

Restoring the living ocean: The time is now

The first part of this two-part essay looks at the destruction that industrial fishing has unleashed on the global ocean. Human beings have forgotten the living abundance that the seas once harboured. A conglomerate of anthropocentric concepts, mega machines, international fishing fleets and consumerist oblivion has laid waste to that abundance, and brought extinction, death and suffering to marine beings. The subject matter of part two is deep-sea mining, which is under preparation for commercial launching. Like industrial fishing, it must be stopped. What is at stake at this historic moment is not only the fate of the living ocean, but who we are and who we choose to be as humanity on this planet.

Part 1: Sweet delight and endless night

The global ocean is imperilled. What remains of marine life abundance, a tiny fraction of what once was, continues to be afflicted by industrial fishing, anthropogenic starvations and diseases, rapid climate change and acidification, and all manner of pollution such as sewage, garbage, oil spills, and fertilizer and pesticide runoff (Danson, 2011). Persistent organic pollutants have infiltrated the ocean so that the bodies of some top predators meet the definition of toxic waste (Whitty, 2011: 118). And what to say of the spectre of gigantic amounts of plastic, decomposing but not biodegrading, killing millions of marine animals every year, and entering the worldwide food web? (Law and Thompson, 2014; Mooney, 2014).

Of the multiple threats to the ocean, industrial fishing has caused and continues to cause the greatest devastation. In the odd 150 years of its history, and especially since 1950, industrial fishing by an international cadre has perpetrated an egregious assault on fish – indeed, on all marine life and habitats. Along with industrial agriculture, industrial fishing constitutes Exhibit A of the human-supremacist mode of operation: both exercise *biome-scale* appropriation and extraction, with blithe matter-of-factness,

as if massively destroying ecosystems were the most normal thing ever devised. The global fishing industry operates more vessels than there are numbers of fish left to be caught, while the incalculable numbers of slaughtered bystanders are labelled ‘by-catch’ as if they are killed by mistake.

This onslaught on virtually the entire ocean rests on its presumed rightful conversion into an all-you-can-eat buffet for global consumers, cushioned with nomenclature like fisheries, fish stock, seafood and by-catch to moor the normality of that buffet in the human mind. Industrial fishing additionally depends on rezoning the ocean’s places as either nation-owned (economic exclusive zones) or humanity’s commonwealth (the high seas [also known as ‘the Area’]), thus institutionalizing human ownership of the ocean – and further befuddling the human mind. Industrial fishing also relies on a plunder-enabling international regime of ‘maximum sustainable yields’, flags of convenience, government subsidies, developing nations (corrupt and non-corrupt) selling fishing rights to developed nations (unscrupulous and not), and lax-to-non-existent law enforcement against illegal fishing practices by both authorized and poaching vessels.

What suffers is not only the living ocean whose very existence in the cosmos is as close to the miraculous as human beings can experience. What suffers is the human –

Eileen Crist

About the author

Eileen has been teaching at Virginia Tech in the Department of Science and Technology in Society since 1997. She has written and co-edited numerous papers and books, with her work focusing on biodiversity loss and destruction of wild places, along with pathways to halt these trends. Eileen lives in Blacksburg, VA, USA.

Citation

Crist E (2019) Restoring the living ocean: The time is now. *The Ecological Citizen* 3(Suppl A): 27–41.

Keywords

Biodiversity; human supremacy; protected areas; sixth mass extinction; water

“Ignorance about both the ecological history and current state of the ocean is rampant.”

human identity – degraded to user, usurper and petty criminal in the community of life.

Ignorance about both the ecological history and current state of the ocean is rampant. The seas have become destitute of “their once great abundance of whales, walruses, sea cows, seals, dolphins, sea turtles, sharks, rays, and large fish” (Jackson, 2005: 29). The immense shoals of small fish – known as prey or forage fish because they feed a diverse and large cast of predators – are also in precipitous decline. It strains the imagination to countenance the destruction of marine life that has occurred: to learn from archaeological data, eyewitness and first-hand accounts (*e.g.* fishing or whaling logbooks), and historical marine ecology about the cornucopia of marine life, most especially prior to when industrial fishing commenced on a global scale (Schrope, 2006; Roberts, 2007). Marine biologist Callum Roberts writes that “before 20th century industrial fishing took off, European seas seethed with life” (2007: 128); these were seas that had *already* been long assailed by fishing – we might try to imagine what that life-seething was like in places more untouched. On a global scale today, in the words of marine researchers Ransom Myers and Boris Worm, “everywhere you go, in every ocean basin, hotspots of life are only relics of what was once there” (Myers and Worm, 2005).

Without willingness to open to the understanding of what has been lost, humanity will remain incapable of aspiring to the restoration of life-filled seas. Instead, people will settle for the large-scale replacement of wild fish with factory-farmed fish, while seas suffer bulldozed continental shelves and seamounts, massive defaunation and extinctions, offshore and deep-sea mining, jellyfish population explosions, and the disappearance of coral reefs and coastal wetlands. Humanity is in danger of capitulating to the human takeover of the ocean that is leading to its ontological reduction into a ‘protein’ factory, a desalinizing solution to the freshwater crisis, a fossil-fuel and mineral extraction domain, and a global transit zone for container ships, nuclear-armed

submarines and cables. A ‘serviceable’ big body of water, in other words.

Abundance

Which is exactly what the ocean is not. Everything about the ocean – including its delicious scent, which is also fading (Upton, 2013) – flows from its polyphony of life. The ocean is a life-creating and life-proliferating crucible, the place where life itself likely emerged, and whose deep past lingers in our intimate fluids of sweat, blood, and tears (Helmreich, 2010). Until recently, the seas teemed with beings from the microscopic phytoplankton and zooplankton (the bottom of the food web, now threatened) to billions of prey fish, billions of carnivorous big fish, and millions of whales whose carcasses and dung returned to marine life – including to the abyssal biota – food to feed them. As true of the ocean as it is of the land, “the world is the sphere of superabundance. Heaven and Earth contrive to drip sweet dew. Contrary to the command of man, it drips evenly over all species” (Cafard, 2017: 70).

Abundance fed abundance and bred abundance, and fish often graced with long lives grew to be really big. (Fish typically continue to grow as they become older. Bigger fish lay more eggs, so bigness is a vital source of marine abundance.) In *The Unnatural History of the Seas*,¹ Callum Roberts reports that 30-foot great white sharks were compared to whales and 20-foot sharks (rare these days) were common when, for example, the Europeans arrived at the islands, shores and seas of the New World (Roberts, 2007). Erstwhile numbers and sizes of all fish are legendary – not only the cod who fed people for centuries, but also the tuna, marlin, sturgeon, salmon and swordfish to name some others. Cod could reach three feet, and their extravagant numbers were compared with grains of sand; imagine the numbers of the fish they fed on. The average swordfish today has dropped to less than half the size it was 100 years ago (Danson, 2011: 104), meaning that swordfish live under the perpetual shadow of being hunted so their odds of living long are slim.

