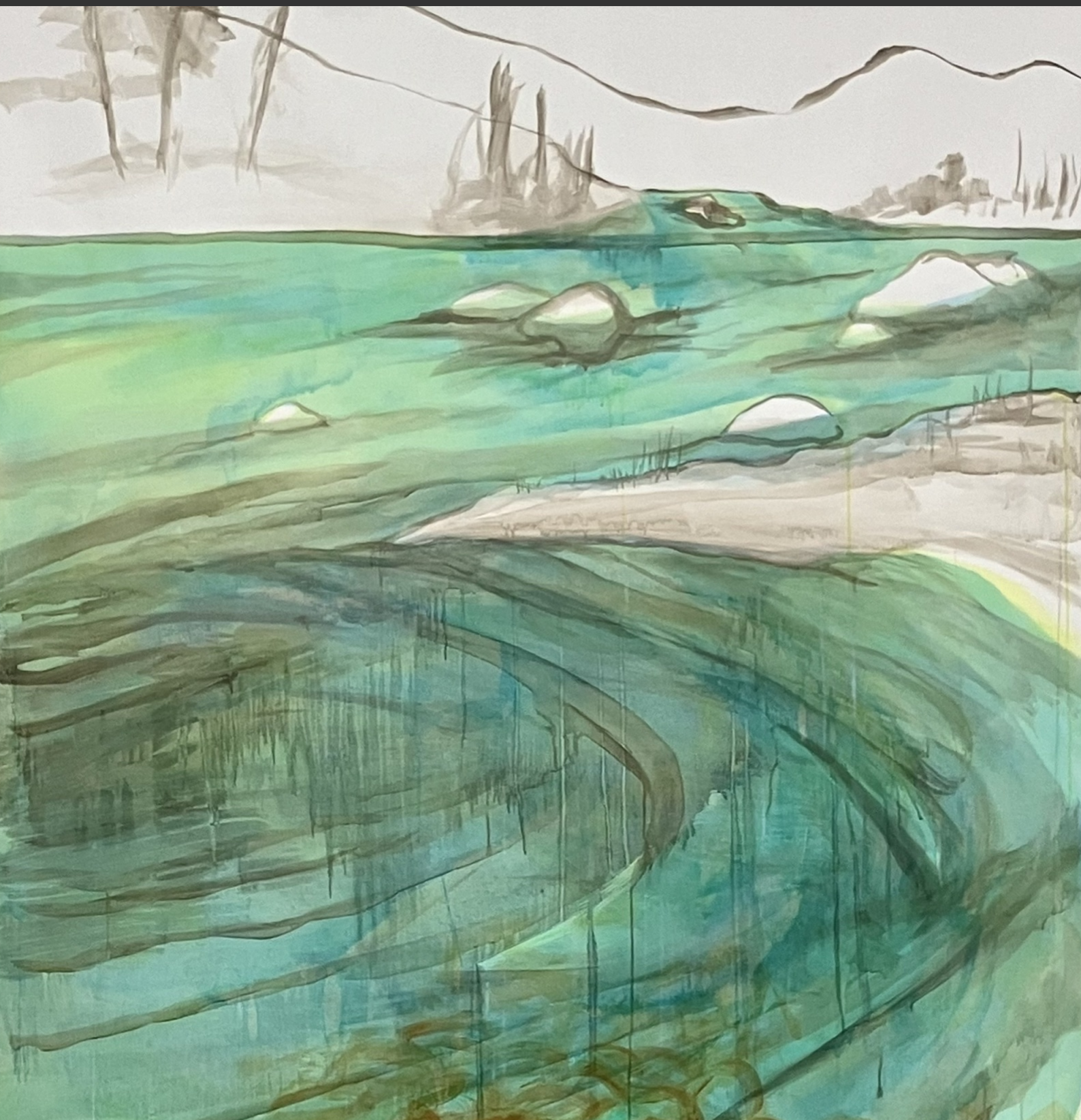
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CONFRONTING HUMAN SUPREMACY IN DEFENCE OF THE EARTH



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Natural history as defiance of the technological takeover

Joe Gray

Joe is a field naturalist who lives in Great Britain. He has edited or co-edited several books, the most recent of these being *Cohabiting Earth: Seeking a Bright Future for All Life* (SUNY Press, 2024).

Keywords: anthropocentrism; ecological empathy; natural history; nature; societal change
Citation: Gray J (2025) Natural history as defiance of the technological takeover. *The Ecological Citizen* 8(1): 3–5.

In this issue of the journal, we feature a number of articles that champion or implicitly support natural history – the practice of attentiveness and receptivity to the more-than-human world – as being crucial for animating an ecological civilization. In fact, so skilfully, and with such buoyancy, is the subject explored that I feel little need, and barely more confidence, to add to what has already been said. So I sit with my face towards a computer screen in a tiny study (small enough that, without leaving my chair, I can touch each of the four walls using a different limb), and I wonder whether a single short paragraph could constitute an editorial. In struggling to find some other thread of natural history's fabric at which to tug, I stare into the rectangular mosaic of differently lit pixels but yearn for a distraction from the world outside the study's one real window. I am, after all, a practitioner of attentiveness and receptivity…

… A fawn-grey shape ambles into the periphery of my vision and I reach, from deep-rooted habit, for the field glasses on my desk. With an index finger on the focus wheel, I transform a blurred head into sharp living features: A fur-covered crown, the skin pleated like a montane landscape. Two ovate ears, pricked with life-defending alertness. And a nose, urgently quivering.

My view is of gravel-covered land, which, in the sense that it could be anyone's, is not mine. And I am watching a coney (a European rabbit). She is discerning odours and sounds with heightened awareness, the reason for which is evident in her eyes – or, rather, the raw pink swellings of myxomatosis that have deprived her of sight. By smell alone, the coney has located a part-eaten windfall apple. She consumes everything including the core and then proceeds, despite the facial dysmorphism, to clean her mouth and front paws fastidiously. There is an elegant recalcitrance in these simple ablutions.

The release of that disfiguring and deadly virus is one of humanity's more barbaric attempts to manipulate ecosystems. And by observing this latest victim,

I am reminded that such cruel, myopic interventions inflict suffering upon generation after generation of our Earth-born relations. This anguish is what can result from paying attention to the life around and among us. It comes too when we stop to contemplate the loss and suffering of a car-killed badger; and as we learn new things about a local river from a school of dead and bloated fish. It also arises with each coming spring when we ask questions about absent friends. Where have all the insects gone? How has the once-vibrant air been bleached of beating wings? And is ecosphere-wide slaughter and despoliation really something with which we are content to live?

Natural history is a window onto the woes of progress (as this short piece might have more doomily been titled). But the knowledge gained helps unblind us to the injuries and injustices caused by our species' technological march. It unveils those ugly truths of a society that pursues expansion with barely a twitch of doubt and that innovates with shallowly defined profit as the overwhelming guide. While we can read and listen to what others have to say on these truths – indeed, we should and must – it is first-hand observations that stir our spirit with greatest potency.

Leading us to question the norms of anthropocentrism is one of the means by which natural history defies the technological takeover of our existence. Below, I will briefly mention three of the other ways.

First, without any scrolling or clicking or streaming or downloading, natural history reveals beauty so rich that it cannot be adequately described. In *A Sand County Almanac*, within his contemplation of cranes (the feathered kind, not the mechanical simulacrum), Aldo Leopold wrote: "Our ability to perceive quality in nature [...] expands through successive stages of the beautiful to values as yet uncaptured by language" (Leopold, 1968: 96). Indeed, I doubt that words will ever be found that do justice to nature's magnificence. Part of the challenge is that, as Sandra Lubarsky has noted, "the world was beautiful before humans arrived on the scene" (Butler and Lubarsky, 2019: 97).

Natural history also offers entrance to the circle of ecological wisdom that is formed by knowledge-begetting-love and its less obvious converse – love-begetting-knowledge. In support of the latter relationship, Ed Abbey presented the following rhetorical question about nature: "how could you know it *unless* you loved it?" (Abbey, 1982: 72). Of course, an arachnophobe might be well-informed of spidery goings-on despite the lack of any positive attachment, but this does not, I feel, undermine the assertion. Furthermore, with significance to the discussion here, we are talking about a form of wisdom that will forever remain out-of-scope for artificial intelligence.

Lastly, in a point that is made well by Tom Fleischner in this issue, natural history grounds us both by fostering connections with places and by inspiring ecological humility. And this grounding, I would add, is something that hits all ideas of technology's supremacy with a sharp blow behind the knees. At the same time, the technosphere's expansive force must not be underestimated, and there is work to be done in restricting its encroachment on natural history (*e.g.* Gray, 2023). I am not saying that all technological advances lack a place in our practice of attentiveness and receptivity. Binoculars, for instance, are one

of humanity's loftiest interventions, allowing the observer of nature to keep a respectful distance from the observed. And printed field guides can be valuable tools too (Whyte and Gray, 2020). I am just stating that we need to be careful.

Before finishing my work here, I have a debt to repay to the blinded coney who gave me the thread that I lacked. With a sickening sense of pity, I resolve to perform an act of kindness in reciprocation. After retrieving a sharp knife from a kitchen drawer, I head outside and walk slowly across to the sloping lawn beneath the windfall-yielding tree. I pick three apples from the branches, cutting each one in two before placing the halves on the ground. As hemispheres, the fruit will stay in place and transmit more aroma to rabbit nostrils.

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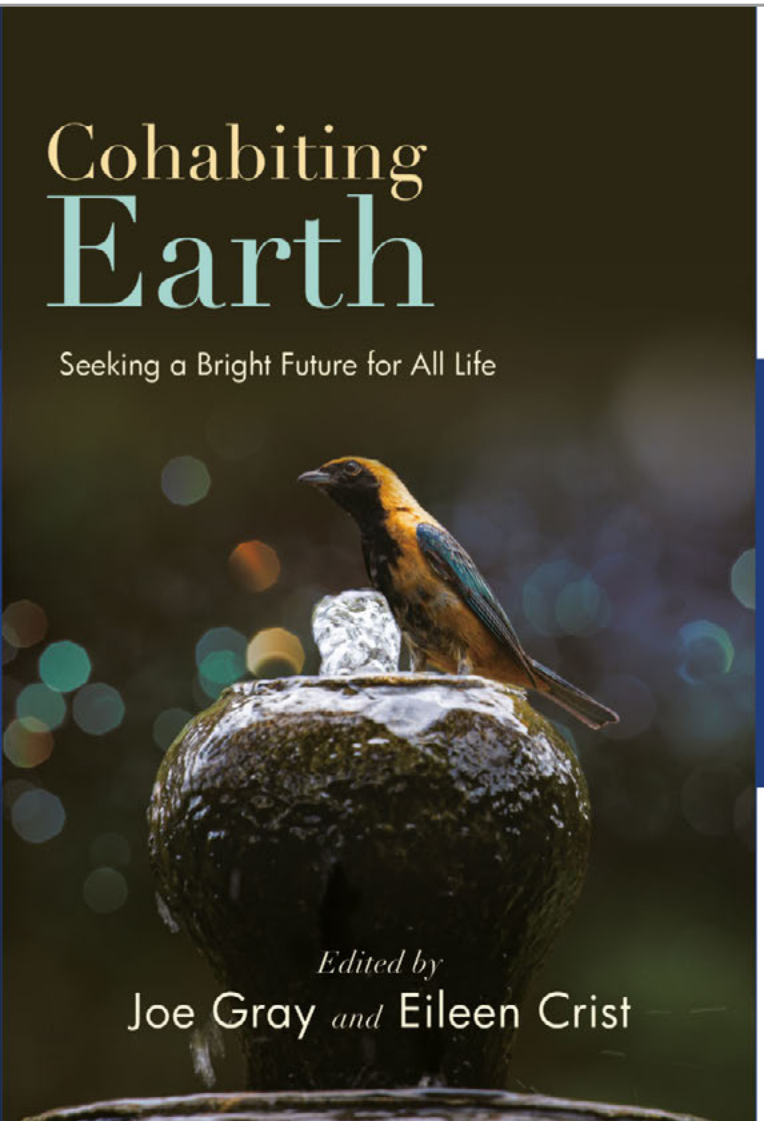
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Sitting near the river

Michaela Mráčková

Part of '**A Soundscape**' series (spring 2024); tempera on canvas (30 x 20 cm).

About the artist: Michaela Mráčková is a practically blind artist devoted mainly to the medium of painting. In addition to her seen or unseen surroundings, some of her paintings also depict heard sounds from the environment, which are translated visually in the painting.

About the series: This series of paintings represents Michaela's daily walk by the river Svitava in Brno, Czechia, with her guide dog. It depicts sound elements by which she orients herself in nature without having to see the environment exactly. Sounds are shown here as lines whose expressiveness, length and direction determine the distance, volume and movement of sound elements from the landscape that can be heard.

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Meadow near the river 1 (top) / Wind in the trees near the river (bottom)
Michaela Mráčková
Oil on canvas (200 x 105 cm / 200 x 100 cm).

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Long way near the river (top) / Path along the river 1 (bottom)
Michaela Mráčková
Oil on canvas (200 x 105 cm) / Tempera on canvas (30 x 20 cm).

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Way near the river 1 (top) / Meadow near the river 2 (bottom)
Michaela Mráčková
Tempera on canvas (30 x 20 cm).

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Way near the river 2 (top) / Path along the river 2 (bottom)
Michaela Mráčková
Tempera on canvas (30 x 20 cm).

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Way near the river under big tree

Michaela Mráčková

Tempera on canvas (30 x 20 cm).

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Friends of Sax-Zim Bog: Protecting North America's southernmost boreal forest for biodiversity

Dan Erikson

Dan is a doctoral student at the University of Southern Maine in the US. His research is at the intersection of ecocentrism and organizational leadership. For more information about Sax-Zim Bog and the Friends, see https://saxzim.org.

Keywords: biodiversity; conservation; natural history; water
Citation: Erikson D (2025) Friends of Sax-Zim Bog: Protecting North America's southernmost boreal forest for biodiversity. *The Ecological Citizen* **8**(1): 12–16.

A unique stretch of 190,000 acres, Sax-Zim Bog is roughly 180 miles north of Minneapolis, Minnesota, in the Upper Midwestern region of the United States (https://saxzim.org/about-sax-zim-bog/). This land is part of the southernmost boreal forest of North America, and home to thousands of living species. It has become a global destination for birders, being, for example, one of the best places in the world to see the majestic great gray owl (*Strix nebulosa*) – the largest species of owl in North America (Figure 1). Enter Friends of Sax-Zim Bog. This nonprofit organization was created to preserve this treasured habitat for future generations of birds (*e.g.* black-capped chickadees; Figure 2) and other boreal species, as well as for human beings who love nature.

The mission of Friends of Sax-Zim Bog began as a problem to be solved. The rate of mature black spruce logging was rising dramatically in the northern Minnesota region and threatening this crucial ecosystem. Sparky Stensaas, a local naturalist, recognized the diversity of species and habitat in the area. He knew that Sax-Zim Bog needed a platform and advocates to make its voice heard. In collaboration with local Duluth naturalists, Dave Benson and Kim Eckert, Friends of Sax-Zim Bog was born in 2011. Sparky serves as the executive director of the organization, which also includes a management director and four naturalists. The head naturalist, Clinton Dexter-Nienhaus, leads educational events during the year to help people connect with this unique ecosystem (Benda, 2024). Sparky and his team all share a palpable exuberance for protecting such a beautiful and biodiverse area.

For some, the word 'bog' may spark thoughts of mosquitoes, mud and feelings of dreariness. However, these places are thronging with a broad presentation of



Figure 1. A great gray owl along McDavitt Road.

life. Furthermore, although bogs make up only three percent of this planet's surface, it has been discovered that they hold up to 44 percent of soil carbon (International Union for Conservation of Nature, 2022). Their protection is thus crucial to combating climate change.

Driving along highway 7 of Sax-Zim Bog creates a feeling of being in the northern tundra (Figure 3). Red osier dogwood speckles the vast horizons. Orchids, wild berries, and carnivorous plants emerge every spring and summer. Tamaracks turn bright yellow in fall. The cyclical reality of life is on vivid display here. Driving the dirt roads of Admiral, McDavitt, and Stone Lake creates an intimate setting. Cars slowly inch forward. Eyes of drivers dart back and forth between the road and the forest canopy. The search is on for the elusive great gray owl. For many visitors, seeing this iconic owl for the first time is a deeply emotional experience. It provides hope for the preservation of what is wild. It creates a special connection to this place.

The Friends of Sax-Zim Bog organization focuses on two primary actions. First, it preserves treasured habitats for the diverse species who live here – with over 3,600 species documented in the area so far. The Friends have currently purchased nearly 25,000 acres of bog land for protection. Second, it establishes spaces for visiting humans to learn about and enjoy the bog. The Friends engage in a variety of fundraising efforts to support this work, including an annual auction for tiny bird art. In recent years, the organization has built a welcome centre for educational purposes, and assembled four boardwalks across a range of preserved land parcels – Auggie's Bogwalk,



Figure 2. A black-capped chickadee.

Warren Woessner Boardwalk, Bob Russell Boardwalk (Figure 4) and John C. Gale Taiga Boardwalk. There are additional trails that have been created as well, all of which are important means for accessibility.

A significant part of protecting Sax-Zim Bog is by creating a public connection with it. This comes through teaching people about the wide array of life that the bog holds. Sparky Stensaas and Clinton Dexter-Nienhaus create videos of their monthly experiences (https://saxzim.org/videos-of-sax-zim/). Sparky takes viewers on virtual field trips throughout the bog, and often finds a broad spectrum of wildlife. Clinton's 'Bog-ventures' and 'Critters' videos delve deeper into natural history and individual species of Sax-Zim Bog. These allow people from all over the world to learn about and develop an affinity with this place.

Bogs, fens, marshes and wetlands tend to be marginalized landscapes and habitats across the world (Miller, 2022). They are often disparaged and discounted as 'wasteland'; they ignite fear as they are difficult for human beings to access and exploit. They symbolize the unknown and humanity tends to fear the unknown. Friends of Sax-Zim Bog offers a way into this 'unknown', by helping human beings to learn about, understand, and most importantly *connect* with the bog environment.

In *The Creative Mind* (1946), French philosopher Henri Bergson suggests that there are two ways of knowing something. The first way involves "circling around its exterior" (p. 128); it depends on the analysis of symbols and perspective; it is abstract, detached. The second way, however, is intuitive and



Figure 3. Sax-Zim Bog from highway 7.

involves entering *into* that thing; becoming a part of it, and making it a part of us. This way of knowing, Bergson suggests, engages our human capacity for transcendence. I can speak from experience that as one connects with the beauty and richness of Sax-Zim Bog, and acknowledges being a part of it, it can inspire love for, and an urge to protect, this special habitat and its extraordinary biodiversity. This is exactly what Friends of Sax-Zim Bog is trying to achieve.



Figure 4. Part of Bob Russell Boardwalk.

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Love of nature in the Trinidad and Tobago Field Naturalists' Club: A legacy of 130 years and counting

Linton Arneaud

Linton is a lecturer in ecology at the University of the West Indies, Cave Hill, Barbados.

Keywords: conservation; education; natural history
Citation: Arneaud L (2025) Love of nature in the Trinidad and Tobago Field Naturalists' Club: A legacy of 130 years and counting. *The Ecological Citizen* **8**(1): 17–18.

Natural history can help foster an intimate understanding of Earth's delicate life-sustaining balance, and I believe that this profound connection with nature can assist in cultural change towards a future in which humans and the rest of nature thrive in harmony. Natural history organizations and institutions thus have an important role to play in shaping society.

Immersed in the intricate dance of life on our planet, the Trinidad and Tobago Field Naturalists' Club (TTFNC) is built on a legacy – 130 years old and counting – of encouraging a deep respect for nature. This well-regarded natural history organization is among the world's oldest and boasts of a repository cherished by both local and global experts. The organization's publications vary widely, from pocket field guides to species monographs, which underscores a commitment to empowering both citizen scientists and specialists alike.

