

Dependence on the Whale: Multispecies Entanglements and Ecosystem Services in Science Fiction

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Abstract:

This article analyses how four science fiction stories frame whale endangerment and salvation as a problem of ecosystem service loss: Arthur C. Clarke's *The Deep Range* (1957), *Star Trek IV: The Voyage Home* (1986), the *Doctor Who* episode 'The Beast Below' (2010), and T.J. Bass's *The Godwhale* (1974). It uses the four categories of the scientific concept of ecosystem services as a way of understanding the types of possible values to humans of multispecies entanglements. By projecting how severing multispecies ties or exposing fractures and disjuncture in current multispecies webs might result in dystopian tomorrows, science fiction gives us insights into how those relationships are currently valued and evaluated.

Keywords: ecosystem services, multispecies, science fiction, whales

In one of the most memorable scenes from a *Star Trek* movie, a Klingon bird of prey crewed by Starfleet officers speeds to the rescue of two humpback whales being pursued by a whaling ship (*Star Trek IV: The Voyage Home*). The whalers' harpoon is loaded and fired. The audience gasps then sees the harpoon bounce off the cloaked spacecraft, which has manoeuvred its way between the hunter and hunted. The whales are saved!

This battle has fierce environmentalist undertones: The helpless whales hunted to the brink of extinction; the heartless whalers defying all international sentiment against whaling; the fearless rescuers physically intervening to save the giants of the deep. At first glance, we might think that a such battle against species extinction would be for the benefit of the directly threatened species. But upon closer inspection, a much more complex environmental sentiment than 'Save the whales' is at the core of the narrative. The motivation for saving these whales has more to do with those doing the saving than those being saved.

Although whales in literature are often allegorical and anthropomorphic—as Graham Huggan (2017, 384) has put it emphatically, '*obsessively* allegorized' and '*relentlessly* anthropomorphized'—whales can also be just whales. While clearly portrayed as sentient in the *Star Trek* movie and the other science fiction stories discussed in this article, the whales are distinctly cetacean rather than human-like. Because the late twentieth century brought about awareness of rapidly declining whale populations, authors have latched onto the decline of whale populations as harbingers of ecological destruction (Huggan 2017). While stories of cetacean extinction may invite the reader or viewer to reflect more generally on environmental issues, they are also fundamentally about the interconnectedness of our planet's species.

Multispecies approaches are well established within environmental humanities as a mode of interrogating how human lifeways are entangled with nonhuman ones (Van Dooren, Kirksey, and Münster 2016). Multispecies frameworks ask us to think relationally—that 'events, actions, and processes affect elements in the assemblage' (Kennedy 2017). Recognising multispecies relationships has ethical, political, and epistemological stakes (Van Dooren, Kirksey, and Münster 2016). As Joni Adamson (2012, 43) has shown in her multispecies ethnographic analysis of whale-indigenous communities, humans and other-than-humans exist in a 'pluriverse' in which linkages are indivisible.

In this article, I will explore the ways in which science fiction narrates whale conservation measures within a multispecies framework. These are bound-up extinction stories, stories of co-extinction and deep entanglement. The entanglement of human and whale in these stories is not allegorical—the humans literally need the whales for survival. At the same time, these narratives are not challenges to a human-centred perspective: the histories of humans and nonhumans may be intertwined, but we are told to care only because humans are suffering. This centring of the human in spite of the presence of an animal extinction narrative allows a multispecies reading, but acts against the trend of postcolonial reading. Postcolonial and animal turn approaches have stressed the intrinsic value of the animal, and that violence to human and nonhuman are linked (Huggan and Tiffin 2015). While the latter is true in these stories since the death of humans and nonhumans are intertwined, as we will see through this article, the intrinsic value of the animal is less of a concern.