Indeed marine animals do not get to live as long, eat as heartily and grow as big as they did when the seas overflowed with life, and feeding was not a competition or a struggle with scarcity, but an extravaganza of more-than-plenty to go around. Coastal seas were bursting with enormous diversity and numbers of beings, and wildlife spectacles could be witnessed from shore (Roberts, 2007). What beauty there was to bruise the eyes when the Caribbean was graced with coral reefs, forested with sea meadows, and dwelled in by innumerable groupers, reef sharks, moray eels, rays, parrotfish, seals, sea turtles, and rainbows of all sorts and sizes of tropical fish (Figure 1). Only ten per cent of the original coral-reef Caribbean habitat remains today. Imagining the Mediterranean in the early Holocene is nearly impossible, for it is a sea that has been subject to human exploitation for millennia. To grope in the mind's eye

towards former and not that distant Edens of the seas is not some nostalgic pastime: It is about nurturing a yearning towards who *we need to become* to restore and inhabit that rich lifeworld again.

The food web of the ocean belied the classic pyramid structure of profusion of microorganisms, followed by prolific plant life and small critters, topped by lesser numbers of mid-sized predators, and finally capped by few large predators at the web's apex. Rather than being triangular, the ocean's food web displayed abundance at every trophic tier (Jackson, 2005). The plankton and krill; prey fish like herring, sand eels, sardines, menhaden and anchovetas; the larger fish such as mackerel, cod, haddock, pollock and sturgeon; the even bigger ones, like sharks, swordfish and tuna; the sea turtles and the seabirds; the mammals, such as seals, manatees, dolphins, porpoises and whales;



Figure 1. A sea turtle photographed off Curaçao in the Caribbean Sea in 2012 (photo: Laszlo Ilyes [CC BY 2.0; <https://creativecommons.org/licenses/by/2.0/>]).

and the habitat-building oysters, mussels, sponges, clams and reefs. Numbers of species, population masses, extravagant sizes and marine wildlife spectacles were as unbounded as the seas are wide and deep.

An intimate and rich conversation primordially bonds marine and terrestrial life. Clouds forming over the seas with the help of oceanic microorganisms bring rain to the land, and rain loosens nutrients from rocks that flow back to the sea via rivers. The ocean's bounty was also brought inland by anadromous fish (Waldman, 2010; Jackson *et al.*, 2011). Rivers of fish might be pursued inland by their predators, like porpoises swimming up Britain's Thames and sharks into North America's James River. The salmon, shad, whitefish, sturgeon and others brought nutrients to the terrestrial animals, trees and soil. Eels went the other way, bringing gifts of the land to the seas. Thus is the natural world knit into a higher-order pattern of intelligence through life's strivings, sensory pleasures, evolved interfaces, whole-weaving multiplicities and mutual feasts.

Stories of fish-filled seas and rivers, and of fecund ecotones where ocean and land meet, teach us that our life-science ideas about 'cooperation versus competition' and 'mutualism versus struggle for survival', while exhibiting some limited erudition, do not hold a candle to life's phenomena themselves, which are creative, fecund, myriad and relational, including relations between different species of mind. For millennia, Western civilization endeavoured to keep itself in the dark about non-human minds, for they have represented a cardinal threat to human arrogance. When we awaken (as is dawning today) to the pervasiveness of forms of awareness on this planet, we surface into awe. When we awaken, we see ourselves *seen* from non-human standpoints – and recognize that we have always been seen. We acknowledge that we do not want to be seen as tyrant-zombies to be feared and avoided, but rather as mindful, curious beings who might even evoke awe in them. Awe is not epiphenomenal sentimentality. It is a state of grounded being that reflects

the awesomeness of the living world; it is the real ground to build human life and inhabitation.

Experiencing the numinous quality of non-human awareness is blissful. That some might dismiss such a statement as romantic does not undo the fact that a clear human being encountering the numinous quality of non-human awareness feels bliss – subtle or elating, commonplace or sublime. Indigenous peoples, who were conscious of the nexus of perceiving-the-numinous and experiencing-bliss, participated in the living world's creativity, abundance, multiplicity and reciprocity. Along with bears, eagles and trees, they also welcomed and ate the migrating fish. And the fish always returned, in numbers that "stretched capacity to believe," surging onward, seeming to reverse the river's flow, spawning prodigiously, more than enough to sustain the forest and its beings, more than enough to recreate their own abundance (Roberts, 2007: 49; Vickers and McClenachan, 2011: 128).

Wetiko

More than enough to keep the First People in gratitude (House, 1999). Not so for members of a culture raised on a credo of *Homo sapiens'* superlative stature. As Native American writer Jack Forbes expounds about the Wetiko psychosis, supremacist individuals and societies destroy in order to devour the life of those considered beneath them, whether non-human or human (Forbes, 2008). The belief of being exceptional – ensouled, rational, self-aware, technological or what-have-you – makes it easy to turn others into *just* trees, *just* fish, *just* rivers, *just* meat, or, until not too long ago, *just* savages.

The fish runs of Europe were wrecked by fishing, dams and industry in the medieval period, all but silencing one of the planet's sea-land conversations (Roberts, 2007). Europeans turned to their fish-abounding coasts, and, after overfishing them, continued fishing further and further afield. Eventually, they came to the New World for its fish – and for its whales, walrus, seals, seabirds, sea turtles and

“For millennia, Western civilization endeavoured to keep itself in the dark about non-human minds, for they have represented a cardinal threat to human arrogance.”



Figure 2. Plastic pollution on a beach in Ghana in 2018 (photo: Muntaka Chasant [CC BY-SA 4.0; <https://creativecommons.org/licenses/by-sa/4.0/>]).

sea otters. Thus, ‘civilized’ rapaciousness towards the natural world kept rehearsing itself, except that the destruction of the New World was more horrific because of its speed, scale and brutality. By the early modern period, Wetiko markets targeting oblivious consumers were devouring the marine life of the New World as flesh, eggs, oils, pelts, fur and feather commodities (Mowat, 1996).

Over the course of centuries and accelerating in the 18th through the 20th, the whale people – called “fisheries” – were serially decimated, population after population, place after place, and species after species. Wherever seafarers found unexploited whale pods, the numbers were staggering. The whales came to see those seafarers, crowding around the ship vessels; they were slaughtered in response. Yet those whalers were not murderers – they were brainwashed by a sociocultural setup of human supremacy, and thus stripped of the desire (*the human birthright*) to see, be seen by and communicate with non-humans. To learn this missive from history – of the internal connection between the devastation of the non-human realm and the pitiable contraction

of the human spirit – is key to redeeming that history through the liberation of all Earthlings from the physical cruelty and mental decay of supremacist creeds.