With the motto "Nature is most to be admired in the smallest things," the organization is dedicated to cultivating a sense of Earth care through the exploration of the world around us and the conservation of all life-forms. The TTFNC's growing legacy demonstrates how cultivating a love of nature can help shape a harmonious relationship between humanity and the Earth.

The TTFNC has contributed to a diverse range of activities, including: environmental data collection; species and habitat conservation initiatives; and campaigns to raise public awareness. Over the years, through the organization's work, detailed knowledge has been accumulated of Trinidad and Tobago's diverse species and ecosystems, enabling the formulation of effective management plans, policies and legislation.

The TTFNC champions active community engagement in data collection and analysis (e.g. in our yearly 'bioblitzes'), as well as in the incorporation of indigenous knowledge. This collaborative approach not only enhances scientific understanding but also helps citizens develop a deeper connection with the Earth's living systems. Educational materials produced for nature-engagement activities aim to reinforce learnings, helping ensure that the benefits, both for field naturalists and wider communities, last in the long term.

Finally, it is also significant that the practice of natural history continually yields new knowledge and enhances the skills of individuals. Such skills can help individuals pursue sustainable careers in fields such as environmental consultancy, ecological field work, community-based environmental activities and eco-tourism.



A photo of a white-lined tanager eating a balisier flower, taken by a member of the Trinidad and Tobago Field Naturalists' Club (photo © Rishi Goordial).



Tiger (Rockscape 11)

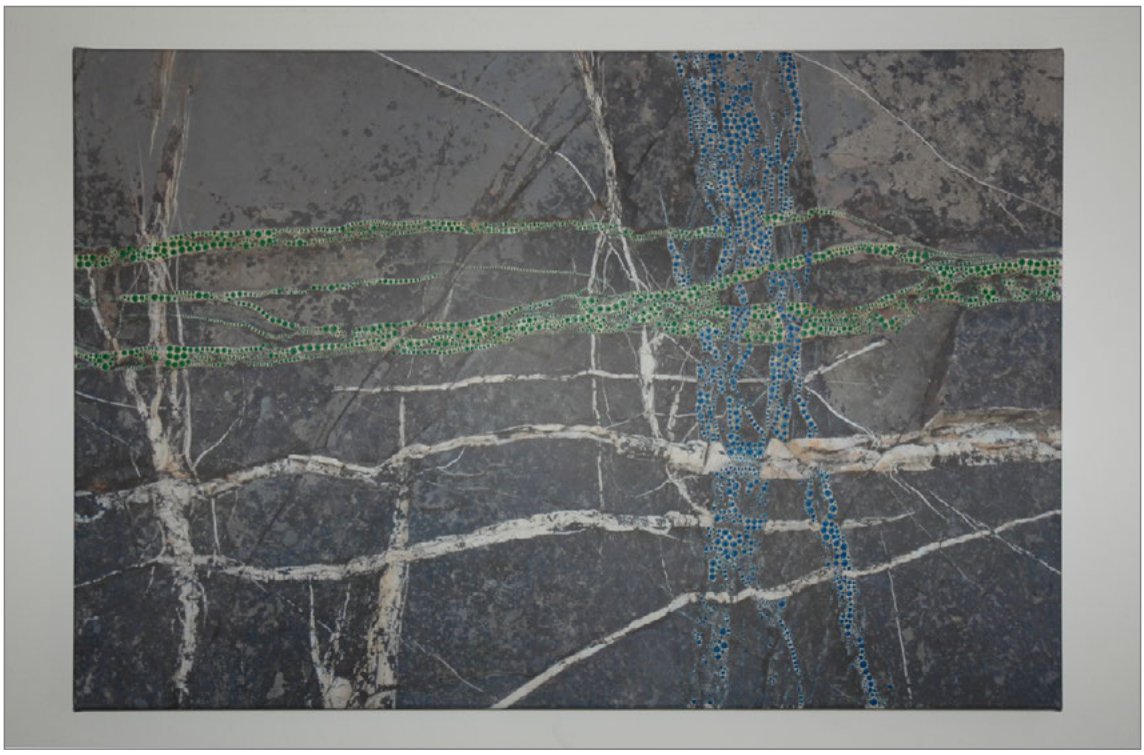
Martin Haase

Oil on photo canvas (75 x 50 cm; 2018).

From the artist: "In my Dotscapes, I trace natural structures with coloured dots emphasising their natural beauty and at the same time putting them into a new context. The Rockscapes featured here are based on photographs taken around the small beach of Almograve, south of Lisbon in Portugal, surrounded by various formations of rocks (Rockscapes 11–13, 17), and in New Zealand (Rockscapes 3 and 16). Rockscape 3 shows the small mineral terraces formed by one of the hot springs along the Waiotapu Thermal Track near Rotorua on the North Island, and Rockscape 16 is a close up of the clay cliffs near Omarama on the South Island."

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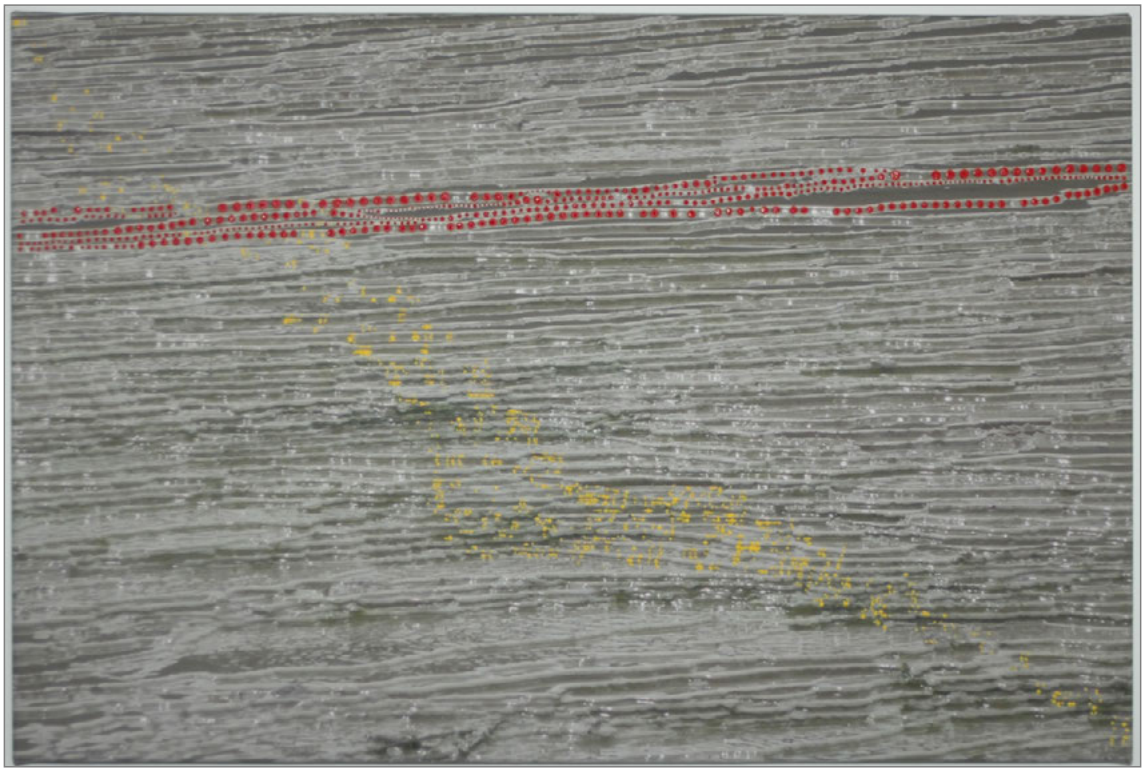




Butterfly (Rockscape 12; top) / Drunter und Drüber (Rockscape 13; bottom)
Martin Haase
Oil on photo canvas (75 x 50 cm; 2018 / 2019).

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Quatro Colori (Rockscape 17; top) / Yellow Sparkles Across Purple Beam (Rockscape 3; bottom)
Martin Haase
Oil on photo canvas (75 x 50 cm / 60 x 40 cm; 2020 / 2016).

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Weathering in Beauty (Rockscape 16)
Martin Haase
Oil on photo canvas (60 x 80 cm; 2019).

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Unlearning

Sally Zaino

Sally is one of the five founders of Manada Conservancy (www.manada.org), a land trust primarily serving Dauphin County, Pennsylvania, USA, which has preserved 3,000 acres since 1997. In 2020 she was awarded the PA Forestry Association Mira Lloyd Dock Conservationist of the Year Award for her work in helping to preserve Pennsylvania's forests. She is a writer and poet, and her writing often reflects her interests in land preservation, wildlife habitat connectivity and the value of wilderness for human well-being.

Keywords: education; natural history
Citation: Zaino S (2025) Unlearning. *The Ecological Citizen* **8**(1): 23–7.

We were hiking in the Hoh Rainforest, in Olympic National Park (WA, USA) – a landscape of green-on-green, nurse trees, ferns, strewn tree trunks and overlapping life. My then seven-year-old daughter and I sat down on a moss-cushioned log for a sip of water. We both noticed, just a few feet away, in a shaft of sunlight, a spherical swarm of gnats. "Mommy!" she said, "what are they saying?"

My first thought was: *They're not saying anything; they're swarming*. But I stopped myself. *Of course they are saying something!* I tried to answer with the same sense of wonder: "I don't know what they are saying, but they are certainly saying something, aren't they? What could it be?" We thought about it, as we sat there within the lush forest. We had ideas. We certainly didn't get close to finding out, but we both became more aware that these were small beings, we had more closely entered into their existence, which made them part of ours, and we were left with the curiosity of wanting to know more. The tiny insects, in the shaft of sunlight, had something to say that related to everything around us.

When did I unlearn this?

Maybe it had to do with becoming an adult, learning the language of my culture – a culture that does not really wonder what the gnats are saying.

Thirty years after sitting on that green log with my daughter, I now have a granddaughter. About the time she turned two, I had been reading David Abram – coiner of the term "the more-than-human world" (in Abram, 1996) – who writes: "For most traditionally oral, indigenous cultures that we know of, any and *every* phenomenon is potentially animate; everything moves. All things are felt to have their own pulse, their own inner spontaneity or dynamism" (Abram, 2018).

I realized that my granddaughter seemed to make no distinction between animate and inanimate objects. She hugged stuffed animals, pumpkins and

pine cones almost as passionately as she hugged me. She clutched sticks as though they were treasures. She said goodbye to rocks. She looked at everything. She cared about everything. She had conversations (presumably one-sided, but perhaps not) with rabbits and robins.

Now that she is three, she doesn't do that anymore. Why? We seem to take for granted that as children mature, they learn more about reality. But what if, in addition to learning, they are also *unlearning*? Are we encouraging a less imaginative relationship with the more-than-human world, less attentiveness to the fullness of the natural history around them? What would happen if we didn't overlay our present world view and culture on what may be an innate reality, and instead embraced the ecocentric world view that some cultures maintain?

How we interpret the world affects our relationship with it, and what happens to it. If life on Earth, the soils, the air, the water, are so interdependent that we need to recognize them all to keep our planet healthy, as some now believe (Cryer *et al.*, 2017), it may make more sense to talk to rocks and robins than not. We may need to know what the gnats are saying.

Though we cannot ever fully know what they are saying without *being* them, we can try to put ourselves into their lives, rather than merely observing them. In the Hoh Wilderness, my daughter and I tried to get closer, just for a few minutes. She didn't say *What are they doing?* Easy: they are swarming in the sun. She asked *What are they saying?* Harder: to answer requires a deeper attentiveness, a curiosity and a concentrated infusion of wonder. It requires a reaching outside of ourselves into other lives. It requires our imagination. As soon as we know that, those other lives become more real to us, they become important and we begin to care.

This may be essential to protecting the world of which we are a part. The news cycle, not to mention the weather outside our doors, is telling us that for all the supposed 'progress' we have made, it hasn't been enough, and we are out of time.

I work with a small land trust which protects land – farms, creeks, and woodlands – in one county in Pennsylvania, USA. The land trust movement could be described as a little like a tree itself: small organizations, like roots, preserving locally important places, protecting community resources – but feeding the successively larger organizations – the canopy – with on-the-ground work. These larger organizations have regional or global goals and the capacity to do more major projects. And they, like the sun on leaves, feed back to us nourishment we need – the science, the expertise, the legal assistance, the partnerships – that helps energize our work, connect us to the larger landscape. We know that our county line means nothing to the Appalachian Mountain chain or the Susquehanna River. But we also know that every drop of water in our county flows to that river, and that every stream, every swale, no matter how small, affects it. The larger organizations are protecting entire life systems; we are helping to add the puzzle pieces.

Just this month – a full thirty years after that conversation with my daughter – while preparing a webinar, I caught myself listing carbon sequestration,

wildlife habitat, agriculture and economic value, recreation and functional landscapes as reasons to preserve land. These are all valid. But as I reviewed this list, my eyes glazed over. These aren't the deep and overarching reasons – the *why* – we preserve land. While it sounded authentic, I had forgotten about the gnats. I had forgotten to say that everything has something to say and that we need to be listening. I had forgotten to emphasize that we are not separate from our environment – instead, I was talking about nature as if it were a *thing*.

I caught myself in time, just as I did those thirty years ago in the Hoh: I changed my message to say that people protect their land because they love it; because they know, deep down, it is part of them and they are part of it. I changed my language, turning it toward the more-than-human world. I talked about the emotional connection, and that it should not be ignored, that it was just as important as the scientific reasons, because that emotional connection translates to wonder, to belonging – and to the acknowledgement of interdependence.

Years have passed without my doing this – without my organization doing this. Even though landowners have told us that preserving their land is "the best thing they ever did"; even though one landowner told us his ground was sacred; even though they love the wildlife that shares their land.

There's a reason that those of us in conservation haven't talked much about emotions, connections or the concept that the world is all one interwoven entity. It's because 'tree-huggers' were not listened to – ignored, deprecated – and we wanted to get things done. We try to appeal to those who oppose our efforts, by giving them things they can't argue with – like the fact that it costs more to build stormwater facilities than it does to preserve stream banks. But this language still promotes *us* as the most important. We avoid asking people to face the threatening thought that humans may not be the most important beings on Earth. Our governments exercise the right of eminent domain for power lines, for roadbeds and for gas lines. But what of migration corridors, waterway protection or critical wildlife habitat? What of the delicate ecological webs that sustain all life on Earth? What of a recognition of the value of non-human life?

Ironically, though we justify our work in the languages of science and economics, we attract our donors with stories of the land, with natural history experiences, with wildlife and scenery – with the very personal *why*. We take them on walks and they donate. They see an oriole for the first time, and they gasp with joy – and will always want the orioles to have a home. The scientific information does focus our work – it is a tool – but the *why* we do it is much larger, and requires getting outside, learning the land, offering and exalting that experience and sharing it. The tool is not the endgame. The people who support us know this, as do our landowners. And it's why we do it, too, that's the big secret. We really *are* tree-huggers. The time – if there is enough of it left – has come to bravely embrace a message that can save us.

In an excerpt from his new book, *The Boy in the Box*, published in this journal, Derrick Jensen (2023) writes that "there are no personal solutions to social

problems". I think I understand what he means – that 'reduce, reuse and recycle' is not going to save us; that small personal changes are not enough. But he also says "unless it's stopped, this culture will kill everything on the planet" – and then he asks instead: "What are the largest, most pressing problems you can help to solve using the talents that are unique to you in all the universe?"

For many of us, changing our world view and our language, and exerting peer pressure might be the best answer to that question. I believe that the only way to achieve cultural change *is* peer pressure; *is* personal – the messages from each of us as individuals and also from conservation organizations like mine. Conservation organizations are made up of individuals, but they can also generate new thought processes. Policy makers often do what their constituents want. We constituents must want an ecocentric world view. We must learn to care what *all* of the beings of the world are saying. As daunting a task as it may seem to foster critical change, I believe that high-level policy decisions will be based on what individual constituents let be known that they want. It will take significant peer pressure to encourage us all to listen, and for those in power to see us doing so. It has to come from each of us. Maybe Jensen is saying the same thing.

Peer pressure can indeed be powerful. For example, researchers asked four groups of utility customers to cut energy consumption, each for a different reason – the good of the planet, the well-being of future generations, the financial savings or because their neighbours were doing it. By comparing meter readings, it was determined that only the last message had any effect – a ten per cent drop in consumption (Conniff, 2009).

Tipping points can happen (Loeffelholz, 2020), and we need one, because our culture has to change overnight if we are to avoid catastrophe. One component of culture is its trends, such as what imparts status. For example, why, in the USA, are there 40 million acres of lawn (Son, 2020) instead of wildlife habitat? Because these tended green expanses were once a sign of wealth; an outdated European fashion – but a trend that has changed the face of a continental landscape, one person's yard at a time.

So here's my personal plan: from this point forward I should ask of every decision I make: How does this nurture life? How does it respect, protect and love the beings with whom we share this Earth? Every word that I utter can be an expression of how I connect with the world. I must share my imagination and my experiences, and must confess my deep love for our whole Earth. I must undergo a personal cultural shift.

Even that small change I made with my webinar could make a difference. I'm changing as I write this. If we openly recognize the beings around us, we will more closely enter into their existence, which makes them part of ours, and we will want to know more. Our whole sense of belonging will change. Our communications will reflect this mindset. Maybe opening the door is just a matter of... opening the door. Natural history is the universe having a conversation with itself. Maybe we can come back in.

A generation has passed since I sat with my daughter on the green log. Now I am being retaught by my granddaughter. When she was two-and-a-half, she

laid on the floor, put a basket on her back and informed me "I'm a turtle!" I responded "Yes, you are!"

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Beautiful, ugly fields

Donna Myers

Donna spent several years raising cattle in Haute-Vienne, France, before returning to the United States in 2023. She now works as a writing consultant (https://www.linkedin.com/in/donna-myers-writing-consultant) but remains a regenerative farmer at heart.

Keywords: agriculture
Citation: Myers D (2025) Beautiful, ugly fields. *The Ecological Citizen* **8**(1): 28–32.

In 2018, my wife and I moved to Folles, France, to be the change we wanted to see in farming. Our goal was to produce high-quality food at affordable prices while achieving a low carbon footprint and high animal welfare. I'd read about rewilding, animal behaviour, regenerative agriculture and raising ruminants year-round on pasture without relying on hay. These ideals served as my compass while planning and managing our fledgling cattle farm located on the outskirts of a small village whose name means 'crazy' in English.

We raised ten Bretonne Pie Noirs, a rare French breed threatened with extinction due to its small stature and 'failure' to specialize. A lot of unavoidable expenses are per-animal, like identification and federally-mandated testing. This incentivizes farmers to garner as much meat and milk as possible from each 'animal unit' and to selectively breed for those specific traits. But that's not what I wanted. I wanted to go back in time, back before humans began commandeering cattle genetics, all the way back to 1884 – to the creation of the first Herd Book of the Bretonne Pie Noir. Our cattle weren't livestock units – they were beautiful, horned, petite black-and-white bovines perfectly capable of caring for themselves.

Our cattle traversed steep hillsides, rocky terrain, a marsh and two streams without ever injuring themselves. They grazed and browsed terrain that included wilted cherry leaves, bracken, foxglove, oak trees and other 'poisonous' fauna without getting sick. And they governed themselves, day in and day out, with very little interference from me.

My job, as I saw it, was to understand their social and biological needs, and to nurture an environment that empowered them to care for themselves. Feed a cow hay and she'll eat for a day; support the local ecosystem and she'll feed herself for a lifetime. That's what I hoped anyway, and in time, I found it to be true.

