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Humanizing the *Seas*

A Case for Integrating the Arts and Humanities into *Ocean Literacy and Stewardship*

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Plastic Catch · Susan Schultz
porcelain and wood sculpture

Immersing the arts:
Integrating the arts into ocean literacy

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Abstract

This article tracks efforts to diversify Connecticut Sea Grant's funding portfolio with an arts-focused award program and examines the implications of that effort. For over ten years, CTSG has supported its Arts Support Awards Program, funding one or more individual artists or a collective each year. The program has led to a ten-year retrospective exhibition of the works of awarded artists and spawned a series of associated artist's talks and transdisciplinary panels. Broadening ocean literacy to incorporate the arts and "blue humanities" leads to a richer and more robust knowledge of the ocean, enhances the process of learning and becoming ocean literate, and can generate value-driven or emotional responses that may catalyze conservation ethics. More research is needed to assess empirically the impact of the arts on ocean stewardship and conservation behaviors.

Prologue

Shortly after I began working at Connecticut Sea Grant (CTSG) as their research coordinator, my friend, the artist Diane Barcelo, invited me to visit the studio of sculptor Susan Schultz. At that time, Susan was creating finely detailed porcelain still-life sculptures of coastal and marine detritus. Her work is meticulous and provocative: carefully arranged recreations of natural detritus and anthropogenic flotsam and jetsam. (The cover of this issue of *Parks Stewardship Forum* features an example.) Schultz visited the beaches and waterfronts of coastal New England towns; collected, mapped, and photographed selected items of debris from the wrack line; and then sculpted and composed arrangements of these objects. She spent hours searching the wrack line for pieces of debris worked on by natural forces: eroded, rusted, wave pounded, encrusted in barnacles or mussels. Her pieces are actually three-dimensional portraits of the items she collects on the beach arranged together in still-life compositions (Figure 1).

After my visit, I realized I saw the beach differently. My vision had changed; I considered process and form, trajectories of change and transformed aesthetics. My motivations and perceptions were altered by a quest to recover human detritus transmuted by natural forces into items with hybrid identities: part human, part "natural"; their hybridity questioning the dichotomous separation of humans from nature.

Introduction

One year ago, in May 2019, the official arbiters of geologic time on Earth decided it was time to end the Holocene. Members of the Anthropocene Working Group, part of the Subcommission on Quaternary Stratigraphy, which in turn is part of

FIGURE 1. *New Bedford, Massachusetts,* by Susan Schultz (porcelain and wood sculpture). Photo by Dean Powell.

the International Union of Geological Sciences' International Commission on Stratigraphy, voted 29 to 4 in favor of moving forward to formalize the earth's entry into the Anthropocene, a new "chrono-stratigraphic" unit.[1] A formal declaration of this new epoch is planned to occur in the next year or two. The Anthropocene demarcates the current geologic period in which humans have come to dominate the lands, waters, geochemical cycles, and living organisms of the earth. The antecedents of this shift to a new epoch reach back to the 19th century but gained traction in the last few decades.[2] In 1997, a seminal paper by Peter Vitousek and co-authors laid out the ways in which humans are dominating the earth.[3] In 2000, in a very brief article placed on page 17 of the *Global Change Newsletter,* Nobel prize winner Paul Crutzen and co-author Eugene Stoermer suggested that humans have changed the geology, biology, and ecology of planet Earth to such an extent that we are now living in a new geological epoch: the Anthropocene, where humans have become geologic agents on par with natural climatic, tectonic, and erosional forces that have demarcated other epochs.[4] In another brief article, Crutzen and co-author Christian Schwägerl put forth the argument that humans "are no longer disturbing natural ecosystems. Instead, we now live in 'human systems with natural ecosystems embedded within them.' The long-held barriers between nature and culture are breaking down. It's no longer us against 'Nature.' Instead, it's we who decide what nature is and what it will be."[5]

Many of the anthropogenic processes driving the Anthropocene forward seem to resist resolution: climate change, the decline and even impending extinction of species, challenges in land use and wildlands management, issues involving environmental and social racism, and a host of others. From the perspective of the ocean, the dominant landform on earth, the changes associated with the Anthropocene loom large, and include warming seas, acidifying waters, loss of biodiversity, changing ocean currents, pollution, coastal development, overfishing, and disrupted benthic habitats, among others.[6] Complex, contentious, politically divisive, socially troubling, intractable problems, often with ecological, political, or social origins have been called "wicked, messy policy problems."[7] Clearly, these problems will not be solved by science alone. The solutions to today's complex environmental

problems will require transdisciplinary approaches and must emerge from robust problem definitions that engender compelling narratives, shared values, and broad-based coalitions.

As an interdisciplinary environmental scientist, I have focused on different approaches to understanding and managing coastal resources. I spent years as a practitioner and an academic, both engaged in and studying native fisheries management in the Pacific Northwest and Alaska. I understand that different cultures have their own knowledge systems and privilege different ways of knowing. I see the utility and necessity of bringing diverse voices, including those of marginalized groups, to the table to share their stories, experience, and knowledge and to collaborate in decisionmaking. I see the wisdom and necessity of employing multiple disciplinary theories, methods, and perspectives to address the pressing and existential environmental issues that our society faces.

How can the arts contribute to these efforts? Often society's approach to addressing environmental issues has been to define them narrowly using science and propose technical policies as solutions. These strategies have not always succeeded, most notably in the case of climate change, where scientific consensus on the technical dimensions of the problem has not generated effective policy responses.[8] A potential solution entails developing broader issue framings for problems that speak to core values and engage emotions. The arts, I believe, have a unique capacity to shape and connect our understandings, values, and emotions and motivate us to change our behaviors in response. That is, of course, how advertising succeeds in its quest to mold our consumption and purchasing decisions.

In this paper I trace the efforts and impacts of diversifying CTSG's funding portfolio with an arts-focused award program and examine the implications of broadening ocean literacy to incorporate the arts and "blue humanities" disciplinary perspectives with those of the natural sciences. I ask how does integrating the arts and humanities: (1) construct more robust and durable conceptions of the ocean; (2) enhance learning about the ocean; (3) impact how we value the ocean; and, (4) promote stewardship and conservation behaviors. This integration aims to facilitate the goals of ocean literacy in by: (1) enhancing the process of learning and becoming ocean literate; (2) leading to a richer and more robust knowledge of the ocean; (3) creating value-driven or emotional responses that catalyze conservation ethics; and (4) motivating behaviors that promote ocean stewardship.

As the research coordinator of CTSG, I administer all of the program's competitive funding programs, most of which support research in the natural and social sciences focused on Connecticut's marine and coastal environments. After meeting Susan Schultz, I reflected on my reconfigured relationship with the coast, my refreshed perception of wrack line detritus. I reasoned if this could happen to me, it could happen to others. Schultz told me that in 2005, her work had been supported by a Visual Arts award from Rhode Island Sea Grant (RISG).[9] With this support, she began her "Cities and the Sea" series, which comprised the work I had seen in her studio.

The arts have a unique capacity to shape and connect our understandings, values, and emotions and motivate us to change our behaviors in response.