By the end of the 19th century, whaling was a global business. Today, even with a moratorium, the vast majority of whales are gone. Where once they sought us, now many humans seek to be near them. We must restore a world in which they thrive again and we can mutually meet. Every life meeting is a meeting of minds, and in the meeting of minds lies one of the greatest joys of being alive. Therefore, still-whaling nations must stand down today. The whales are experiencing suffering enough – what with anthropogenic starvations and disease, ship collisions, entanglements in fishing gear, noise pollution and the scourge of plastic waste (Figure 2). One hundred thousand small whales, dolphins, and porpoises are deliberately slaughtered every year, by an international cast of offenders, for meat, bait or body parts (Altherr and Hodgins, 2018). Whales are washing up emaciated and with their stomachs full of plastic and garbage. In one example, a sperm whale beached in 2012 was found to have in their stomach

“From an exuberance of life the ocean has become unsafe for its residents, yet the public seems buffered from that knowledge, society keeps up the pretense of seafood as ‘health food’ and the mainstream observes silence about the plight of the sea’s beings.”

30 square metres of tarpaulin, 4.5 metres of long hose, a 9-metre plastic rope and two flower pots.² Yet a few centuries ago, sperm whales were a million strong and schools of them numbered 600 to 700 (Whitty, 2011: 167; Roberts, 2007: 93). Now, with just a fraction of sperm whales left, and behemoth-sized males scarce, if a family of females and their children run into hungry killer whales – themselves suffering from toxic pollutants, food insecurity, and starvations – there may follow an agonizing ripping of flesh: the protection that numbers and sizes of sperm whales offered against killer-whale predation are gone (Whitty, 2011).

The standard answer to industrial fishing decimations of “fish stocks” has been to “‘move on’ down the food web, toward deeper waters, and to other areas or regions of the world” (Sumaila and Pauly, 2011: 25). That historical pattern continues, even as global fish catch peaked over two decades ago. Today, industrial fishing fleets from China, European nation-states, Chile, Indonesia, Canada, the US, India, Thailand, South Korea and Vietnam, to name some players, are rushing to extract the fish of their own seas, of the high seas, of Africa’s coasts, of any places fish are left to extract. The fishing methods – trawling (super-trawlers can reach the length of 1.5 American football fields), long-line fishing (with thousands of baited hooks), and purse-seine netting (which can be more than 6000 feet in length and 600 feet in depth) – are expedient at mass killing. One fishing tactic exploits the predilection of fish and other marine creatures to gather around floating objects in the open sea. Buoys called ‘fish aggregating devices’ (FADs), often equipped with sonar and GPS, are strewn across the ocean to lure fish into their vicinity before the fishing vessels arrive. In the western and central Pacific Ocean alone, there are more than 50,000 FADs legally sited (Urbina, 2019: 65). All around, the industrial-fishing machine has become ‘High-Tech Wetiko’.

People of developing nations, who rely on fish from artisanal fishers, are robbed of both livelihood and nourishment by

the industrial-fishing complex (Golden *et al.*, 2016). Along with other marine beings, fish are being exterminated at every ecological tier of the ocean, with shoddy accountability on that (legal, shady and illegal) appropriation (Pauly and Zeller, 2016). The majority of ‘fish stock’ and ‘fisheries’ – jargon that warps living seas into human warehouses – are so exploited that the trend in biomass across species is sliding downhill (Gjerde *et al.*, 2013: 540). Only 10 percent of the historical populations of big fish remain (Myers and Worm, 2005).

All the entitled taking is emptying the seas of the livelihood of marine animals. Vacuuming the herring, menhaden, anchovies, sardines and other small fish is taking its toll on seabirds, sea lions, penguins, dolphins and whales, among others. On California’s coast, sea lions and their pups have recently experienced famine (Steinmetz, 2014). Arctic terns, puffins, albatrosses, and other seabirds are taking nosedives in their numbers (van Dooren, 2014: chapter 1). Seabird populations have declined by 70% overall since 1970. With krill opined a ‘sustainable fishery’ – for such consumer niceties as aquaculture feed and health supplements – how can whales find sufficient sustenance to make a comeback? (Since the 1970s, krill populations have declined by 80% [Taylor, 2018].) Plastic bags strangle the digestive tracts of sea turtles who mistake them for jellyfish. All species of sea turtles are endangered from multiple pressures (see Crist [2019: 137–9]). Over a million seabirds, 100,000 marine mammals and uncountable fish die yearly in the North Pacific from eating plastic or getting ensnared in it (Casey, 2010). From an exuberance of life the ocean has become unsafe for its residents, yet the public seems buffered from that knowledge, society keeps up the pretense of seafood as ‘health food’, and the mainstream observes silence about the plight of the sea’s beings, thus breathing new meaning into the adage Silence = Death.

Reality versus normality

It is amazing to watch how Dr Seuss captivates the minds of children with so

many interdimensional flower-animal-beings in enchanted landscapes filled with colourful structures that protrude, intrude and levitate. We inhabit a world that makes Dr Seuss's creativity a dreamy plagiarism of its creatures, their antics, their peregrinations and their makings of worlds. We are members of a living planet that also enchants children, before they grow into the brainwash that Earth is human property composed of natural resources, providing maximum yields of, among other things, cheap seafood. Cheap seafood that can be eaten by the global consumer class – which recently passed the half point of the global population (Kharas and Hamel, 2018) – in any amount, at any time, and with much enthusiasm for all its ostensible micronutrients. Yet the counsel deserves stating that the days when eating fish was good for human fitness are receding in the rearview mirror, while the currently unknown repercussions of ingesting microplastics are undergoing a mammoth 'experimental trial'.

Where submerged continents extend out towards ocean depths, they form once-life-prolific continental shelves: In rampages of demolitions, industrial trawlers have gouged out marine beings and shattered their three-dimensional, life-created habitats. Rolling hills filled with fish, mussels, oysters, crabs, anemones, tubeworms and sponges, among others, have been smashed and levelled, while leafy glades and sea forests have been turned to muddy flats. "Today," writes Roberts, "there is hardly a scrap of suitable bottom in the world that has not felt the scrape of a trawl." As a result, where there once were "rich, complex, and productive habitats," what predominates is "gravel, sand, and mud" (Roberts, 2007: 156). "Each year," writes Ted Danson, "the world's fleet of bottom trawlers disturbs a seabed area twice the size of the contiguous United States" (2011: 82). Trawlers should have been decommissioned long ago, their parts recycled into something useful. Quite to the contrary, however, having fished out the relatively accessible waters of continental shelves, there are other ocean

wonders they have taken to vandalizing: its mountains.