Our fields were seldom tidy. Depending on the season, passersby may have witnessed chest-high clumps of desiccated rye grass, stands of stinging nettles, swaths of bracken, unruly mounds of blackberry brambles, thistle in

various stages of maturity, reed canary grass matted beneath lounging cattle, thickets of blackthorn and hawthorn. This differed from the vast open spaces typical of rural France, with a hay ring as the focal point amid a carpet of short green grass dotted with cattle. Clearly, farmers cared about those well-kept fields that had been grazed, mowed to uniformity, perhaps even planted with a forage mix.

Tidy land is very clearly managed. Part of me covets that landscape because I appreciate order. Monocultures and planted forage mixes are pretty, like an English garden, with dozens of acres of symmetry and purpose. A uniform pasture is like a giant lawn that feeds livestock, and lots of farmers spend a lot of time and money tilling, seeding, fertilizing, harvesting, mowing and haying to ensure their crop succeeds.

Sometimes our unkempt fields felt like cheating. No tractor, no tilling. I strimmed brambles on occasion to keep them from taking over and at least once a year we had to strim beneath the fenceline to prevent the growth from sucking current from the electric fence, reducing the shock to a mere tingle. But no fertilizing, harvesting, mowing or haying. In this regard, our farm caused less ecosystem disruption than the massive fields of corn, soy and wheat that are generally considered more environmentally-friendly protein choices than beef.

We had four ‘alleys’, each with natural shelter and water from a stream or lake. Then we had 25 paddocks, somewhere between a quarter to half an acre each. If you think of the pasture like a house, each alley contained a bedroom, bathroom, living room and garden area, while each paddock was like a kitchen or local restaurant. The cows lived in the alleys and ate in the paddocks.

The herd remained in each alley for three weeks and didn’t return for 60 days. While in the alley, I opened and closed gates to various paddocks so they could eat fresh forage, but they only got access to each paddock for a week or less. This way, each individual paddock rested for somewhere between two months to a year, depending on how much forage was available.

It was a little complicated but allowed me to break the parasite cycle instead of using dewormers, provided the cattle with nutrient-dense forage year-round and built soil organic matter. Our fields may have looked neglected, but they were actually carefully curated to ensure healthy soil, enhance biodiversity and provide vast dietary choices.

When cows enter a paddock, they explore the whole thing and eat all the best stuff. The next day, they do the same thing. So the longer they’re in the same place, the worse the forage gets for them. Lower and lower quality every day. Until, that is, whatever they ate starts to regrow after a few days (depending on the season). The new stuff is the best stuff, packed with protein. So the cattle will grab it as soon as they find it.

This is bad for grass because it has borrowed capital from its roots, and it’s supposed to repay the loan after the blades have grown long enough to capture sunlight and convert it into energy that the roots can use to grow. But the cows don’t know this. They don’t make long-term investments. For all they know, a predator’s going to come to snatch them, so they might as well live for the moment.

So if they're in the same place for too long, they graze plants down to the nubs, weaken perennial grasses and create bare soil. When farmers don't rotate their livestock, the animals become the source of disturbance in ecological succession, inviting dreaded 'weeds' like thistle, dandelion and dock to take hold and 'destroy' a perfectly good paddock. But these maligned plants are just doing their job – cultivating soil so grass seeds can eventually take hold. It doesn't happen quickly, but the system is literally designed to reduce the 'weeds' in favour of the types of forage most farmers prefer.

My job as a regenerative farmer was to manage our livestock in a way that kept the fields hovering in the sweet spot where nature provides shelter and a wide array of nutrients from grasses, herbs, forbs, legumes, vines, brambles, bushes and trees.

By moving our cattle to a new paddock at least every week, we helped forage thrive and avoided patches of bare soil that would make life difficult for the hundreds of thousands of organisms that live beneath it. We had a bunch of different things in various stages of development: perennial ryegrass, meadow fescue, mallow, reed canary grass, chicory, plantain, wild carrot, curly dock, dandelion, oxeye daisy, Yorkshire fog, thistle, white clover, red clover, bird's foot trefoil, purple nettle, speedwell.

Our brown, waist-high grass offered seeds to native bird populations and infrastructure for spiderwebs. Those webs caught some of the flies that preyed on our cows, and birds preyed on both the flies and spiders. When wind blew the grass over, or it was flattened by ruminating cattle, it looked like wasted forage. But grass has more than one purpose on a regenerative farm. Grubs, crickets, beetles, moles, voles and earthworms all appreciate the insulating layer it provides, and plant roots appreciate aeration and fertilizer provided by those subsoil dwellers. And when the cattle lie on the matted grass, it's like lying on a blanket instead of a tile floor: it's less cold, less hot and softer. I used to watch them relaxing in the field, sometimes on their side like dogs lounging in the yard, and I'd smile because I knew they were comfortable.

They'd sprawl in the sun, ruminate in the rain, mosey to shade and run for cover when a storm rolled through. The hawthorn and blackthorn trees were particularly useful during periods of heavy wind and rain because they were like a natural barn. The thickets were so dense wind and rain could barely penetrate them. Yes, they took up grazing space, but they provided excellent shelter – not only to our cattle but to wildlife as well.

The two-inch spikes emerging from their branches deterred mammalian predators and created a paradise for nesting birds. Lots of caterpillars rely on hawthorn and blackthorn foliage, and their presence served as a readily-available protein source for birds. The surviving caterpillars became a variety of moths (hummingbird, lackey, magpie, swallow-tailed, yellow-tailed) and butterflies (red spotted purple, striped hairstreak and white admiral). And that diversity was supported by just two kinds of trees.

We allowed thistles to remain on our farm, despite a friend's suggestion that we cut them so the seeds wouldn't drift into neighbouring fields. I understood his concern, because they spread easily on bare soil and take up valuable

grazing space in a conventional system. But they produce more nectar per flower head than most wildflowers and are the main food source for caterpillars of the painted lady butterfly. Our cattle grazed young thistles on occasion, when they were rich in calcium, sodium, potassium, phosphorus, selenium and iron. And when they went to seed, they became a valuable source of nyger – small, high-oil, energy-packed seeds loved by finches, chickadees, juncos, sparrows, doves and buntings.

I found the vast swaths of stinging nettles on our property to be a painful nuisance, but everything in nature serves a purpose. I had never encountered stinging nettles before moving to France, so I had no idea why my hands were stinging and burning when I retrieved a ball my son had kicked into some weeds. I must've looked like a chimp seeing herself in the mirror for the first time. I rooted around for the ball, withdrew my hand because of the discomfort, stared at it, plunged it back into the nettles, then removed it and stared at it again. Stinging nettles have hollow hairs called trichomes, which are basically tiny syringes filled with neurotoxins and capped with a glass tip. Brushing against the nettle breaks the tip and causes the plant to inject toxins into the 'attacker'.

So why didn't we eradicate stinging nettles from our fields? Because although they're annoying, they're also awesome. They're the primary food source for caterpillars that become comma, peacock, red admiral and small tortoiseshell butterflies. Nettles are also high in protein, have anti-inflammatory properties, and contain antioxidants, vitamin A, vitamin C, and a bunch of minerals including cobalt, iron, molybdenum, nickel, potassium and zinc. Even when plenty of other forage was available, our cattle chose to include stinging nettles in their diet, usually in the summer when their sting wasn't as strong.

Nettles are so healthy I even decided to harvest some myself and turn them into tea. I pinched the tops off a bunch of plants, washed them in a colander, then laid them out in a dehydrator and crushed the dried leaves into tea. But it was like drinking the water left over after boiling spinach, so I decided to leave the nettles to the cattle.

Even now, knowing what I know, I still appreciate the beauty of conventionally-managed fields, and the effort that goes into keeping them that way. But the world needs more ugly fields. Animals, farmers, and the environment benefit more when ruminants roam pastures instead of machines.

Both farming methods require planning and labor; one works to force nature into compliance, while the other harnesses nature's workforce. One micromanages the environment in an effort to control what grows when, to what extent and exactly which nutrients will be available at any given time. The other macromanages the environment, empowering nature to nourish livestock and encouraging livestock to nourish themselves. One has higher up-front costs and a better short-term return; the other has lower up-front costs and better long-term returns.

One reflects life as we sometimes wish it would be: predictable, immediately rewarding, and within our control. The other reflects life as it actually is: complex, messy and utterly beautiful.



A field on the farm.



Caterpillars on nettle.

Fighting back for the Earth

Sandy Irvine

Sandy is a political activist based in Newcastle-upon-Tyne, UK.

Keywords: societal change
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In these darkening times, it is all too possible to surrender to despair. But there are actually some positive things we can do, ideally working together, that might halt, or at least slow down, the ecological catastrophe currently underway. Here are a few suggestions.

First, convince a critical mass of people (we'll never persuade everybody!) to accept two things: that we cannot go on like this, for the costs will be too great – as Herman Daly (2019: 18*n*) put it, "so-called 'economic' growth has become uneconomic"; and that there is a better way.

That 'better way' might be leaner, smaller, slower and darker (*i.e.* less light pollution), with some current conveniences absent. But, on the plus side, there would be many gains – such as better personal health, more satisfying work, a stronger sense of community, less loneliness, more tranquillity, all the mental and physical benefits of contact with 'green spaces', pride in doing the right thing, and so on. But we cannot offer some Big Rock Candy Mountain, where the handouts grow on bushes and the hens lay soft-boiled eggs. Things may be very hard in some ways (for one fictional imagining of such a world, see Kunstler [2009] and its sequels).

Thus there has to be alarm-bell ringing but also positive vision, including exemplars from here and now that show the practicability of an alternative way of living. The battle of ideas is absolutely central. The Mont Pèlerin Society really learned that lesson (*cf.* Mirowski and Plehwe, eds. 2009; Mirowski, 2013). Electoral campaigns have to be but a part of that struggle to challenge and change mindsets.

Comparatively speedy change can happen. For example, Pinker (2011) documents how that happened in only a few decades during the Enlightenment when lots of people began to think and see many things differently. Whether we have the luxury of decades to win hearts and minds is another matter! That said, the 'woke' revolution shows how fast things can change, not least institutional policies (for some analysis see, *e.g.* Doyle [2022] and https://historyreclaimed.co.uk/podcast/how-woke-won/). We have to learn from all sources!

Second, fashion a *transitional* programme. It would cover both personal lifestyle change and new public policies from government at all levels,

including new regulations for businesses and new tax frameworks. It would have to concentrate on essentials, dropping all else. It would have to search for ways of connecting to the *current* hopes and fears of significant layers of people. Many matters can, however, be left for expert commissions, referenda and other means of resolution. Other forces are getting organized for the breakdown of the *status quo* – consider, for example, the Heritage Foundation's sinister Project 2025 (https://www.project2025.org/; discussed in Goodwin, 2024).

Third, deliver clever messaging tailored to target audiences – that is, 'different strokes for different folks'. This will, to some extent, involve being a bit opportunistic. Thus, one can critique the WWF on several grounds, but its use of pandas and other such imagery has been effective in raising truckloads of cash, if nothing else. I doubt if scorpions and wasps would have had the same effect. There is nothing wrong with, *sometimes*, selective use of anthropocentric arguments for ecocentric ends (*e.g.* promoting the conservation of plants for future supplies of beneficial drugs). We have to use all sorts of arguments with those whose minds are mired in conventional thinking. But people often care about their children and grandchildren. Thus the most successful TV election broadcast ever in the UK in terms of responses was a short film for the Green Party by the famous photographer David Bailey in which buckets of something horrible were poured on the heads of children, along with a simple message about cutting pollution.

Fourth, form networks of people who agree with the ecocentric vision and who can work together as appropriate in particular circumstances. Even just two people going together to, say, a public lecture or rally will find it easier to stand up and voice ecocentric messages than someone all alone. A group of just three people can keep up a stream of letters to the media. It might be a faction in a political party, members of the same trade union, co-workers in local government, or members of an academic network. It all depends on what boots there are on the ground. Furthermore, just being in touch with like-minded people can keep one sane.

Fifth, use all channels of communication, from academic articles in learned journals to street theatre, art and music. Even 'legacy' media such as the press retain considerable influence over their newer digital forms, still playing a very significant role in shaping the public 'agenda', especially amongst elites. Good slogans will be particularly important. Language has to be chosen carefully. 'Slimming' sounds better than 'cutting'; 'post-growth' better than 'contraction'.

Sixth, join mass organizations where there might be receptive audiences.

Seventh, have lots and lots of luck since the cards are stacked against us. As Orwell (2000: 375) wrote, more than eight decades ago: "The actual outlook, so far as I can calculate the probabilities, is very dark, and any serious thought should start out from that fact."

Actually there is no formula for success. There are so many contingent factors. All we can do is give up or keep trying, ideally learning from past failures and past successes in the experiences of other movements, political parties and other organizations. Many past 'breakthroughs' often took most

people at the time by surprise. Few contemporaries predicted, say, the English, French and Russian Revolutions. Similarly, Margaret Thatcher was widely dismissed in the 1970s yet she swept to power in 1979 and brought about extensive changes to the fabric of British society (not good ones!). Two years ago, it was widely assumed that the British Labour Party was finished as a political force but now it is in power (albeit helped by the warped workings of the 'first-past-the-post' electoral system and the intervention of Nigel Farage's Reform Party).

There are also 'objective' forces, ones beyond human volition, that will compel many changes – for example, the relentless decline in reliable supplies of what are currently cheap resources, not least oil. The changing balance of EROEI (energy return on energy invested) will be a major driver of change. Of course, such factors may not go in a good direction but, instead, favour a new wave of autocratic demagogues who will promise seemingly easy fixes. They will demand "drill, baby drill" and/or scapegoat vulnerable minorities for any shortages.

But let's be honest. If there were an *easy* answer to the 'here to there' question – from our current state, in the midst of what some call the "great unraveling" (Miller and Heinberg, 2023) to somewhere closer to the sustainable common good – the Earth would already be saved and we could all put up our feet.

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Habitats of Freshwater Mussels in the Potomac River

Stephanie Cussans Moran

From the artist: "These paintings are part of a body of work based on my research into freshwater mussels during a Fellowship at the Smithsonian's National Museum of Natural History in Washington DC. Mussels are a keystone river species that filter the water and maintain habitats for many other species. The museum's collection contains shells from 16 different species of mussel that have been found in the Potomac River historically, some of which are now endangered or extinct because of human activity (such as pollution and construction). These paintings show some of the different freshwater environments along the river where mussels have been found."

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Under Aqueduct Bridge

Stephanie Cussans Moran

Acrylic and ink on paper (200 x 150 cm).

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Cherry Blossom Tidal Basin Outlet

Stephanie Cussans Moran

Acrylic and ink on paper (200 x 150 cm).

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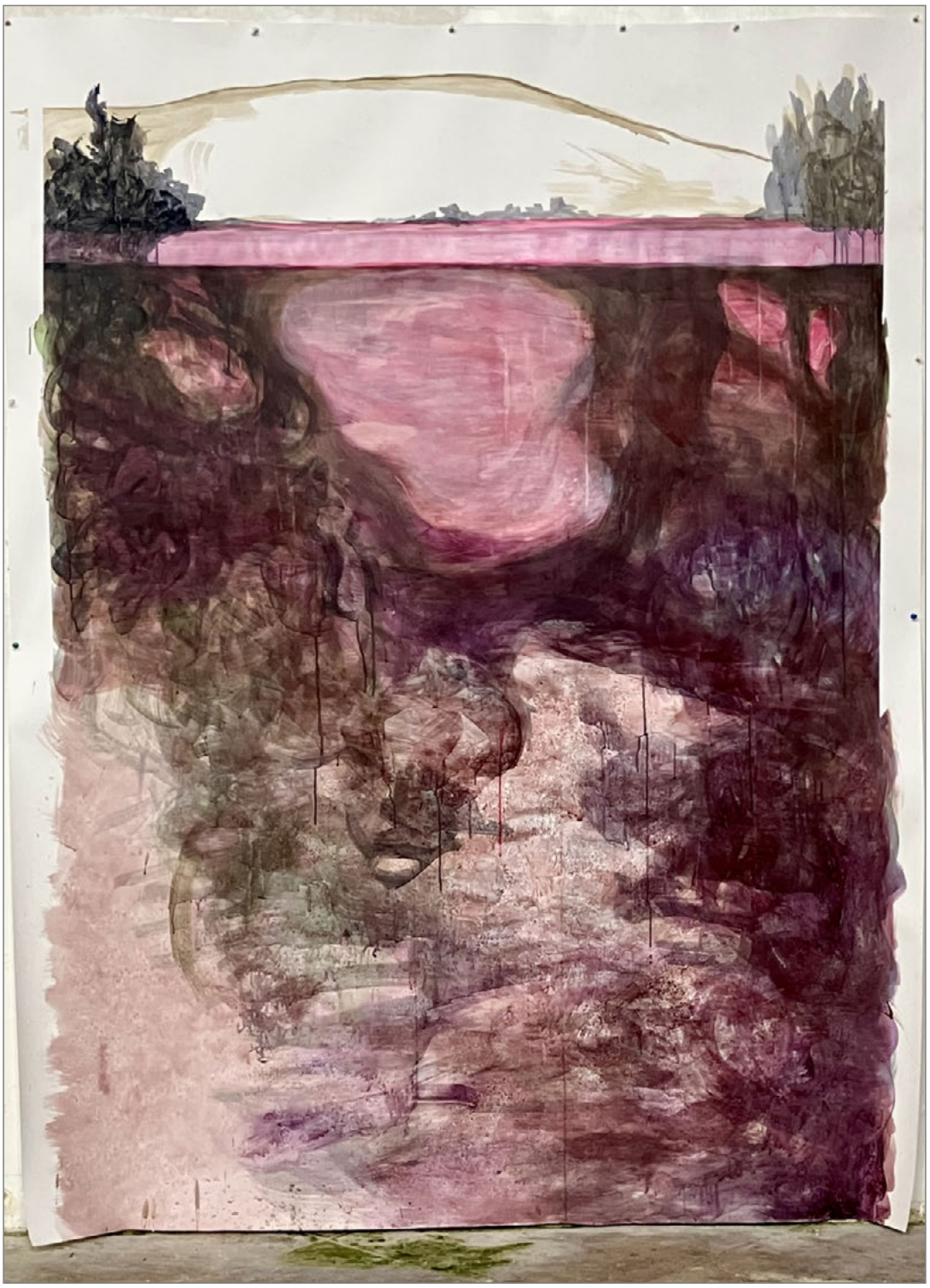
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Stephanie Cussans Moran
Acrylic and ink on paper (200 x 150 cm).