Why couldn't CTSG create a program like RISG's and provide similar support for the arts? After I proposed the idea at a staff meeting, it was tweaked and expanded from visual arts to encompass arts writ large: painting, sculpture, literature, music, dance, film, photography, theatre, puppetry, and other emerging and experimental genres. The CTSG Arts Support Awards Program was launched in 2010.[10] Now over a decade into this experiment, the program is modest in size and scope, supporting up to $1,000 in materials and supplies for an artist or group of artists each year, sometimes funding two in a year. Fourteen artists have been supported over the tenure of the program, creating art that explores the biodiversity and health of Long Island Sound as well as important environmental and social issues facing marine and maritime communities: issues such as marine pollution,

the decline of the world's whale populations, and the role of women in US maritime history. Over this decade, many of the artists have had their CTSG-supported work exhibited in the University of Connecticut's (UConn's) Alexey Von Schlippe Gallery and several have given campus talks. For the past two years, the Connecticut Department of Economic and Community Development Office of the Arts has contributed funding to expand the program.

Integrating the arts and sciences

In 1939, Albert Einstein wrote that the arts and sciences are branches of the same tree of knowledge.[11] The term "consilience" was proposed by E.O. Wilson to refer to the linking of knowledge across disciplines, creating more holistic understandings better able to decipher the complex and dynamic systems that comprise our world and the wicked, messy problems by which we are beset.[12] It has also been proposed that art–science collaborations could lead to breakthrough discoveries by encouraging "learning at the edge of chaos," adventurous exploration that maps the "sea of ignorance."[13] A recent essay in "The Big Ideas," a component of the *New York Times*' "The Stone" philosophy series, included reflections by authors from different disciplines and perspectives on the same question: *Why does art matter*? The series included responses from practitioners and academics involved in the visual arts, film, television, music, literature, science, dance, fashion, and other professions/avocations. Perhaps because he is a theoretical physicist, Brian Greene emphasized ideas similar to those of Einstein in his essay pondering the significance of the arts:

> Physicists approach [truth] through their analyses of fundamental particles and the mathematical laws that govern them. Chemists illuminate it by invoking collections of these particles, organized into atoms and molecules. Biologists consider higher levels of organization, amalgamating atoms and molecules into the fantastic complexity evident to us within cells and life forms. Psychologists, neuroscientists, and philosophers add further layers still, examining the workings of the mind and the questions minds can pose about themselves and their experiences. No single story tells it all. Only by blending insights from each of these accounts can we gain the fullest understanding. Art is a critical component of this project, a pathway toward a yet broader variety of truths that encompasses subjective experience and celebrates our distinctly human response to the world.[14]

Of course, this notion that there is value in integrating disciplinary perspectives and tools is not new. What may be new is the idea that transdisciplinary teams of experts in different fields will help unlock the mysteries of the complex problems facing society. The idea of the "Renaissance man," a polymath skilled at varied subjects, emerged in the 14th century, or even earlier, to refer to individuals with diverse talents and interests. Leonardo da Vinci is often acknowledged as the epitome of this concept, evincing expertise and producing works as an inventor, artist, scientist, mathematician, and engineer.

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The work of Alexander von Humboldt, the 18th- and 19th-century German explorer, scientist, geographer, and philosopher, falls into in the realm of polymathy. In fact, a recent biography actually calls him "one of the last polymaths" and goes on to note that when he died, "scientific disciplines were hardening into tightly fenced and more specialized fields."[15] His name is securely fastened to more places and species than any other human, including natural phenomena as diverse as ocean currents, penguins, and mountains.[16] He collected data from areas all over the world, and developed the ideas of climatic zones, isotherms, and the web of life—or the idea that all things are connected which underpins the modern science of ecology. Perhaps most significant were Humboldt's efforts to make his works comprehensible to non-experts, thereby expanding the audience interested in his work. He developed ways of visually translating and synthesizing multivariate information, incorporating thousands of data points he had collected into a single comprehensive figure. His "thematic maps,"

as he called them, presented scientific information in an accessible manner and augured future developments in the fields of science communication, data visualization, and infographics.

Influenced by Humboldt, Ernst Haeckel, the 19th- and early 20th-century artist/scientist, also embraced multiple disciplinary callings in his life. Haeckel, a German biologist, naturalist, philosopher, physician, professor, marine biologist, and artist, struggled to reconcile his dual callings in the arts and sciences: "For Haeckel the act of drawing was the best method of understanding nature. With pencil and paintbrush, he said, he 'penetrate(d) deeper into the secret of her beauty' than ever before; they were his tools of seeing and learning. The two souls in his breast had finally been united."[17] He created many of the illustrations of organisms collected during the *Challenger* voyage and compiled in the 50-volume report of the voyage's findings. He coined the term "ecology" (or "oecologie") in 1866 to refer to Humboldt's field of study. Haeckel defined the word, based on the Greek word "oikos," meaning "home" or "household," as the "science of the relationships of an organism with its environment."[18] His scientific illustrations portray a high-level aesthetic sensibility and are anatomically detailed and precise as well. His illustrations of microscopic organisms played a particularly important role in educating the public about the beauty and nature of these organisms so small as to be invisible to the naked eye.[19] He is particularly known for his work cataloguing, naming, and drawing radiolarians, a group of siliceous zooplanktonic organisms.[20] Darwin is reported to have been particularly impressed by these works.[21]

Anna Atkins, a contemporary of Haeckel, also integrated science and art in her work, innovating the photographic technique of cyanotype. Her ethereal blue images were both beautiful and structurally detailed. In 2018 when the New York Public Library hosted an exhibition of Atkins' work, the *New York Times* noted, "these resonant cyanotypes are also artifacts from a time when science and art were better acquainted."[22] Atkins compiled stunning blue cyanotype images of algae in a book, *Photographs of British Algae*, the first portions of which were published in 1843, with additional content added in subsequent years. It was the first book to be illustrated with photographic illustrations. Photographic methods had only been developed in 1839, simultaneously by two different individuals: the British scientist William Henry Fox Talbot, who called his new technique "photogenic drawing," and the French artist Louis Daguerre. The cyanotype process was developed three years later by the chemist and astronomer Sir John Herschel. Atkins' cyanotype images "are as significant for the development of photography as for the history of science," according to the *New York Times*.[23]

The list of individuals who have fused the sciences and arts is long, but I have selected these three because their works allowed others to "see" the world differently, particularly its small, submerged, and otherwise obscured parts. By seeing the world differently, we have been able to know our world better. This process of enhancing vision through the integration of multiple perspectives brings to mind the Indian parable of the six blind men and the elephant. Each blind man in the group grabs a different part of an elephant—side, tail, trunk, leg, ear, etc.—and with their limited information each comes to a different conclusion regarding the nature of the beast they hold. Different iterations of the parable have either an argument among the group members leading to efforts to communicate their perspectives with each other or, alternatively, a wise man coming onto the scene to help negotiate an understanding. In any of these scenarios, the truth that emerges requires that each partial insight be shared and integrated to construct a complete understanding of the nature of the elephant. Integrating multiple perspectives and disciplines is likely to yield more robust understandings of problems and eliminate the blinders that sometimes constrain the range of potential solutions considered.

Integrating the arts into STEM education

The idea that diverse types of knowledge and ways of knowing might create more robust knowledge and improve learning outcomes, as Einstein noted in his 1939 essay, initiated an effort by the National Academy of Sciences (NAS) to review the empirical evidence. This led to the publication of a 2018 book that explores the challenges and opportunities associated with integrating the humanities and arts with science, technology, engineering, and math (STEM) disciplines, and an additional "M" for medicine (STEMM).[24] The book laments recent

shifts towards hyper-disciplinary "silo" thinking and teaching, and seeks to find paths towards greater integration.