Earth's seamounts jut out of ocean depths forming majestic peaks, gorges and valleys. Life has set up house on them, of course. Deep-sea coral lives there, some of it hundreds and even thousands of years old. Fish who have evolved abilities to withstand extreme conditions of pressure and cold also live there. Trans-oceanic travellers like tuna, sharks and sea turtles make stopovers. These are places dwelled in by some of Earth's strangest, most long-lived children. They are oases of gorgeous life. Here come the trawlers with their military gear and yawning steel mouths to desecrate the mounts, extract the fish and discard the by-catch. It is horror-genre material turned into a reality show in the ongoing staging of human supremacy on Earth.

The people who eat the fish live 'light-years' away from the continental shelves, high seas and seamounts and know little about them. Certainly not about the sea mounts' Seuss-like corals, sea fans and fish who are older than their grandmothers. Nor any of the cool science stories about those habitats and their endemism, or evolutionary tales from coruscating stardust to the magic of creatures who make their own light. The fish suddenly appear in the supermarket. Some of them living near Australia and New Zealand used to be called 'slime heads', but were renamed 'orange roughy' for better marketing appeal (Kurlansky, 2011). Some of them dwelling in the Southern Ocean, called 'toothfish', were renamed 'Chilean sea bass' for its exotic ring (Urbina, 2019). Having suffered the fleeting reduction into being-flesh,³ and predictable 'fishery collapses', what fragment of real life of our slime head and toothfish cousins remains, and of so many others who have suffered and are suffering the same fate (Dreifus, 2002; Victorero *et al.*, 2018)?

It is not necessary to Question Reality in whose cosmic play we are enmeshed, even as we are denied metaphysical knowledge of what lies beyond it. Questioning Normality, however, is good. For example, the octopus

“Trawlers should have been decommissioned long ago, their parts recycled into something useful.”

“The industrial-fishing regime has remodelled the ocean into a scrumptious food jar from which to extract cheap fish for the global consumer class. This regime will be allowed to destroy the living ocean as long as we continue to think, without explicitly thinking it, that industrial fishing is normal.”

on the menu. If you give an octopus in an aquarium a ball, she will bounce it against the walls to pass the time. It is good also to question the mass-produced shrimp, spooned into one another on the mass-produced plastic cocktail trays. For every pound of shrimp, 10 pounds of sea life are thrown overboard dead and dying (by-catch); tens of thousands of sea turtles are killed yearly by commercial shrimp trawls in the Gulf of Mexico (by-catch); and mangrove ecologies are deforested for shrimp aquaculture (Danson, 2011; Keledjian *et al.*, 2014). Let's question the parade of fish species featured in lines like Filet-O-Fish and look into the labour conditions that deliver cheap fish (Urbina, 2019). And: Do you really want to eat the factory-farmed, dyed-pink, wild-fish-fed, habitat-polluting, soon-to-be-GM salmon?

“Think about that slab of tuna in the deli case as bushmeat,” urges marine biologist Sylvia Earle (2003). More to the point, think about that slab of tuna as a crime.⁴ Question the restaurant grouper that may well not be a grouper – or worse, actually is.⁵ The swordfish steak: Can we not let them be? The tasty scallops? Along with half of the total fish catch, they come from trawling, which (it bears repeating) is among the most base assaults on nature ever orchestrated. With indiscriminating violence, in a matter of hours, trawlers devastate what it took the natural world hundreds or thousands of years to create. (The silt clouds that trawlers stir underwater can show up on satellite images.) What about the lobsters? They are still plentiful, because their predators have been decimated. Lobsters were once so beneath polite-society food, they were fed to convicts and slaves and used for fertilizer. Lobsters have had a status ‘upgrade’ because in certain places they are all that is left. When lobsters lived out their natural lifespans, they might grow to 20 pounds.

It is good to Question Normality for all the above reasons. It is especially important to question the normality of calling sea life ‘marine resources for harvesting’. A resource does not feel, think or know pleasure. It cannot die, starve, suffer or

be treated unjustly. A resource does not create exquisite worlds nor look you in the eye. It can be ‘harvested unsustainably’ or, unwanted, thrown overboard like trash. A resource can be ‘depleted’ and may even ‘collapse’. When such things happen to the resource, earnest calls entreat more sustainable harvesting (or farming). The problem with this ostensible corrective to the serial depletion of fish is that, as a solution, it will never retrieve the primordial condition of free seas of abundant, creative and ocean-churning life. The intent of ‘fisheries management’ is not to restore such living waters, but to make maximal taking from the ocean pantry sustainable. “The goal of fisheries management,” in official speak, “is to optimize society’s total benefit from the use of natural resources” (Nielsen, 1976: 15). A telling exercise would be to deconstruct virtually every word in this sentence to discern how the real is denatured into the normal.

From living artwork composed by a plenum of beings and phenomena – with dramatic, life-sustaining reverberations throughout the whole Earth system (including, notably, the air we breathe) – the industrial-fishing regime has remodelled the ocean into a scrumptious food jar from which to extract cheap fish for the global consumer class. This regime will be allowed to destroy the living ocean as long as we continue to think, without explicitly thinking it, that industrial fishing is normal.

Cosmic wealth

We can choose the real over the normal by giving the ocean back its freedom, thus enabling the restitution of its abundant life. Despite a frequent incrimination of climate change as cause of sea-life trouble, industrial fishing is the chief driver of marine biodiversity destruction (Pitcher and Cheung, 2013: 510; McCauley *et al.*, 2015). To underscore this, consider coral reefs, which *are* directly imperilled by climate change and acidification. Yet today, coral reef areas that are strictly protected from fishing (and pollution) are faring

better than those not so protected (Roberts *et al.*, 2017). This means that in order to have a shot at preserving the world's coral reefs, we must strictly protect them right now. Indeed, restoring oceanic life requires bold action. Captain Paul Watson calls for a 50-year moratorium on all commercial fishing "to give the ocean time to repair itself" (Watson, 2018: 152). Given the devastated condition of marine life, and an ocean heading towards mass extinction and decimations of wild fish, this is a self-evidently rational proposal. Is it too much to hope that some leaders might have sufficient clarity to hear it, and sufficient courage to attempt its implementation?

At the very least, we must immediately establish a vast ocean-wide network of marine protected areas. This can begin with an international agreement to stop all fishing in the high seas. By prohibiting legal fishing in the high seas, illegal fishing vessels would become more readily detectable, making law enforcement easier. Along with networked protected areas along the world's coasts, estuaries and islands, full high-seas protection would enable the renewal of marine life: research reveals that ecological revival follows in strictly protected marine areas (Warne, 2007; Roberts *et al.*, 2017).