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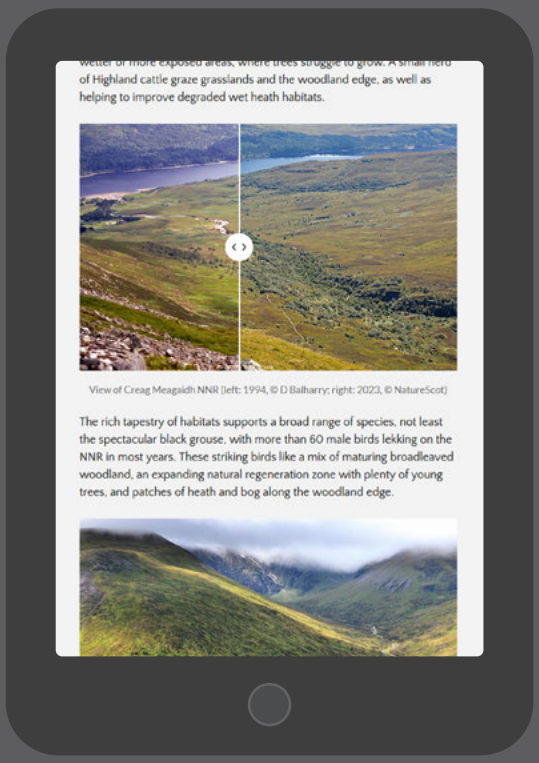
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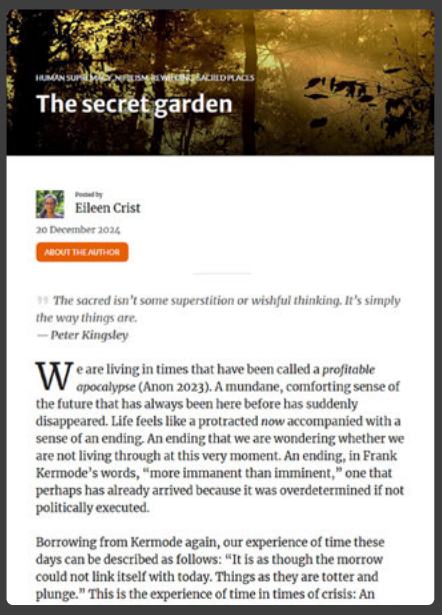
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The enduring and elemental importance of natural history

Thomas Lowe Fleischner

Thomas is a naturalist and conservation biologist who was the founding director of the Natural History Institute in Prescott, Arizona, USA. He currently serves as the Institute's Senior Advisor and Director Emeritus. He is Faculty Emeritus at Prescott College and an elected Fellow of the Linnean Society of London, and he has served as Chair of the Natural History Section of the Ecological Society of America and on the Board of Governors of the Society for Conservation Biology.

Natural history – a practice of intentional focused attentiveness and receptivity to the more-than-human world, guided by honesty and accuracy – is the oldest continuous human endeavour. In the evolutionary past of our species, the practice of natural history was essential for our survival, imparting critical information on habits and chronologies of plants and animals that we could eat or that could eat us. Natural history continues to be critical to human survival and thriving. It contributes to our fundamental understanding of how the world works by providing the empirical foundation of natural sciences, and it contributes directly and indirectly to human emotional and physical health, thereby fostering healthier human communities. It also serves as the basis for all conservation efforts, with natural history both informing the science and inspiring the values that drive these.

Keywords: biodiversity; conservation; Harmony with Nature; natural history; societal change
Citation: Fleischner TL (2025) The enduring and elemental importance of natural history. *The Ecological Citizen* 8(1): 43–51.

The Earth needs natural history – the practice of falling in love with the world – now more than ever. This process of careful observation, description and comparison – paying attention to the larger-than-human world – makes us better, more complete human beings. Natural history helps us see the world, and thus ourselves, more accurately. It humanizes and grounds us, fostering curiosity, wonder, imagination and empathy. Natural history animates our sense of belonging and reciprocity, thus promoting our conscious, respectful relationship with the rest of the world, and I believe that it encourages us to build better human societies, ones that are less dysfunctional and less destructive to each other and to our non-human kin. When we engage in this practice of attentiveness, we reaffirm our commitment to nurturing hope.

Natural history – "a practice of intentional focused attentiveness and receptivity to the more-than-human world, guided by honesty and accuracy" (Fleischner, 2001) – cultivates receptivity to revelation. This attentive practice can involve watching birds at a backyard feeder or in alpine tundra; tending the garden or observing old growth forests; sketching flowers, watching butterflies or counting migrant hawks. In short, natural history involves mindful observation. Natural history, then, is as much a verb as a noun – a practice, something we *do*. And attention, as the Buddhist psychologist John Tarrant (1998) has pointed out, is the most basic form of love.

* * *

About two thousand years ago a Roman scholar and philosopher, Pliny the Elder (1991), assembled the first ever encyclopaedia, and in the process coined the term *natural history*. This monumental work was titled *Historia Naturalis*, typically translated as "natural history." It consisted of 37 books in ten volumes, covering everything from plants to animals, from rocks on Earth to stars and planets in the heavens, from art to mineralogy, from ethnography to mathematics. In short, it was an attempt to capture all that was known about the world at the time – an ambitious, comprehensive presentation of how the world works.

Substantial confusion exists because of the common translation of *historia* as "history" – leading many to assume that natural history is concerned only with the past (a view amplified by the prominence given to dinosaurs in many museums). But in Latin (and contemporary Spanish), *historia* has two meanings: "history," but also "story." A perusal of Pliny's 37 books makes clear that when he coined this term he was concerned with far more than past events. In many ways, then, a more accurate and telling translation would be "the story of nature." At any given moment, in any given place, nature offers a boundless array of stories. Natural historians can follow their own instincts, inclinations and interests to trace narratives of the living world.

* * *

We're all wired to do natural history. Human beings are designed by natural selection to practise it: our senses, our limbs, our whole bodies have evolved for attentiveness. No wonder – our survival has wholly depended on our capacity to pay attention to the encompassing living world, full of threats, foods and delights. Paul Shepard (1998a: 12; 1998b: 51–66) and others have proposed that the very nature of the human psyche, or mind, is a result of natural history practice – discerning predator from prey, poison from food, and so on. Natural history, then, is the oldest, continuous human endeavour (Fleischner, 2011a). In fact, there have never been people without natural history. Throughout human history and "prehistory," attentiveness to nature was so completely entwined with daily life and survival that it was never considered as a practice separate from life itself. As Barry Lopez (in Lueders [1989: 22]) pointed out:

"Natural history has served for forty thousand years at least – it's as old as the history of coherent narrative, as old as the history of the interaction of people with landscape – as a reminder of the breadth of the universe and the inability of the individual mind to encompass what is known or what can be known."

And yet, there has never been a time in the history of our species when such a small proportion of people practised natural history – we live amidst the greatest dearth of natural history in human history. We have come to see the world as a funhouse built of human mirrors, where we see narcissistic distortions of ourselves. Indeed, as we grow older we learn – or are taught – to *not* pay attention to our world (Brusca, 2024). The advertising industry and mass consumer culture collude to encourage this shrinking of the scope of our attention – this squashing of our curiosity, our inquisitiveness, and our bold, direct exploration of the world. We have witlessly traded immersion in the endlessly engaging richness, depth and diversity of the living world for portrayals of a tiny subset of experience, often on small, two-dimensional screens – which diminishes our overall capacity for perception (Sewall, 2012). Without attentive immersion in the larger-than-human world – the exact immersion for which we are biologically adapted – we dissolve into individual and collective malaise. The current gush of social dysfunctions – violence, depression, anxiety, alienation and lack of health in so many ways – coincides with this mass sacrifice of human interaction with nature.

But natural history attentiveness is inherent in us, and it can be reawakened readily. If anyone doubts that we are all born to practise natural history, just watch any small child anywhere in the world. We turn over stones; we crouch to look at insects crawling past; we turn our heads to listen to new sounds, to witness the passage of birds.

* * *

Natural history helps us to see the world accurately. Careful observation and description – the cornerstones of natural history – are the basis for all good science. Natural history is the process by which we gather information and insight about the world in which we live. It plays an especially critical role for ecology, by helping scientists answer four key ecological questions: *Who? Where? When?* And *how many?* In so doing, it helps us find areas of high diversity, for example, or patterns of migration, locations of rare species, and much, much more. Empirical observations provide the framework upon which integrative theories can be draped. Theories – which are highly prized in academia – are only as valuable as the natural history observations on which they are based.

Charles Darwin (1863) once wrote in a letter to a friend, "Accuracy is the soul of natural history." Accurate natural history undergirds all theoretical advances in understanding the world. Darwin investigated the equatorial desert islands of the Galápagos archipelago; Alfred Russel Wallace explored the lush tangle of tropical forests in Amazonia and Malaysia. Both naturalists then independently described the patterns of variation they observed and worked

out the theory of evolution through natural selection; the world was forever changed by their insights. Entomologists crawling on hands and knees, tracking movements of ants, ponder theories of sociobiology (Wilson, 1975; 1994). Geologists, sweating in dusty desert mountains, tracking fault lines and stratigraphies, contribute to a unified theory of plate tectonics (Oreskes, 2002). And geneticists, peering through microscopes, unravel the human genome. Every worthy science arises from a sturdy foundation in the careful observation and description of natural history.

Conservation, too, has always depended directly on natural history. How can we save populations or species from declines and extinction if we don't know where they are, or how many individuals they comprise, or, even, that they exist? How can we prioritize natural ecological communities for protection if we haven't mapped patterns of vegetation? Without detailed natural history information, a species cannot be nominated for protection under the US Endangered Species Act, and similar considerations apply elsewhere in the world. The earliest formal conservation policy in the United States was the regulation of hunting seasons – closures motivated by natural history observations of decreasing "game" populations (Trefethen, 1975). Every conservation issue involves an interaction between three realms: science, values and policy (Fleischner, in Jones *et al.* [2010]). Natural history *informs* the science and *inspires* values that favour conservation of nature – hopefully leading to wise policies. The sense of wonder generated by natural history can predispose field scientists to a lifelong commitment to conservation (Fleischner, 2005).

While the remainder of this article explores, for the most part, the myriad benefits of natural history for humans, its importance for conservation and biodiversity protection – doing right for all our non-human kin – cannot be overstated.

* * *

Natural history is good for us. I mean this quite literally: we are physically and emotionally healthier when we pay attention to nature. "Nature Deficit Disorder," a term coined by Richard Louv (2005), focused public attention on the notion that immersion in nature is essential for human health. The idea garnered some persuasive power by utilizing the jargon of medical science – "deficit," "disorder." As yet, there's no formal medical disorder, nothing listed in the *Physician's Desk Reference*, concerning lack of nature. But there should be. When one reads what's buried in the technical verbiage of professional journal articles, it's stunning how remarkably healthy that time outdoors turns out to be. Again and again, the conclusion in a wide variety of psychological and medical studies – published in such respected journals as the *Proceedings of the National Academy of Science*, the *Journal of Experimental Psychology*, *Environmental Health and Preventative Medicine*, the *Journal of Cardiology*, to name just a few – is that it's simply healthier, both physically and emotionally, to spend time outdoors than in more human-dominated urban settings, to

walk in forests rather than along city streets (Fleischner, 2017; Fleischner and Sewall, 2020).

The bottom line from the rapidly exploding scientific literature, in a wide variety of peer-reviewed studies in cognitive and medical sciences: nature is good for us. The documented benefits of what healthcare professionals now sometimes refer to as "nature therapy," "forest therapy" or "forest bathing" – simply put, being outside – are striking and diverse. On the whole, people who spend time outside have less stress, improved memory, stronger immune systems, better vision, increased creativity and problem-solving capacities, reduced inflammation and improved concentration; and they are, well, happier. Immersion in nature reduces stress, and this can be measured by standard physiological metrics like heart rate, heart rate variability and blood pressure (Fleischner, 2017).

Attentiveness to the world around us engenders humility and open-mindedness. Humility is especially easy to grasp when encountering a grizzly bear, catching a glimpse of a long animal migration or witnessing a plant thriving in the harshest of habitats. But it also comes simply from, say, a canyon wall's reminder that the Earth was here long before us, and will persist long after. Or simply by watching a bird visit the ledge outside our urban apartment, or new flowers growing in sidewalk cracks. Natural history combats arrogance, tackles despair. It humanizes and grounds us by offering a larger perspective on the world. Humility – so sorely needed in our social and political discourse – can only be taught through modelling. Some human elders do a fine job of this. But immersion in the complexity, the unpredictability, and, occasionally, the ferociousness of the natural world almost always teaches humility – that all too rare human trait, which is absolutely essential for building sustainable human cultures (Fleischner, 2017).

Natural history makes us healthier as individuals and, collectively, as societies. Engagement with the beauty and power of nature brings out our best behaviour, supports our best selves. When we love the world we can love ourselves. And vice versa (Fleischner, 2017). A society comprised of naturalists – those who learn directly and broadly from more-than-human nature – is less myopic and less inclined to believe in the myth of human supremacy (Wessels, 2013). The practice of natural history connects us to the particulars of place, making the world less homogenous and abstract, and more interesting. The engagement, affection and sense of compassion that flows from attention to these particularities of place and organism promote an ethic of stewardship and compassion.

Ultimately, natural history is a *spiritual* path. One commonality of virtually all spiritual and religious traditions is that they try to break us free of our small minds toward a more expansive sense of ourselves and the world. Natural history provides a simple, time-tested protocol for developing awareness of something much larger than ourselves: pay attention to what's going on around us. We might observe the everyday wonder of a finch building a nest, a new green shoot pushing through still-cold soil in spring, a sudden wind ruffling the branches of the tree outside the window, the stillness of the

mountain in the doorway. These and countless other mundane miracles can shift us into alertness, remembering what a gift it is to live in this wild, bountiful world.

Mindfulness is a crucial element of many spiritual traditions. Mindfulness practices of all traditions share three characteristics: a commitment to developing the capacity to pay attention; an object or ally to pay attention to (typically, one's breath); and a focus on in-the-body rather than out-of-body experience. The first notion – developing skill at paying attention – is fully concordant with any definition of natural history. But some advocates of mindfulness have concentrated on the importance of interior reality, while neglecting that which occurs outside. When considering mindfulness, we should erase the false boundary between inwardly and outwardly directed attention. Natural history and mindfulness are two surfaces of the same leaf, a seamless merging of attentiveness outward and inward, toward the interwoven realms of nature and psyche (Fleischner, 2011a). Recognition of the essential permeability of the "self" and larger "ecological self" unifies mindful practices directed toward inner and outer landscapes.

Natural history represents a practice of compassion, of "feeling with." Too often, people – even those predisposed toward conservation – lump all of non-human life into one amorphous bundle, and label it "nature." This is good as far as it goes, but "nature" hides at least as much as it illuminates. We tend to have our deepest compassion for *individual* beings, not for general categories. Mother Teresa took on mass hunger by looking each person in the eye, as she lifted a ladle to their lips. Look into enough eyes and some sense of caring for humanity as a whole can emerge. The same goes for "nature". We need to watch an individual bird struggle to stay warm as she fluffs up against swirls of snow, or contemplate the purple gentian flower blooming an inch above the grassland of the high Andes, tenaciously clinging to the ground as a fierce wind knocks human observers to their knees. Watching a particular bird sing – *this* redwing, from this fencepost – or a particular flower blossoming... this lavender jewel we call *Penstemon*... helps us transcend the vague notion of "nature," or, worse yet, "the environment," and replaces it with texture, depth and a realm of specificities. And in the process, *awe* suffuses our beings – from the simple recognition that something like a paradise tanager actually *exists*. If this expansion of consciousness is not a spiritual practice, I don't know what is.

Natural history is also ultimately political, in that its practice shifts relationships of value and power. When we fall in love with some particular plant, animal or place, something shifts in the way we relate to the whole world. We foster this falling-in-love in ourselves first. Then, love by love, friend by friend, story by story, we engage others – and we just might make a brand-new world. Natural history is inherently honest and transcends ideologies.

We humans understand the world through stories: we are a storytelling and a story-listening species (Lopez, 1988: 61–71). But oftentimes important ecological and conservation stories are not told in the most compelling ways, or in the ways that are accessible to the general public around the world.

Natural history *reanimates* the world by adding sensory details and living vibrancy, and making real what is at stake when we talk about something like "sustainability." Compelling ecological stories are usually rooted in natural history in one form or another. *This* hawk who landed on the branch behind my house, songbird in his talons; these exceptional floral colours nodding in the desert wind after a wet winter. Natural history stories *serve* us and they connect us both with the biodiversity in which we live, and also with one another by deepening our understanding and fostering compassion. Natural history provides *better stories* – ones that can help guide us out of our current mess. Stories that are more useful and accurate, less self-absorbed and narcissistic: stories of relationship, of sharing space, of adaptation, of perseverance.

The importance of natural history to science and conservation, as discussed earlier, has been widely recognized (e.g., Greene, 1994; 2005; Herman, 2002; Tewskbury *et al.*, 2014). But how does natural history affect the lives of individuals who practise it? After teaching natural history for more than two decades I began to ask learners this question at the end of field courses or workshops: *How has natural history changed you, if at all?* There has been remarkable similarity in responses over many years, amongst adult learners from college age to 80 and beyond. Among the often-mentioned gifts of natural history: awe; a sense of relationship and connection; humility; gratitude; greater capacity for sympathy and empathy; emotion and feeling; renewed energy. One thing that has been striking about these commentaries is the lack of statements about the personal importance of gaining new information or gathering facts – though, no doubt, that has enlivened and enriched all these naturalists' lives, too. But when asked to reflect on how we have been most affected by natural history practice, most of us think first about how it changed what kind of people we are, much less about gaining knowledge, per se.

Bottom line: natural history makes us healthier as individuals and, collectively, as societies (Fleischner, 2011b). Natural history expands our sense of self into one of an ecological self and helps us to clarify our ecological identity (Thomashow 1996), by encouraging us to engage with nature – any place we can be in meaningful kinship with other species. Love for our biologically and culturally diverse world is a fundamental virtue and imperative. Humans are born to practise natural history – simply put, to pay attention to nature – and we are physically, emotionally and socially healthier when we do.

And, not least, it's a whole lot of fun.

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ARTWORK



A collage of all published artworks to date

This collage, the 500th artwork published in *The Ecological Citizen* since our first issue back in 2017, combines all of the preceding 499 pieces, including those appearing on the earlier pages of the present issue. (Each artwork in the collage was placed manually within the software that was used to create it.)

Higher-quality versions of artwork from this issue:
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Interspecies healing through natural history: On Thomas Lowe Fleischner's 'spiral of offering'

Joachim Nieuwland

Joachim is a philosopher in the Faculty of Veterinary Medicine, Utrecht University, the Netherlands. As a teacher and researcher, he works on contemplative pedagogy within higher education of future health professionals as a way to relate to interspecies interdependence.

Thomas Lowe Fleischner has revived the ancient practice of natural history within academia, especially as a teacher of biology. While natural history naturally aligns with biology, its offerings as described by Fleischner are not limited to this scientific discipline alone. In particular, natural history can support teachers and students within interspecies health education in at least three ways. First, by providing a *pre*disciplinary grounding of their work, involving a reverent attuning to the more-than-human world unbound by the restrictions and expectations of disciplinary thinking. Second, by helping us move away from an isolated understanding of health to a more holistic conception of reciprocal healing. Third, by helping us to cultivate attentiveness to the more-than-human world alongside (and inseparable from) one's inner self. As Fleischner argued, the practice of natural history honours the interdependence of humans with the more-than-human world, and by becoming a naturalist, possibilities for genuine interspecies healing emerge.

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Over two decades ago, the journal *Wild Earth* published naturalist Thomas Lowe Fleischner's aptly titled article "Natural history and the spiral of offering". Fleischner needs little more than two pages – embellished with a beautiful pen-and-ink drawing by D. D. Tyler – to lay out his offering and set off any reader to go and rekindle the ancient practice of natural history.

In that article, Fleischner defines natural history as a "practice of intentional, focused attentiveness and receptivity to the more-than-human

world, guided by honesty and accuracy" (2001–2: 11). He argues that the practice of natural history spurs a "spiral of offering" between Earth and naturalists, an ever-deepening of their reciprocal relationship. Fleischner has made natural history an inextricable part of how he teaches biology, taking students on long field trips to be with the more-than-human world. This serves an important scientific purpose, as fieldwork provides the empirical bedrock for theorizing about the workings of nature. But it reaches beyond science into the senses, cultivating both a "sense of place" and a "sense of wonder" (Fleischner, 2017: 2). For Fleischner, science without such senses quickly becomes abstract and reductive – out of touch, both literally and figuratively, with the aliveness of the more-than-human world.

In this article, I explore how Fleischner's pioneering work can shine a light on higher education of future health professionals. What has natural history to offer these students as well as their teachers? I explore the spiral of offering of natural history within the broader scope of what I call 'interspecies health education', which encompasses all higher education geared towards protecting and promoting health, including at least education in medicine, veterinary medicine and the biomedical sciences.

