

# Whales and the Ecology of Value: Listening as Planetary Imagination

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Figure 1. Illustration by Zainab Zulfikar.

A story carried by sound: Cold War hydrophones, Indigenous cosmologies, AI pattern recognition, and the shifting legal status of whales. Listening becomes a method for reframing value and agency. This case sits alongside “Tehanu,” which also probes cross-species communication through technical mediation, and threads toward the “North Sea,” where ecological voice becomes a cornerstone of political authority.

## Whales, Song, and Perception

In 1970, the Western world woke to the sounds of whales. Biologist Roger Payne, working with Katy Payne and Scott McVay, released *Songs of the Humpback Whale*, an album of humpback vocalisations. For the first time, the public could hear these voices of the deep. Through analysis and transcription, the team identified repetition and

structure, framing the sounds as songs. This presentation of whale calls as music transformed their cultural meaning. The album became the best-selling nature recording in history and the soundtrack of the “Save the Whales” movement. It helped drive the 1972 Marine Mammal Protection Act, curbing large-scale whaling in the United States and saving several species from the brink of extinction.

Describing the sounds as song was arguably an anthropomorphism, one that risked diluting the unique cognitive abilities of whales. Yet at a time when art was central to peace and environmental movements, the framing proved powerful. Cultural reframing drew whales closer to human experience, forging bonds of empathy and helping to position them as beings worthy of protection. Pressing their vocalisations onto vinyl, using the same process as for the human voice, compelled people to listen. In 1979, *National Geographic* included a flexi-disc with two tracks from the album, sending whale songs to 10.5 million subscribers. It remains the largest single pressing of a record in history.

Ironically, the recordings that entered millions of homes were never intended to capture whales at all. The eerie, haunting moans first appeared as interference during recordings by the Sound Surveillance

System (SOSUS), a military deployment tasked with detecting Soviet submarines in the Atlantic during the Cold War. Thanks to the patient ears of audiophile Frank Watlington, the unidentified sounds did not go unnoticed. In the early 1950s, Watlington was serving as a SOSUS sound engineer in Bermuda. His hydrophones picked up unidentifiable noises, and by 1955 he realised the strange, melodic signals were coming from migratory humpback whales. More than a decade later, after declassification, these recordings reached whale researcher Roger Payne, who recognised their extraordinary cultural and ecological significance.

## From Interference to Indicators: Whales as Socioecological Signals

Before Watlington, scientist Marie Poland Fish had already suggested that the “interference” detected by submarine hydrophones was not mechanical but animal. An oceanographer and bioacoustician, Fish helped establish the field of marine bioacoustics. Tasked by the US Navy with identifying mysterious underwater sounds in the mid-1940’s, she was among the first to recognise that the cacophony of chirps, whistles, grunts and groans came from sea life. In a 1956 *Scientific American* article, Fish asserted that “articulate denizens of the sea ‘speak’ a confusing variety of dialects, but each is distinctive, and with experience one can learn to identify the kind of animal by its sounds, as one recognises a familiar voice on the telephone.”<sup>1</sup> This challenged the prevailing belief in a vast silent ocean, reframing the sea as alive with sound.

That same year Jacques-Yves Cousteau’s film *The Silent World* offered vivid colour images of a quiet sea. Limited by the technology of the time, the film recorded no live sound and added audio in post-production to shape the narrative rather than document the ocean. The very tools that provided passage to the depths; scuba gear, phosphorous torches and ultra-wide-angle lenses, also masked natural underwater soundscapes. As Fish observed, “even the most loquacious species fall quiet at a ship’s approach.”<sup>2</sup> As terrestrial animals we will always need tools to mediate our interactions with whales and other marine beings, but Fish reminds us that how we use aquatic tools matters. We are required to not just hear the ocean, but to listen to it in its complexity.

Watlington’s recordings, reframed through Payne’s interpretation, built upon this lineage of listening, and for Payne, the interplay of the biological and mechanical sound found in the hydrophone recordings was crucial. In producing *Songs of the Humpback Whale*, he insisted the recordings remain unaltered, leaving intact the noise of ship propellers, sonar and dynamite scattered amongst the beauty of the whales’ melody. In the 1940s it was understood that whale sounds were interfering with recordings of the ocean. By 1970, the intrinsic value of the ecosystem was more widely accepted and Payne’s decision to ensure that human activity punctuated the whale recordings heard in human homes underscored the interconnected nature of the two realms. Recent studies confirm that human impact on the ocean environment is catastrophic and changes in whale song can reflect ecological disruptions such as shifting prey availability. Songs of the humpback and other sealife can act as barometers for the health of the oceans, carrying signals of both resilience and fragility.