We must end the mass extermination enterprise of industrial fishing with its collateral slaying of whales, dolphins, sharks, sea turtles and seabirds, among innumerable others (Keledjian *et al.*, 2014). Indeed, artisanal and subsistence fishers agitated for the abolition of trawling almost as soon as it was invented (Roberts, 2007: chapter 10). Calls to ban trawling have continued but been derailed by the fishing industry (Rabesandratana, 2013). At this eleventh hour, humanity must find the wisdom and the mettle to dismantle all industrial-fishing weapons, starting with trawling (Danson, 2011; Keledjian *et al.*, 2014; Rabesandratana, 2013).

For a life-filled ocean to return we must also stop polluting it at all point sources, and reverse, to the greatest extent possible, the pollution already plaguing it. This requires, among other measures, ending

plastic production and use. "What we are witnessing in the global ocean," states scientist Marcus Eriksen, "is a growing threat of toxin-laden microplastics cycling through the entire marine ecosystem" (quoted in Mooney [2014]). Ending ocean pollution also means embracing agroecological food production and phasing out industrial agriculture with its estuary-killing fertilizer and pesticide run-off, and its hefty contribution to climate upheaval.

In the medium-to-longer term, we must work towards humanely lowering our global population considerably in order to support the substantial lowering of fish consumption and to enable the deindustrialization of all food production (Crist, 2019). Even as it is an ecocentric imperative today, in a downsized future people can also opt for eating fish sparingly, so that the cosmic wealth of marine life is preserved. The choice of eating *no* fish is also prudent – especially where people are not dependent on fish for basic nourishment – to avoid the infliction of unnecessary suffering. As author Jonathan Safran Foer states (2009: 193): "No fish gets a good death. Not a single one. You never have to wonder if the fish on your plate had to suffer. It did."

In a world of globally trading billions, the mass consumption of fish equals the mass extermination of beings and ecologies that we, and our descendants, might explore and witness instead of eating without restraint. "The great majority of sea species are badly depleted," Jackson rues. "But they still exist. If people actually went away, most could recover" (quoted in Weisman [2007: 266]). We do not literally have to go away. Just lay the weapons down. In exchange, we will feast our eyes and minds with the pleasures of life's marvels, encountering forms of awareness unlike our own, and bathing the fire of our sight in the colour and dance of diverse sea animals and plants. We will behold the living ocean, which has the distinction, in all time and space, of resembling nothing other than itself. Creating a global culture that valorizes the arts of snorkelling and scuba diving (practised mindfully), as much as it values

“In order to have a shot at preserving the world's coral reefs, we must strictly protect them right now.”

“Ours is the long-overdue time to put down the warring weapons against Earth, scale back humanity’s presence, cease our invasions into the natural world and withdraw from large-scale portions of the ecosphere.”

the gifts of education and healthcare for all – that is a culture worthy of the highest aspirations of the human.

Coda

Before this option can open to our collective consciousness the worldview of human distinction – and its nature-mutilating and mind-numbing framework of “natural resources” – must be jettisoned. For now, that worldview and its idioms shape how many people think, are conditioned to think, about the seas. Humanity’s entitlement over the Earth is distilled in language deployed to reason with. For example: “Common-pool fish stocks are often open-access, and fishing effort can push stock levels beyond maximum sustainable yield. In those cases, price increases lead to reduced seafood production” (Smith *et al.*, 2010: 784). (Actually, price increases can fuel hunting down creatures to [regional, commercial or global] extinction, as happened to California’s sea otters and abalones and is happening today to bluefin tuna.) Back to the language: “Common-pool,” “fish stocks,” “open-access,” “fishing effort,” “stock levels,” “maximum sustainable yield,” “price increases,” “seafood production” – none of this anthropocentric babble has anything to do with marine life: It is resource-contortionist vocabulary twisting the ocean into a human manor.

Before our eyes and under our watch stretches the endless night of marine life decimations and extinctions, with the global ocean turned into a natural-resources-for-harvesting and fish-factory-farm domain, as well as garbage dump, mining frontier, ship lane terrain and ‘carbon sink’. Alternatively stretches the sweet delight of a life-filled ocean we can restore, preserve, commune with, and imbibe with body, senses and mind.

A civilization that chooses endless night over sweet delight slumbers. A civilization that orchestrates the pretension that industrial fishing is normal, and that the abolition of industrial fishing is radical, lacks judgement. A civilization that treats the seas like a human food pantry is a hungry ghost. A civilization that cannot see

that ocean pollution is an extremely urgent problem is blind. A civilization incapable of choosing to be in love with the ocean does not deserve our respect. We must disidentify human *being* from this civilization and evolve it to a higher octave. ■

Part 2: Leave it in the ocean! Halt plans for deep-sea mining

A new chapter of Earth pillage is in the works: the commercial venture of deep-sea mining. The deep sea, over 200 meters below sea level and comprising roughly 65% of Earth’s surface, is being encroached on by nation-states and industries slaving over “mind-boggling quantities of untapped resources” (Mengerink *et al.*, 2014: 696).

The setup

Deep-sea mining has gotten quietly under way since the turn of the century. The International Seabed Authority (ISA), a United-Nations-created body of 168 states, has already conceded 29 exploratory mining contracts for the high seas covering over 1.2 million square miles (Wedding *et al.*, 2015; IUCN, 2018). Additionally, nation-states and corporations have brokered deals for mining national waters. For example, Papua New Guinea has given permission to Canadian company Nautilus Minerals to mine deep-sea sulphide deposits off its coast for copper and gold (Davidson and Doherty, 2017).⁶

There is no doubt about the obscenity of the unfolding enterprise of deep-sea mining, nor about its significance. Ours is the long-overdue time to put down the warring weapons against Earth, scale back humanity’s presence, cease our invasions into the natural world and withdraw from large-scale portions of the ecosphere. Yet what do we see? A human-supremacist coalition of nation-states and corporations preparing to deal out more death in exchange for ‘natural resources’.

It’s never been a matter of *whether* deep-sea mining should proceed. Just a well-

planned, technologically ready raid about to be fast-tracked into business as usual. It is blithely dubbed “the new gold rush” (e.g. *The Economist*, 2017), as though we don’t know how depraved the old one was. The new venture is not only for gold but also for other metals and minerals like silver, copper, cobalt, nickel, manganese, zinc, rare earths and yttrium. Filching this stuff from Earth’s seas is deemed necessary for making ever more cell phones, iPads, PCs, Kindles, batteries, LED bulbs, flat-screen TVs, fuel cells, wind turbines and so on, not to mention “essential parts of advanced military technology,” like missile guidance, laser targeting and radar surveillance (Kato, 2017).

Piling on the cheap cliché of “the new gold rush,” the deep sea is being called “the last resource frontier.” That “resource frontier” is neither. The deep sea is filled with beautiful life, amazing adaptations, abiding mystery, primordial being. There are millions of species in the deep sea, Earth’s largest biome, yet we know next to nothing about its biodiversity (University of Oxford, 2017; www.savethehighseas.org). The places targeted for violation – hydrothermal vents for sulphides, seamounts for cobalt and the abyssal seabed for polymetallic nodules – are life-abundant and largely life-created (Vanreusel *et al.*, 2016; Van Dover *et al.*, 2018). All harbour a great diversity of endemic and mostly unknown species, yet they are currently being wrecked by mining machinery – even before commercial deep-sea mining ‘regulations’ are in place.