I want to conceptualise the relationship between science fiction protagonists and animals in their environment by borrowing a concept from the ecological sciences called *ecosystem services*. I recognise that it is a radical interdisciplinary move to apply an ecological concept like ecosystem services to literary and film works, but environmental humanities encourages this kind of cross-disciplinary thinking. As a syncretic academic endeavour that aims to reconcile the differing (and even opposed) practices across humanities disciplines, environmental humanities stretches and reshapes academic analysis of historical and contemporary environmental dilemmas. The commitment of environmental humanities scholars to blending the individual environmental disciplines into a new system of inquiry and thinking gives me the confidence to transplant a theoretical framework from the environmental sciences into a firmly humanistic analysis.

Ecosystem services are the ‘benefits humans obtain from ecosystems that support, directly or indirectly, their quality of life’ (Harrington et al. 2010, 2781). Although the ecosystem services concept emerged in the 1970s as part of the early environmentalist movement, it became a central theme in ecological sciences after the publication of *Nature’s Services: Societal Dependence on Natural Ecosystems*, edited by Gretchen Daily, in 1997 (Kingsland 2011). Ecosystem services were envisioned as a way to make the benefits of ecosystems, which are often taken for granted, visible, and in so doing favour their conservation (Muradian 2017). Ecosystem services serve as a heuristic device to educate the public about the benefits that functioning

ecosystems provide to us (Fisher 2009). Through the language of services, the scientific community can advocate ecological conservation, sustainable management, and restoration to ensure that humans can continue to benefit from needed services.

Science fiction was clearly in the minds of these early ecosystem service proponents. Daily (1997, 3) offered a science fiction scenario of ‘life on the moon’ to explain ecosystem services in her introduction: she asked, if the moon suddenly became habitable and people could move there, ‘which of earth’s millions of species do you take with you’? In her rhetorical reply she points that you would need to take both species that are directly exploited for food and materials, but also the supporting species (like bees that pollinate food crops). According to Daily, the new lunar colony’s question is not a simple matter of making a list of species, because in fact ‘no one knows which—nor even approximately how many—species are required to sustain human life’. The ecosystem services concept was intended to make visible ‘a whole suite of ecosystem services that earthlings take for granted’. It is eerily appropriate then to analyse science fiction works with the ecosystem services concept.

Early work on ecosystem services was particularly motivated by the recognition that modern society is ‘poorly equipped to evaluate environmental tradeoffs’ and argued that we needed analytical frameworks that included ‘earth’s life-support systems’ for decision-making about competing activities (Daily 1997, 2). Because ecosystem services dealt with tradeoffs, the paradigm was quickly adopted into economic spheres as a way of assigning monetary values to things which had previously not been monetised (e.g. Boyd and Banzhaf 2007). Economists have enrolled ecosystem services into a neoliberal agenda that turns intangible benefits like moderating weather extremes, cycling nutrients, and dispersing seeds into capital value. Criticism of the ecosystem services concept often targets its monetisation. One problem is that mechanisms are limited to convert scientific data about ecosystems into market data for trade purposes (Robertson 2006). Another problem is that some benefits of ecosystems, such as spiritual well-being, are not quantifiable in the same way as other benefits, such as pollination of a specific crop (Muradian 2017). Both of these criticisms are valid. This article, however, is not using ecosystem services within a neoliberal framework to assign economic values—such a usage would be irrelevant for all of the narratives discussed in this article, since none are concerned with the economic cost or benefit of whales. Instead I am deploying ecosystem services as they were originally intended: to raise awareness of ‘the conditions and

processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life' (Daily 1997, 3).

The Millennium Ecosystem Assessment (2005), which mainstreamed the ecosystem service concept, broadly divided ecosystem services into four categories: provisioning (e.g. the production of food, water, fuel), regulating (e.g. control of climate and disease), supporting (e.g. soil structures, nutrient cycles), and cultural (e.g. aesthetic enjoyment, recreation, spiritual meaning). While there have been some attempts to think and restructure the service classification system (e.g. Fisher et al. 2009), nearly all publications recognise the validity of the MEA's four-fold classification scheme. The categories themselves are intended to make visible the value of environments which are often overlooked.

