Before World War II, the resources that most Americans imagined using from the ocean were rather limited: fish, transportation, and a site for warfare. After the war, however, the ocean as frontier became a common analogy. With it came the associated belief that the ocean’s resources were available at a staggeringly new rate. This article uses the writings and activities of the science fiction author Arthur C. Clarke to explore the analogy of the sea to the western plains of the United States. Clarke, better known for his science fiction stories set in space, wrote extensively about the ocean as a source of food and other material resources, livelihood, inspiration, and insight into human nature. Clarke’s personal experiences with the ocean and his writings are valuable tools for analyzing changing cultural conceptions of the ocean. I argue that the frontier analogy for the ocean was, in part, a failure because space came to seem a more promising frontier. Nevertheless, it still had a tremendous impact on how we conceived of and used the sea in the postwar period.
Introduction

In 1960, the bathyscaphe Trieste reached the bottom of the Marianas Trench at the Challenger Deep, the deepest point of the ocean. The first human to orbit the earth did not do so until two years later. Yet for three decades after the Trieste’s epoch achievement, no further efforts were launched to revisit the deepest seafloor. Meanwhile, the Gemini and Apollo programs built on the foundation of Mercury’s accomplishment of orbital travel, realizing the goal of putting people on the moon by 1969. During the 1960s, in parallel with space exploration, the oceans, particularly their third dimension, likewise attracted attention from politicians, scientists, engineers, entrepreneurs, boosters, and ordinary people. Ocean exploration, already well established by the late 1950s, paled somewhat by the late 1960s in comparison with the prospect of space travel. Any effort to understand the fascination of the 1960s with the undersea realm must grapple with the shadow of space. The momentous dive of the Trieste did not, as boosters confidently predicted, open up the depths to commercial development, new industries, or human occupation. Instead, the achievement of putting humans at the ocean’s deepest point was interpreted by some, including Arthur C. Clarke, as signaling the end of the ocean’s status as a frontier.

Although the ocean and its resources loomed large in the development of the American colonies and the young United States, awareness of the ocean had attenuated by the early twentieth century. Before World War II, most Americans thought about the ocean, if they did at all, as the source for seafood and a surface for steamship travel, shipping, or warfare. Submarine warfare particularly attracted attention seaward and ensured massive federal investment in marine science and technology to improve understanding of the ocean, especially the depths. After the war, the metaphor of the frontier became attached to the ocean. At about the same time, the frontier appeared as a powerful metaphor for outer space as well. To varying degrees, the metaphor resonated with perceptions of these realms as sources of material resources and as sites for cultural development. By the late 1960s, outer space had overtaken the sea as the most culturally resonant frontier. This article investigates why the ocean shifted from being the most promising frontier, certain to satisfy material as well as spiritual needs, to a distant second-place frontier relative to space.

Following wartime advances in oceanography, many scientists and writers published popular accounts about the relatively unknown realm of the ocean. These accounts identified many new uses for the sea. No longer was the ocean limited to serving as a fishing ground, a transportation surface, or a battlefield. Pursuit of wild fish would give way to cultivation of fish, plankton, and seaweed, just as farming had replaced hunting and gathering. Ranching of whales
numbered among the more imaginative proposals. Extractive industries would expand to nonliving resources such as minerals, chemicals, and even fresh water. No longer would people visit the ocean temporarily to engage in such activities. Instead, the seafloor would become a construction site, followed thereafter by an industrial zone where workers would participate in undersea oil drilling, submarine cargo shipping, mining, and other lucrative endeavors. Human habitation of the ocean floor would follow naturally. Technology was integral to these visions. For example, technical experts anticipated the installation of seafloor nuclear reactors to create artificial upwelling zones as well as the use of nuclear submarines for undersea cargo transport free of danger from storms on the surface. The term *frontier* had resonance in this context because of the associations linked to it by Frederick Jackson Turner, whose western frontier was first entered by trappers and hunters, then by cattlemen and miners, then by farmers, and finally by industrialists whose work was made possible by the growth of cities. Ocean boosters likewise envisioned a shift from inefficient extraction of a small number of marine resources to modern industry and agriculture that would enable comprehensive and maximal use of the sea's bounty.

The idea for ranching whales, just as cattle had been ranched on the frontier of the Great Plains, may have been the brainchild of Arthur C. Clarke, the well-known science fiction writer who explored the analogy of the sea to the western plains of the United States in his 1957 novel *The Deep Range*. Clarke, better known for his stories set in space, numbered among the earliest recreational scuba divers. Before his famous work *2001: A Space Odyssey*, he wrote both fiction and nonfiction celebrating the promise of the ocean as a source of food and other resources, livelihood, inspiration, and insight into human nature. In both his ocean and space writing, Clarke integrated state-of-the-art science and engineering; indeed, he famously predicted the advent of communications satellites. In this article, Clarke's personal life and his writing serve as tools to analyze changing cultural conceptions of the ocean and to provide insight into the relative status of the oceans compared with outer space.

Clarke presented a vision of a new human relationship with the ocean, one that integrated science, recreation, industry, government, and spirituality. Promoters of the fast-growing field of oceanography likewise planned facilities and technologies based on a similar vision applied to research that linked oceanography to engineering, medicine, aquaculture, archaeology, and recreation. Rather than being limited to the study of oceanic phenomenon, this new blueprint for ocean science addressed every possible aspect of how people might work and live on and under the sea.