The destruction of life forms and habitats that commercial deep-sea mining will cause will be enormous and irreparable in human timescales (Koslow, 2007; Van Dover *et al.*, 2017; Niner *et al.*, 2018). Given the extensive endemism of living beings in the targeted areas, exploratory mining has almost certainly already caused extinctions. Commercial deep-sea mining will cause many more – the kind EO Wilson calls anonymous extinctions since most deep-sea species are unknown (Wilson 1999: 243). In addition to the outrage of this impending assault on life poised to quicken the sixth mass extinction, there

is the outrage of a political-economic human-supremacist posse that has the *gall*, at this historical moment, to introduce a new chapter of Earth desecration – in the name of servicing a ‘green economy’ to boot (Carrington, 2017; *The Economist*, 2017).

Humanity’s common heritage – not

In 1982, UNCLOS declared the seas beyond national jurisdiction – the high seas or ‘the Area’ – “the common heritage of mankind.” Let’s bring that one up to speed with current language-use decorum. UNCLOS surely meant “the common heritage of *humankind*,” as contemporary reports are rectifying (see, e.g., Jaeckel *et al.* [2017]). That one raises virtually no eyebrows. On the contrary, it is avowed a *principle* – one “generally understood to require access and benefit-sharing arrangements, especially for developing [nation]-states” (Jaeckel *et al.*, 2017: 150). The common heritage of humankind raises the dutiful mandate to ensure that “financial and other economic benefits” of deep-sea mining “will be equitably shared among all states” (Kim, 2017: 135). “UNCLOS recognizes,” as echoed in another anthropocentric skin-deep hoopla for justice, “the right of all states to access marine living resources in ABNJs [areas beyond national jurisdiction]” (Danovaro *et al.*, 2017: 453).

How is it that calling the high seas “the common heritage of humankind” pulls the wool over so many eyes? An ancient living landscape, pre-existing *Homo sapiens* by millions of years – *humanity’s* common heritage? In response to the species- and habitat-demolishing spectre of industrial-scale deep-sea mining, well-meaning scientists and analysts engaged with this topic are scrambling for damage control couched in environmental pleas: for ‘preservation reference zones’, ‘remediation obligations’, ‘balancing trade-offs’, ‘environmental impact assessments’, ‘mitigation strategies’, ‘baseline data’, ‘holistic management of deep-sea use’ and so on and so forth. The very political-economic establishment that is destroying

“The destruction of life forms and habitats that commercial deep-sea mining will cause will be enormous and irreparable in human timescales.”

the Earth and endangering so much of humanity seems to have successfully whipped a host of experts into submission as it gears up for a united-front gold rush on the last resource frontier.

Indeed, that establishment is consummately skilled at procuring near-universal compliance to its ecosphere-wrecking dictates by means of a two-tiered mode of operation: one discursive, the other operational. The discursive one is the long-standing appropriation of planet Earth as human property, enabling the embezzlement of all geographical space for human exploitation, use, control and management. For the high seas, this indoctrination spins out in their 'declaration' as the common heritage of humankind. People hesitate to call out such pompous drivel for fear of being dismissed as foolish, idealistic or radical. Most choose instead to defer to official discourse, and do their best to make the seemingly 'inevitable' deep-sea mining a little less destructive. The second strategy by which the human-supremacist regime secures near-universal submission is operational: *Just do it*. Exactly what has been orchestrated with deep-sea mining: it is underway; most states are already involved (now or in principle) given the ISA's international composition; the technologies are developed and being tested; and the regulations to dress it all up as 'sustainable' are being ironed out.

The cognitive schema of Earth-ownership and the operational schema of Earth-looting work together. Planetary ownership authorizes getting an operational head-start, which subsequently invites more: after all, it has already begun, certain players are currently more involved than others, and, when it comes to politically correct Earth-ravaging, everyone in the posse needs to get a turn. To mirror the vulgarity of deep-sea mining and its squalid creep: spitting into the soup is the surest way to ensure you get to eat it. How fitting for a species-killing and habitat-destroying political-economic global regime, which is "never contented but always encroaching," in the words

of Shawnee Chief Tecumseh (quoted in Waters [1972: 278]).

The ecocentric response

Not only must deep-sea mining and current projects be immediately halted, but today's crisis of life in the global ocean calls for placing the high seas off limits to *all* extractive activity: for fish, fossil fuels, and metals and minerals. We must rename the Area 'the common heritage of all life' to reflect what it actually is. Human presence in the high seas can be limited to the lightest of touches, for the elevated purpose of witnessing, learning about and teaching our children the marvels with whom we share the ecosphere. With the high seas designated a marine protected area (MPA), marine-life abundance will rebound and be able to cope (and help humanity cope) with climatic upheaval and ocean acidification (see Roberts *et al.* [2017]). Coastal seas and continental shelves (critically endangered and endangered, respectively [Jackson, 2008]) are also in urgent need of robust MPA networks. Ocean protection levels can thus achieve upwards of 80%.

Along with setting vast areas of the ocean free, we must turn the spotlight on the high-tech industry – the one poised to most benefit (if profiteering counts as 'benefit') from deep-sea mining. The high-tech industry needs to change fundamentally and clean up its act, rather than trying to buy another century's worth of time for its wasteful, dollar-hungry workings. First, engineering, investing and public policy must focus resolutely on recycling metals and minerals (Teske, 2017). Even though recycling potential for materials connected with deep-sea mining is high, actual recycled contents remain low; for example, less than one per cent of rare earths are recycled (Kim, 2017: 135–6). The focus of turning an extraction industry into a recycling one will give Earth a rest, while forcing governments and industry to quit dumping their e-waste on the disempowered – human and non-human.

Second, the high-tech industry must put an end to the profligate production of ever-more devices, to be replaced by

“Human presence in the high seas can be limited to the lightest of touches, for the elevated purpose of witnessing, learning about and teaching our children the marvels with whom we share the ecosphere.”

ever-more new lines. (The same applies for the production of other commodities like cars and appliances.) Instead, the high-tech industry – calling here on any conscientious leadership therein – needs an immediate paradigm shift toward the durable: stuff must be made well, made to last, and made to use not flaunt (McKibben, 2008). Devices can indeed be long-lasting, made to be repairable if they malfunction, and only upgraded when hugely meaningful increases in efficiency, or changes in energy sourcing, warrant ‘new generations’. Finally, civil society has to figure out how to create a culture of sharing this stuff.