This article will use the four categories of ecosystem services as a way of explaining how four science fiction stories frame whale endangerment and salvation as a problem of ecosystem service loss: Arthur C. Clarke's *The Deep Range* (1957), *Star Trek IV: The Voyage Home* (1986), the *Doctor Who* episode 'The Beast Below' (2010), and T.J. Bass's *The Godwhale* (1974). This list captures all the mainstream works of science fiction that feature whales except Alan Dean Foster's novel *Cachalot* (1980).ⁱ Because science fiction often writes the present as historical past while seeking to explore possible futures (Heise 2012:4), the genre is useful for thinking through how current multispecies relations might play out in the future. As work by Ursula Heise (2003) and Chris Pak (2016) shows, science fiction narratives exist in a feedback loop between current science, popular culture, and literary speculation. By projecting how severing multispecies ties or exposing fractures and disjuncture in current multispecies webs might result in dystopian tomorrows, science fiction gives us insights into how those relationships are currently valued, evaluated, and disrupted.

I am interested here in the narrative lines and structure rather than the presentation modes (literary versus cinematic) of the four narratives. This means that my reading of all four is textual in nature for the most part, specifically focused on the role of the whale in the story's telling. I explore the motivations of the characters in each narrative to 'save the whales', so to speak. I argue that ecosystem services as a heuristic device might be a valuable tool for understanding the construction of multispecies relationships in science fiction. Even in stories nominally about animal

extinction, the concern for the ecosystem service provided to humanity remains paramount.

Whales as provisioning service providers

In *The Deep Range* published in 1957, Arthur C. Clarke's vision of the twenty-first century weaves together settlements on Mars and farms at sea. The idea that humans could master the oceans 'seemed the greatest and most daring of all man's presumptions' since 'not even the conquest of space had been a greater victory than this' (54).

The story revolves around Walter Franklin, who becomes a whale warden in the Pacific with the help of his mentor Don Burley. Although whales had been nearly extinct fifty years before the story (contemporaneous with its writing), whales are now numerous. The implication is that their salvation from extinction was because of their use to humanity: now they are herded in the ocean. The whales had grown on average 10% longer and 30% heavier than fifty years before 'thanks to the careful stewardship of the masters' (179). Clarke overtly compares the practices to cattle ranching in the American West: 'It made no fundamental difference that the beasts Don herded weighed a hundred tons and browsed on the endless savannahs of the sea' (12). The metaphor is extended numerous times in the book; for example, when a pod of whales breaks into a plankton farm for feeding, the nursery rhyme 'Little Boy Blue' with its line 'the cow's in the corn' is the reference point (104).

The 20,000 employees of the Bureau of Whales, a governmental agency, are providing one eighth of humanity's food, mostly as whale blubber reduced into a cooking fat. Their activities are 'holding at bay the spectre of famine which had confronted all earlier ages, but which would never threaten the world again while the great plankton farms harvested their millions of tons of proteins and the whale herds obeyed their new masters' (16). The whales' importance to humanity is as a provider of food, the most basic of the provisioning services in the ecosystem services model. The use of whales for blubber demands their deaths, and this becomes the point of contention in the novel.

The leader of a radical Buddhist movement, which is the biggest religious following at the time, tours a whale processing facility along with a cameraman. Unlike earlier whale slaughter, the process is 'very humane' (181) with a direct current used to instantaneously kill the animal: 'one moment it was swimming quietly

along the pen; a second later it was a lifeless hulk, continuing to move forward under its own momentum' (180) to the conveyer belt which lifted it out of the water. The processing plant itself, however, is not the same kind of sterile process as the killing channel; it is instead a 'reeking inferno where the great carcasses were torn asunder into mountains of meat and bone and guts' (182). Although the disassembly line takes only two minutes to separate the whale into all of its component parts, it is a graphic demonstration of the corporal nature of whale management.

During his discussion with Franklin after seeing the process, the Buddhist leader frames the killing of whales as an unnecessary evil both at that time and in the past:

Since the beginning of history man has assumed that the other animals exist only for his benefit. He has wiped out whole species, sometimes through sheer greed, sometimes because they destroyed his crops or interfered with his other activities. I won't deny that he often had justification, and frequently no alternative. But down the ages man has blackened his soul with his crimes against the animal kingdom—some of the very worst, incidentally, being in your particular profession, only sixty or seventy years ago.