The STEM disciplines have been promoted in US elementary and high schools as well as colleges. These fields are seen as important in producing graduates to fill new, cutting-edge jobs, generating economic growth, and developing critical thinking and a scientifically literate population. Beginning in 2010, the Rhode Island School of Design was one of the first institutions to promote the integration of the arts and design into the national agenda of this STEM model of education and research, shifting the educational paradigm towards STEAM.[25] STEAM education uses project-based learning that integrates disciplines, engages students, makes learning more fun, and creates inclusive learning environments.[26]

Among the many conclusions of the 2018 NAS report is "that some approaches that integrate the humanities and arts with STEM have been associated with positive learning outcomes. Among the outcomes reported are increased critical thinking abilities, higher-order thinking and deeper learning, content mastery, problem solving, teamwork, communication skills, improved visuospatial reasoning, general engagement and enjoyment of learning."[27] At its end, the report concludes that the

> vitality of the whole depends on the combined force of the parts. The trunk of the tree represents the core strength of the disciplines in higher education—the centralizing force that directs students through the course of academic study. Yet the branches—where Einstein located religion, arts, and sciences—could also be seen as the locations for integration, as they move away from the trunk yet remain integrally connected to the core strengths of the whole. Most importantly, the branches create opportunities for trees to connect to each other. In a forest, the canopy of intersecting branches connects distinct units. In this metaphor, it is the connections between branches and trunk (and roots), rather than the singular strength of any one part, that make the tree healthy and viable.[28]

Integrating the arts into ocean literacy

Although oceanography is often claimed to be one of the newest sciences, its antecedents reach back many tens of thousands of years. Voyagers used their knowledge of the marine realm to navigate across vast water bodies seeking out new lands and resources. The field of oceanography reflects the culmination of decades of practices, technologies and questions dedicated to creating knowledge about the ocean.[29] Modern oceanography is usually thought to begin with the four-year *Challenger* voyage in 1872, dedicated exclusively to studying the ocean environment from physical, chemical, geological, and biological perspectives. An official artist, John James Wild, also joined the expedition. In addition, some of the expedition's collection was shipped to other artists, including Ernst Haeckel as described in the previous section. The HMS *Challenger,* outfitted with a darkroom, used photography to document the work of the voyage. Hence, from its very beginning, oceanography has been an inherently interdisciplinary endeavor, combining multiple scientific perspectives along with the arts.

The Rhode Island School of Design was one of the first institutions to promote the integration of the arts and design into the national STEM model of education.

"Ocean literacy" is a relatively new term, coined around 2004, the result of the efforts of a grassroots group of scientists, formal and informal educators, governmental agencies (e.g., National Oceanographic and Atmospheric Administration), and professional organizations (National Geographic, National Marine Educators Association) who met over several years.[30] The principles of the formal Ocean Literacy program were developed in part as a reaction to new national science literacy standards, which, for the most part, omitted any focus on ocean science.[31] Seven principles and a suite of 45 fundamental concepts comprise the Ocean Literacy principles, which at heart are "an understanding of the ocean's influence on you—and your influence on the ocean," according to the National Marine Educators Association Ocean Literacy website.[32] For the most part, the principles derive from natural sciences perspectives and ignore the historical and culturally diverse ways in

which the ocean has been conceived and elaborated, as Rozwadowski explains in the second article of this thematic section of *Parks Stewardship Forum*.

But as our crowded world moves into the Anthropocene, it may be instructive to step back and acknowledge that the ocean has not always meant, and even now does not mean, the same things to all people. Only recently has the ocean been framed as a singular feature of our planet—the first principle of Ocean Literacy. This leads one to ask, what exactly is the ocean? Is it an empty basin, bathymetrically defined? Is it filled, a hydrologically complete body of salty water? Is it an ecosystem, home to plants, animals, and microbes with abiotic characteristics and forces and processes? Or is it a human space, a platform for commerce and transportation, a defensive theatre for staging geopolitical moves, a realm of inspiration, a setting for spiritual reflection? The science of oceanography attempts to blend disciplinary perspectives to understand the physics, chemistry, geology, and biology of this space, accumulating knowledge through the scientific method, erecting a reified edifice that serves as the ocean. Is there room for other disciplinary perspectives, transdisciplinary thoughts, spaces to construct new social understandings and cultural meanings? Who decides what the ocean is?[33]

Although the ocean has long played a supporting role and been used as a backdrop for works in the humanities and arts, scholars have only recently taken a more critical approach, focusing these efforts under the rubric of Blue Humanities.[34] According to Steve Mentz, one of the leading scholars of this integrated and reflective approach, the "Blue Humanities names an off-shore trajectory that places cultural history in an oceanic rather than terrestrial context."[35] He further conceptualizes four "interpretive clusters" to group works within the humanities at the human–ocean interface: wet globalization, blue ecocriticism, salt aesthetics, and shipwreck modernity,"[36] which identify future trajectories for the blue humanities. Salt aesthetics and blue ecocriticism are most relevant here.

Salt aesthetics explores the influence of the marine realm, "the disorienting pressure of the inhuman environment of the sea" on the arts, broadly conceived.[37] Although images of seascapes have been a part of Western art traditions for as long as those depicting landscapes,[38] it was not until the 19th century that the definition of *seascape* entered the lexicon of the arts.[39] The seascape genre has been explained as "an organization of expressive gestures that can give permanence to our visual awareness of the sea, the coast, and the voyage. As such it is as much a record of our thoughts and feelings about that fluid outer space and our attempts to map it and to impose upon it a conceptual grid as it is a documentary record of that space itself.…"[40]

For environmental- and ocean-focused artists, their art can be a source of identity, ideas, inspiration, and materials. The 19th-century shift of artistic gaze towards the ocean came as "pristine nature, now in short supply in industrialized heartlands, found refuge in the oceans, while the mystery once associated with terra incognita relocated to the deeps."[41] And with this shift, the idea of the sublime, once grounded to mountains, precipices, and waterfalls, became linked to the ocean world.

The idea of the sublime was introduced in 1757 by Edmund Burke who wrote, "The passion caused by the great and sublime in nature, when those causes operate most powerfully is astonishment, and astonishment is that state of the soul in which all its motions are suspended, with some degree of horror."[42] According to Burke, a certain opaqueness or obscurity is necessary to create terror and this, combined with the allure of the ocean, drives it to become sublime. Dugald Stewart (1818) noted that the "idea of literal sublimity is inseparably combined with that of the sea, from the stupendous spectacle it exhibits when agitated by a storm."[43] It is the ocean's sublimity that generates inspiration to create. And this is woven into the narrative of the 1840 novel *A Shabby Genteel Story* by William Makepeace Thackery who wrote, "a true artist is never so happy as when he can have the advantage to gaze upon yonder tempestuous ocean in one if its angry moods."[44]

Blue ecocriticism interrogates the role of the ocean in environmental thought and sustainable thinking, moving from (stable/pastoral) green ecologies to chaotic/dynamic marine environments. As with its "green" cousin, blue ecocriticism embeds itself in post-modern, reflective critiques that examine the way we represent, interact with, and construct ocean and maritime space, including the "natural" and "humanmade."[45]

It might be prudent to perceive this ocean world as constructed space, full of cultural meanings, created and accumulated over centuries of human thought. Ocean literacy should entail an understanding of the dynamic nature and nexus of the human–ocean relationship and provide some acknowledgement of "that great sprawling corpse and its many scattered corpuses, the human, animal, textual, and intellectual flotsam and jetsam circulating through every ocean current in the world."[46] Simply put, the ocean is an idea, or actually a collection of ideas, all products of human creativity and thought, that reference and reflect a dominant physical reality of our planet. Seeing the ocean in this way does not mean "there is nothing 'out there.'" The ocean is not simply an abstraction; it exists. Rather, this emphasizes the fact that our understandings of this wild, wet, and salty place "are the products of a highly creative interaction between human minds and the cosmos. The cosmos may be found; but the ideas we form about it, and the things we say about it, are made."[47]