One last response to the spectre of deep-sea mining is to raise a question: If this planned Earth violation does not reveal the imperative to achieve a lower global population, what does? The global middle class – the clientele of high-tech products – is growing rapidly. The middle-class population is projected to reach 5 billion before mid-century (Kharas, 2017). All these people are expected to want cell phones, PCs, flat-screen TVs, hybrid cars, solar panels and so on. Making materials recyclable, durable and shareable is critical, but it will only get us so far. Design changes and behavioural shifts will not offset the commodity-supply surges that the growing global middle-class population portends. Therefore, we must ramp up without further delay the human-rights campaigns – for women’s equality, state of the art family planning, and comprehensive sexuality education for all – that will steer the human population towards a ballpark figure of 2 billion (Engelman, 2016; Kaidbey and Engelman, 2017; Crist *et al.*, 2017; Crist, 2019).

We cohabit living Earth with countless Earthlings we know and more we have still to meet. Are we awake yet? ■

Acknowledgements

I would like to thank Richard Rich, Ian Whyte and Joe Gray for their helpful comments on an earlier draft. A longer version of part two was published on The Rewilding Institute’s blog in the summer of 2019, with the title “Something Wicked this Way Comes: the Menace of Deep-Sea Mining.”

Notes

- 1 This is a must-read work about the history of human impact on the ocean.
- 2 See the video *It’s a Plastic World*, which is available at <https://is.gd/xYe4Um>.
- 3 For critical explorations of the reduction of animals to meat, see Plumwood (2013) and Calarco (2014).
- 4 Something that Jeremy Jackson does (see, *e.g.*, <https://is.gd/qjY3SE>).
- 5 Seafood fraud is apparently common (see Danson [2011]).
- 6 Fortunately, that relationship has run into political and economic controversy, forestalling or derailing mining plans, though Nautilus Minerals continues to hold the deep-sea mining licence from the government of Papua New Guinea (The Economist, 2018; Heffernan, 2019).

References

- Altherr S and Hodgins N (2018) *Small Cetaceans, Big Problems: A global review of the impacts of hunting on small whales, dolphins and porpoises*. Available at <https://is.gd/b55M4o> (accessed October 2019).
- Cafard M (2017) *Lightning Storm Mind: Pre-ancientist meditations*. Autonomedia, Williamsburg, NY, USA.
- Calarco M (2014) Being toward meat: Anthropocentrism, indistinction, and veganism. *Dialectical Anthropology* **38**: 415–29.
- Carrington D (2017) Is deep sea mining vital for a greener future – even if it destroys ecosystems? *The Guardian*, 4 June. Available at <https://is.gd/D7h9or> (accessed October 2019).
- Casey S (2010) Garbage in, garbage out. *Conservation Magazine* **11**: 13–19.
- Crist E, Mora C and Engelman R (2017) The interaction of human population, food production, and biodiversity protection. *Science* **356**: 260–4.
- Crist E (2019) *Abundant Earth: Toward an ecological civilization*. University of Chicago Press, Chicago, IL, USA.
- Danovaro R, Aguzzi J, Fanelli E *et al.* (2017) An ecosystem-based deep-ocean strategy. *Science* **355**: 452–4.
- Danson T (2011) *Oceana: Our endangered ocean and what we can do to save it*. Rodale, New York, NY, USA.
- Davidson H and Doherty B (2017) Troubled Papua New Guinea deep-sea mine faces environmental challenge. *The Guardian*, 11 December. Available at <https://is.gd/iiTv8z> (accessed October 2019).
- Dreifus C (2002) A conversation with Callum Roberts: A biologist decries the ‘strip-mining’ of the deep sea. *The New York Times*, 5 March.
- Earle S (2003) *Our Oceans, Ourselves* (interview with Sylvia Earle). *Wild Earth* **12**: 23.

“One last response to the spectre of deep-sea mining is to raise a question: If this planned Earth violation does not reveal the imperative to achieve a lower global population, what does?”

“We must immediately establish a vast ocean-wide network of marine protected areas. This can begin with an international agreement to stop all fishing in the high seas.”