A film exposé released using the Buddhist leader's footage quickly turns public opinion against whale slaughter. This encourages the Bureau to ramp up attempts to milk whales for protein instead, since milking would not involve killing the whales. Franklin is persuaded in the end that the Bureau of Whales needs to move from a killing operation to a 'conservation' one (201). The author Clarke interestingly portrays this shift as illogical: 'In a purely logical world, this controversy could never have arisen, for no one would have doubted man's right to use the animal kingdom as he felt fit. Logic, however, could be easily discredited here' (203). The logic of the situation for Clarke lies in the use-value of the whales, rather than an economic value; the ethical dilemma of death makes Clarke question the way we use whales if death is involved, but it does not make Clarke reject using whales altogether.

What we see in *The Deep Range* is that the whales have only been saved in the future because of their value as protein. This can be understood within an ecosystem services framework as a provisioning service. Even the shift to milking does not change the fundamental premise that the reason whales are to be saved is because

they provide a direct benefit to humans as a food source. By the end of the novel, Franklin has developed a personal connection and respect for whales, ‘the great mammals who were his kindred’, so a ‘truce upon the battlefield of Nature’ is in order (223). The truce is not, however, a call to stop using the whales to human advantage, but rather only to stop killing them. *The Deep Range* offers an ethics in which the exploitation of the service provided by a species is ethically justifiable if they are not cruelly treated. The human decides what is humane.

The entanglement of whale and human in the novel through the provisioning service also reveals that the benefits nature provides can change over time. Before the action of the novel takes place, whales were almost extinct, but because they suddenly gained value as a food source, they were worth saving. On Clarke’s earth, humanity would have had no need for whales as protein if they collectively had made other choices, such as better managing the land ecosystems or intentionally controlling their own population. Yet because humans did not make those decisions, whales took on value and provided a benefit. Whales are to be protected and conserved in the narrative because humans are dependent on whales for their future survival.

Whales as regulating service providers

Star Trek IV: The Voyage Home has been called one of the great environmentalist movies because of its anti-whaling message.ⁱⁱ According to the movie, which is set in the twenty-third century, humpback whales had been hunted to extinction in the twenty-first century. The crew of the starship *Enterprise* travels back in time to the late twentieth century to find and bring back humpback whales to their own time. In an extended sequence at the Cetacean Institute, the horrors of modern whale hunting fill the big screen. Visitors at the Institute and moviegoers are treated to video footage (described as ‘pretty gruesome stuff’ in one of the shooting scriptsⁱⁱⁱ) showing the bloody butchery of a whale on a ship deck while Dr. Gillian Taylor explains that ‘despite all attempts at banning whaling, there are still countries and pirates currently engaged in the slaughter of these inoffensive creatures’. While the film-in-film plays, the audiences are told by Taylor about the dwindling numbers and the atrocity of killing females bearing unborn calves. This anti-whaling message is carried through to the climax of the movie, when our time-travelling heroes thwart a foreign whaling ship from killing the vulnerable whales by manoeuvring their spaceship in front of a harpoon in mid-flight and triumphally capturing the two humpbacks for relocation to

the twenty-third century. We all cheer with the *Enterprise* crew when the whales are finally free in the future ocean.

On the surface, the movie is thus a storyline speaking to the anti-whaling environmentalist sentiment of the 1980s (Jørgensen 2013). The anti-whaling movement spearheaded by the activist organizations Greenpeace and Sea Shepherd at the end of the 1970s brought whaling under sharp criticism. The International Whaling Commission, which had been regulating whaling worldwide since 1946, moved to implement a moratorium on all commercial whaling worldwide in 1982, over the vocal objection of countries like Norway and Iceland who practised hunting of small (not endangered) whale species. When the moratorium came into effect in 1985, some whaling nations continued their hunts, sparking much of the fiery anti-whaling language we see in the movie.