Shortly before the 1960s, scientists, explorers, and writers had begun to characterize the ocean, particularly the undersea world, as a
frontier. Many who were involved in ocean exploration associated the sea with outer space, sometimes pointing to similarities and sometimes to contrasts between these two forbidding, yet promising, environments. As an example, consider how the engineer and popular author Seabrook Hull characterized the sea in 1964:

Of the two great frontiers, space and the ocean, being opened up in the 20th Century, only the ocean is close, tangible, and of direct personal significance to every man, woman, and child on the face of the globe. Another war might be won or lost in its depths, rather than in outer space. It is a cornucopia of raw materials for man’s industries, food for his stomach, health for his body, challenges to his mind, and inspiration to his soul.

Hull labeled both the sea and space as frontiers, and then he enumerated some of the reasons why champions of ocean exploration believed it might prove more pressing, and also more rewarding, to concentrate on the ocean. Reference to the provision of food and the potential for creating wealth echoed cultural assumptions about what the American West offered as a frontier. In addition, the suggestion that the sea promised strength and spiritual sustenance likewise evoked associations between the western frontier and American individualism and democracy.

As Hull’s quote makes clear, promoters of underwater exploration felt it held more immediate potential compared with space exploration. This was especially the case during the 1950s before Sputnik and the race for the moon. A single invention, the Aqualung, was most responsible for opening the undersea world, not only to experts but to ordinary people as well. In 1949 Jacques Cousteau and a colleague invented the Aqualung, the first free-swimming underwater breathing set. Previous underwater breathing gear included helmeted diving suits and wartime innovations such as re-breathers that used carbon dioxide scrubbers to avoid the escape of air bubbles that might reveal the diver below. Such equipment required significant expertise and was dangerous to use even for professional divers. The Aqualung or, as subsequent generations of the technology were called, Self-Contained Underwater Breathing Apparatus, or SCUBA, was eagerly embraced by skin divers and spear fishers, and also by newcomers to the sport, including recreationalists, scientists, filmmakers, and others.

Among the early users of the Aqualung was Arthur C. Clarke. Relative to his fame for science fiction and space prognostication, Clarke is less well known for his early and enthusiastic pursuit of diving, spear fishing, underwater photography and treasure hunting; for his promotion of undersea exploration; and for his predictions of
futuristic ocean industries, technologies, and uses of the sea. He dove and wrote about the oceans in the late 1950s and early 1960s, and the ideas and preoccupations found in his ocean writings appear and re-appear in popular and scientific works throughout the 1960s. Although many of Clarke’s expectations and predictions regarding the ocean were not fulfilled, they fell firmly within the range of what ocean scientists and engineers also anticipated.

In Clarke’s words and deeds, and also in the minds of a generation of scientists, diver/explorers, engineers, and entrepreneurs, the ocean promised to become the premier outlet for their economic, intellectual, cultural, and social ambitions. Their embrace of the frontier analogy signaled their belief that the ocean might provide not only resources but also necessary challenges. Clarke and some of his contemporaries believed that an emerging relationship with the ocean formed part of what they considered an evolutionary trajectory for humanity. In a very concrete sense, the ocean’s resources would in the near future prove essential for the survival of the growing population. But the relationship with the ocean had another dimension as well because Clarke believed that humanity required new challenges in order to survive. People had evolved from the sea, and now the ocean’s depths were expected to serve as the testing ground for both the technology and the spirit that would be required for humans to break free of the earth to explore space. Clarke’s writings and biography, then, offer a window into how the ocean was perceived, how experts expected to be able to use it and its resources, and even how the ocean might figure in world history.

Despite the tremendous enthusiasm for the ocean and its potential, the sea could not quite match the appeal of space—either in Clarke’s writings or in reality. In *The Deep Range*, Clarke tells the story of a failed astronaut who finds fulfillment working undersea. In the end, however, the astronaut’s son chooses outer space over the ocean. Similarly, despite all the promise and enthusiasm, experiments in undersea habitats did not lead to underwater colonies, and ocean engineering did not spawn a marine equivalent of the giant aerospace industry. Oceanography remained the science of the oceans rather than an integrated sciences and engineering approach devoted to establishing a fundamentally new relationship between people and the sea.

Clarke’s life and writings, both his fiction and nonfiction, provide an excellent tool for exploring the expectations that a generation of scientists and dreamers projected onto the ocean, providing new insight into a history of the ocean. Maritime history has tended to privilege human events and actions that take place on the sea, rather than the ocean itself. Environmental history offers the imperative to consider the mutual influence of nature on human history and vice versa, but, until recently, environmental historians have largely ignored the ocean. Those few scholars who have begun to write
excellent histories of marine environments are strongly influenced by the science of ecology and by environmental, and especially fisheries, management concerns. The time has come for scholars in the humanities to try to understand that the ocean is not only a source of natural resources or a stage for the events of human history, but rather a complex and changing natural environment that is inextricably connected to, and influenced by, people. The humanities are uniquely positioned to grapple with an important characteristic of the ocean: it is a place known through imagination as well as through direct experience. Because human lungs cannot breathe unassisted in the ocean, our knowledge about the ocean is necessarily mediated through technologies, knowledge systems, or cultural conceptions of this space—or some combination of these. Imagination may, in fact, play a larger role in our perception of the ocean, especially its third dimension, than modern science. Rather than thinking of our task as including the ocean in our histories, we might more profitably put the ocean in the center of our stories and aim to write histories of the ocean to include human actions, habits, cultural assumptions, and expectations.