- The Economist (2017) *Deep-sea mining could transform the globe*. Available at <https://is.gd/XmtML2> (accessed October 2019).
- The Economist (2018) *A high-profile deep-sea mining company is struggling*. *The Economist*, 6 December. Available at <https://is.gd/u3otMS> (accessed October 2019).
- Engelman R (2016) Nine population strategies to stop short of 9 billion. In: Washington H and Twomey P, eds. *A Future Beyond Growth: Towards a steady state economy*. Routledge, London, UK: 32–42.
- Heffernan O (2019) Deep-sea dilemma. *Nature* **571**: 465–8.
- Foer JS (2009) *Eating Animals*. Little, Brown and Company, New York, NY, USA.
- Forbes J (2008) *Columbus and Other Cannibals*. Seven Stories, New York, NY, USA.
- Gjerde K, Currie D, Wowk K and Sack K (2013) Ocean in Peril: Reforming the management of global ocean living resources in areas beyond national jurisdiction, *Marine Pollution Bulletin* **74**: 540–51.
- Golden CD, Allison EH, Cheung WW *et al.* (2016) Nutrition: Fall in fish catch threatens human health. *Nature* **534**: 317–20.
- Helmreich S (2010) Human nature at sea. *Anthropology Now* **2**: 49–60.
- House F (1999) *Totem Salmon: Life lessons from another species*. Beacon Press, Boston, MA, USA.
- IUCN (2018) *Draft mining regulations insufficient to protect the deep sea – IUCN report*. Available at <https://is.gd/Pb5lwe> (accessed October 2019).
- Jackson J (2005) When ecological pyramids were upside down. In: Estes JA, ed. *Whales, Whaling, and Ocean Ecosystems*. University of California Press, Berkeley, CA, USA: 27–37.
- Jackson J (2008) Ecological extinction and evolution in the brave new ocean. *PNAS* **105**: 11458–65.
- Jackson J, Alexander K, and Sala E eds (2011) *Shifting Baselines: The past and future of ocean fisheries*. Island Press, Washington, DC, USA.
- Jaeckel A, Gjerde KM and Ardrón JA (2017) Conserving the common heritage of humankind – options for the deep-seabed mining regime. *Marine Policy* **78**: 150–7.
- Kaidbey M and Engelman R (2017) Our bodies, our future: Expanding comprehensive sexuality education. In: The Worldwatch Institute, ed. *EarthEd: Rethinking education on a changing planet*. Island Press, Washington, DC, USA.
- Kato Y (2017) *Deep-sea mud in the Pacific Ocean as a new mineral resource for rare-earth elements* [presentation]. Available at <https://is.gd/knne2T> (accessed October 2019).
- Keledjian A, Enticknap B, Cano-Stocco D *et al.* (2014) *Wasted Catch: Unsolved problems in US fisheries*. Oceana, Washington, DC, USA.
- Kharas H (2017) *The Unprecedented Expansion of the Global Middle Class: An update*. (Working Paper 100), Global Economy and Development at Brookings, Washington, DC, USA. Available at <https://is.gd/AIE5X6> (accessed October 2019).
- Kharas H and Hamel K (2018) A global tipping point: Half the world is now middle class or wealthier. *Brookings*, 27 September. Available at <https://is.gd/6m2qvx> (accessed October 2019).
- Kim RE (2017) Should deep seabed mining be allowed? *Marine Policy* **82**: 134–7.
- Koslow T (2007) *The Silent Deep: The discovery, ecology, and conservation of the deep sea*. University of Chicago Press, Chicago, IL, USA.
- Kurlansky M (2011) *World Without Fish*. Workman Publishing Company, New York, NY, USA.
- Law KL and Thompson R (2014) Microplastics in the seas. *Science* **345**: 144–5.
- McCauley D, Pinsky ML, Palumbi SR *et al.* (2015) Marine defaunation: Animal loss in the global ocean. *Science* **347**: 1255641.
- McKibben, B (2008). *Deep Economy: The Wealth of Communities and the Durable Future*. St. Martin's Griffin.
- Mengerink KJ, Van Dover CL, Ardrón J *et al.* (2014) A call for deep-ocean stewardship. *Science* **344**: 696–8.
- Mooney C (2014) Good job, humans: The oceans now contain 5 trillion pieces of floating plastic. *The Washington Post*, 10 December.
- Mowat F (1996) *Sea of Slaughter*. Mariner Books, New York, NY, USA.
- Myers R and Worm B (2005) Extinction, survival or recovery of large predatory fishes. *PNAS* **360**: 13–20.
- Nielsen L (1976) The evolution of fisheries management philosophy. *Marine Fisheries Review* (December): 15–23.
- Niner HJ, Ardrón JA, Escobar EG *et al.* (2018) Deep-sea mining with no net loss of biodiversity—an impossible aim. *Frontiers in Marine Science* **5**: 53.
- Pauly D and Zeller D (2016) Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining. *Nature Communications* **7**: 10244.
- Pitcher T and Cheung W (2013) Fisheries: Hope or despair? *Marine Pollution Bulletin* **74**: 506–16.
- Plumwood V (2013) Being prey. Reprinted in: Gruen L, Jamieson D and Schlottmann C, eds. *Reflecting on Nature*. Oxford University Press, Oxford, UK.
- Rabesandratana T (2013) European deep-sea trawling ban sinks. *Science*, 10 December. Available at <https://is.gd/LKSgov> (accessed October 2019).
- Roberts C (2007) *The Unnatural History of the Sea*. Island Press, Washington, DC, USA.
- Roberts C, O’Leary BC, McCauley DJ *et al.* (2017) Marine reserves can mitigate and promote adaptation to climate change. *PNAS* **114**: 6167–75.

- Schrope M (2006) The real sea change. *Nature* **443**: 622–4.
- Smith MD, Roheim CA, Crowder LB *et al.* (2010) Sustainability and global seafood. *Science* **327**: 784–6.
- Steinmetz K (2014) Sea lions are starving to death – and we don't know why. *TIME*, 13 May. Available at <https://is.gd/DxOBjp> (accessed October 2019).
- Sumaila UR and Pauly D (2011) The “march of folly” in global fisheries. In: Jackson J, Alexander K and Sala E, eds. *Shifting Baselines: The past and future of ocean fisheries*. Island Press, Washington, DC, USA: 21–32.
- Taylor M (2018). Krill fishing poses serious threat to Antarctic ecosystem, report warns. *The Guardian*, 13 March. Available at <https://is.gd/YiLuQ> (accessed October 2019).
- Teske S (2017) *Renewable Energy and Deep-sea Mining: Supply, demand and scenarios*. Institute for Sustainable Futures. Available at <https://is.gd/zK8W8D> (accessed October 2019).
- University of Oxford (2017) *Shocking gaps in basic knowledge of deep sea life*. Available at <https://is.gd/SDk1eq> (accessed October 2019).
- Upton J (2013) Vanishing ocean smell could also mean fewer clouds. *Grist*, 28 August. Available at <https://is.gd/QoYU26> (accessed October 2019).
- Urbina I (2019) *The Outlaw Ocean: Journeys across the last untamed frontier*. Alfred A. Knopf, New York, NY, USA.
- van Dooren T (2014) *Flight Ways: Life and loss at the edge of extinction*. Columbia University Press, New York, NY, USA. Van Dover C, Ardron JA, Escobar E *et al.* (2017) Biodiversity loss from deep-sea mining. *Nature Geoscience* **10**: 464–5.
- Van Dover C, Arnaud-Haond S, Gianni M *et al.* (2018) Scientific rationale and international obligations for protection of active hydrothermal vent ecosystems from deep-sea mining. *Marine Policy* **90**: 20–8.
- Vanreusel A (2016) Threatened by mining, polymetallic nodules are required to preserve abyssal epifauna. *Scientific Reports* **6**: 26808.
- Vickers D and McClenachan L (2011) History and context: Reflections from Newfoundland. In: Jackson J, Alexander K and Sala E, eds. *Shifting Baselines: The past and future of ocean fisheries*. Island Press, Washington, DC, USA: 115–33.
- Victorero L, Watling L, Deng Palomares ML and Nouvian C (2018) Out of sight but within reach: a global history of bottom-trawled deep-sea fisheries from >400m depth. *Frontiers in Marine Science* **5**: 98.
- Waldman J (2010) The natural world vanishes: How species cease to matter. *Yale Environment* **360**, 8 April. Available at <https://is.gd/4IHHN6> (accessed October 2019).
- Warne K (2007) The global fish crisis: Blue haven. *National Geographic* (April): 70–81.
- Waters F (1972) *The Book of the Hopi*. Penguin Books, New York, NY, USA.
- Watson P (2018) Interview with Captain Paul Watson. *The Ecological Citizen* **1**: 152–3.
- Wedding LM, Reiter SM, Smith CR *et al.* (2015) Managing mining of the deep seabed. *Science* **349**: 144–5.
- Weisman A (2007) *The World Without Us*. St. Martin's Press, New York, NY, USA.
- Whitty J (2011) *Deep Blue Home: An intimate ecology of our wild ocean*. Mariner Books, New York, NY, USA.
- Wilson EO (1999) *The Diversity of Life*. Harvard University Press, Cambridge, MA, USA.

“At this eleventh hour, humanity must find the wisdom and the mettle to dismantle all industrial-fishing weapons, starting with trawling.”

Show your support for ecocentrism
by signing the Statement of
Commitment to Ecocentrism

Read and sign it here: <http://is.gd/ecocentrism>