Yet under the surface, *The Voyage Home* can tell us something deeper about environmentalist thought. The humpbacks are not being brought back to the twenty-third century just because they had been exterminated in the twenty-first—it would have, after all, been a simple science project of the future to restore an extinct animal—rather, the motivation for the restoration in this case is entirely human. A probe orbiting the Earth had begun ionizing the atmosphere, evaporating the oceans, and draining all power sources, leaving the inhabitants of Earth helpless. The *Enterprise* crew needs to intervene to save the people of Earth. In Mr. Spock's investigation of the probe's transmission, he discovers that the probe is sending humpback whale song in an attempt to contact whales. There can be no answer, however, since whales are extinct by the twenty-third century. It turns out that the whales are necessary to provide a regulating ecosystem service to control the climate of the planet.

Leonard Nimoy, who both directed the film and played Mr. Spock, was directly inspired by the work of ecologist Edward O. Wilson which he was reading during the script development process. In his Pulitzer-prize winning book *Biophilia*, Wilson (1984) argued that humans have an affinity for nature because of their inherent intimate links to nature; in fact, all species are linked together in webs that could crumble apart if even one species is removed. Although Wilson did not employ the term ecosystem service, his ideas resonate with the concept. His position is that species have functions that they perform, whether or not we have knowledge of the function, and those services are vital to continuing ecosystem health. According to

Nimoy (1995, 250), Wilson's idea that species might become extinct without us ever knowing their ecological role was critical to the script development:

In his work, Wilson talks about the vast numbers of species becoming extinct, and predicted that by the 1990s, Earth would lose as many as 10,000 species per year. That's *one* species per *hour*! Most disturbingly, many of these lost species would never have been catalogued; we would never have the chance to know what they were or what function they performed in the cycle of nature. They would simply vanish without leaving behind a record of their existence. The grim future painted by *Biophilia* haunted my thoughts.

In a conversation Nimoy had with a friend about *Biophilia* and endangered species, the language and function of humpback whale song, which has eluded scientists, came up as an example. He decided on a plot that focused on how the extinction of whales who sing a song with an unknown function could threaten human existence (Nimoy 1995, 250–252).

In this narrative, it is the function of the whales and how the loss of the whales' ecosystem service threatens the Earth and its humans that matters. There was a service provided to humans by whales through their whale song that was missing. We see that clearly when the two whales are finally released in the twenty-third century. The immediate question from Kirk after he has dramatically forced the bay doors open to free the whales is not 'Are the whales ok?' but rather 'Why don't they answer? Why don't they sing?' In this question, we see that the purpose of the whale recovery project is not about the whales, but about people. The whales' regulating ecosystem service is vital. The whales of course do sing, and the probe returns home, sparing Earth from its deadly effects. The whales are the planet's saviours.

The *Star Trek* whales are not conservation objects out in the boundless sea but rather personally known, stressing their relationship with humans. The scientist Dr. Taylor refers to them as 'my whales' in two scenes, when confronting Spock about swimming in the tank and during dinner with Kirk. In the first of those scenes, Spock counters that the whales 'like you very much, but they are not the hell your whales'. He suggests that the whales should be consulted about their potential time relocation and later reports that the whales agreed to the plan because 'they are very unhappy about the way their species has been treated by man'. Although the whales

must consent to the transfer, in one of the final scenes of the movie, Kirk reaffirms the human-whale relationship of mastery, intoning that he will take Dr. Taylor to see ‘her whales’ in the bowels of the spaceship. These whales belong to humanity in the sense that humans *need* them. They become *our* whales.

The future of humans is linked to other species through the services they provide, even services that we may not recognise, as E. O. Wilson had argued. Kirk poignantly alludes to this when looking at the captured whales, ‘It’s ironic. When man was killing these creatures, he was destroying his own future’. Moreover, when the Federation President labels the humpback whale extinction as ‘short-sightedness’ in the film’s last scene, it reaffirms that extinction has consequences beyond the species itself being lost—it has consequences for us. As Daily (1997) points out, the list of required species for survival is not known, so the prudent approach is a precautionary one that favours conservation and minimal environmental degradation. Just as in this movie, it might turn out that something we had never considered before is needed to provide a service without which humans cannot survive on the Earth. The ecosystem services concept was launched precisely to bring these types of unknown benefits of species, especially indirect benefits like these whales regulating service, to the fore.