Clarke and the Ocean

Clarke is certainly more famous for his associations with outer space than with the sea. He joined the British Interplanetary Society in 1936 at age nineteen, when he moved to London from the seaside town of Minehead in Somerset to begin work in the civil service. Over the years he acted several times as the society’s chair. During the war he served in the Royal Air Force as a radar technician and instructor, and afterward he earned a university degree in mathematics and physics. He began work as a science editor while also writing nonfiction and stories. By 1949 Clarke was successful enough as a writer to quit his day job; two years later that trajectory was confirmed when the Book-of-the-Month Club bought rights to his nonfiction book *The Exploration of Space*. Over the course of his productive career, Clarke won major writing awards including the UNESCO-Kalinga Prize for the Popularization of Science in 1962. He also achieved recognition as an inventor, particularly for proposing satellite communications systems in 1945, for which he was awarded the Franklin Institute Stuart Ballantine Gold Medal in 1963. His successful predictions for a moon landing and other space achievements demonstrate the depth of his understanding of the technology and knowledge required for space exploration. Indeed, Clarke appeared as a commentator on CBS for the Apollo 11, 12, and 15 moon missions.

Clarke is most famous as a science fiction writer. Until 1951 he had mainly made a name for himself as a nonfiction writer. After the Book-of-the-Month Club success with *The Exploration of Space*, he
shifted from British to American publishers and began publishing more science fiction. *Childhood’s End*, released in 1953, launched his reputation as a novelist. Clarke also worked in film and television. His collaboration with the director Stanley Kubrick led to the famous movie *2001: A Space Odyssey* as well as a novel by the same name.

This summary of Clarke’s life and accomplishments reflects what is most commonly found in obituaries, biographical accounts, and scholarly criticism of his writings. Clarke’s interest in the ocean is usually presented by his biographers in the context of his dedication to space; his interest in skin diving, for instance, derived from his desire to experience something akin to the weightlessness of space. In addition, the period of his interest in the sea is usually bounded by identifiable start and end dates. Yet the sea, and skin and scuba diving in particular, preoccupied him throughout his adult life.

In 1956 Clarke moved permanently to Sri Lanka (then Ceylon), whose beaches seemed to him akin to the platonic ideal of the beach compared to the English beach of his childhood. At age seventy-five he was still an active diver and operated diving-related businesses including a dive school (the Arthur C. Clarke Diving School) that was still in operation until its building was destroyed by the 2004 tsunami.
Literary critic Eric S. Rabkin argued that understanding Clarke’s fiction and its sources requires knowledge of “Clarke’s exceptionally active life.” This point is as true for his ocean-related work as for his writings about space. Between his childhood summers on the coast and 1950, when he was age thirty-three, Clarke does not appear to have had any serious preoccupation with the ocean. In 1950 Clarke began a long-standing friendship with Mike Wilson, a young science fiction fan living and working in London as a wine steward. Wilson, who had served in the British merchant marine, army, and also marines, including service as a military frogman, told Clarke about his diving experiences in the Pacific. Intrigued, Clarke took skin diving lessons in a local pool and later rented an Aqua
Lung to try diving in the English Channel. Clarke’s friendship with Wilson, oriented around underwater activities, coincided with the years of his active writing about the ocean.

After his 1953 trip to the United States, Clarke regularly combined business travel with jaunts to dive in new and exotic locations. A trip to Tampa, Florida, provided him with an opportunity to dive with Dr. George Grisinger, an admirer of The Exploration of Space, who introduced him to underwater photography and to the fish known as groupers (also called sea bass, these large fish were popular targets for spear fishers). In May 1953 Clarke and his group moved on to Key Largo, where he dove and also met the diver Marilyn Mayfield, whom he briefly married.\(^{17}\)

In the mid-1950s to early 1960s, Clarke embarked on a series of expeditions with Mike Wilson to dive in areas where few Western divers had previously visited. In 1954 and 1955, for example, he spent months in Australia diving on the Great Barrier Reef. One place he visited on that trip, Heron Island, became the setting for scenes in two works of fiction.\(^ {18}\) These expeditions were not just personal adventures; they were entrepreneurial enterprises. He and Wilson experimented with underwater diving and photography equipment and amassed experiences to write and lecture about. Their joint ventures broadened to include filmmaking, treasure hunting, underwater businesses (involving consulting, salvage, underwater surveying, and tourism), and coauthoring books.\(^ {19}\)

In pursuit of novel diving experiences and new undersea places to photograph and write about, Clarke headed to Ceylon in 1956. At the time the Indian Ocean was the least familiar ocean to Western scientists. Acknowledging this, oceanographers began organizing the International Indian Ocean Expedition, a multiyear, multiship effort to study this sea biologically, chemically, physically, and geologically. Typically for the time, organizers confidently predicted that the expedition would not only result in new knowledge but would also lead to more intensive use of the sea and its resources, including as a sink for radioactive and other wastes and as a source for much needed protein from the sea.\(^ {20}\)