This recognition of whales as ecological indicators has been extended into economic valuation. The International Monetary Fund (IMF) has attempted to integrate whales into the global monetary system. A 2019 IMF study estimated that each great whale represents around two million US dollars in carbon sequestration and other ecosystem services, amounting to more than one trillion dollars across the species. The analysis calculates the carbon stored in whale bodies, the market value of carbon and financial techniques of discounting to assign this figure. It suggests that over a lifetime, a single whale’s contribution to carbon capture is equivalent to that of a thousand trees. Their nutrient-rich waste fertilises phytoplankton, which produce at least half of the Earth’s oxygen and capture around 40 percent of global CO<sub>2</sub>. Through their migratory and breeding behaviour, whales spread these nutrients across the seas. When they die, their bodies sink to the ocean floor, sequestering an average of 33 tonnes of CO<sub>2</sub> for centuries. By contrast, a tree absorbs just 22 kilograms of CO<sub>2</sub> each year. In some ways, this formulaic rationale for whales’ contribution to the monetary system is even more reductive than

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1 Marie Poland Fish. “Articulate Denizens of the Sea.” *Scientific American* 195, no. 2 (1956): 54–61.

2 Fish, 1956.

categorising their vocalisations as song. Yet it can clearly articulate their indispensability in planetary ecology and ecosystem regulation.

The story that began with accidental recordings of haunting songs now converges with the languages of economics and climate science. Yet the thread to understanding remains the same: listening. When Payne and his colleagues transcribed whale vocalisations as songs, they did more than analyse sound, they created a bridge. Framing these calls as music brought them into the realm of human culture, where song is linked to meaning, memory and identity. Pressed onto vinyl and distributed like popular records of the era, whale voices entered living rooms and imaginations. Could we have cared in the same way if they had remained framed only as biological data? Would laws have shifted without the empathy stirred by melody?

## Whakapapa, Sovereignty, and the Politics of Legal Personhood

The complexity and significance of whales is intertwined with the coastal cultures who share habitat and cosmos with them. In Aotearoa New Zealand, Māori voyagers navigated vast waters with *te whānau puha*, the air-expelling mammals and waiata teaches the cultural and spiritual value of whales as protectors, navigators and collaborators of whale riders. Seen as ancestors and guardians, whales are linked to people through *whakapapa*: the saying “*Ko ahau te tohorā, te tohorā ko ahau*” (“I am the whale, and the whale is me”) shows how closely their identities are intertwined.

Māori see the value of whales in life and in death measured through cultural and spiritual connection rather than the IMF's financial terms.<sup>3</sup> For example, a whale's death by stranding on a beach is not always seen as an accident and can be a moment of deep significance, carrying spiritual, cultural, and ecological meaning. Within Māori traditions, strandings are occasions to listen. Not only to the messages whales may bring from *atua* and ancestors, but also to the responsibilities they place on people as *kaitiaki*. *Tikanga*, or customary practices, guide the community in responding to strandings: *karakia* and rituals honour the whale, resources are shared respectfully, and the event is woven into *whakapapa* and collective memory. Strandings can occur for many reasons, but human activity has increased their frequency and severity. Fishing gear, pollution and ship strikes can injure whales, while noise pollution from naval sonar and seismic surveys has been shown to disorient them, damage their sensitive hearing and

interrupt the communication on which they rely. Understanding the behavioural signals of whales such as strandings can offer insights of ecological imbalance in part caused by human interference in the ocean, if we are open to receive the signal that is.

For Māori, beyond communicative instances, these strandings are also opportunities to renew cultural relationships with whales. Materials gifted by the sea, such as bones, teeth, and oil, have long been valued and used with care. The *rei puta*, a whale-tooth ornament, symbolises the highest honour and the intimate connection between people and whales. If you have a sperm whale's teeth, you must have a sperm whale's jaw to carry them, the proverb goes. In the same vein, whale bones have traditionally been carved into tools, weapons and taonga that carry *mana* and memory. Such practices are not only cultural but also political: under Article Two of the Treaty of Waitangi, *iwi* retain customary rights to stranded whales, affirming their sovereignty and the recognition of whales as taonga species.