Whales as supporting services

‘The Beast Below’, an episode from the fifth year of the new *Doctor Who* series, takes the Doctor and his Companion Amy Pond to the twenty-ninth century where they encounter what humans have been willing to sacrifice in their struggle for survival. The Earth’s ecosystem had become unliveable, as solar flares had superheated the atmosphere. In response, the nations of the world built spaceships to resettle their populations on other planets.

It turns out that the United Kingdom had been unsuccessful in their attempts to build a standard propelled starship and turned to an unlikely saviour from space: a star whale had appeared during the crisis and was captured by the UK government. The creature has the same general body configuration as Earth whales but on a much larger scale. It is believed to be the last of its kind. Starship UK was built on top of the harnessed creature, which serves as the propulsion system. The whale is literally the ground people walk on and keeps civilisation in motion, which are vital supporting ecosystem services.

To keep the whale travelling, electrical impulses are regularly administered to the whale's brain. The Doctor and Amy discover this truth through the course of the episode, which climaxes with the Doctor's decision to lobotomise the star whale so that the higher functions would be knocked out and it would no longer feel the pain of the electrical shocks.

In the dialogue leading up to that point, there is clearly remorse on the part of the UK government for the decision to imprison the star whale. When Amy Pond enters a voting booth by accident, she sees the beginning of a pre-recorded video shown to the populace about Starship UK. The presenter concludes his introduction: 'Here, then, is the truth about Starship UK, and the price that has been paid for the safety of the British people. May God have mercy on our souls'. The Queen Liz X had likewise recorded a video after the star whale was captured stating: 'What we have done to it breaks my heart'. There is recognition of a moral dilemma, yet the government decided to choose human health and safety over the star whale's.

To further justify their decision to harness the whale in this way, it is portrayed as a beast. Near the beginning of the episode, a child recites a poem describing this beast:

A horse and a man, above, below
One has a plan, but both must go.
Mile after mile, above, beneath
One has a smile, and one has teeth.
Though the man above might say hello
Expect no love from the beast below.

The line 'One has a plan, but both must go' in the poem stresses the relationship between man and whale; the whale is the horse that the humans will ride to safety. This is not an undeserved relationship as the beast 'has teeth' and gives 'no love'. The beast is fierce and must be forced to serve man. Additionally, the beast is fed 'protestors and citizens of limited value' and its tentacles grasp ominously at those who get too close, giving it a monstrous quality.

The Doctor counters this monster portrayal by calling the star whale a 'poor, trapped, terrified creature' and makes audible its cries of pain using technology. But while the UK's actions invoke the Doctor's outrage, he too is placed in a moral

dilemma. Believing that if he frees the star whale, Starship UK will disintegrate and all the inhabitants will die, he opts to in essence murder the whale.

In this storyline, the star whale is being used involuntarily to render a vital ecosystem service of physical land and transport, which are supporting services. The moral implications of the star whale being forced to provide those services are questioned, yet everyone—even the Doctor—concur that the human needs outweigh those of the whale. This cannot be a simple environmentalist story about saving the last of the star whales because we need the whale to do something for us. The benefit we acquire from the service brings about the star whale’s conservation, but if it provided no service, humans would not have cared about it at all.

Luckily for viewers that dislike depressing endings, the moral dilemma ends up with a more positive solution than the Doctor proposed. As it turns out, the star whale had not come to Earth by chance—it had actually heard the cries of the children and came to help. Amy ends up freeing the star whale, yet it continues to carry the ship. She explains her reasoning to the Queen: ‘The Star Whale didn’t come like a miracle all those years ago. It volunteered. You didn’t have to trap it or torture it—that was all just you’. Not only could the whale provide the needed service, but it willingly would do so. This turn suggests that nature deliberately wants to help humans survive, reiterating the anthropocentrism of the narrative.

At the end of episode, the viewers hear another poem voiced by Amy that rewrites the image of the star whale.

In bed above, we’re deep asleep
While greater love lies further deep
This dream must end, this world must know
We all depend on the beast below.

Whereas the star whale in the little girl’s poem was a beast without love, this one is full of love.