Integrating the arts: Shifting values, fostering conservation

Certainly, integrating the arts and humanities into ocean literacy will add new dimensions to our understanding of the ocean. It will at least provide room for the integration of human creativity and history into this realm. But will this integration enhance ocean stewardship and conservation? Recent interdisciplinary research has explored the role of the arts in enhancing traditional cultural values and stewardship and inspiring concomitant behavior changes that promote conservation. In their study of Inuit artists in Nunavut, Canada, Rathwell and Armitage found that the process of artmaking connected artists to their Indigenous culture and traditional knowledge and practices. And this allowed them to maintain identity and cultural continuity in the face of environmental and social change and enhance learning and adaptation necessary to persist in the face of these changes.[48]

In their analysis of eight community environmental arts events in Australia, Curtis, Reid, and Reeve posit a model that explains the mechanisms through which the arts shape environmental behavior. They delineate three pathways in which the arts influences behavior by: (1) educating and communicating with viewers in an engaging manner, (2) creating empathy towards the natural world, and (3) embedding the arts in sustainable action and development.[49]

Jacobsen, Seavey, and Mueller also found that integrating the arts improved learning outcomes associated with creating novel ways of communicating about climate change mitigation and adaptation. They noted that integrating art into their field-based graduate natural resource management course "helped to make climate change impacts real and normalized what some students believed was a controversial scientific topic." They concluded that the arts led to more inclusive learning environments and improved learning outcomes and creative communication related to climate change.[50]

Ocean literacy should entail an understanding of the dynamic nature and nexus of the human–ocean relationship.

Art that is specifically created as environmental art is a hybrid that explicitly intertwines aesthetic, ethical, and political threads, often with an objective of social engagement.[51] The power of environmental art to instill stewardship values and behaviors seems to provide a space where nature, society, and science can intersect, connect to our core values, and elicit emotional responses. The artist Judy Chicago explicitly addressed this nexus in a recent *New York Times* essay, noting that she makes her own art to "educate, inspire and empower viewers to effect change," and that "when art is meaningful and substantive, viewers can become enlightened, inspired and empowered. And this can lead to change, which we urgently need."[52] There are many artists now working in this area of environmental art. Chris Jordan's *By the Numbers* series, Maya Lin's website *What Is Missing?*, Judy Chicago's art installations, Courtney Mattison's sculptural depictions of coral reefs, and Olafur Eliasson's *Ice Watch* are among a growing number of artists' works that explore environmental, specifically ocean-focused, threats. Even Google has a webpage that showcases "arts and culture experiments" which merge science and art into compelling visual presentations focused on various topics.[53] In these environmental works and

others, art serves as creative space, communication, persuasion, critique, problem-solving; it creates knowledge, ritual, community, conversations, narratives, metaphors; and it connects with our senses, values, emotions, spirituality, and intellect.

Some artists describe their art and inspiration to be spiritual in nature. Stuart Hyatt, a sound artist who describes his work as "Interdisciplinary Projects combining Art, Music, and Science," is currently involved in a project to record the ultrasonic language of bats and use these sounds as the basis of new musical works. His current work, *Ultrasonic*, is the eighth album he has recorded in the *Field Works* series. His goal is to "tell evocative stories about our complicated relationship with the natural world." In a recent interview, Hyatt noted, "I have a real craving for a deeper connection with our world. I approach sound and music with this spiritual longing to feel the whole thing—even if I don't know what the whole thing is yet."[54]

Integrating the ocean and arts: CTSG Perspectives

Since the inception of the CTSG Arts Support Awards Program in 2010, 14 artists have received support for assorted items including training, contracted services, materials, and equipment.[55] The program has changed each year in response to feedback from an independent review panel that evaluates submissions and critiques the administration of the program. The following synopses of the supported projects are extracted from the artists' statements for the 2019 CTSG *Crosscurrents* exhibition at the Alexey von Schlippe Gallery at the Avery Point campus of UConn.[56]

The first artist to be funded by the CTSG Arts Support Awards Program was Debbie Hesse, who created *A Parallel Guide to Seaweed,* an artistic book that, in her words, serves "as a counterpart to a traditional field guide to New England Seaweed, informed by observations, interactions and interventions with nature, and current aquacultural research." Hesse "invented unique hybrid forms that referenced traditional practices of Victorian pressed flowers, silhouette portraiture, parallel botany, and notions of utopia/dystopia through a combination of drawn, scanned, and altered imagery"[57] (Figure 2).

Sculptor Jeff Slomba carved large chunks of styrofoam collected from beaches into ornamented meditative objects. In another sculpture, he assembled small shards of styrofoam into a large channeled whelk. He noted that his work incorporates "layered references of nature and commerce to create hybrid objects" and that his

> experience of the intertidal zone has been an uneasy reconciliation of the natural and industrial histories of the sea, as the abundance and diversity of polystyrene and plastics found on the beach seem to evenly match the persistence of the natural flora and fauna. The exhibited work developed as a way to complete this conflation of the [Long Island] Sound's material identity. Both the physical material and the imagery for these pieces were pulled (literally, figuratively and virtually) from the sea[58] (Figure 3).

Gar Waterman sculpted large, detailed nudibranchs (sea slugs) out of finely honed stones and created a video documenting the creation of the sculpture.[59] He wrote of his work *Canaries In A Blue Coal Mine* that the sculpture is

> as much about the creatures who inspire it as it is about the artwork itself.... Art inspired by nature has always celebrated a vision that by its very definition is fleeting. Today, as biodiversity vanishes at an unprecedented rate from both above and below the water line, art that describes it takes on a new kind of political urgency. Much of the marine life that inspires these sculptures is threatened by ocean acidification caused by CO_2 absorption, a symptom of the broader issue of Climate Change.... This will affect all of us whether we are responsible for it, care about it, or believe in it or not—it really doesn't matter. We are all in the same boat, sink or swim. Specific examples within the larger picture can help us to understand a very complicated phenomenon, and this is where art and science together have an opportunity to engage and inform more effectively than either might be able to do on their own. This exhibit's art/science dialogue will, I hope, give you pause for thought and a little better understanding of ocean acidification and what it will mean for some of these extraordinary creatures with whom we share this planet[60] (Figure 4).

Watercolorist Lynn Stephens Massey produced the beautifully illustrated book *Aqua Marine, Sea*

FIGURE 2. *Sea Foam* (from *Sway, Shift* series) by Debbie Hesse; exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Lloyd Langevin.