Before disciplines

One of the first lessons of natural history lies within its own history. Fleischner traces the onset of natural history's gradual demise to over ten millennia ago, around the dawn of agriculture. Due to this change in the human relationship with the more-than-human world, "[f]armers discovered natural history nuances of a few species, but began to ignore many more. … As millennia passed, these societies grew ever more specialized, and natural history – which was fundamental for hunting and gathering people – gradually diminished as the foundation for daily life" (Fleischner, 2001–2: 11).

Specialization and ignoring continues until this day. Just a few domesticated species of nonhuman animals attract abundant scientific interest, driven for instance by the desire to 'optimize' the process of 'livestock production' (Marino, 2017; Nieuwland and Meijboom, 2023). Furthermore, health sciences are rife with siloing despite initiatives for more integrated approaches like One Health (Manlove *et al.*, 2016). To get a grip on the complexity of life, science generates evermore specialized fields, which simultaneously both grows and fragments knowledge (Casadevall and Fang, 2014).

The upsurge of disciplinary-transcending approaches – such as multi-, inter-, and transdisciplinary approaches – reflect an awareness of the disadvantages of monodisciplinary and disconnected ways of understanding nature (Choi and Pak, 2006). In that sense, natural history appears to dovetail with transdisciplinary approaches specifically, as both try to see the bigger picture and put science in the service of real-world concerns.

It would, however, be a mistake to understand natural history as trans-disciplinary. More accurately, natural history is *pre*disciplinary. As Fleischner points out, the origins of natural history can be traced back way before the rise of Western science and its recent specialization and fragmentation. Natural history

does not carve up the world into different fragments to begin with, so there is no need to put it back together again.

Moreover, natural history sets itself apart from transdisciplinary approaches in the way that naturalists devote themselves to the natural world. As Fleischner puts it, in explaining his use of the phrase "the spiral of offering":

> *We naturalists ... undertake the practice of natural history in tribute to the world, as a token of esteem for the world, in gratitude for the gift of living in a world that is inestimably more diverse and gorgeous than it might have been. All natural history is informed and motivated at some level by this sense of gratitude and awe (2001–2: 12).*

In contrast to what Fleischner termed "natural-history-as-devotion" (2001-2: 12), transdisciplinary approaches could be undertaken without any such sense of gratitude and awe, and might quickly overlook nature herself. In other words, transdisciplinary approaches change our ways of knowing but not necessarily our ways of being. While natural history makes one inquire into the workings of nature, it does so with a sense of reverence and humility, serving as a constant reminder of both the sacredness of nature and the limitations of our understanding.

Of course, natural history is not *a*disciplinary either, with Fleischner's own educational practice a case in point. The practice of natural history provides the necessary fertile soil for a diverse range of disciplinary assemblages and other foliage to flourish. In doing so, natural history provides an antidote to what Vandana Shiva (1993) has called the "monocultures of the mind", as it fosters a kaleidoscopic, holistic view of the more-than-human world that cannot be grasped through the siloed visions of highly specialized scientific disciplines alone.

Above all, natural history requires a reverent attuning to the more-than-human world unbound by the restrictions and expectations of disciplinary thinking. A naturalist engages in the practice of being a humble student – and member – of the socio-ecological web she finds herself in, learning and adjusting every step of the way. Any disciplinary understanding of interspecies health adds to rather than replaces a naturalist appreciation of a place and all those species living there.

Reciprocal healing

Another lesson of natural history pertains to interspecies health and healing. The spiral of offering involves an ever-deepening reciprocal relationship between the Earth and the naturalist. Such reciprocity pushes back against the perception of nature "as a *resource* for human healing, without giving in return, without concern for the health of natural ecological relationships of the more-than-human others" (Fleischner and Sewall, 2020: 159; emphasis in the original). Reciprocal healing asks the question of how humans and the more-than-human world might heal each other. Here, healing involves more than an individualized, frozen-in-time, free-from-disease understanding of health that requires an individual organism to return to a set of species-specific

biophysical reference points (Boorse, 1977). Rather, healing involves an ongoing and wide-ranging process of striving "to make the individual, the collective self and the wider, more-than-human world whole again" (Fleischner and Sewall, 2020: 159).

In many ways, human health is a *gift* from the more-than-human world – not something to be taken for granted. As naturalists, we strive to enrich our understanding about the intricate interrelations between humans and the more-than human world, and how the interplay between these affects the health of oneself and others. By doing so, if we are honest with ourselves, we uncover the many ways in which humans squander the gifts of the more-than-human world. Faith in technological innovation upholds inherently unsustainable standards of living (Rees, 2019). Ecological disruption and loss endanger health and engender disease across geographical borders and species, with potentially wide-ranging implications – and, in general, inflict profound harm in unequally distributed and unjust ways (Acevedo-Whitehouse and Duffus, 2009; Ilea, 2009; Myers and Patz, 2009; Crighton, Gordon and Barakat-Haddad, 2018; Bambra, 2022).

Natural history allows for reciprocal healing through various means. As naturalists become humble students of their own ecological embeddedness, being taught by the more-than-human world, they might shed some (or many) beliefs of how places and species should conform to conventional human practices, or come to recognize the various ways in which the more-than-human world has been overlooked in health education. This open mind allows both for an honest diagnosis and helpful understanding of what interspecies healing might involve (Fleischner and Sewall, 2020).

Moreover, being devoted to the more-than-human world – as we have seen, the heart of natural history – helps to restructure and develop human–nonhuman interactions and relationships that work towards interspecies healing. If health professionals engage with other species as naturalists, this profoundly shapes their ability not only to recognize but also foster the health of the more-than-human world as part of their own profession.

Finally, it is itself healing to immerse oneself in a place vibrant with life. Various scientific studies on the human health benefits of 'being in nature' (e.g. Maller *et al.*, 2006; Kotera *et al.*, 2022; Shanahan *et al.*, 2016) confirm Fleischner's idea of reciprocal healing, of simply offering attentiveness and receptivity to the more-than-human world and receiving healing gifts in return (*cf.* Fleischner, 2025). For health professionals, turning towards the more-than-human world might help not only to benefit nonhuman species but also to find ways to care for themselves and other human beings as part of a movement towards genuine sustainable health care.

Being (with) the more-than-human world

Natural history brings into relief the transformative potential of being attentive to the more-than-human world. Fleischner is quick to recognize and reassert the kinship between natural history and contemplative practices found across religious and spiritual traditions (2001–2: 11; Fleischner, 2011; Fleischner,

2025). Both practices honour a way of being present, and experiencing reality, that eludes the discursive mind (Brandmeyer and Delorme, 2021).

In that sense, natural history aligns with contemplative pedagogy, as both revolve around attentiveness. Contemplative pedagogy emerged just before the start of this century as a movement to foster 'complete attentiveness' within higher education (Zajonc, 2013: 91). Its roots run perhaps just as deep as those of natural history, spanning across millennia throughout the world, with contemplative practices venerated within a wide variety of spiritual and religious traditions. In higher education, contemplative pedagogy involves a respectful exploration (being careful of the risks of appropriation) of various contemplative practices to cultivate attentiveness, mindfulness, insight, love and compassion (Zajonc, 2013).

Interestingly, both natural history and contemplative pedagogy include field trips as part of their practice (Fleischner, 2017; Barbezat and Bush, 2014). Moreover, both understand attentiveness and receptivity as a step towards a larger self – an understanding of oneself as part of something more encompassing (Fleischner, 2001–2: 11; Zajonc, 2013). In joining natural history with contemplative pedagogy, an old bond is restored.

While similar in spirit, an important but subtle difference remains between natural history and contemplative pedagogy – a difference that, as Fleischner points out, allows for a symbiotic relationship between natural history's emphasis on the *outside* and mindfulness's emphasis on the *inside* (Fleischner, 2011, 2025). On the one hand, natural history invites students to become naturalists, to go out and pay attention to the interspecies fabric of life in which they find themselves embedded. In doing so, natural history shifts attention outside oneself to create a broader conception of self (Fleischner, 2011; Fleischner, 2025). On the other hand, contemplative pedagogy turns inside to tend to the inner work required to open to a broader conception of self.

Interspecies healing

Fleischner's plea for natural history reinvigorates not only attentiveness but also various affective states – such as gratitude, awe, reverence, humility and love – in relation to the more-than-human world; ways of attuning that have become rather dormant in modern industrial societies (Plumwood 2012; Kingsnorth, 2017; Nieuwland, 2022). The practice of natural history invites one to become familiar again with one's more-than-human kin, a lifetime commitment to finding one's place within the larger ecological fabric of life (Fleischner, 2019). In doing so, natural history helps us to see the wisdom of predisciplinary thinking and how this might serve as a foundation for any scientific approach, whether these are mono-, multi-, cross-, inter- or transdisciplinary. We need not only to transcend disciplines, but also to transcend our desire to only grasp the more-than-human world in scientific terms.

Natural history enriches interspecies health education by cultivating an awareness and appreciation of the wider ecological aliveness that supports the health of individual humans, animals and organisms. It makes apparent any narrow focal points of attention and fosters wonder, admiration and care for

the wider interspecies collective with whom humans share this biosphere. In doing so, natural history shifts the attention from health to healing, inviting students to critically examine how they as health professionals could engage with the more-than-human world to serve reciprocal healing.

To end with Fleischner's foundational insight: in a world full of abstractions and distractions, education should cultivate attentiveness to the spirited lives of other species. Natural history joins contemplative pedagogy in honouring attentiveness and receptiveness as doorways into the self and its interdependence with the more-than-human world. Through these doors one will find the beginnings of critically important – and nowadays too seldom taken – pathways to interspecies healing.

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A puffball
(Ian Whyte)

Reptiles: Misunderstood, maligned and mistreated

Enrique Font

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For centuries, researchers and non-specialists alike have dismissed the behaviour and cognitive abilities of reptiles as simple and moronic compared to those of other vertebrates. This widespread misconception can be traced, at least in part, to long-standing fallacies regarding reptilian brain size and organization. Until recently, the brains of reptiles were thought to be small and lacking the neural structures that underpin complex cognition in birds and mammals. In reality, reptile brains are not as small as previously thought and possess the same major subdivisions found in all vertebrates. Furthermore, a growing body of research shows that the brains of reptiles support a rich behavioural repertoire and sophisticated cognitive abilities on par with those of mammals and birds. Thus, the persistent myth of the sluggish, primitive, uninteresting reptile is based on prejudice, ignorance, and multiple misunderstandings, is utterly inconsistent with the available evidence, and should be abandoned.

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What makes humans different from other animals has been a long-standing concern and a source of endless debates. Where some consider that an impassable chasm – the Cartesian abyss – sets us apart from the rest of the natural world, others – following Darwin – see only a small crack in the ground, quantitative rather than qualitative differences. Theoretical arguments and empirical evidence notwithstanding, many still believe that humans are a pinnacle of some sort, superior to and essentially different from other animals – a view sometimes described as 'humaniqueness' (Pepperberg, 2008) or human evolutionary exceptionalism (McCullough, 2015). Those in the exceptionalist camp often point to the existence of presumably unique human traits, such as language, consciousness and, most important, our (vastly overrated) intelligence. But it is becoming increasingly difficult to be an exceptionalist – at least a rational one. It is true that we do things that other animals cannot do, but

the reverse is also true. Each animal species is unique and different from any other, otherwise zoologists would not assign them to different species. Diversity is the predictable outcome of the evolutionary process. We should expect to find differences, but also commonalities arising from patterns of shared ancestry and adaptation to similar environmental conditions. This applies as much to morphology or physiology as it does to behaviour and cognition (Shettleworth, 2010). Obtaining convincing evidence for cognitive commonalities between humans and nonhumans was important for early defenders of Darwinism, but initially much of that evidence was anecdotal. Recently, however, a growing literature is revealing behavioural and cognitive accomplishments in all kinds of animals that were once thought to be our species's exclusive domain. Rats laugh when they play or are tickled, and demonstrate empathy towards a trapped cage mate; dogs show evidence of referential understanding; bumble bees play rolling wooden balls and are capable of social learning and complex problem solving; roosters and cleaner fish recognize themselves in a mirror; octopuses use tools. Given this evidence, it is unsurprising that, in April 2024, scientists attending a conference in New York, USA, signed a declaration stating that there is a realistic possibility of consciousness in all vertebrate animals and in many invertebrates (https://sites.google.com/nyu.edu/nydeclaration/declaration).

The available evidence makes it clear that non-human animals are more like us than we used to give them credit for. But there is at least one exception: reptiles. The human–animal gap may be shrinking for some groups, but reptiles apparently do not follow suit. As far as their behaviour and cognitive abilities are concerned, most people blithely assume that reptiles are, compared to other animals, below par. Although admitted as possibly conscious by the signatories of the New York declaration, reptiles are often portrayed as primitive, instinct-driven, slow-witted and lacking even the most basic intellectual abilities. In fact, for a long time the motivation of many studies of reptile behaviour was to characterize the primitive or primordial state from which the more complex behaviour of birds and mammals evolved. Even fish, despite their undeserved reputation for bad memory, often rate better than reptiles (Nakajima *et al.*, 2002). Catchy titles such as "The evolutionary advantages of being stupid" (Robin, 1973), referring to turtles, or "Reptiles are the real bird brains" (Fessl, 2022), certainly do not help to dispel the widespread notion of reptiles as the cognitive morons of the vertebrate radiation. Perceptions of reptiles have consequences for the way we treat them and cater for their welfare in captivity (Burghardt, 2013), and may also hinder conservation efforts, as detailed in a book that inspired the title of this essay (Warwick, 1990).

What did reptiles do to deserve such a bad reputation? Negative attitudes towards reptiles in part stem from the fact that they are perceived as potentially dangerous to humans. Crocodiles, large lizards like Komodo dragons, and large constricting snakes are feared as potential man-eaters. Venomous snakes evoke intense fear (Landova *et al.*, 2020), although the risk of envenomation is often overestimated. Of approximately 4,100 species of

snakes on the planet, only 600 are venomous, and only 200 (less than five per cent) can kill or cause serious damage to a human. In the USA, a country with no shortage of venomous snakes, deaths by snakebite average five per year (National Institute for Occupational Safety and Health, 2024), less than one tenth of those caused by dog attacks (National Center for Health Statistics, 2023). Another factor contributing to the negative public image of reptiles is that most people perceive them as relatively alien life forms. We are more likely to empathize with animals that are similar to us in behaviour and physiology (Prato-Previde *et al.*, 2022). But many reptiles have reduced legs or lack them entirely. Others spend all their lives encased in a protective shell. As ectotherms, they spend long periods of time basking in the sun (although in this they resemble many tourists on the Mediterranean coasts). Depending on their body temperature they can have a sluggish demeanour, or they can move at lightning speed (don't try to outrun a croc!). They are covered in hairless, scaly skin, they lack facial expressions, and they rely on mysterious sensory modalities such as infrared/ultraviolet vision and vomerolfaction.

But arguably the main enemies of reptiles are ignorance and prejudice. With more than 12,000 recognized species, they are the second largest vertebrate group after fish. However, research on vertebrate behaviour and cognition is heavily biased in favour of mammals and birds. Many researchers, lured by the appeal of working with 'higher vertebrates' and improved funding opportunities have eschewed the study of groups such as reptiles or amphibians. As a result, we know very little about the behaviour and cognitive abilities of most reptile species. Traditionally, what little research has been done on reptile cognition has focused on turtles, while other groups (lizards, snakes, crocodiles) have received much less attention. But reptiles are an extremely diverse lot, comprising a tremendous range of body forms, behaviours and life-history patterns, which should cast a shadow of doubt on broad generalizations based on work on a limited number of species. Added to this is the fact that our perception of reptile behaviour and cognition is clouded by multiple misconceptions. Recently, I and my colleagues Gordon Burghardt and Manuel Leal devoted a chapter in an edited volume to debunking several myths about reptile behaviour (Font *et al.*, 2023). We focused on seven widespread misconceptions, although many more undoubtedly exist. Our goal was not to assert that reptiles should have the same privileged status as birds or mammals in the pantheon of comparative cognition. Reptiles resemble birds and mammals in many ways, but they are also very different from them. That is what makes their study so interesting. Instead, our goal was to review an already abundant literature that challenges the traditional view of reptiles as simple, moronic and uninteresting creatures.

Several persistent myths about reptilian behaviour and cognition can be traced, at least in part, to long-standing misconceptions about reptilian brain size and organization. The reptilian brain has often been stereotyped as small, simple and lacking a cerebral cortex – a characterization that is incorrect and based on outdated evidence. Research on reptilian neuroanatomy experienced its heyday in the 1970s and 1980s but has languished over the last few decades.

Thus, compared to the great volume of work on mammalian and avian brains, relatively little is known about the reptilian brain, and studies several decades old claiming that reptiles have small and incomplete brains are still cited as if they were authoritative. It is true that the brains of reptiles are smaller than those of mammals or birds of similar body size, but the difference has traditionally been exaggerated. Many textbooks and review papers report that the bird brain is ten times larger than that of a reptile of similar body size. However, the ten-fold figure is based on a handful of species, small sample sizes (a single individual for most species) and flawed analytical methods. Recent analyses using an expanded dataset and modern phylogenetic comparative methods that allow more precise examination of relative brain size in reptiles show that the actual value is 6.5-fold. A comparison using brain volume and body volume instead of mass to account for reduced body density of birds (an adaptation for flying) further reduces the average difference in relative brain size between birds and reptiles to 5.4-fold (Font *et al.*, 2019).

For decades, we have been hearing stories about the walnut-sized brains of large dinosaurs like *Stegosaurus* or *Diplodocus*. Our own brains, for comparison, weigh approximately 1,350 grams, which is 1,000 grams heavier than the brain of a five-ton *Tyrannosaurus rex* (Balanoff *et al.*, 2013). Indeed, one (apparently serious) hypothesis about the extinction of dinosaurs did not mention asteroids or massive volcanic eruptions, but instead attributed their demise to their "dwindling brain and consequent stupidity" (Benton, 1990). However, across all vertebrates, whether living or extinct, there is a well-documented trend for relative brain size to decrease as body size increases. This trend (technically known as negative allometry) is responsible for large animals having proportionally smaller brains than small animals. So, applying the necessary corrections to account for several flaws in previous estimates of both brain and body size, the large dinosaurs had brains the size that we should expect for a reptile or a bird of their gigantic body size, no more and no less (Hopson, 1977). These brains were responsible for an elaborate behavioural repertoire, including territoriality, dominance hierarchies, male–male combat and courtship behaviour, sophisticated vocal and visual communication, intensive parental care of the eggs and young, gregariousness, cooperative breeding and food-getting behaviour, even play (Rothschild, 2014). It is telling that, although this is often described as an 'avian level' of behavioural complexity, all these behaviours have been documented in non-avian living reptiles, including crocodiles, alligators, caimans and their kin, the dinosaurs' closest relatives among living reptiles (Kramer and Burghardt, 1998; Schuett *et al.*, 2016; Whiting and While, 2017; Doody *et al.*, 2021).

In any case, the extent to which brain size is an indicator of behavioural and cognitive complexity is highly controversial. One might intuitively think that large brains should be found in more intelligent animals, but things ain't quite that simple. Elephant brains are larger than human brains, yet most people would agree that we are more intelligent than the average elephant. The fact that elephants are large animals suggests that the ratio brain-size:body-size may be a better measure of brainpower, but it turns out that many small

animals, such as pocket mice and harvest mice, have relative brain sizes considerably larger than humans and elephants (Striedter, 2005). Recent work has suggested that the number of neurons in all or selected parts of the brain, or patterns of connectivity in neural networks, may be better measures of cognitive ability in a comparative context (Herculano-Houzel, 2017; Barron and Mourmourakis, 2024). But despite some success in correlating brain size or neuron number with ecological, life-history and cognitive variables, the relationship tends to be very noisy (Healy and Rowe, 2007). Also, the correlations become weaker, not stronger, as the taxonomic diversity of sampled groups increases (Barron and Mourmourakis, 2024).