Whereas the opening sequence of the episode showed Starship UK as a city in space, the final shot reveals the star whale carrying the city on its back. We are shown that humans are riding on the back of the whale to safety. The supporting ecosystem service provided by the whale now not only exists, but it is consciously recognised and applauded. This is a positional shift that was only possible through outside intervention.

By conceptualising the star whale's role in the narrative as an ecosystem service provider, it makes sense that every voter in the booth chose to forget—they each recognised that they would die without the whale. Yet in choosing to forget, they failed to overtly acknowledge society's dependence on the whale. Daily (1997, 7) argues that 'ecosystem services are absolutely essential to civilisation, but modern urban life obscures their existence'. 'The Beast Below' affirms Daily's position: we do not often recognise the value of the ground beneath our feet.

Whales as cultural service providers

In T. J. Bass's novel *The Godwhale* from 1974 the plankton harvester *Rorqual Maru* is the last of her kind. She is 'a giant mutation of the finback whale' (113) modified into a cyborg ship to gather krill for the dominant Earth humanoid lifeforms (the Nebish living in The Hive) of the distant future. *Rorqual* has a burning desire to serve Man, but after the oceans became infertile she had been abandoned; yet 'if he should ever return to the sea, she wanted to serve' (27).

Rorqual is not, however, primarily a provisioning services provider in the book—she is rather a spiritual figure. She is the Godwhale from our first encounter with her as she contemplates shutting down for the last time. Her small service droid named Iron Trilobite calls her 'deity' throughout that first scene. When Trilobite goes out scouting for signs of human life and finally encounters water-dwelling humans called Benthics eking out an existence in the unproductive waters, he speaks of his deity, but believes that she is no longer functioning. The Benthics insist that Trilobite pray to *Rorqual* 'to bring food back into the seas' (87). After making contact through his prayer with what he believes to be *Rorqual* (although at the end of the book, we find out that it was a colonization ship), Trilobite exclaims, 'My deity returns to the sea. ... You will like her, I know. She is big and strong – and wise beyond your imagination' (89).

The Benthics are highly religious, centred on the Deep Cult who live in the deep ocean beyond normal human reach, keeping alive ancient traditions. After Trilobite's prayer was received, the Deep Cult added *Rorqual* to the Hall of the Gods and each family offered a daily prayer to her to guarantee that the prophesy of returning food would come to pass (95). A few years later, the krill do reappear, as do other forms of advanced sea life. The response from Opal, one of the key water-dweller figures, confirms what everyone is thinking: 'Trilobite's deity has answered

our prayers' (112). In these passages, the whale serves a spiritual role for society both before and after life returns to the ocean. There is a deep faith in the whale.

After regaining her strength and following Trilobite's signal, *Rorqual* enters the service of the Nebish, but she wants to serve the Benthics who had prayed to her. While gathering plankton for The Hive, *Rorqual* detours to the area of the ocean where she had once encountered Opal and releases a cargo of 'flaky, green biscuits' in order to serve (119). The Nebish captain interprets the printouts from *Rorqual* as some kind of 'offering to a water sprite' (119), which he chalks up to outdated beliefs. Really this is *Rorqual* as god providing food for her devotees. This food supply to Opal is a provisioning service, but that is just an aspect of *Rorqual*'s spiritual role as god, who naturally would provide for followers.

After *Rorqual* is eventually commandeered by Benthics, she solidifies her role as spiritual figure. People settled on the oceanic islands ask the Godwhale for help, raising a signal flag to indicate their problem (256-57). *Rorqual* regularly distributes food, tools, and medicine through sea cargo, and even offers her hold as a clinic to treat disorders, including infertility. To the end of the book, the cyborg whale is praised as a god throughout Benthic society.

In *The Godwhale*, the fate of humans (or human-like beings of the future) is tied to its spiritual belief in the whale. The whale is providing a benefit through its service in this religious role. If the Benthics had not asked Trilobite to pray to his god *Rorqual*, the signal would never had been received by the seeding ship which ends up bringing life back to the oceans. In addition to food on the plate, the religious worship of *Rorqual* provides social coherence through the course of the book. Social relations and practices develop to focus on *Rorqual* as a deity worthy of worship. The whale through its cultural ecosystem service is part of the multispecies cosmos of the human and it confers both tangible and intangible benefits on the humans.