While Clarke, in many of his writings, waxed enthusiastic about the prospect of food, energy, and other material resources from the ocean, he and Wilson had a new entrepreneurial idea in mind as they headed to Ceylon in 1956; they hoped to find historic treasure. Wreck diving was becoming a popular activity in scuba circles, and examples abounded in the popular press of divers finding ancient silver and gold-laden shipwrecks using modern diving equipment.\(^ {21}\) Indeed, Wilson did discover treasure in 1961, at a wreck at Great Basses Reef where he was filming a movie. That discovery and their other Indian Ocean adventures became grist for a series of books about this little known part of the world.\(^ {22}\)
In 1962 Clarke was diagnosed with polio. Recuperation was slow, although within a year he had managed to scuba dive, an achievement that helped motivate him to continue exercising and writing. Biographical accounts of Clarke’s life often mention this period as the time when he gave up the sea; indeed, the 1964 novel *Dolphin Island* has been called his “farewell to the sea.” The reality is more complex. The conclusion that he had left the ocean behind seems to have derived both from his physical weakness and also from the fact that his publications after this point focused again on space after years of preoccupation with the ocean. For example, 1964 was the start of his vibrant, productive partnership with Stanley Kubrick. Yet as he sought out scientists and government experts to discuss space flight and weather satellites, Clarke remained actively engaged with
the sea. He continued to dive until the end of his life; he continued to live in Sri Lanka, enjoying its beaches and reefs, and he also maintained an active interest in businesses related to diving. In Clarke’s writings after 1964, his conceptions of the ocean and space continued to be closely intertwined.

The Ocean in Clarke’s Writings

Any attempt to create a strict separation of Clarke’s interests and work related to the ocean and space is destined to fail. In 1958, in the midst of his obsession with the ocean, he wrote essays that were later published in *Profiles of the Future*, a book of predictions that included much on space but also forecast the advent of submarine and hovercraft cargo transport and other futuristic uses of the sea. In the same work he relied on the analogy of sail power to argue for the equal likelihood of, first, cheap nuclear energy and, subsequently, very high-speed transport drawing natural energy from the upper atmosphere. He explained, “After all, there is nothing fundamentally absurd about the idea. We sailed the seas for thousands of years in fuelless ships, powered by the free energy of the winds.” In 1962 he published the collection titled *From the Ocean, From the Stars*, making clear the parallels he drew between the two realms. In the fall of 1960, the same year he published *Challenge of the Sea* and struggled financially with supporting his and Wilson’s diving and other endeavors, he wrote the novel *A Fall of Moondust*, a story set on the moon inside a tourism vehicle that sank into a ‘sea’ of dust. Stories such as “The Road to the Sea,” written in 1950s but included in the 1962 collection *Tales of Ten Worlds*, likewise demonstrate the similarities Clarke saw between space and the ocean.

Clarke’s unwillingness to differentiate strongly between oceans and space may have derived from his conviction that human exploration of space was a natural extension of an evolutionary journey that began with movement of sea creatures onto land. In *The Deep Range*, as one of his characters gazed over great plankton farms and whale herds, he reflected that, “Man had come back to the sea, his ancient home, after aeons of exile; until the oceans froze, he would never be hungry again.” Other writers shared this perception. The German rocket scientist Wernher von Braun, in his introduction to Clarke’s *Challenge of the Sea*, mused that humans might be compelled to explore the sea because “the sight of it evokes subconscious and vestigial memories of his primal beginning.” Then von Braun continued, “From a poetical, but not too farfetched, viewpoint, we on earth can consider the bottom of the sea as man’s point of departure on his extremely long trip to outer space.” He elaborated that life, which began in the depths, then moved onto land, and, after “after a brief pause,” would continue upward into space.
Jacques Cousteau likewise framed the human relationship in evolutionary terms, although looking forward rather than backward. At the World Congress on Underwater Activities in London in 1962, Cousteau declared, “A new species of human being is evolving, *Home aquaticus*.”

The evolutionary trajectory from the ocean to space that Clarke imagined fundamentally involved technological innovation. For example, he surmised that the invention of a one-man gravitator might “do for mountains what the aqualung has done for the sea . . . . It is only a matter of time before tourists are floating all over the Himalayas, and the summit of Everest is as crowded as the seabed round the Florida Keys or off Cannes.” Similarly, after discussing the achievement of the bathyscaphe *Trieste*, which traveled seven miles down to the bottom of the Marianas Trench, the deepest spot in the world’s ocean, Clarke turned to consider space. “In our own time, men have peered through the portholes of a bathyscaphe into a region, only inches away, where they would be crushed in a fraction of a second by the pressure of a thousand tons on every square foot of their bodies . . . . Centuries in the future, and light-years from Earth, there may be men peering out of portholes into the still more ferocious environment of a dwarf star.” Even in the arena of cultural understanding and expression, sea and space were connected in Clarke’s mind. Reflecting on the literature accompanying America’s frontier settlement he decided, “Space flight has, therefore, very little in common with aviation; it is much closer in spirit to ocean voyaging, which has inspired so many of our greatest works of literature.”

The frontier analogy was particularly important for Clarke, who was among the first writers to elaborate on it to make sense of human interaction with both oceans and space. Clarke’s vision of the frontier derived from that made popular by the historian Frederick Jackson Turner who theorized that the western frontier had forged a distinct, democratic American culture and provided an outlet for the restless energy of its people. Turner first articulated his argument about the influence of the frontier in American history in 1893, at the very moment that the U.S. Census Bureau declared the western frontier to be “closed.” To politicians and others, the obvious problem emerged of finding new outlets for expansion; solutions included overseas territories, Alaska, polar regions, and even the frontier of new knowledge, especially discoveries in the natural sciences.