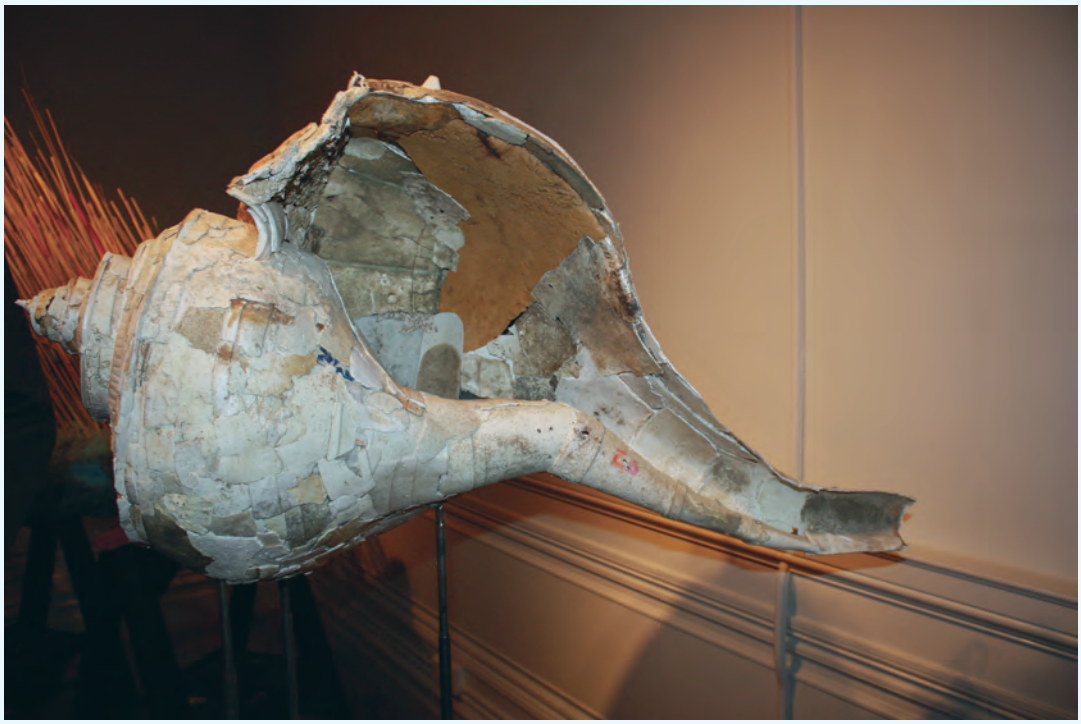

FIGURE 3. *Channeled* by Jeff Slomba; exhibited in 2012 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Syma A. Ebbin

FIGURE 4. *Persian Nudibranch* (from *Canaries in a Blue Coal Mine* series) by Gar Waterman (onyx and travertine); exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Brian Taylor.

FIGURE 5. *Jellyfish* (from *Aqua Marine, Sea Life on Long Island Sound*) by Lynn Stephens Massey; exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Lloyd Langevin.

Life on Long Island Sound, which unfortunately has not found a publisher yet. She notes that nature provides her with artistic inspiration and quotes Rachel Carson as the best way to express this sentiment: "Like the sea itself the shore fascinates us who return to it, the place of our dim ancestral beginnings. In the recurrent rhythms of tides and surf and in the varied life of the tide lines there is the obvious attraction of movement and change and beauty. There is also a deeper fascination born of inner meaning and significance"[61] (Figure 5).

Conceptual artist Sam Ekwurtzel produced blown glass works based on shrink-wrapped plastic water bottles. He wrote that the "series highlights water in a product form, refers to the waste generated by bottled water, represents a cast off piece of trash via the specialized craft of glassblowing, and connects the old world of glass packaging with the new era of plastic packaging. It is an opportunity to contemplate the politics of where and how we choose to get our drinking water"[62] (Figure 6).

Jacob Steinberg, a filmmaker, shot a visually striking documentary about ospreys providing "a unique perspective and unprecedented intimacy into the fascinating story of a life-long pair, following them from their migratory return through the struggles and triumphs of their breeding season.... Theirs is a timeless story of the cycles of nature, of family devotion, of joy in flight, and tragedy in death. It is a story every bit as complex, and vital, as our own human one"[63] (Figure 7).

Carla Goldberg creates large scale sculptural images of sea foam based on her memories of waters in specific places. She visited a different Connecticut beach each month throughout the year and created a series of twelve *Sea Foam Sculptural Drawings*. She writes that, "the delicate, lacy, sea foam drawings act as a synaptic matrix holding a dreamy memory suspended in ethereal light and shadow"[64] (Figure 8).

Graphic artists Anastasiia Raina and Rebecca Sittler created a set of speculative "experimental museum objects" for their installation, *A Further Sea: Jackie's Drift*, which explored the life and adventures of the cross-dressing stowaway Madeline Blair. The artists created an imagined visual narrative and material items to serve as "missing evidence" to enrich the incomplete historical account[65] (Figure 9).

Ashby Carlisle and Diane Barceló created the audio-visual installation, *They Came by Water*, which referenced the cultural and ethnic diversity of individuals involved in the 19th-century whale fishery in New London, Connecticut. This port was the most ethnically diverse in the US at that time, according to the artists. Carlisle and Barceló formed, out of copper wire, common words in all the languages spoken in New London referencing whaling and water, and hung them in a large-format diorama that included voice recordings of words originating from non-written languages such as Pequot and Mende[66] (Figure 10).

Sea, Seen by Lillianna Marie Baczeski addressed marine debris by having landscape photos of the area where debris was collected printed on the pieces of debris themselves. Explaining the motivation behind her work, Baczeski wrote, "the word 'seen' is thought to originate from an Indo-European root shared by the Latin 'sequi,' meaning 'to follow.' The objects I found followed the sea from a place of unknown origin to a place of specificity. The word 'seen' is also a play on the homonym 'scene,' alluding to landscape views I make with the camera when locating each object. I hope viewers of my objects will consider their own views of the sea. How does physical material alter human experiences of the coast? What view does one wish to see from the Connecticut coast in the future? These are questions I hope to raise through my work"[67] (Figure 11).

Entangled Ghost Whales, created by Kristian Brevik, the 2018 CTSG-awarded artist and, at the time, a doctoral candidate in plant and soil science at the University of Vermont, remained after the show ended. The installation, a pod of large, illuminated papier-mâché sculptures of great whales tangled in fishing gear, stuffed with plastic debris, or suffering propeller cuts from a ship strikes filled a darkened room in the gallery. He wrote that the piece "aims to explore the relationship of humans to whales by crafting a fleet of 'ghost whale' lanterns which represent the ghostly nature of our relationship to these creatures, the precarious condition of the North Atlantic right whale population, and 'the Ghost of Extinction Yet To Come.'"