Cultural ecosystem services have been the most difficult of the four service types to integrate into scientific studies and policy. This has been because of both the difficulty of assigning economic values to cultural services and the difficulty of incorporating epistemologies outside of Western science (Daniel et al. 2012). Cultural services are, however, experienced and appreciated, making them ripe for raising public support for ecosystem preservation. *The Godwhale* reveals the value of nature as a religious bearer, one that is experienced and appreciated.

Services, Entanglements, Dependence

These four whale tales demonstrate the promise of thinking about ecosystem services in science fiction. Even in narratives of reversing or averting extinction, which all of them are, whales are not saved for their own value, but rather their anthropocentric value. While post-colonial approaches to ecocriticism and animal studies are right to focus on the animal, we should not assume that centring the animal brings about a clearer understanding of human-animal relations. Embracing the fact that humans are the ones written into the centre of these science fictions narratives allows us to understand how the environment can be valued in a myriad of ways that are not intrinsic to nature itself.

Nature has a value—it does things for us on many levels whether directly, such as providing food, or indirectly, such as fostering cultural beliefs. By using the scientific concept of ecosystem services, the role of the whale in each story becomes clear: *The Deep Range* has whales that provide nutrition; *The Voyage Home* shows us whales that regulate the climate; *The Beast Below* gives us a view of a whale as a supporting service; and *The Godwhale*'s namesake offers a religious service. These whales are not in narrated as beings equivalent to humans, although their willingness to help is discussed by the human actors; they are rather animals put into the service of humanity. The whales are needed by the characters in the stories because they provide something vital for the humans.

That does not make the stories less powerful or less 'environmental'—it rather exposes the dependence of humans on nature, which is one of the primary lessons of ecosystem services thinking. The humans in these narratives are dependent upon the whale: in *The Deep Range* the whale is food that humans will starve without; in *The Voyage Home*, whale song is necessary to maintain a liveable climate; in 'The Beast Below', the whale is literally the ground on which the humans walk; and in *The Godwhale*, the whale provides a religious hope in the face of hopelessness. These functions cover the four types of ecosystem services, demonstrating the wide range of roles animals take in relation to humans. By portraying the whale as providing a distinct ecosystem service, the authors of these stories highlight the dependency of humans on animal lives. Centring the human in the narrative makes the reader realise that we humans cannot live alone.

These science fiction narratives expose the threats of disjuncture in multispecies webs. In all of these cases, something has gone wrong in the relationship

between human and whale and must be righted. These wrongs may be physical, whether it is whales are being slaughtered in *The Deep Range* or are already extinct in *The Voyage Home*. The fractures can also be mental, whether humans have unintentionally forgotten about whales in *The Godwhale* or intentionally forgotten them in ‘The Beast Below’. An incomplete web is a threat to humanity.

Because humans are entangled in a complex web of multispecies relations, we cannot survive without the services that ecosystem components provide. Valuing the components that provide the services becomes an imperative. Yet just as it is difficult to make a list of species that one would need to take to a new colony on the moon, it can be difficult to identify which values are provided by what. Through these stories, the imaginary relations of whale and human have the potential to serve as models for real conservation in that they describe a host of values found in nature. The original goal of the ecosystem services framework was to make visible unseen connections and reveal unnoticed values—and this is precisely what all of these stories do. They expose the entanglements. While the whales are dependent on us for survival, we are just as dependent on them.

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Notes

ⁱ In *Cachalot*, evolved whales have been relocated to a new planet as reparation for their near extinction. Even in this story, the whales end up saving the humans by being able to identify and locate the enemy of the human colonists.

ⁱⁱ <http://trekmovie.com/2007/11/25/star-trek-iv-named-top-environmental-film>

ⁱⁱⁱ Star Trek IV shooting script, March 11, 1986,
http://www.scifiscripts.com/scripts/Trek/Star_Trek_IV.htm