By the mid-1950s, the ocean, too, had acquired the status of frontier, as observers including Clarke expected the sea soon to provide food to feed a growing population as well as mineral and other critical resources including fresh water. In November 1953, the American Association for the Advancement of Science included at its annual meeting a special session on “The Sea Frontier,” which included topics ranging from the geology of ocean basins to the productivity
and biological resources of the sea, to the potential for extracting resources such as fresh water or minerals. A 1954 advertisement in *Life* magazine placed by the American Petroleum Institute declared, “In the open waters of the Gulf of Mexico, against every hazard of wind, wave, and sudden storm, sea-going oilmen are opening up a new American frontier.” Even when the word *frontier* was not invoked, its associations were. “This wet world, as many is belatedly beginning to realize, may hold the key to his survival on this planet—not only in terms of attack and defense but in terms of minerals, chemicals and food . . . . Beneath the sea, man is still a tentative intruder, just learning how to farm and mine its depths.” This characterization of the ocean appeared in a 1962 *Life* magazine article describing a novel 300-foot instrument-vehicle for ocean exploration, the Floating Instrument Platform, or FLIP, designed by and built for researchers at Scripps Institution of Oceanography. While FLIP was mainly intended as a stable platform for performing delicate acoustic measurements, work with explicit military applications, the enthusiasm surrounding such new technological means for probing the sea frequently used the frontier analogy.

Futurists believed that, like the western frontier, the sea would be the site of dramatic innovation in transportation, communication, and other technologies. As with all his work, Clarke’s ocean-focused writing rested on his knowledge of contemporary science and technology. As he did for space (famously predicting earth-orbiting satellites for telecommunication), he envisaged uses that people would soon make of the sea and its resources. Stories from *Tales from the White Hart*, dating from the days when Clarke first met Wilson, included two works that evoked anticipated new uses of the ocean. “The Man Who Ploughed the Sea” revolved around a plan to extract minerals from seawater, and “Cold War” revealed a scheme by California to destroy Florida’s appeal to tourists by landing icebergs on Miami Beach. Both proposals, although presented by Clarke in the context of Harry Purvis’s tall tales, were believed by experts to be firmly within reach or nearly so by the late 1950s and early 1960s. The communication with dolphins depicted in *Dolphin Island* reflected the work of physician and neurophysiologist John C. Lilly. Farming the sea, as outlined in *The Deep Range*, likewise seemed an obvious and achievable goal to scientists and engineers.

**Not the Last, Nor the Best, Frontier**

Clarke’s novel *The Deep Range* provides a window into the nature and extent of the frontier analogy in his conception of the ocean. What follows is an exploration of the frontier analogy in the novel, with reference to Clarke’s treatment of the sea in some of his nonfiction work.
Clarke’s writings offer clues about the limitations of the ocean as the preferred frontier in the space age.

Starting with its title, *The Deep Range* leaned on the image of the cowboy and cattle-driving frontier. In the opening scene, Whale Bureau warden Don Burley sat in his one-man scout sub preparing to battle the killer whales that were destroying the whales he tended. He felt a kinship with ancient shepherds guarding flocks but more so with ranchers of the American West. “Yet far nearer in time, and far closer in spirit, were the men who had marshaled the great herds of cattle on the American plains…. They would have understood his work, though his implements would have been magic to them.”\(^{41}\) The analogy was not perfect; Clarke compared the whales being protected and herded to bison, which were exterminated in favor of introduced cattle, whereas Burley’s charges were “native” whales. In other parts of the ocean of this future earth, vast plankton farms stood in for endless wheat fields.

The goal was for humanity to move from exploitation of the sea using a hunting model to a farming model, which Clarke articulated in his nonfiction work.\(^{42}\) This trajectory bears the imprint of Turner’s frontier thesis, which described an inexorable progression on the frontier whereby cattlemen and miners replaced the trappers and traders who were the first European settlers to expand into the American West. After the cattle ranchers and miners came the farmers, the first of whom had small subsistence farms. Farming grew more intensive and settlements larger until cities and industries formed. The inevitable outcome, as described by Turner and predicted for the ocean by Clarke, included access to food resources, wealth from extractive and productive industries, undersea living, and the continued development of individuals and political and social institutions.\(^{43}\)

As Clarke himself pointed out, there were limits to the applicability of the frontier analogy. “The parallel with the old-time cowboy is obvious, but it cannot be taken too far,” he admitted in *Challenge of the Sea*. Rather than the fixed borders of western cattle ranches, the ranches of the sea would move from the polar regions where whales fed to the warmer waters where they gave birth and raised their young. Such migration would make it impossible for individual countries to operate such an enterprise, so Clarke’s vision for the future included a radical internationalization of all aspects of life and politics.\(^{44}\) Likewise, while “the great gold rushes of a century ago may be repeated on the sea bed,… prospectors will not be grizzled old-timers working alone. They will be multimillion dollar corporations employing armies of scientists and technicians.”\(^{45}\)

*The Deep Range* used the characteristic trope from maritime literature of describing the training of a neophyte to introduce the reader to the ranching business and the vessels and technologies it employs.\(^{46}\) In the novel, Don Burley, after killing a great white shark to protect a
mother whale and her two calves, reported to the main office in Brisbane, Australia, to induct Walter Franklin into the ranks of whale wardens. Although Burley did not pry into Franklin's personal situation, it did not escape his notice that the newcomer was on "the wrong side of thirty" and was obviously a spaceman; "you could tell them a mile away." Under Burley's tutelage, Franklin not only learned the job but also gained an appreciation for the ocean, coming to recognize it as resembling space in some ways and yet distinct in others. Just before the training ended, Burley took Franklin into the middle of a herd of whales, an experience that provided "one of the great moments of his life," akin, as he described it, to his first glimpse of earth from space. Amid the gigantic creatures, Franklin felt the same awe and the same awareness of cosmic forces as he had in space. At peace with the new direction for his life, Franklin "had lost the freedom of space, but he had gained the freedom of the seas. It was enough for any man."