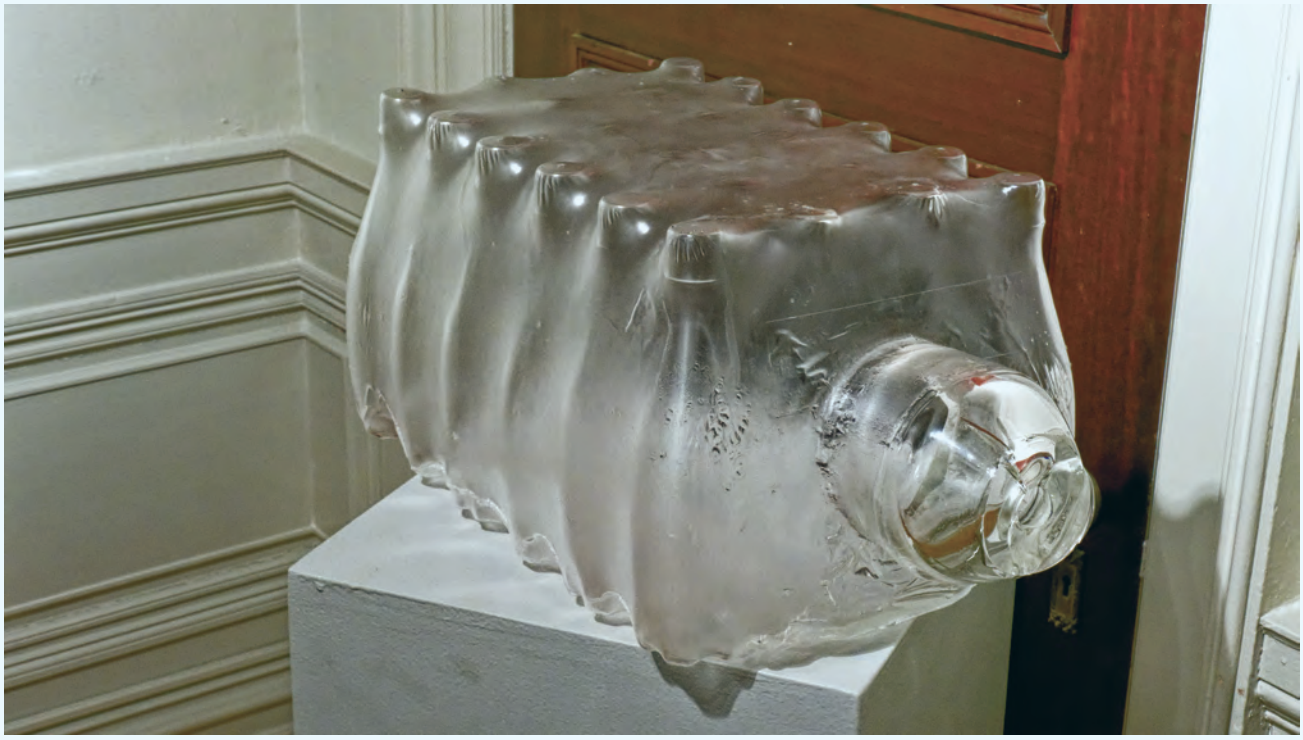

FIGURE 6. *Costco Bulk-Wrapped Water Bottles* by Sam Ekwurtzel (blown glass); exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Brian Taylor.

FIGURE 7. *Osprey* by Jacob Steinberg (movie); shown in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Lloyd Langevin.

FIGURE 8. *Starboard* (from *Sea Foam Sculptural Drawings* series) by Carla Goldberg (mixed media); exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Lloyd Langevin

FIGURE 9. *A Further Sea: Jackie's Drift* by Anastasiia Raina and Rebecca Sittler; exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Lloyd Langevin.

FIGURE 10. *They Came By Water* by Diane Barceló and Ashby Carlisle; exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Brian Taylor.

FIGURE 11. *Sea, Seen* by Lilliana Marie Baczeski; exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Brian Taylor.

FIGURE 12. *Entangled: Ghost Whales* by Kristian Brevik (sculptures); exhibited in 2019 at Alexey von Schlippe Gallery, UConn Avery Point. Photo by Syma A. Ebbin.

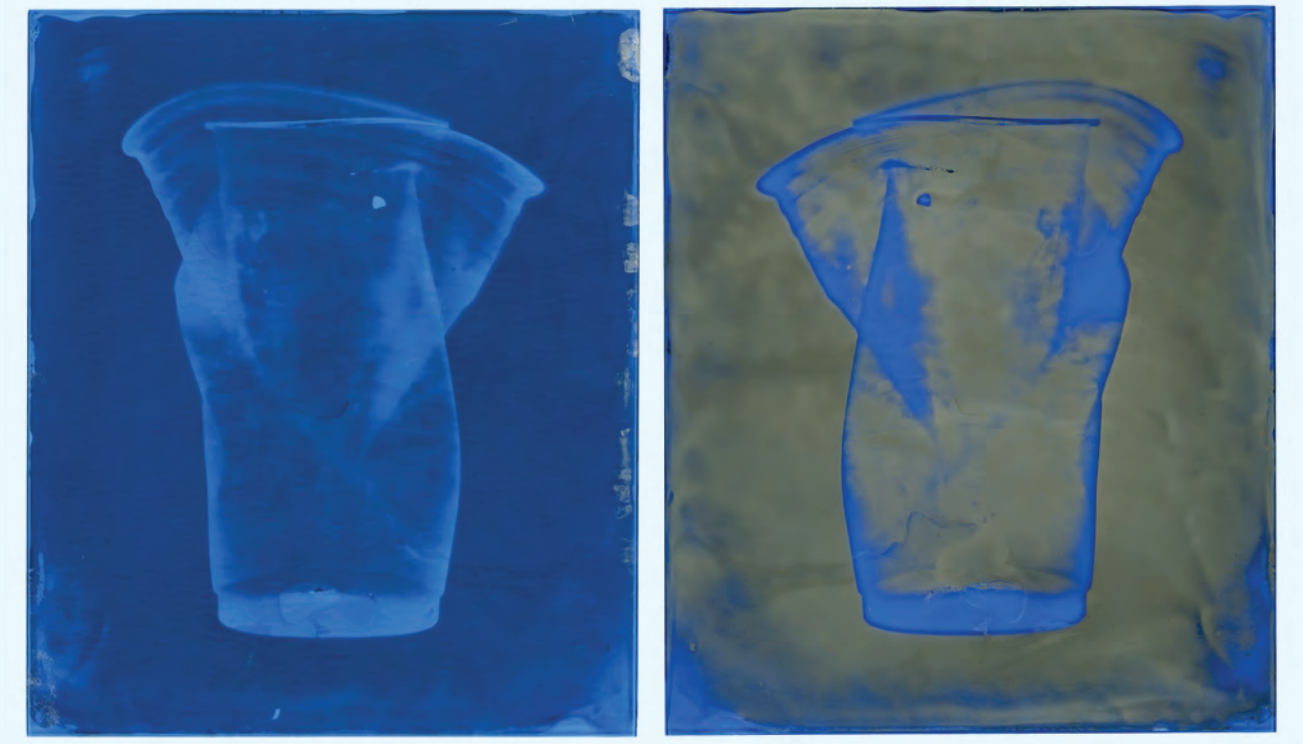

FIGURE 13. *Dunkin Donuts Cup (front/back) Collected on September 19, 2018 from East Beach, RI* by Elizabeth Ellenwood (wet plate collodion on blue glass). Photo by the artist.

Brevik asks the viewers: "Are we willing to allow this species to become a ghost?"[68] (Figure 12).

The most recent artist selected is Elizabeth Ellenwood, a graduate student in the UConn School of Fine Arts. Ellenwood uses photography as a medium to explore connections between the natural world and human impacts on it, especially focused on the plastic debris that is increasingly being found in coastal and marine waters. She uses different photographic techniques, including the historical processes of cyanotype and anthotype printing[69] to capture portraits of plastic debris she gathers along local beaches. (Figure 13).

In 2019, with gallery curator Chris Platts I co-curated *Crosscurrents*, a well-received ten-year retrospective exhibition of the work of artists supported by the CTSG Arts Support Awards Program at the Alexey Von Schlippe Gallery.[70] (Figure 14). In conjunction with this exhibition, I along with Platts led numerous tours for a diverse array of students and faculty in classes ranging from the humanities to the sciences: history of the oceans, marine biodiversity and conservation, marine fisheries economics and policy, and geographic information systems, among others. We presented at a workshop focused on integrating the arts into humanities for UConn's Early College Experience Program, comprising high school teachers who teach UConn courses to their students who earn college credit. I developed pedagogy to help integrate the art show into course content. The show was extended due to its pedagogical relevance and utility to the campus.[71] CTSG produced a short documentary film describing the exhibition and its heuristic impacts.[72]

After the show ended, Brevik's installation, *Entangled Ghost Whales*, remained in a darkened room of the gallery, serving as a backdrop to a public presentation entitled *Art, Science, and Conservation: Saving the World's Great Whales and Other Marine Mammals*. Brevik presented in conjunction with marine mammal biologist Andrea Bogomolni. Their talks focused on the role of the arts in conserving marine mammals, including the North Atlantic right whale, and locating common ground to enhance conservation of marine mammals.