Cultural and spiritual recognition continues to evolve. *He Whakaputanga Moana* (Declaration for the Ocean)<sup>4</sup>, signed in 2024 by Māori leaders of the Pacific, including from Aotearoa New Zealand, the Cook Islands and Tahiti, seeks to confer Legal Personhood for migrating whales. Emerging from deeply rooted ancestral reverence, this framework affirms their *mana* and mandates human responsibilities to protect them from pollution, sonar, seismic testing and entanglement. Legal Personhood for non-human entities is not new. Corporations, ships and natural entities have long been recognised as legal persons in various jurisdictions. Around the world, Rights of Nature frameworks are extending these protections. Applying this to whales ensures their rights are acknowledged without conflating them with human rights. The responsibility rests with human institutions to uphold protections and recognise the benefits whales bring to planetary survival.



Figure 2. Spectrogram of a humpback whale. Image by NOAA Fisheries.

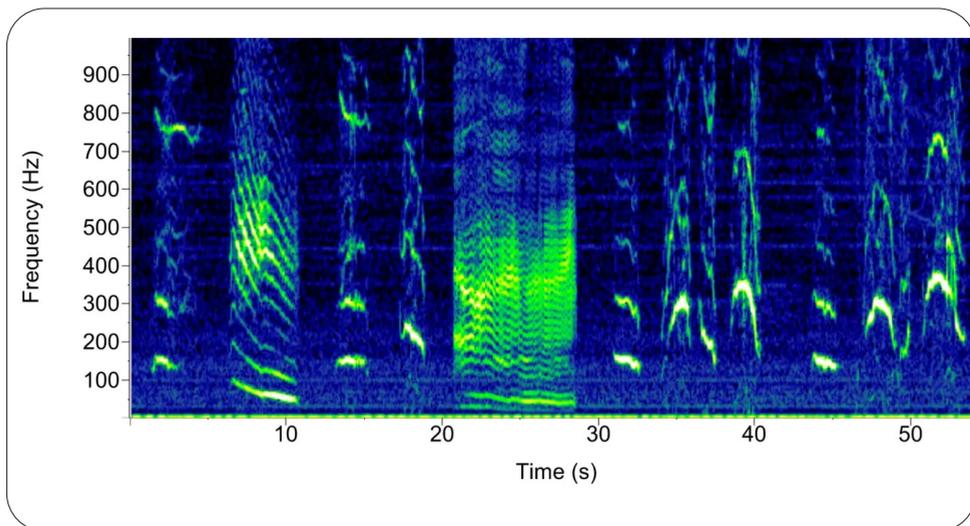


Figure 3. Spectrogram of a humpback whale. Image by NOAA Fisheries.

## Technology, AI, and the Interspecies Internet

But what if whales could articulate their own worth? When the idea of an interspecies internet was first presented in a 2013 TED Talk, it sounded like science fiction. Four interdisciplinary leaders—musician Peter Gabriel, internet pioneer Vint Cerf, cognitive scientist Diana Reiss, and technologist Neil Gershenfeld—sketched a vision for a future where technology, animal communication sciences and the arts might converge to connect humans and other animals through considered digital mediation. In the talk, Gabriel recalls “the most amazing music-making experience” of his life: an improvisational jam session with Panbanisha the bonobo, guided by researcher Sue Savage-Rumbaugh. On screen, Panbanisha’s human-like fingers explore a keyboard with growing intention. Off-screen, Peter hums in response, while Sue encourages her with warmth and care. The encounter—which like Roger Payne’s experience connected beings through the concept of music—kicked off a collaborative journey to imagine what might happen if access to networks were not restricted only to humans.

More than a decade later, this vision feels far less speculative. Technological convergence has made high-powered, deployable listening devices widely accessible. As Gabriel and the other founders of Interspecies Internet imagined, humans now have the tools capable of connecting non-human animals, as sentient, intelligent beings.

Audio-visual and sensory interfaces have been deployed in a range of contexts to explore both intraspecies communication (decoding signals within a single species) and interspecies communication (two-way exchanges between humans and non-human animals). In the latter, we’ve seen research that includes the *Dolphin Pad* touchscreen designed for dolphins to use with their rostrums; parrots offered agency to initiate video calls with one another; and dogs able to call their owners using haptic-enabled toys. With increased access to such technologies, the possibilities of Animal–Computer Interaction are expanding and designers are asking what it may mean to not just design for animals, but with them. The participation of non-human animals in research processes often relies on the introduction of novel tools into natural environments, yet as technology becomes more flexible and powerful, we might imagine co-design frameworks whereby technology becomes assistive, passive and modeled to the natural behaviours of the animals and their ecologies.