Indeed, Clarke signaled in both this novel and elsewhere in his writings that the ocean offered greater challenge and more profound mystery than space. He believed that the deep ocean "may still remain utterly savage—the last wilderness of the world," even when continents have been tamed from poles through deserts. In the novel, Franklin marveled at technical accomplishments such as the globe-circling fences of high-pitched sound created by nuclear-powered generators on the deep seafloor, wondering what earlier people might have thought. "In some ways," he reflected, "it seemed the greatest and most daring of all man's presumptions. The sea, which has worked its will with man ever since the beginning of time, had been humbled at last. Not even the conquest of space had been a greater victory than this." Such an admission that the ocean posed greater challenges than space was striking, coming as it does from the mouth of a character who had experienced outer space. Franklin's continued thoughts make the point even more strongly—that the oceans will ultimately present a greater challenge than space: "And yet—it was a victory that could never be final. Slowly, Franklin was coming to terms with the sea, as must all men who have dealings with it."

Franklin's pursuit of the great sea serpent provided a concrete manifestation of the lingering mystery of the sea. Clarke gave serious consideration to the possibility that the ocean still hid yet undiscovered monsters as big and strange as the sperm whale and the giant squid. In Challenge of the Sea, he asserted, "There can be little doubt that there are other sea monsters, perhaps even stranger and larger, still completely unknown to us." Franklin discussed with his colleagues a faint echo on the sonar screen that he chased with his mini-sub but lost. His fellow wardens warned him not to discuss the episode with reporters but, among themselves, the appeared convinced that it
had been “nothing less than the Great Sea Serpent.” Franklin initially tried to tell himself to let go of this particular mystery, musing, “the oceans still held many secrets and would retain them for ages yet to come.” He found himself, however, unable to let go of his fascination with this puzzling challenge. Working deftly within the layers of bureaucracy of his government office, he managed to acquire and deploy remote sensing equipment to begin a study of unexplained phenomena of the deep. After analyzing several months of echoes, he moved all the recorders to one location and collected data that revealed a very large, thin animal that lived at 20,000 feet and came halfway to the surface twice a day, presumably to feed. An official search launched to find the sea serpent ended with the tragic loss of Burley’s sub and the painful lesson to Franklin of the ocean’s dangers.

People seemed more firmly in control of the ocean and its resources closer to the surface. Franklin rose to the directorship of the Bureau of Whales and faced a set of challenges to its whole operation. The long-running conflict with the Plankton Bureau over ocean space, in which the plankton farm administrators argued that their bureau produced far more food more efficiently, started to heat up. More importantly for the plot, Franklin learned of experiments with training killer whales to help herd whales, as sheepdogs herd sheep, and also efforts to build and use an automatic milking device for whales. He mentioned the idea of milk from whales in an interview and suddenly he found himself and his bureau under determined attack by the Buddhist leader, the Maha Thero. Since Buddhism had become “the only religion that still possessed any power over the minds of men,” Franklin was forced to take seriously calls to end the killing of whales. Secretly, Franklin and the other wardens had always felt that whales were different from other animals, perhaps closer to humans in intelligence. Most of them disliked the necessity of killing the whales and even the necessity of destroying the killer whales that preyed on them. Facing political and moral pressures from many directions, Franklin decided to speak out publicly in support of the Maha Thero’s proposal, even at the likely cost of his own professional advancement.

As tied to the ocean as Franklin had become, his decision to take a stand against killing whales derived, oddly, from his former—and apparently continuing—allegiance to space exploration. Of the various arguments presented by the Maha Thero, one he presented privately to Franklin but did not air publicly, posited the inevitable future meeting between man and “his superiors from other worlds,” who would likely judge humanity on the basis of how humans treated other creatures. Clarke’s ultimate ranking of space as a more important frontier than the ocean becomes clear at the novel’s end when Franklin watches his son leave earth to begin a career as a spaceman. “To his
son, he willingly bequeathed the shoreless seas of space. For himself, the oceans of this world were sufficient.” As he faced the stars after his son’s rocket disappeared, Franklin whispered to himself, “Give us another hundred years, … and we’ll face you with clean hands and hearts—whatever shape you be.”56 The end of The Deep Range, then, offers a hint to the limitations of the ocean as a frontier relative to outer space.

Conclusion

The Deep Range provides a window into the relationship between the ocean and outer space in the minds of boosters for the exploration of both places. Like other works by Clarke, this novel reflects popular conceptions of the ocean in the 1950s and 1960s as a frontier offering material resources as well as the possibility for human expansion and progress. Clarke explicitly discussed frontiers and their role in human history in his nonfiction book Profiles of the Future.