In winter 2020, the works of Liz Ellenwood were shown at the Alexey Von Schlippe Gallery in a one-person show, *Among the Tides*.[73] Ellenwood has developed collaborations with scientists at the University of Rhode Island and Mystic Aquarium and was recently awarded a Fulbright Fellowship to work with marine scientists in Norway. As part of the UConn Avery Point Coastal Perspectives

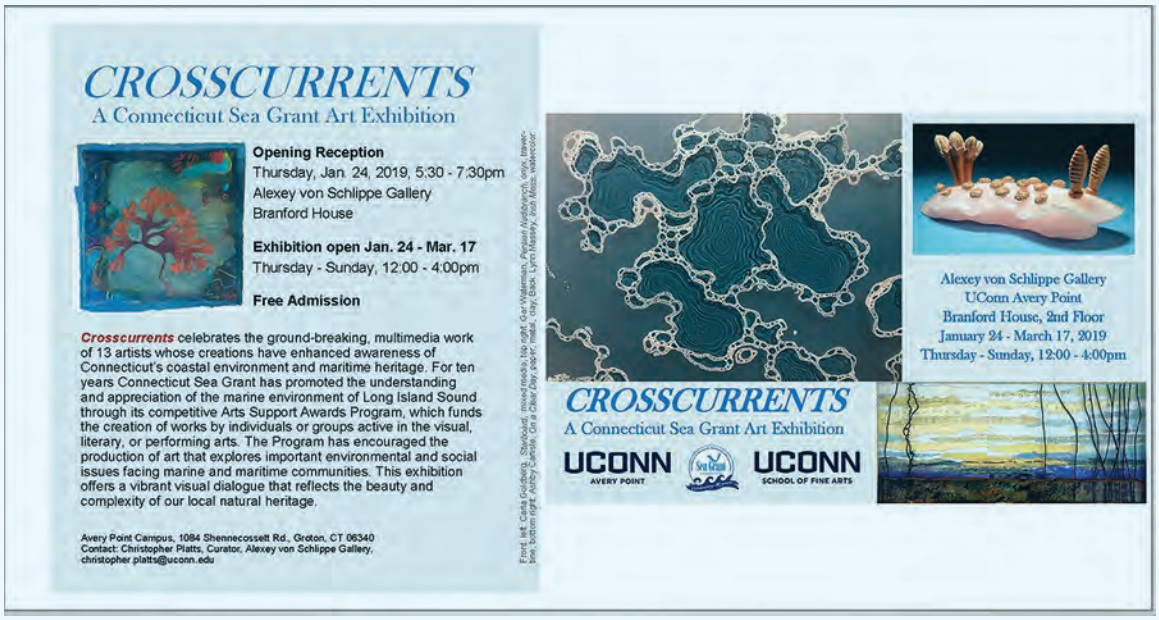

FIGURE 14. *Crosscurrents: A Connecticut Sea Grant Art Exhibition* advertising postcard, 2019. Created by Syma Ebbin and Chris Platts. Images: (left) *Irish Moss* by Lynn Massey (watercolor); (center) *Starboard* by Carla Goldberg (mixed media); (top right) *Persian Nudibranch* by Gar Waterman (onyx, travertine); (bottom right) *On a Clear Day* by Ashby Carlisle (paper, metal, clay).

lecture series, a transdisciplinary panel entitled "Visualizing Plastic: Integrating Science and Art to Inspire Change" was organized, pairing Ellenwood and UConn marine scientist Evan Ward to discuss scientific and artistic approaches to documenting plastic marine debris. Ellenwood presented her artistic inspirations and processes to my marine science students and gave tours of her exhibition to UConn Avery Point students, including those in my upper level maritime/American studies capstone focused on working waterfronts. The exhibit provided a foundation for my class to explore the idea of aesthetics and the working waterfront.

Integrating ocean art and pedagogy

As the educational philosopher John Dewey noted in *Art as Experience,* "art is the most effective mode of communication that exists."[74] Art starts a conversation and creates a space for dialogue. It begins this process internally, a reflective process of exploring a work of art. Art can also generate an external process, creating a space where an audience can have a common experience and reflect and share. In this way, it has the capacity to engage a diverse audience and create a virtual community, linked together by the object of their common gaze. Art creates a space and time for dialogue and discussion, and in this way circumscribes a community. Zoe Rose, a recent Brandeis University alumnae of the Creativity, the Arts, and Social Transformation Program (CAST), commented that the arts play an important role in allowing the stories of often-marginalized peoples to be heard in ways that are ethical. Academic language can be alienating, while the arts levels the playing field and connects with people at an emotional level, creating space for social change and impact. She likened the arts to semipermeable membranes that create physical, temporal, and emotional spaces, which allow some individuals to connect and not others.[75]

For both artist and audience, works of art can act as "artistic boundary objects" which connect social worlds and mediate different knowledge systems.[76] Knowledge, practice and belief are embedded into the artistic process and, as a result, the objects produced and shared help co-produce a hybrid knowledge. For viewers, ocean art can help them learn about the ocean, create richer understandings, connect with emotions and possibly inspire stewardship and conservation behaviors. Actor and producer Cate Blanchette has noted that the ability of the arts to "cross social, partisan and even temporal gaps can help foster a shared sense of understanding. It can bring us together physically and emotionally. And it can teach us about one another, inspiring empathy rather than anger. Art matters because it lets us engage with our complex social fabric, allowing us to cross divides and work toward a safer and more meaningful existence together."[77]

In my fisheries policy and maritime/American studies capstone classes, as well as for the many class tours of ocean-related campus art exhibitions that I led, gallery visits have been paired with a series of questions. I engaged students by challenging them to "listen" to the conversations started by the pieces of art. Art asks questions but doesn't necessarily answer them. What questions do these pieces ask? What conversations are being started? What messages are the artists trying to convey with their choice of subject matter, construction, materials, colors, tones, positioning, composition? The interrogation of ocean-art can be deepened by asking: How is the ocean represented in this piece? How have our conceptions of the ocean changed over time? How are environmental crises or problems depicted in these works? What metaphors or images of how humans have treated the ocean are present in the work? Is the artist/creator urging us to feel, care, or take action, and if so what exactly is suggested? How are ocean creatures depicted and what is their relationship to humans? In what way, if any, is the interplay of power among the ocean, ocean creatures, and humans portrayed? What does the work say about the values and cultural attitudes we hold about the ocean?

I asked my students to write reflective essays exploring how the arts impacts values, understandings, and behaviors as they relate to environmental conservation and stewardship and, more specifically, how this exhibit has impacted them personally.[78] I used Susan Schultz' 2009 installation, *Cities and the Sea,* to begin a discussion about marine plastics. Two traveling shows on water—*Water, Water Everywhere: Paean to a Vanishing Resource* in 2015, and *Unfiltered* in 2018—provided an opportunity to engage students in thinking about the importance of water and anthropogenic impacts. Christian Brevik's *Ghost Whales* formed the basis for a debate on interna-

tional whale governance and the push to reopen commercial whaling. Liz Ellenwood's show, *Among the Tides*, was used to explore the working waterfront as a source of pollution and artistic inspiration.