Another widespread misconception holds that the reptilian brain is essentially a mammalian brain that is missing some parts. This idea originated with the work of neuroscientist Paul D. MacLean. MacLean, with precious assistance from astronomer and science communicator Carl Sagan, popularized the triune brain model of brain evolution, that holds that vertebrate brains evolve through the addition of successive layers. According to this hypothesis, reptiles are endowed with only the basic layer, to which two more complex layers were added in the evolutionary transition to mammals first, and then to primates and, of course, humans. To underline the limitations imposed by a brain lacking more evolutionarily advanced layers, MacLean allegedly once pronounced that "it is very difficult to imagine a lonelier and more emotionally empty being than a crocodile". Nothing could be further from the truth. In addition to their own complex emotions, crocodiles seem to be finely attuned to human emotions, according to a recent report (Thévenet *et al.*, 2023). MacLean was a pioneer in efforts to integrate information from evolutionary theory, comparative neuroanatomy and animal behaviour, but his model is clearly at odds with the current understanding of vertebrate brain evolution (e.g. Cesario *et al.*, 2020). The three layers implied by the triune brain were already present in the common ancestor of all living vertebrates and can be found, in modified form, in all its descendants (Emery and Clayton, 2005). Contrary to MacLean's model, reptiles have the same major subdivisions found in a mammalian brain, including an emotional brain and a neocortex (Striedter and Northcutt, 2020; Font *et al.*, 2023). Thus, MacLean's claim about the emotional emptiness of crocodiles and, by extension, other reptiles is untenable on theoretical grounds, as well as being contrary to evidence that reptiles can in fact be quite emotional animals (Cabanac *et al.*, 2009; Lambert *et al.*, 2019; Martin *et al.*, 2023).

A remark often attributed to Mark Twain is that "It's easier to fool people than to convince them that they have been fooled". Mistaken ideas about brain evolution in vertebrates are no exception. Although the triune brain model has been discredited, it continues to have considerable intuitive appeal, and its influence has been subtly perpetuated, even among specialists. Unfortunately, MacLean's ideas about reptilian brain and behaviour set the trend for many years and are still considered cutting edge in some quarters, where the behavioural repertoire of reptiles is thought to be limited to the four Fs: fight, flight, feeding and... reproduction.

However, the notion that reptiles are unsophisticated in their behavioural repertoires is increasingly out of step with reports of complex behaviour in many species. Current work shows that reptilian behaviour is as rich, complex and elaborate as that of many mammals and birds (Gillingham and Clark, 2023). Lizards have become esteemed models for studies in ethology and behavioural ecology and are a key focal group in research on a diversity of topics, including aggression, reproductive strategies, anti-predator behaviour, and communication. One area where recent research is driving a paradigm shift is social behaviour. Although traditionally considered solitary, uncaring and asocial, recent reviews paint a different picture of reptile sociality (Doody *et al.*, 2013, 2021; Whiting and While, 2017). Some reptiles communicate extensively with one another using smells, sounds, colours and movement-based displays such as head bobs, dewlap extensions, foot shakes and tail-twitches. Some have refined and extended parental care, long-term monogamy and family ties spanning generations. Some hunt, feed, court, mate, nest and hatch in groups. Although diversity is understandable in such a large group, 'social reptile' can no longer be considered an oxymoron.

The familiar view of reptiles as stupid and unintelligent also faces a growing list of exceptions. One problem that has vexed researchers working on comparative cognition for decades is confusing our own ignorance for the lack of a particular cognitive trait. One often hears that chimpanzees (or primates, or mammals) are the only animals capable of a given cognitive feat, only to wonder in what other species has the ability been tested. Absence of evidence is not evidence of absence. Many authors have uncritically assumed that the small and allegedly primitive brains of reptiles must condemn them to a life of cognitive mediocrity. The unfortunate consequence of this misperception is that the cognitive abilities of reptiles have rarely been tested. This, in turn, reinforces the notion that sophisticated cognition is absent in this group. However, recent work documents rather complex cognitive achievements in all kinds of reptiles (Leal and Powell, 2012; Wilkinson and Huber, 2012; Font, 2020; Roth *et al.*, 2019; De Meester and Baeckens, 2021). At least some reptiles show fast and flexible learning, long-term memory, spontaneous problem-solving abilities, remarkable navigational abilities, quality and quantity discrimination, gaze following, tool use and social learning. Even self-recognition, which in primates and other mammals is taken as an unequivocal proof of self-awareness, has been demonstrated in some lizards and snakes (Burghardt *et al.*, 2021; Szabo and Ringler, 2023).

Many learning tests conducted with reptiles during the last century failed because they did not take into account peculiarities of their morphology, physiology and behaviour. Temperature at the time of testing, for example, is a crucial variable, as most reptiles will not perform efficiently at temperatures that may be adequate for work with mammals and birds. Studies using test conditions and paradigms more appropriate to reptilian physiology and behaviour clearly demonstrate that turtles, crocodiles, lizards and snakes are capable of performing most traditional learning tasks (Burghardt, 1977a; Szabo *et al.*, 2021; Font *et al.*, 2023). But to reveal the full extent of their learning

abilities requires adopting an ethological approach – that is, to view learning and other forms of cognition not from our perspective, but from the perspective of species' normal behaviour under natural circumstances.

As a token of appreciation for his relentless defence of reptiles and reptilian ethology, I believe it is appropriate to end this essay by quoting Gordon Burghardt: "we need to be on guard against 'science' being uncritically accepted as supporting and encouraging our deeply held prejudices. This paper is but a partial brief in behalf of a maligned and oppressed class" (Burghardt 1977b: 189). His powerful message is as valid today as it was when these words were written almost 50 years ago. It is time we take stock of the prejudices that blind us and take animals in general and reptiles in particular for what they really are: beautiful, fascinating and magnificent creatures.

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A common lizard, Scotland
(Joe Gray)

Killing barred owls to save spotted owls is the lesser of two evils

Dominick A DellaSala

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The northern spotted owl (*Strix occidentalis caurina*) was federally listed under the US Endangered Species Act in 1990 due to loss and adverse modification of its old-growth forest habitat from rapacious logging. Range-wide expansion of barred owls (*Strix varia*) has since elevated extinction risks through competitive exclusion of spotted owls by barred owls. The US Fish and Wildlife Service controversially proposed the lethal removal of 470,000 barred owls over three decades to slow the advancing barred owl expansion wave. This set up a novel ethical dilemma of pitting one remarkable raptor against the other. Qualified support for barred owl removal, the lesser of two evils, along with expanded old-growth forest protections, is the only chance for spotted owl survival. However, a long history of political interference in endangered species recovery actions and command-and-control over nature hubris continue to shift recovery actions from old-growth habitat protections to inappropriate 'ecoforestry' logging in spotted owl territories.

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I cut my intellectual teeth in the early 1980s as a doctoral student at the University of Michigan, riding the wave of the newly formed field of conservation biology by conducting bird population studies in Michigan's old-growth hardwood forests.[1] My survey routes included climbing nest trees to count the eggs and nestlings of songbirds and birds of prey to figure out their habitat needs in a matrix of oil and gas drilling on the Pigeon River State Forest in northern Michigan.

At the time, endangered species management was flooded with examples of efforts to contain certain predatory, invasive and superior-competitive species responsible for the decline of conservation reliant species (*i.e.* those that would otherwise go extinct without our help). Invasive predators are linked to nearly 60 per cent of all vertebrate extinctions worldwide and are often the subject of lethal removals when deemed necessary to reverse collapsing wildlife populations (Doherty *et al.*, 2016). Range-expanding species are also problematic for certain endangered birds. For example, the brown-headed cowbird (*Molothrus ater*), a delinquent parent with a very successful evolutionary strategy, lays its eggs in the nests of unsuspecting songbirds throughout much of North America. Cowbirds expanded their range into Michigan in the 1900s, and, in the ensuing decades, the cowbird, along with habitat losses, nearly wiped out Kirtland warblers (*Setophaga kirtlandii*) that had not previously encountered this invading brood parasite. Four decades of trapping and lethal cowbird removals by researchers have finally begun to recover warbler populations to the point where further removals may not be necessary (Cooper *et al.*, 2019).

Additional examples of necessary lethal removals include killing rats, feral cats and introduced mongooses (*Herpestes* spp) on islands to protect ground-nesting birds (some of which have gone extinct); hunting invasive pythons (*Python molurus*) in the Everglades that are devastating wetland birds and amphibians, including eating crocodiles (*Crocodylus actus*); and both the lethal and non-lethal removals of feral mountain goats (*Oreamnos americanus*) introduced for trophy hunters in the 1900s in the Olympic National Park of Washington where removal is necessary to restore alpine communities. When there is evidence of the efficacy of lethal removals, it can be an effective management tool to thwart extinction risks and is classic endangered species management.

Conversely, lethal removals can also be an excuse for avoiding habitat protections – as in the case of inappropriately killing wolf (*Canis lupus*) populations to recover endangered woodland caribou (*Rangifer tarandus caribou*) in Canada's boreal forests where the ultimate factor responsible for caribou declines is logging of old-growth forests. Caribou seek out older forests as thermal sanctuaries in the winter and because older forests contain abundant lichen food sources. Killing wolves for this reason therefore represents a shell game of command-and-control tactics to blame the predator instead of habitat loss.

The lethal removal of barred owls (*Strix varia*) is quite novel, rightfully controversial, and, in itself, hard to accept without getting emotional about it. I argue here that lethal removals of barred owls represent the lesser of two evils of killing one raptor to save another, the imperilled northern spotted owl (*Strix occidentalis caurina*), that only recently came into contact (sympatric, overlapping ranges) with barred owls due to human actions (Figure 1).

As a life-long deep ecology student, where all native species have intrinsic value and the rights of nature are of utmost importance, the choice of lethal removal does not come easy for me. The difficult question of whether or not to intervene in this way began presenting itself when I was appointed to the US

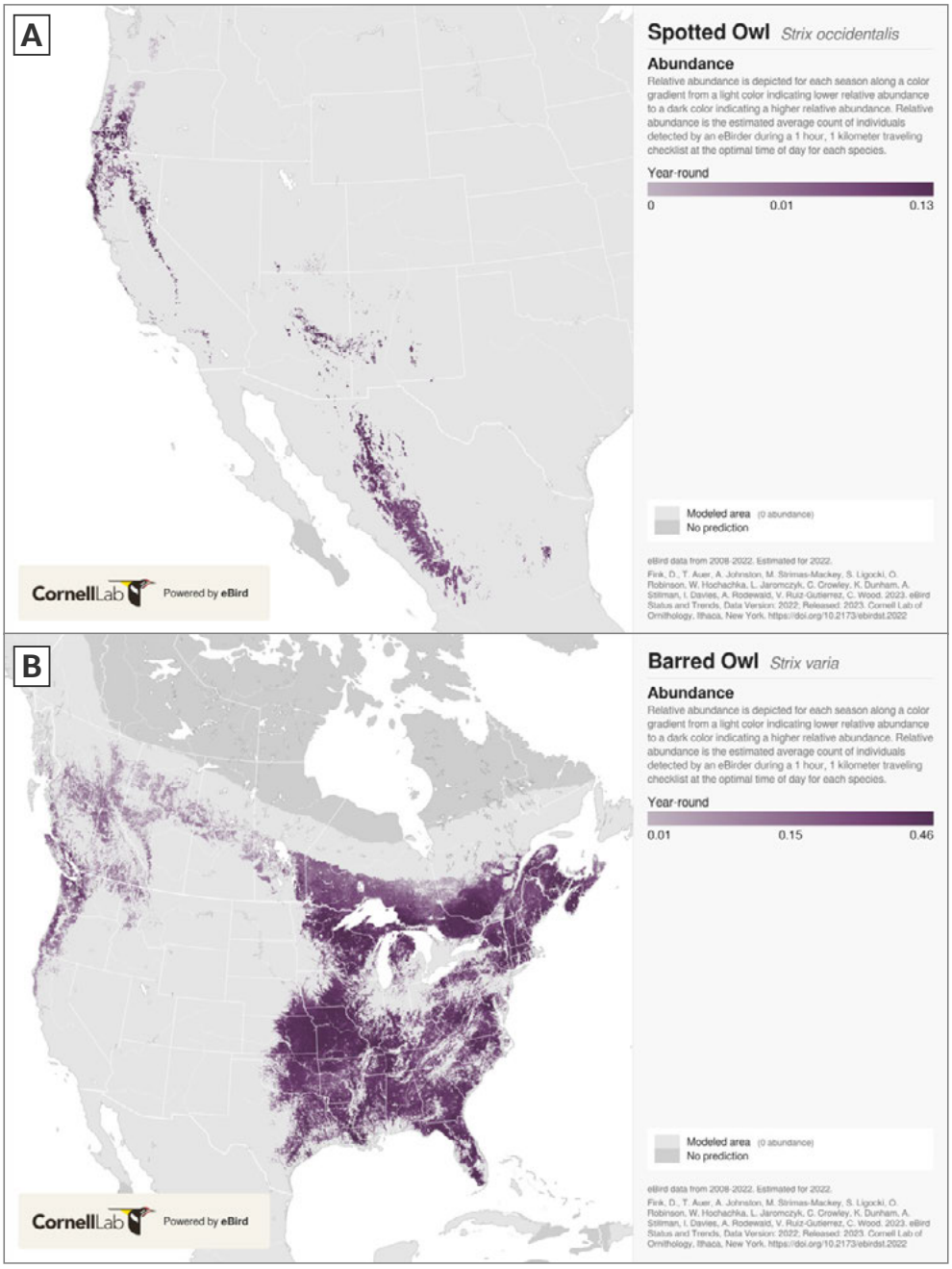


Figure 1. [A] Spotted owl (3 subspecies) abundance map versus [B] barred owl abundance map. The barred owl invasion may have implications for all three spotted owl subspecies if range expansions continue unabated. The leading front of the barred owl invasion has already moved into northern California, overlapping with California spotted owls (*Strix occidentalis occidentalis*).[2]

Fish and Wildlife Service recovery team for the northern spotted owl by the George W Bush administration in 2006–2008. At the time, the US Fish and Wildlife Service was under intense political pressure from higher ups in the Bush administration to blame spotted owl declines on barred owl invasions and severe wildfires (shell game), instructing the recovery team to de-emphasize

habitat protection in owl recovery actions (DellaSala, 2021). I was one of a handful of scientists and many others that blew the whistle on widespread political interference in endangered species recovery efforts at Congressional hearings on the Endangered Species Act. This eventually set in motion the retraction of the Bush owl 'recovery' plan by the incoming Obama administration, citing opposition from scientists and scientific societies that demonstrated how the plan was tainted by politics in publishing a revised recovery plan for the northern spotted owl (US Fish and Wildlife Service, 2011). It also set me up to now opine on the ethics, politics and ongoing shell game of misplaced blame and command-and-control hubris over nature behind at least some of the spotted owl recovery actions.

Forest raptors in their native habitat and historical range are intrinsically loved

Detecting a barred owl during my bird survey routes in Michigan's old-growth forests was a real treat. On the rare occasion of spying one, my field crews would stop and marvel at this splendid raptor quietly perched on the tallest trees where it would make use of its sound-funnelling facial discs and 270 degrees of neck-rotational swivel to detect subtle movements of rodent prey concealed within the leaf litter. What a joy to witness nature, red in tooth and claw. To maximize our ability to detect owls on census routes, sometimes we would use taped vocalizations of their calls or mimic them ourselves – a distinct hooting of around eight call notes sounding something like 'Who cooks for you? Who cooks for you-all?' This is very distinguishable from the great horned owl (*Bubo virginianus*) that sounds more like 'Who's awake, me too? Who's awake, me too?', and the Eastern screech owl (*Megascops asio*) that makes an eerie, even-pitched trill (tremolo) descending rapidly in sequence. All three owls occurred on my sites and would literally stop us in our tracks when detected.

After completing my PhD in 1986, I took a post-doctoral research position at Oregon State University where I got acquainted with my newest test subject – the northern spotted owl, one of three subspecies of spotted owl dependent on older forests in the western USA. Considered in lay-person terms as a close 'cousin' of the barred owl, at the time these two co-generic owls were just beginning to overlap in territorial space, but not in major way due to the low barred owl numbers at the leading edge of its range expansion. My field crews traversed transects within old-growth Douglas fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) forests with trees as tall as fifteen-storey buildings, searching for the cryptic spotted owl that differs mainly in appearance from the barred owl in having large, oval white spots on its chest and belly versus the reddish-brown streaks of the larger barred owl (Figure 2). Spotted owls sound very different from barred owls, with many distinct whistles, four easily imitated hooted notes, and barking sounds used in territorial defence and in attracting mates. At the time, the spotted owl was under consideration for listing under the federal Endangered Species Act mainly because most of its old-growth forest habitat had been destroyed by unmitigated logging. During my field surveys, spotted owls were easily called

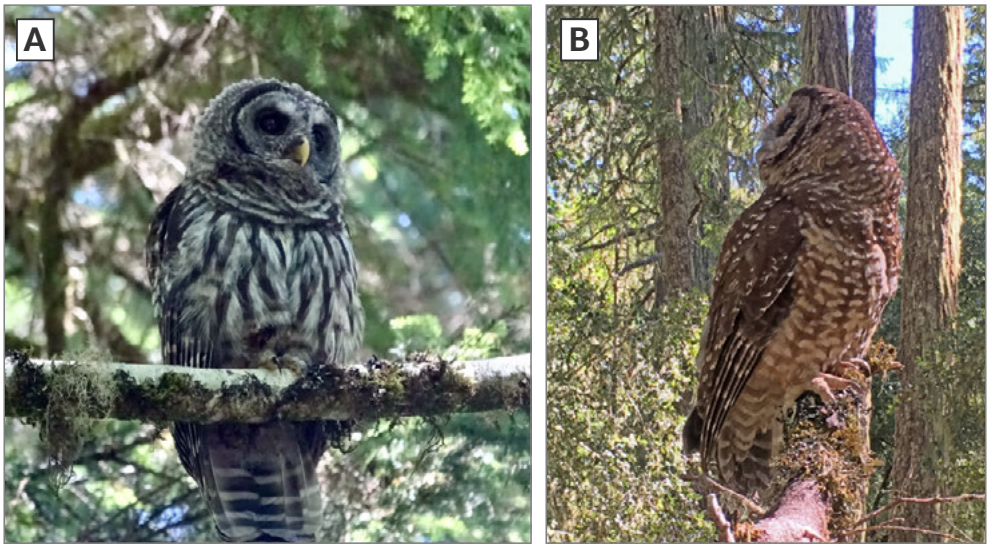


Figure 2. [A] Barred owl (credit: Francis Eatherington); [B] northern spotted owl (credit: Dominic DiPaolo).

in by researchers (we all knew how to imitate their calls) while barred owls rarely responded. Decades later, the reverse is sadly true across the entire range of the northern spotted owl as spotted owls seldom call back and barred owls are easily located.

Kissing cousins, they are not

While nobody knows for sure how this all started, presumably barred owls were prevented from reaching the Pacific Northwest due to a lack of trees in the Great Plains acting as a natural barrier to range expansion (Livezey, 2007). That barrier ostensibly broke down decades ago because of massive water withdrawals along the Missouri River floodplain that changed the floodplain dynamics of the system, allowing encroachment of cottonwoods (*Populus* spp) and other trees that connected the dots for barred owls to migrate over the Rockies and into British Columbia (where spotted owls are now functionally extinct), eventually reaching the Pacific Northwest (Livezey, 2007) where they are spreading rapidly. In my view, whether or not we enabled the invasion, we have a moral responsibility to act on the spotted owl's behalf because we destroyed most of its old-growth habitat and set this population spiral in motion. Unfortunately, that means lethal removals of barred owls – but in association with stepped up old-forest protections and not as a tradeoff for relaxing protections. To add insult to injury, barred owls also have been preying on amphibians and other species within riparian areas, thereby raising alarms about potential trophic cascades (Holm *et al.*, 2016). More may be at stake here than one owl versus the other. Losing the spotted owl while gaining the barred owl also is not some sort of one-off, evolutionarily or ethically speaking. Rather it would constitute another branch of the tree of life broken by humanity's exploitation of nature.