3 International Monetary Fund. “Nature’s Solution to Climate Change: Whale Carbon Sequestration.” February 13, 2019. <https://www.imf.org/en/Blogs/Articles/2019/02/13/natures-solution-to-climate-change>.

4 *He Whakaputanga Moana (Declaration for the Ocean)*. Aotearoa New Zealand, Cook Islands, Tahiti, 2024.

Plants have already been integrated into sensing environments, where power is drawn from their natural electrical signals and microbial cells. Could such systems lay the groundwork for ecologically integrated interfaces? Where plants, animals, and humans are all nodes in a shared network that can form the next evolution of the Interspecies Internet?

When it comes to decoding animal data, advances in AI and large language models are providing powerful tools to parse the vast amounts of information generated by bioacoustic monitoring. In the 1960s, Payne and McVay transcribed Watlington's recordings into spectrograph renderings, identifying long and complex patterns that whales repeat. Using AI, these discoveries are being confirmed. The aim of much of today's research is to approach decoding animal sounds in ways that mirror how we've learned about human languages. Thanks to their songs, whales are a popular research subject for this approach. Researchers are assembling corpora from the vast collections of existing whale vocalisations - including Watlington's. Self-supervised learning models, similar to those used for human languages, are trained to predict missing or future elements in whale sound sequences. The detection of patterns, discrete units or combinatorial units can be suggested as akin to the linguistic structure of human language. By comparing vocalisations with contextual data, researchers aim not only to gain a clearer picture of animal behaviour but also to begin uncovering meaning. The triangulation of human, animal and artificial intelligence offers an extraordinary opportunity for deep listening. Yet a gap persists between statistical pattern recognition and genuine semantic understanding. Bridging this gap requires care. We must resist anthropomorphism and acknowledge that whale communication may not map onto human concepts of semantics at all.

It comes as no surprise that the most skilled tool-using species would be the one to equip other species with such abilities. Yet this raises profound moral and ethical questions around the collection of data by humans: what does it mean to "eavesdrop," as Fish described, on non-human communication? What might it mean to move from data as commodity to data as agency, where ownership confers rights?

Emerging frameworks mediated by human-designed technologies suggest that one day, no middleman may be needed. The Kingdom of Bhutan, for example, mints carbon credits exchangeable on the Singapore Exchange, creating digital currency in recognition of its vast carbon sequestration. Without a physical wallet, Bhutan earns through the ecological services it provides. Perhaps a similar framework could apply to whales—unable to carry a wallet, yet undeniably worthy of credits for their immense role in carbon capture. Such credits could be directed to conservation funds, effectively allowing whales to "earn" for their own contribution.

Whales with digital wallets may sound whimsical, yet it is not far from existing models where nature is represented in human economies. The *Sounds Right* initiative, launched by the Museum for the United Nations and Spotify, officially lists Nature as a featured artist on tracks incorporating natural sounds, with royalties channelled into biodiversity and conservation projects. If whale vocalisations were recognised not only as data but as cultural or artistic contributions, they too could generate royalties or rights-based revenues. In this way, whales' own voices and ecological labour could be acknowledged as assets in both cultural and economic terms, with the returns used to protect their species and habitats—a contemporary *Save the Whales* campaign, led by the whales themselves?

## The Value of a Whale is How We Listen

Payne's recordings in the 1970s transformed whales from hunted commodities into beings with culture and voice. Today's breakthroughs in decoding their vocalisations and behaviour offer only a glimpse of their social and cultural complexity, raising the hope of eventually uncovering an alignment that affirms the intrinsic worth of whales in an anthropocentric world. Yet questions remain: will this come through linguistic understanding, and do we have an intraspecies - that is an understanding within the diversity of human languages - as a precedent for such a shift? At best, decoding could unlock deeper empathy and connection, compelling transformations in law and ethics—perhaps even allowing whales to speak for themselves. But for now, a significant gap persists between collecting data, interpreting meaning, and taking responsibility for

what is revealed. Across this history—from Cold War surveillance and scientific discovery to Indigenous cosmologies, artistic reframing, economic valuation, and technological innovation—one throughline emerges: the value of a whale is not measured in numbers or ownership, but in our willingness to listen. True listening asks us to decenter the human and allow new frameworks of nature-culture relations to surface, grounded in reciprocity, humility, and reverence for all life. The question that remains is not whether we can hear whales, but how we will respond if we learn to truly listen.