This effort to integrate the arts into CTSG's funding portfolio and into the pedagogy of undergraduate classes was not undertaken as an empirical study. Students submitted their reflections. One wrote of Brevik's work: "I thought it was brilliant that the artist didn't make just one of these ghostly whale figures, but instead constructed at least ten of them; giving the art's message of death-by-entanglement a sense of magnitude rather than a minute, singular impact on marine mammals." Reflecting on the same piece, another student wrote, "After seeing this piece, I am sure I am not the only one who went and looked up North Atlantic Right Whales and researched about mass deaths and issues with fishing gear and boat strikes. This ignites conversations among people and when it comes to stewardship, those who feel very passionate about this topic may be compelled to join an organization or try to make a difference to help these whales." Another student reflected on Ekwurtzel's glass creation, "I think art can shape people's values and behaviors because people are instinctively emotional. Reading scientific literature can be taxing or unreasonable for the general public and looking at real life disasters or issues can be daunting or sad. However, if you look at a piece like the glass blowing one and think about its parallels and context in terms of people negatively affecting the environment you can elicit emotion and maybe change someone's outcome on simply buying plastics. I know I'm still thinking about plastics."

Conclusions

Being ocean literate does not necessarily translate into positive actions; the knowledge deficit model of pro-environmental behavior has been revealed to be flawed.[79] In 1968 at a meeting of the International Union for Conservation of Nature and Natural Resources (IUCN), Senegalese conservationist Baba Dioum is credited with having stated, "In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught."[80] The summary of research in the previous section demonstrates the value of integrating the arts to enhance learning and create more robust understandings of the environment, and particularly of the ocean. However, research has found that (conservation) action is not predicated simply on knowledge alone. Perhaps part of this behavioral conundrum is located in Dioum's middle step entailing what he terms "love"—emotional attachments and passion that can lead to stewardship conservation behaviors. Although there is no consensus in the social psychological literature on what causes people to act environmentally, it is likely that some mix of knowledge, values, attitudes, and emotional relationship comprise pro-environmental consciousness.[81] Embedded within this discussion is where the critical questions that need answers are found: What promotes pro-environmental attitudes and has the power to transform these sentiments into pro-environmental behaviors? What promotes stewardship and conservation actions? What will inspire us to alter our decision-making calculus concerning what we produce, consume, dispose and how we live? The evidence suggests the need for new or more effective communication strategies and different ways of framing and engaging the public.[82]

Integrating the arts into our environmental thinking along with other perspectives can lead to the innovation of transdisciplinary solutions with the power to transform.

Integrating the arts and blue humanities into ocean literacy will enrich and enliven our knowledge of the ocean and has the capacity to enhance the process of learning about the ocean. However, the effort to stake out and improve the state of ocean literacy is not just about educating a public that lacks this knowledge, but about developing solutions to marine-based problems and implementing actions that are consonant with our culture and values. Integrating the arts into our environmental thinking along with other perspectives can lead to out-of-the-box thinking, the development of new modalities of thought and

action, and the innovation of transdisciplinary solutions with the power to transform. The evidence suggests that this can provide a collaborative space to develop transformative solutions. More research efforts are needed to assess empirically the impact of the arts on ocean stewardship and conservation behaviors. To facilitate these efforts, more funders and funding opportunities should explicitly incorporate the transdisciplinary art–science interface into their funding portfolio, as CTSG has done.

In this new age of the Anthropocene, when humans decide "what nature is and what it will be," it behooves us to remember what the ocean has been and what it could be. The arts and humanities are critical perspectives to weave into the transdisciplinary knowledge essential to guide us as we navigate the wicked, messy problems we face into one of many possible futures.

Acknowledgments

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Endnotes

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66. Ebbin and Platts, *Catalogue*.
67. Ebbin and Platts, *Catalogue*.
68. Ebbin and Platts, *Catalogue*.
69. Anthotype print techniques were developed in 1842 and utilize photosynthetic pigments from plants as the basis of the prints. Ellenwood has used raspberries, purple cabbage, and other plants. The prints fade over time, a trait that Ellenwood has incorporated into her work to accentuate the loss of the world's coral due to ocean acidification and other threats.
70. Kristina Dorsey, "Of 'Ghost Whales' and Sea Foam: Coastal Environment Inspires Art on View at Avery Point," *The Day*, March 12, 2019.
71. Syma A. Ebbin, "Crosscurrents: Connecticut Sea Grant's retrospective art exhibition makes waves," *Wrack Lines* vol. 19, no. 1 (Spring/Summer 2019): 20-21; https://seagrant.uconn.edu/wp-content/uploads/sites/1985/2019/06/wrack-lines-S-2019-access-reduced-size6.pdf.
72. The movie can be downloaded and viewed at https://www.dropbox.com/s/kl34y638tmsnmtj/Crosscurrents%20FINAL%20with%20Acknowledgement.mp4?dl=0.
73. Tom Verde, "As Plastic Trash Fills the Ocean, Pawcatuck Artist Finds a Disturbing Source of Inspiration," *Wrack Lines* vol. 20, no. 1 (Spring/Summer 2020): 9–12.
74. John Dewey, *Art as Experience* (New York: Berkeley Publishing Group, 1934), 286.
75. Zoe Rose, interview, June 10, 2020.
76. Rathwell and Armitage, "Art and artistic processes."
77. Cate Blanchett, "I'm Not 'Mrs. America.' That's the Point," *New York Times*, May 21, 2020; https://www.nytimes.com/2020/05/21/opinion/cate-blanchett-art-mrs-america.html.
78. The specific assignment asked students to select an artwork they believed reflects some aspects of the relationship between people and marine resources: (1) Explain what kind of message or messages you think the artist is trying to convey and how the artwork expresses that message; (2) What do you think the role of art is in shaping people's values and behaviors? and (3) What impacts did the exhibit have on your own thoughts regarding the themes we have explored so far in this course?
79. Anja Kollmuss and Julian Agyeman, "Mind the Gap: Why Do People Act Environmentally and What are the Barriers to Pro-Environmental Behavior?", *Environmental Education Research* vol. 8, no. 3 (2002): 239–260; https://doi.org/10.1080/13504620220145401.
80. A source for this widely repeated statement by Baba Dioum has proved difficult to track down.
81. Sam Dupont, "*I am the Ocean*—Arts and Sciences to Move from Ocean Literacy to Passion for the Ocean," editorial in *Journal of the Marine Biological Association of the United Kingdom* vol. 97, no. 6 (2017): 1211–1213, 1211. https://doi.org/10.1017/S0025315417000376. See also Shona Paterson, Martin Le Tissier, Hester Whyte, Lisa B. Robinson, Kristin Thielking, Mrill Ingram, and John McCord, "Examining the Potential Art–Science Collaborations in the Anthropocene: A Case Study of Catching a Wave," *Frontiers in Marine Science* vol. 7, no. 340 (May 2020), https://doi.org/10.3389/fmars.2020.00340; John Thornes, "A Rough Guide to Environmental Art," *Annual Review of Environmental Resources* vol. 33 (2008): 391–411; https://doi.org/10.1146/annurev.environ.31.042605.134920.
82. Komathis Kolandi-Matchett and Maria Armoudian, "Message Framing Strategies for Effective Marine Conservation Communication," *Aquatic Conservation: Marine and Freshwater Ecosystems* vol. 30, no. 5 (May 2020); https://doi.org/10.1002/aqc.3349.