When two related species become sympatric, Darwinian evolution presents a number of choices: (1) they separate some portion of their *n*-dimensional niche space (*e.g.* prey and/or habitat selection) and persist peacefully by avoiding each other; (2) hybridization results in an emergent species that becomes reproductively isolated from its F1 parents over time (the two F1 parents and the emergent species coexist; also any one of the three species may move out to avoid each other); (3) the hybrid is an evolutionary dead-end, a reproductively sterile organism; and (4) one species wins, the other loses, and extinction breaks another branch. While hybridization does occur between these owls, it is generally rare and the hybrids sound like a jumbled mixing of call notes derived from their parents. Niche separation appears not to be enough to reduce competitive pressures either (Hamer *et al.*, 2007; Weisel, 2015). However, protecting old-growth habitat from logging does lower barred owl pressures on spotted owls, potentially creating safe havens (population strongholds) for spotted owls to build back populations in conjunction with barred owl removals in those areas (Dugger *et al.*, 2011, 2016). Dispersal of the two from each other does not seem to be happening as both are using nearly identical sites. Thus, without all legitimate recovery actions working in concert, the bigger, more aggressive and invasive barred owl is winning Darwin's war because we entirely tipped the scales towards the victor.

In sum, barred owl range expansion has become a tsunami that is inundating spotted owl territories, causing nest abandonment and/or spotted owl adults to become silent rather than call for mates in order to avoid notice by barred owl invaders. Endangered species often become that way due to multiple 'listing factors' – operating independently or in combination – triggering widespread population declines. In such cases, each of the listing factors need to be addressed in tandem to increase the chances of survival. That means in the case of the spotted owl this is not an either/or pick of the listing factor that best fits our particular ethical choices. Both barred owl removals *and* additional habitat protections are critical to providing spotted owls with the only chance at persistence because every population in the eleven demographic study areas – large areas where owls are periodically monitored for population dynamics – is in steep decline (ranging from two to nine per cent annually, and 35 to 80 percent in the last two decades; Dugger *et al.*, 2011, 2016). Extinction is inevitable if we do not act with the right measures.

An ongoing shell game of false recovery actions, command-and-control hubris, and owl politics

Some of the inappropriate recovery actions from the Bush administration 'recovery' plan mades its way into the revised recovery plan (US Fish and Wildlife Service, 2011), burrowing deep into land management actions that persist today despite their negative consequences. Post-fire logging projects proposed by federal agencies within spotted owl habitat are routinely approved by the US Fish and Wildlife Service citing a lack of 'jeopardy' to the entire species, and 'ecoforestry' damaging logging in owl critical habitat is permitted that sometimes reduces canopy cover below thresholds needed for spotted owl

nesting. The latter has been endorsed even by some conservation groups like The Nature Conservancy in the Rogue Basin of southwest Oregon (DellaSala, 2021). Evidence that this will do more harm than good is often pushed aside by those cherry picking the science to implement questionable 'ecoforestry' logging more impactful to spotted owls than forest fires (Hanson *et al.*, 2009; Raphael *et al.*, 2013; Odion *et al.*, 2014; Lee, 2018). Importantly, in the only published assessment of the interactive effects of logging, barred owls and wildfires on northern spotted owls, Bond and co-workers (2022) documented 87 per cent of 105 severely burned northern spotted owl territories experienced some form of logging, with 60 per cent affected by logging both before and after wildfires and many owl sites having multiple logging entries. Additionally, 22 per cent of burned-and-logged territories had barred owl detections. In other words, spotted owl territories subject to severe fire rarely lacked the compounding stressors of logging and barred owls, yet only wildfire and barred owls are blamed for spotted owl declines. The shell game has given land managers the license to approve 'ecoforestry' practices as what is really a command-and-control of nature strategy based on the false assumption that it will thwart wildfires. However, with this much documented logging within spotted owl territories, most studies that investigate wildfire effects on spotted owls lack a clean sample (*i.e.* a 'control'), as they are tainted by confounding factors that prevent determining causal relations in owl nest and territorial abandonment (Lee, 2018; Bond *et al.*, 2022).

Some scientists have also shown that spotted owls use both burned and unburned areas in large wildfire complexes in a 'kitchen-and bedroom effect' where the owls' bedrooms are the remaining pockets of unburned-low burned nest trees (fire refugia), and the kitchens are the patches of severely burned vegetation where prey often thrive, and with an abundance of large, burned trees for owls to perch and listen for their prey rustling below (Lee, 2018). Despite this evidence and concerns about 'ecoforestry' logging, the US Fish and Wildlife Service entered into a Memorandum of Understanding with Sierra Pacific Industries and others in 2017 to log within spotted owl habitat in California under the assumption that this would thwart wildfires (US Department of Agriculture, 2017). The *déjà vu* shell game of promoting actions that employ untested 'ecoforestry' logging marches on despite growing evidence that it may in fact make matters worse for spotted owls (Lee, 2018).

Will lethal barred owl removal work?

Recovery Action #30 in the spotted owl recovery plan underscores the need to "manage to reduce the negative effects of barred owls on spotted owls" (US Fish and Wildlife Service, 2011). The preferred action in barred owl lethal removals will concentrate around spotted owl sites, in general owl management areas, and specially designated areas to build spotted owl strongholds over time (US Fish and Wildlife Service, 2023). Barred owl containment measures would also extend into the range of the California spotted owl, in order to slow the advancing wave into the coast redwoods and Sierra Nevada mountains.

Despite concerns I have about trained researchers shot-gunning barred owls in forests, my rhetorical answer to whether it will work to save spotted owls is maybe if done in concert with additional habitat protections, versus not likely if killing barred owls, blaming wildfires on spotted owl declines and promoting 'ecoforestry' constitute the federal government's last-ditch effort to save the owl, which, in fact, may likely continue the trajectory toward extinction. The maybe part of this involves uncertainty around increases in wildfires related to climate change (reaching a wildlife–habitat tipping point?); the unprecedented scale and practicality of killing some 470,000 barred owls over three decades across three states (Oregon, California, Washington); and whether barred owl 'floaters' (young non-territorial individuals not detected in owl surveys during lethal removals) will simply retake emptied barred owl sites, a potential consequence of an advancing invasion. Regardless, 'ecoforestry' champions cannot log their way out of the spotted owl's demise because large fires are mainly driven by extreme fire weather caused increasingly by global overheating that is only exacerbated by command-and-control fire suppression tactics (see DellaSala *et al.*, 2022). Trying to contain severe fires, if that is even possible, would mean irreparably damaging spotted owl habitat by removing far too many of the large trees the owl needs to survive and nest successfully.

But let's consider the evidence thus far regarding lethal removals. In situations when barred owls have been removed from dormant or nest-failing spotted owl territories, spotted owl site occupancy and nesting success dramatically increased (Franklin *et al.*, 2021; Wiens *et al.*, 2021). Researchers noted that after lethal removals, the estimated mean annual rate of population change for spotted owls stabilized in areas with removals (0.2 per cent decline per year) versus sharp declines (12.1 per cent per year) where barred owls were not removed (Wiens *et al.*, 2021). They concluded that long-term persistence of spotted owls depends on reducing barred owl impacts "while simultaneously addressing other threats, such as habitat loss." This needs to include greatly expanding old-growth forest protections (Dugger *et al.*, 2016). Working on listing factors in tandem is, theoretically, our best shot (pun intended) at reducing barred owl invasion effects and increasing spotted owl population persistence – but there are no guarantees in endangered species management. Rather it is a question of risk management of the listing factors and not just picking those that fit one's particular ethics or desire to log in owl habitat.

In closing, the US Fish and Wildlife Service barred owl removal plan calls for a massive, unprecedented killing of these magnificent raptors over a vast area and not enough habitat protections for spotted owls. While I have doubts that it can be achieved at scale, I have spent many sleepless nights wondering about a world where my special research partner for decades (the spotted owl) goes permanently silent, while the barred owl that I also marvelled at prospers at the expense of its 'cousin'. I lend my qualified support to the lesser of two evils: lethal barred owl removals in concert with cessation of 'ecoforestry' logging in owl habitat. It is my hope that land managers will replace kill- and log-hubris with kill- and protect-habitat in doing what is ultimately best for spotted owls and the old-growth forest ecosystem that it symbolizes.

In many ways, what is happening to spotted owls is exemplary of the millions of species across the globe facing unprecedented extinction events unfolding from our rapacious ecological footprint, and feeble attempts to slow the haemorrhaging of the natural world through command-and-control actions rather than forging a coexistence relationship with what remains of nature. In the end, it will not work for either us or nature to continue on this path of mutual destruction. The consequence of taking the wrong actions is that another branch of the tree of life is forever broken, with the potential for dangerous feedbacks to humanity. We can and should do better as the spotted owl continues to symbolize what is wrong with forest management in the Pacific Northwest and what could be right if we choose a different relationship with nature. Going forward means that difficult ethical choices sometimes mean having to accept the lesser of two evils in order to have a clear conscience in averting extinctions that we are responsible for.

Note

1 I am grateful to the spotted owl and barred owl for my early field days of nature-based discovery in the forests of Michigan and the Pacific Northwest, and to Dr. Monica Bond for reviews of manuscript drafts. No funding source was used in writing this paper.

2 Abundance maps downloaded from ebird with permission (spotted: https://science.ebird.org/en/status-and-trends/species/spoowl/downloads; barred: https://science.ebird.org/en/status-and-trends/species/brdowl/downloads; accessed 6 May 2024).

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Our rivers need help

Robert MacNaughton

In 2010 Robert moved to Calne in North Wiltshire, where he started picking up litter in the streets, and demanded his local Council do more. This led to him becoming an elected Councillor, and eventually Mayor. This platform has helped him promote the river work which he feels so strongly about. For twelve years he was a member of a Druid Grove based in North Oxfordshire.

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It all started way back in the summer of 2019 when I noticed an article that said nearly all the rivers in England are in bad health.[1] I thought we must do something about it and with friends here in Calne in North Wiltshire, we formed a local river group called the Friends of the Marden Valley (http://www.friendsofthemardenvalley.co.uk/).

After Covid in November 2022 we held our first River Festival where we declared the Rights of the River Marden. I am a local Town Councillor, so was able to ask our Town Crier to declare the Rights from the four directions – a tribute to the many years I had spent in a Druid Grove in North Oxfordshire.

I had seen a photo of the Bishop of London blessing the River Thames, and decided that that is what we were going to do next. I contacted our local Bishop, Andrew of Ramsbury, and I suggested he come for a walk with me, and others, to the real Source of Life – the Source of our local River, the Marden. He agreed.



Photo 1. Our River Marden in the middle of May.

Like many others, I know rivers to be living beings, that they have sentience, and that they need our support in dealing with the poisons and sewage that our selfish corporations are pouring into them, aided and abetted by our inept government. The general election won't change anything with respect to the abuse of our rivers, in our opinion.

At our first River Blessing in March 2023, I introduced Kate, our shamanic practitioner from Stroud, to Bishop Andrew, gave them a pair of waders each, and asked them to create a Blessing together. They only had half an hour to work it out but everything went well. They are both musicians, and love singing. Kate has had shamanic training in South America, and she created a *despacho*, a wreath of flowers made by the children who came to the Blessing, and Kate herself.[2] Once the *despacho* had been made, Kate and the Bishop got in the river and sang to each other from their different traditions, before releasing the wreath. Around 80 people came from the town to watch.



Photo 2. Kate, Bishop Andrew and the *despacho* in the River March 23.

I was elected Mayor in May 2023, and announced our group would be holding River Blessings through the South West of England for my mayoral year. Being the 'Druid Mayor' helped attract attention and interest.



Photo 3. Tara, our River Maiden, preparing our offering at the winter Solstice Blessing in Bath.

Each participant in the Blessings is asked to bring a flower and water from their local area. The waters are mixed into one jug, the flowers are woven into a *despacho*, and each person steps forward in the circle we make, to talk about the water they have brought, and share any anecdote they feel is important.



Photo 4. The waters being poured into the River Frome, at a Blessing we did in Stroud at Imbolc this year. Kate released the *despacho* as Tara poured the mixed waters from the bridge above.

At the spring Equinox this year we were back in Calne. I had invited the other local Mayors to join us to illustrate that these Blessings are not just for ageing hippies like myself. People from more orthodox backgrounds and more conservative career paths also feel the same need to support and help our rivers.



Photo 5. After the Blessing in March 2024. A lot of people were giving, and receiving hugs.

The Blessings bring people into a larger group with a coherent purpose. Our strength is working together, sharing our love and our indignation at the callous neglect and abuse of the natural world. We need a complete change in our collective consciousness to learn to love our Earth, instead of destroying and poisoning her.

Over the summer of 2024 we are holding three more River Blessings in the South West. Everybody is welcome. We can turn the tide of sewage being poured into our rivers, but, unfortunately, it will take time.

Will you help to share your love with the rivers of our planet?

Notes

1 According to the *State of Our Rivers 2024 Report*, the UK's rivers "are in a desperate state of affairs", with 85 per cent of river stretches falling below good ecological standards. Every single river in England is contaminated with chemicals and toxic agricultural run-off, and there are frequent spills of untreated human sewage (https://theriverstrust.org/rivers-report-2024).

2 A *despacho* ('dispatch') is a ritual offering used by the Quechua and Aymara peoples of the Andes to communicate with the nature deities (to bring rain, to request abundant crops, to cure disease, *etc.*). For a detailed and accessible discussion, see Armstrong (1990: ch. 1).

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Poetry section

Edited by Victor Postnikov

Victor is a poet, essayist and translator whose home is in Kyiv, Ukraine.

Life far exceeds humans. For millennia, ecopoets have understood it as a far greater enterprise. In their poetry, we can hear the voices of those who came before us and those who live alongside us. Now, however, they face extinction and die in silence, deafened by the roar of civilization. The time has come to renew the old understanding that all life, including humanity, speaks a common language. Thus, the mission of ecocentric poetry, or ecopoetry, is to help us empathize with non-human entities, be they a whale, a tree or a mountain. For we are all kin.

CLASSIC

The Second Coming

William Butler Yeats

Turning and turning in the widening gyre
The falcon cannot hear the falconer;
Things fall apart; the centre cannot hold;
Mere anarchy is loosed upon the world,
The blood-dimmed tide is loosed, and everywhere
The ceremony of innocence is drowned;
The best lack all conviction, while the worst
Are full of passionate intensity.

Surely some revelation is at hand;
Surely the Second Coming is at hand.
The Second Coming! Hardly are those words out
When a vast image out of Spiritus Mundi
Troubles my sight: somewhere in sands of the desert
A shape with lion body and the head of a man,
A gaze blank and pitiless as the sun,
Is moving its slow thighs, while all about it
Reel shadows of the indignant desert birds.
The darkness drops again; but now I know
That twenty centuries of stony sleep
Were vexed to nightmare by a rocking cradle,
And what rough beast, its hour come round at last,
Slouches towards Bethlehem to be born?

CLASSIC

Now I can see... (excerpt)

Mikhail Lermontov

We'll perish and our steps dissolve,
Such is our fate, such is the end;
Our spirit will be sent away
To boundless, tenebrific space.
Our dust will merely soften earth
For creatures of a purer race.

They'll curse no-one; for their kin
Will worship neither gold, nor rank –
Their days will be like children's days
Of innocence and simple games;
The chains of decency won't kill
Their innate friendship, nor their love,
And their brothers' righteous blood
They, idly laughing, shall not spill!...

To their lovely crowd, we'll see
How angels flock from outer space
And their Eden we'll observe
From our bottomless abyss.
The pangs of jealousy, ennui,
Will be our punishment for eons
Of villainies under the heavens.

Translated by VI Postnikov.

CLASSIC

What was great

Czesław Miłosz

What was great, now looks diminished.
Kingdoms turned pale like snow-piled statues.

What was amazing, now no more amazes.
Celestial spheres are rolling and rolling, and rolling.

On a river bank, stretched upon grass,
As in distant childhood, I'm launching the boats made from cork.

Translated by VI Postnikov.

CLASSIC

Today, I'm doing nothing

Roberto Juarroz

However, many things
still happen to me.
Birds that don't exist
have found their nests.
Shadows that don't exist
have found their bodies.
Words that do exist
have found their silence.
Maybe my inaction will somehow
restore the balance in the world
by removing things cluttering
the horizon?

Translated by VI Postnikov.

CONTEMPORARY

They are enough

RM True

I stand at your border before your throng
of whip-poor-will, meadowlark, doves unseen.
Had I my druthers, I'd bathe to-n-fro
amidst your brothers' sisters' songs, o Wood,
Oh would you let me in amongst them all?
I escape my toils and the rising sun
And softly step in your shade of mercy.
All my machinery behind subsides,
And so, too, your brothers' sisters' songs.

But rising swifter than the dawning sun,
Like church choir after pastor-prayer,
They speak for you, they speak to me—they sing:
"Do not invade the forest-line, stay blind:
Had we our *druthers, aren't our songs enough?"*

Ere I retreat alone and go, o Wood.
I take a small step back into my field—
a life beyond fathom, necessity—
and softly hear your brothers' sisters' songs
from a distance sounding over my field.
I sing to them, to you: "they are enough."

CONTEMPORARY

On Seeing a Butterfly in My Garden

James Bellanca

Today in quiet I watched
a silent monarch float,
flutter, flit, flick, fly in flows
above this summer's white,
pale yellow and red coneflower plants.
Twin orange-black speckled wings
sweep up and down to reach
new cloudless heights
before a stop, a stolen rest
atop a single bud to drop
five hundred fertile eggs.

I searched to note
one magic larva born.
It stirred my eager soul
alive again this morn,
assured that Aurora's new light
will bring a bright-lit sky to foretell
such next green-golden days
to urge each new stirred
grey chrysalis to rise
from measured sleep,
a multi-striped self.

I closed my eyes
so my gladdened heart
might flutter-float-flick
with bright-winged joy.
I soared above, conjoined as one
with this first-day butterfly,
soul free, our cycle from death
to life an ever-turning clock
with endless spinning
hands that circle round
In cornucopian conjoined delight.

CONTEMPORARY

Nova Scotia

Bill Garvey

Cormorants gathered at a bloated seal
skip into flight when I paddle close enough

to this lonely beach and witness entrails
splashed across bleached driftwood.

Its face stares blankly away as if in resignation
to the shark that did this, here, as far

north as Nova Scotia. Cormorants return,
long past their fear of my kayak.

They circle the seal with reverence
that doesn't belong to me.

CONTEMPORARY

The meadow's tender grace

RM True

Amidst the meadow's tender grace,
A mole, unseen, burrows grassy ground.
A farmer frets a furrowed frown,
His holy place now a holy place.

Days of toil to the devil displace,
Roving and roving mound by mound.
Amidst the meadow's tender grace,
A mole, unseen, burrows grassy ground.

To the clouds he pleads his case,
But settles for a hose on ground.
Floods flow forth eager to erase,
Yet the mole, willful, won't be drowned.

The farmer bides patient in place,
Til' up for air, the beast uncrowned.
Amidst the meadow's tender grace,
A mole, now seen, dreams of grassy ground.

By shovel-face to a neighbor's place,
He brings the mole to virgin ground.

And returns to his defaced space,
But hears an unfamiliar sound.

About the poets

William Butler Yeats (1865–1939) was an Irish poet, dramatist and writer, and one of the foremost figures of 20th century literature. He was awarded the 1923 Nobel Prize in Literature.