While Clarke derived his view of the frontier from Turner, his vision differed from Turner’s in important elements. Turner identified the close of the American frontier as the US Census Bureau did, with the announcement that the 1890 census could no longer identify a “frontier line” behind which empty land beckoned settlers.57 In contrast, Clarke claimed as an end date for the frontier 1869, the year in which the first transcontinental railroad was completed. Clarke’s starting date, 1492, alluded to the act of discovery of the New World. Turner, however, did not glorify explorers; to the contrary, his heroes were the farmers and ranchers who went west and stayed there, not explorers who went ahead then returned to report back. Indeed, he hardly mentioned explorers or exploration at all in his famous essay. To Turner, the frontier was fundamentally an economic entity, albeit one with powerful political and cultural resonances. To Clarke, and to his contemporaries in the 1950s and 1960s, frontier was tied to discovery, to newness. Clarke contended, in Profiles of the Future, that, “the ocean will keep us busy for centuries to come.” This claim was presented, however, with a significant caveat. In 1960, just two years before Clarke published this sentiment, the bathyscaphe Trieste reached the deepest spot in the oceans, the bottom of the Marianas Trench. To Clarke, after this achievement—just as with the successful spanning of the continental United States in 1869—the task of dealing with the remaining parts of the ocean, although admittedly vast, “will only be a mopping-up operation.”58

Clarke shared with Turner the assumption that finding alternative frontiers as outlets would be essential for the continued existence and development of society. While some frontiers would serve as sources for humanity’s physical needs, such as food and mineral resources, Clarke explained, “The spiritual need is less apparent, but
in the long run it is more important.” Other planets would not, he predicted, offer a solution to the problem of overpopulation because space colonies would require too much support from Earth, at least at the outset. “If we are looking for living space for our surplus population, it would be far cheaper to find it in the Antarctic—or even on the bottom of the Atlantic Ocean,” he warned. Space settlements would, however, provide a significant intellectual and emotional contribution to the “stay-at-homes,” those people who did not leave Earth to colonize new planets. Using strikingly Turnerian language, Clarke continued, “They will know, as they watch their TV screens, that History with a capital H is starting again.”

This formulation leaned on Turner’s argument that the close of the frontier in 1890 ended what he identified as the first period of American history. Yet Turner’s cyclical nature of how the frontier shaped people and the nation implied that a turn to a new frontier provided a chance to start over. Unexplored areas of ocean might still function in some ways as frontier, particularly because of the almost unimaginably vast scale of new resources that Clarke’s generation expected from the depths. The ocean, however, had a crippling limitation compared to space, namely that ocean exploration—although at an early stage and still promising to keep people “busy for centuries to come”—would one day end. The ocean, in short, ultimately lacked the starting-over element. What made space a better frontier, to Clarke, was its infinity. The space frontier, he argued, was “beyond all possibility of exhaustion.” As an uncloseable frontier, space would remain immune to the restrictions of earthly frontiers.

Notwithstanding the limitations he assigned to the ocean relative to outer space, Clarke had bold and ambitious expectations for human use of the sea and its resources. His writings reveal attitudes toward the ocean that influenced how its resources were perceived and used. His language and the content of his writings depicted an ocean that strongly resembled the western frontier as described by Turner and others since, complete with seemingly unlimited economic potential and great social and cultural power. Clarke conveyed breathtaking optimism about the expected scale and extent of new uses for the ocean and, predictably for his time, exhibited blindness about what groups of people would and would not be involved in or benefit from a deepening human relationship with the ocean. Embedded in his view of the ocean as a frontier was the bedrock assumption that the sea should be systematically and maximally exploited, just as the resources of the American West had been.

Science and technology would, to Clarke and contemporary ocean enthusiasts, enable new and intensified uses of the sea and marine resources. Oceanography existed not simply to increase understanding of the ocean and its contents and processes, but to facilitate exploitation. In the late 1960s, ocean scientists and engineers who planned
for the proposed International Decade of Ocean Exploration reflected
this view. The overall goal articulated for the Decade was “To achieve
more comprehensive knowledge of ocean characteristics and their changes
and more profound understanding of oceanic processes for the purpose of
more effective utilization of the ocean and its resources” [italics in original].
The sentence immediately following this goal in the Steering Com-
mittee report pressed the point: “The emphasis on utilization was consid-
ered of primary importance.”62

Clarke and his contemporaries had plans for using the ocean that
reflected more accurately their desires than anything inherent about
the ocean environment itself. The sea, like other elements of the
natural world, did not simply bend to the will of the engineers and
entrepreneurs of the 1950s and 1960s, however much they expected
it to do so. The technologies, industries, and capabilities that Clarke
and others predicted—such as atomic submarine engines transporting
cargo underwater in giant rubber bags, massive-scale farming of plank-
ton or ranching of whales, profitable mining of a host of minerals and
metals from seawater, or the possibility of communication with
whales and dolphins—did not come to fruition. While the offshore
oil and gas industry did emerge, other undersea industries involving
workers operating, even living, deep under water did not. In 1969
the experimental saturation diving program, SEALAB III, was termi-
nated after the death of diver Barry Cannon during emplacement of
the habitat. Two years earlier, the Apollo program continued after
the fiery death of three astronauts on the launch pad. There are
many reasons for the failure of the dreams for using the ocean harb-
ered by the likes of Clarke and his contemporaries—and for the con-
tinuation of space exploration when it seemed, to ocean enthusiasts,
that the promise represented by Trieste and SEALAB went regrettably
unfulfilled.