Mikhail Yuryevich Lermontov (1814–1841) was a Russian Romantic poet and writer. His influence on Russian literature is felt in modern times, not just through his poetry but also his prose. The excerpt translated above was written when he was 16 years old.

Roberto Juarroz (1925–1995) was an Argentine poet famous for his *poesía vertical* (vertical poetry). In the words of Octavio Paz (another notable poet): "Each poem of Roberto Juarroz is a surprising verbal crystallisation: language reduced to a bead of light. A major poet of absolute moments."

Czesław Miłosz (1911–2004) was a Polish-American poet, prose writer, translator, and diplomat. One of the greatest Polish poets, he won the 1989 Nobel Prize in Literature.

James Bellanca is a retired high school English teacher and author/publisher of teacher education guides. He writes poems which spring from many years observing and caring for nature, advocating for peace, and laughing at bizarre events in senior life. He lives with his wife in LakeForest, IL, USA. *Witcraft*, *The Oakleaf*, *Down in the Dirt*, *Calliope*, *The Ethereal Haunted Journal*, and SolutionTree Press have elected to publish his poems this year.

RM True is a writer from north central, rural Kentucky, USA, that engages with humanity's relationship with nature, specifically "one's own place." To further his relationship with nature and place, True is an environmental engineer (working fruitfully to ethically steward the environment), farmer, and landscape photographer. He holds a BS in Civil/Environmental Engineering from the University of Kentucky and an MA in English from Texas Tech University.

Bill Garvey grew up in Springfield, MA, USA. He is a dual citizen of Canada and the USA. He currently lives in Nova Scotia and Toronto. Bill's collection of poetry, *The basement on Biella*, was published in 2023 by DarkWinter Press. His work has been nominated for Best of the Net, and has appeared in *Thimble*, *Wrong Turn Lit*, *Rattle*, *One Art*, *San Antonio Review*, *Connecticut River Review*, *Cimarron Review*, *The New Quarterly*, *Nixes Mate Review* and others.

Fiction section

Edited by Joe Gray

Joe is a field naturalist and conservationist who lives on the island of Great Britain. He writes eco-fiction under the pen name Dewey Dabbar.

In this issue's fiction section, it is a pleasure to bring you the work of another new contributor. And, once again, we extend the diversity of writing styles that we have featured in our growing catalogue of imaginative prose.

Dreams Made of Sand

Taylor Hood

As he stared at the small brown mushroom, its five points radiating outward from the centre, his woodland solace shattered. Memories barrelled toward him, forcing him to relive the tears shed under the duvet, the blandness of an unfinished breakfast, and the agony of the ever-shifting digits on the car's dashboard during the long drive coastward.

He cursed the earthstar as he arose, burdened by his rucksack full of buckets and spades, his sweep net clutched tightly. He jogged with his shoulders hunched, and his head only lowered further when the broadleaved canopy gave way to ranks of skeletal conifers.

"Dad!" his son called, weaving carelessly through the trees. "Hurry up!"

Against a Scots pine, dead flaking limbs formed a tent. The boy crawled inside, vanished a moment, then jumped out with a leap and a roar, toppling branches on one side.

"Enough of that," the man commanded through gritted teeth. He glanced at his watch. "Let's go."

Oblivious, the boy brandished one of the branches like a sword, reducing half the structure to ruins. "I'm a giant!"

Just then, the man lunged forward and seized the stick mid-swing, before laying it gently on the ground. He opened his mouth to apologise but shut it instead, lest the words threatening to escape should burst out of him. With a strained smile, he motioned to the sunlit gap in the trees.

* * *

Pulling the brim of his Tilley hat firmly over his brow, he moved swiftly across the grassy expanse, darting intermittently for the cover of stunted pines. Here and there low-lying outcrops of stone painted yellow and green with mosses and lichens jutted out of the sward, which the boy bounded over or climbed.

Moving onto the dunes, they navigated around broad slacks and sea buckthorn thickets laden with flaming berries, gaining their first sight of the beach. A pair of dog walkers threw balls, their pets racing to fetch and return them, over and over. One family wrote messages and drew faces in the sand. Beyond the shoreline, the firth stretched out, dotted with several islands, the largest of which bore a lighthouse atop a hill, leftmost of a stack and isthmus. Far to the east, faded in its distant reaches, sat an iceberg of rock, its head blanketed by a hundred thousand gannets and their droppings. Further along the coast, inland, a green conical hill loomed, poised above the houses at its base.

The man held his breath, afraid that the slightest exhalation might topple the lighthouse, the rock, the hill, and the village as he took in the panorama before him.

Up ahead, his son waved at him among a swathe of woolly yellow flowers hugging the ground. On one of the woundwort stems a butterfly rested, its pale underwings spattered with black dots.

"What is it?" asked the boy.

"Small blue," replied the man in a whisper. "*Cupido minimus*. Our smallest butterfly."

"*Kapeedoo mim-mim-us*..."

The creature took flight and resettled, and the man's heart leapt into his throat. The dusky hue of the upper wings, bordered in white, told him the insect was female. He swung his net with a twist of the wrist, then reached inside to transfer the fragile thing to a sampling tube he slipped out of his pocket.

He held up the glass for a closer look—and immediately realised his mistake. For the object shining like a second sun in the sky had already burnt its imprint into his mind.

It had batted away every inquiry of the world's best and brightest on its weeks-long course through the cosmos. Missiles launched in hope found themselves bewildered by the object's erratic trajectory, and when warheads hit, it simply absorbed the explosions like fingers snuffing out a flame. After the smoke cleared, there was no longer any talk of survival. Plans turned to placating the people, while those who still desired to understand spent their energy attempting to give form to that which was to end all things. Yet not even the most advanced imaging techniques could discern anything but its most basic dimensions, which always seemed to shift. After much speculation, the only certainty was that the object was palmate in nature—hand-shaped.

The man did not raise his head again as he pushed through dense tufts of marram. Before long, he reached the edge between the young dunes and the beach, where wind-stirred sand couch and sea lyme grasses tried their utmost to hold themselves together.

* * *

He sat hunched over, at cross-grain to the sea's waves, transfixed by the small blue in the glass. Meanwhile, his son skipped over the strandline composed of

seashells, driftwood, plastic bottles and food wrappers. Two red buckets flapped winglike at the boy's sides, splashing water everywhere.

Taking one last look at the butterfly, the man sighed and tucked the tube deep into the sand. Silently he sidled over to where his son had set down the buckets and gestured for him to watch. He piled up layers of sand in the shape of a volcano and poured water into it from another bucket, making sure none of it spilled over the rim. With his fingers he massaged the sand-and-water mixture until it thickened, closing the mouth.

"There's our motte," he said, wiping his brow with the back of his wrist. "Now, it's your turn."

He shuffled to one side of the now-dormant volcano to give his son space to pack a smaller mound on top of it. Then it was time for the precision work. He directed the boy to take the wooden ruler from his rucksack and carefully slice off four clean faces, fashioning the keep. Soon, little eager hands had raised a high palisade around the fortress.

"This is fun," said the boy.

"Aye, lad." The man halted and set down his spade a moment. "You know—don't you—that I... Never mind."

The boy shrugged and fell back into his own little world as he carved in the lines of bricks, poked holes for windows and doors, and inscribed arches with the edges of seashells. And all the while, the twin sun flamed in the sky. The more the man fought to ignore it, the hotter it seared until it became a finger tugging at his nerves, playing with him.

Another check of his watch and half an hour had flown by. The motte and bailey, with its water-filled ditch, outer walls, and gateway, stood strong and proud, each shimmering grain a dagger piercing his soul. Even so, he was about to congratulate the boy on his work—when a yell cut him off.

A figure with dishevelled hair and ragged clothes stumbled his way down the beach. Sharp, scornful laughter erupted from him in bursts, punctuating the steady flow of his wailing. He clawed the air, trying to swat down the birds, hurled a spaniel's yellow ball into the sea, and uprooted a parasol, causing the couple beneath it to flee.

Before the man could shield the sandcastle, the stranger crashed into it and sped away.

Motionless, he surveyed the ruin.

Before him lay the remnants of a most ancient country—*his* country: its mountains ground into a thousand grains, every tree flattened, and all lakes and rivers drained away, leaving only barren wastes. And there, supported by the land itself, rested the detritus of humanity, the crushing weight of concrete, metal, glass, and rubbish from every factory and corporate office. Yet among the wreck were fragments of beautiful and storied things—of carved capitals, roofless galleries open to the sky, and once-tended gardens.

Gradually, his shoulders slumped, and a warm wave washed over him. He had spent thirty years reading the story of nature, contemplating the vast transformations of land and sea, the multitude of species blinking in and out of existence, the birth and inexorable death of all suns and all worlds. To be a

student of change meant accepting what could not be changed—that every story must end.

Nearby, the whimpering couple drew his attention away from the mess that had been his and his son's sandcastle. Having returned to their spot, they sat clasping their knees before the stricken parasol, sending worried looks at The Hand. On the beach there was only one fearful species. He would not be among them.

He removed his wristwatch and let it fall. Then he slowly gathered himself as the coast-shaping sea furled and unfurled its foamy fingers, while gulls wheeled above, defying gravity's pull, and the beach's infinite grains leapt upon the wind into green palms, sculpting the dunes higher. Careless of whether the epilogue came in a day or in a million years, every animal and plant, every force, was following its own lifeway.

Except the butterfly, whose wings flashed across his mind.

He scrambled in search of the sampling tube with the small blue caged inside, now half-buried in the sand—and unscrewed the lid.

Fluttering free and graceful despite the gusts, the creature guided him backward in time—back to when he had scattered the ashes of his own dusky-haired, blue-eyed companion. In the days before the coming of The Hand, she had stopped painting butterflies and spoke only in warnings about the world that she loved. Soon after, they found her body in the forest near their home, her letter for him stuffed in her jacket pocket.

"*Just as the world disintegrates*," he said under his breath, "*so does my mind…*"

But the letter had not mattered; he could never have swayed the people who were supposed to have known her best. And so, instead of spreading out from a woollen cocoon over the land and rising to the sky on myriad wings—as a gift to the beings who had sustained her and inspired so many creations—a cremator pulverised her and spat her out as poison. Another manifestation of a dying world, she would have said. He nodded solemnly. Releasing the small blue now was a small solace, but it was enough.

The boy, who had stood enchanted by the butterfly, quietly regarded the remains of the sandcastle, a finger pressed to his lips.

* * *

In the depths of a rock pool, a starfish grappled the shell of a clam with slow but unyielding force. The man reached out instinctively to deliver the mollusc from its demise but stopped himself, leaving that under-water drama to transpire. He rejoined his son and helped him gather water out of the churning sea.

"I wish we could stay," said the boy, "but… I've got homework."

"Lad," said the man, trying to hold back tears, "we can stay as long as you like."

"Really? How?"

"School's… closed Monday."

Together they walked back up the beach, their buckets brimming once more. A driving wind blew the man's hat from his head, but he let it go.

"What do you want to make next?"

"How about... a caterpillar. They're baby butterflies, right?"

"Good thinking, little caterpillar!"

The boy, half groaning, half giggling, reached into his bucket and splashed his father, so the man grabbed and spun him round, before setting him down cackling. With laughter still bubbling between them, they turned their attention to their task. On top of the castle ruins, they carefully shaped the segments of the insect's body, lump after lump in a line along the sand. The boy picked a stick to describe the ridges of its back, while the man went in search of pebbles. As they pressed in the stone eyes—a sudden change in pressure gave them pause.

The Hand, burning golden-white, streaked through the atmosphere, setting the clouds ablaze.

Terrified beachgoers, their resolve crushed, sprinted back toward the dunes.

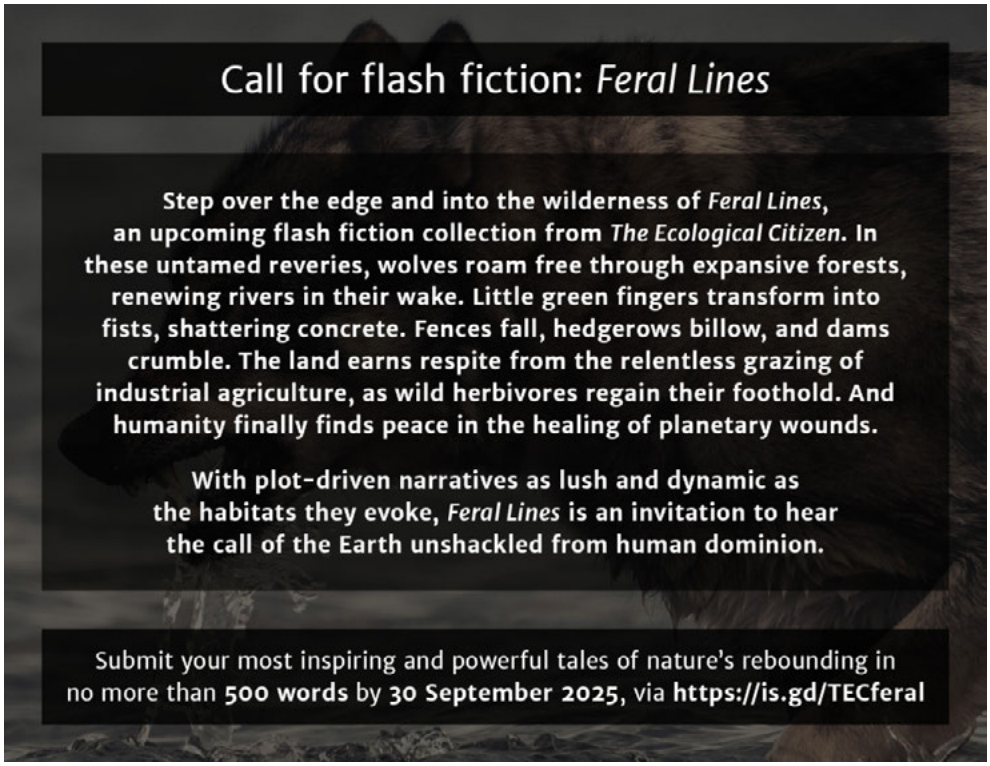
A shockwave barrelled forth in the object's wake, followed by a deafening roar.

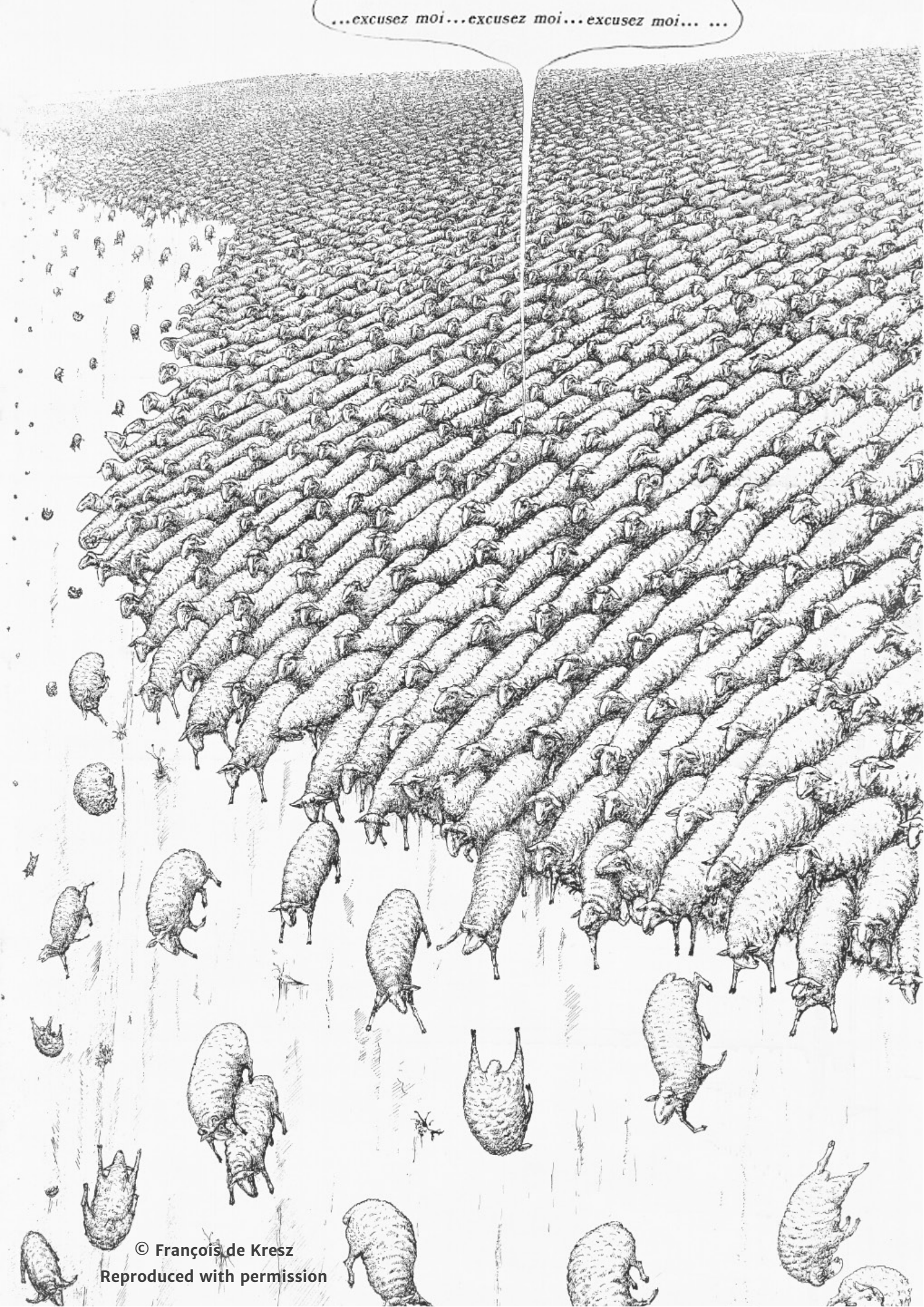
The caterpillar disintegrated.

But the father, spreading his fingers through the quivering canvas of sand, found his child's hand, took it in his own, and lifted them both as they met the end.

About the author

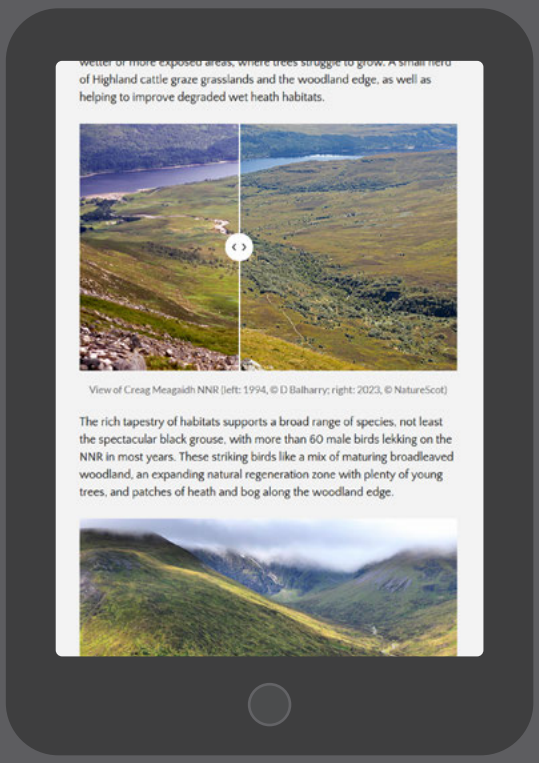
Taylor is a Scottish writer, naturalist and artist. After working in ecological consultancy and scientific editing, he wrote his MA English Literature (by Research) thesis on Earth-centred sacrality in the fantasies of Lord Dunsany and JRR Tolkien. He also holds a BSc (Hons) in Wildlife Ecology and a Level 3 Extended Diploma in Countryside Management.





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