Because the space frontier overshadowed the ocean frontier in the
decades after the Second World War, it is essential to examine these
frontiers relative to one another. The ocean possessed characteristics
recognized as associated with Turner’s frontier: resources to fuel eco-
nomic development and increase standard of living as well as the
setting for the outlet of human energy and the progressive develop-
ment of human culture. At times the space and ocean frontiers
seemed similar, but analysis of the writings and life of Arthur
C. Clarke, who immersed himself in both of these realms, reveal a
crucial difference. The value of the ocean frontier rested in the vastness
of its potential economic resources. Space, however, was ultimately
judged a better frontier because of its potential to serve human
spiritual and cultural needs endlessly into the future.

Articulation of this difference offers insight into current ocean
issues. It illuminates the frustration expressed by ocean boosters
from the postwar period to the present that ocean exploration is
wrongly neglected relative to exploration of outer space. Boosters of ocean exploration apparently have a hard time arguing that earth-bound exploration is not simply a “mopping-up operation.” The cultural promise offered by the infinite extent of space came to resonate more strongly, by the end of the 1960s, than the fading dreams of the fabulously wealth to be derived from the ocean’s depths. The stubborn persistence in viewing the ocean in terms of its economic resources has contributed to massive global overfishing, depletion of other marine resources, and cascades of unintended ecosystem effects. While concepts of conservation and preservation were applied to land at the turn of the twentieth century, and Aldo Leopold articulated the need for a land ethic at midcentury, recognition of the ocean as an environment in need of protection and ethical treatment has emerged slowly and recently. The enthusiastic identification of the ocean as frontier created a legacy for human use and understanding of the sea and its resources that remains with us to the present.

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Notes

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1 Among the earliest was Rachel Carson, The Sea Around Us, first published in 1951.


7 SCUBA was later simply considered “scuba.”


11 This goal is articulated in Rozwadowski’s essay, which reviews literature that might be construed as contributing to a history of the oceans: Helen M. Rozwadowski, “Oceans: Fusing the History of Science and Technology with Environmental History,” in *A Companion to American Environmental History*, ed. Douglas Cazaux Sackman (Malden: Wiley-Blackwell, 2010), 442–61.

12 See, for example, the *New York Times* obituary from March 19, 2008. I believe that a more detailed treatment of Clarke’s life is warranted because his engagements with the ocean, which included adventure, business interests, pursuit
of technological innovation, enjoyment of the physical experience of diving, and the domestic relationships that formed the context for his ocean-oriented activities, reflect the kinds of connections that his contemporaries had and sought with the sea. See Helen M. Rozwadowski, “Playing by—and on and under—the Sea: The Importance of Play for Knowing the Ocean,” in Knowing Global Environments: New Historical Perspectives on the Field Sciences, ed. Jeremy Vetter (Piscataway: Rutgers University Press, 2010), 162–89.


16 They met at the White Horse, a pub where Clarke spent Thursday evenings with fellow “space cadets” talking about books and other matters. This pub was later memorialized as the setting for Clarke’s comic tall tales, told by the fictional narrator Harry Purvis, published in 1957 as Tales from the ‘White Hart.’ McAleer, Arthur C. Clarke, 67. Richard Boyle, “The Enigmatic Mr. Wilson: Part I: Submarine Safaris and Adventures,” The Sri Lankan Sunday Times, March 2, 1997, sundaytimes.lk/970302/plus4.html.


18 Heron Island was the setting for scenes in The Deep Range and served as a model for the setting in Dolphin Island: A Story of the People of the Sea (New York: Holt, Rinehart & Winston, 1963).


McAleer, *Arthur C. Clarke*, 165. Clarke’s so-called turn away from the sea also coincided with the departure of Mike Wilson from his household; Wilson, and later his wife and first child, had lived with Clarke, whose household often included close friends who were not relatives. As was the case with Wilson, these friendships were often both personal and business ones. All of Clarke’s joint ventures and activities with Wilson were oriented around the ocean, mostly involving diving. After Mike and his family moved out of Clarke’s house in the early 1960s, they continued their many business partnerships for several more years until a falling out in the late 1960s ended communication between them entirely. Clarke’s active engagement with the ocean in his writings declined in step with the increasing distance between him and his former diving partner, and it seems likely that the two trends were related.


Quoted in Matsen, *Jacques Cousteau*, 160.


Ibid., 99, 111.

Ibid., 88–89.


 Clarke, *Challenge of the Sea*, 92–111.

 Rozwadowski, “How the Sea Became a Frontier.”

 Clarke, *Challenge of the Sea*, 101–2; quote on 101.

 Ibid., 121.


 Clarke, *Deep Range*, 265.

 Clarke, *Challenge of the Sea*, 342–44.

 Ibid., 346. This sentiment of Clarke’s has been widely shared by commentators throughout at least the nineteenth and twentieth centuries, and probably before.


 Clarke, *Deep Range*, 300–1.

 Ibid., 359–62.

 Ibid., 396.

 Ibid., 405–13.


 Clarke, *Deep Range*, 488.

 Frederick Jackson Turner, “The Significance of the Frontier in American History,” in *The Frontier in American History* (New York: Dover. 1996); first edition of this volume was published in 1920 and the essay was first delivered as a paper in 1893.


 Ibid., 84–85.
60 Ibid., 83.

