

Lindenwood University

Digital Commons@Lindenwood University

Theses

Theses & Dissertations

4-2026

The Indian River Lagoon Through the Lens of an Artist: Examining the Impact of Growth and Development on the Lagoon's Water Quality

Lisa K. Skelly

Follow this and additional works at: <https://digitalcommons.lindenwood.edu/theses>



Part of the [Interdisciplinary Arts and Media Commons](#)

THE INDIAN RIVER LAGOON THROUGH THE LENS OF AN ARTIST: EXAMINING
THE IMPACT OF GROWTH AND DEVELOPMENT ON THE LAGOON'S WATER
QUALITY

by

Lisa K. Skelly

Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Arts in Studio Art
at
Lindenwood University

© April 2026, Lisa K. Skelly

The author hereby grants Lindenwood University permission to reproduce and to distribute publicly paper and electronic thesis copies of document in whole or in part in any medium now known or hereafter created.

THE INDIAN RIVER LAGOON THROUGH THE LENS OF AN ARTIST: EXAMINING
THE IMPACT OF GROWTH AND DEVELOPMENT ON THE LAGOON'S WATER
QUALITY

A Project Report Submitted to the Faculty of the College of Arts and Humanities
in Partial Fulfillment of the Requirements for the
Degree of Master of Arts
at
Lindenwood University

By

Lisa K. Skelly

Saint Charles, Missouri

April, 2026

ABSTRACT

Title of Thesis: THE INDIAN RIVER LAGOON THROUGH THE LENS OF AN ARTIST:
EXAMINING THE IMPACT OF GROWTH AND DEVELOPMENT ON THE LAGOON'S
WATER QUALITY

Lisa K. Skelly, Master of Arts/Studio Art, 2026

Thesis Directed by: Joseph Weber, Department Head and Associate Professor of Art,
Production, & Design

This project investigates the ecological degradation of the Indian River Lagoon, a vital estuary on central Florida's east coast. The research focuses on the intersection of habitat loss and water quality degradation, specifically as they relate to anthropogenic factors such as land development and nutrient pollution. Furthermore, the study evaluates the effectiveness of environmental art in fostering environmentally conscious behavior. I translated these findings into a cohesive body of work, including ceramics, fiber arts, and oil painting, utilizing site-specific materials sourced from the lagoon. By integrating these organic elements, the work aims to showcase the estuary's natural beauty while highlighting its inherent fragility, ultimately encouraging a deeper sense of environmental stewardship.

Keywords: Indian River Lagoon, environmental art, anthropogenic, pollution, estuary

Acknowledgements

I would like to express my sincere gratitude to my committee chair, Joseph Weber, whose extensive knowledge of ceramics and research methodology provided the essential framework for this project. I am also deeply grateful to my committee members, Peter Cotroneo and Michael Wartgow, for their invaluable insights into the discipline of painting. Collectively, their mentorship has been instrumental in helping me bridge the gap between technical studio practice and rigorous academic inquiry. By guiding the conceptual direction of my work, they helped me create a strong connection between research and practice, ultimately fostering my growth as a multidisciplinary artist.

Table of Contents

Abstract	3
Acknowledgements	4
Introduction	6
Literature Review	9
Methodology	25
Production.....	27
Production Analysis	33
Conclusions.....	35
Bibliography	36

Introduction

The Indian River Lagoon has long been a foundational part of my life, serving as a source of recreation through boating, fishing, and paddling. As an educator, I strive to empower the next generation to value and protect this vital ecosystem. In my role as a Guy Harvey Conservation Educator, I work to bridge the gap between awareness and action. I achieve this by integrating conservation into STEM and art lessons, leading a student Conservation Club, and coordinating hands-on experiences like shoreline clean-ups and field trips to the Indian River Lagoon. By providing students with these real-life connections to the Indian River Lagoon (IRL), I aim to foster an understanding of why this natural resource must be preserved.

The Indian River Lagoon is situated between the Florida mainland and the barrier island I call home. Having lived here for 38 years, I have observed first-hand the decline of its water quality alongside the explosive development of Brevard County. The scale of this growth is staggering. In 1920, the county population was just 8,505; by 2020, it reached 606,612. This represents a 7,048.8% growth rate, dwarfing the national average of 212.7%¹ for the same period.

My research investigates how this rapid population surge impacts the flora and fauna of this unique estuary. The Indian River Lagoon is an essential ecosystem that covers “27% of Florida's eastern coastal wetlands and is home to more species than any other estuary in North America, including some 4,300 plant and animal species. It is present along 156 miles of coastline and encompasses almost 40% of Florida's east coast.”² Beyond its biological importance, it serves as a critical economic asset for fisheries, tourism, and real estate.

¹ “Demographics: Population by Decade,” Space Coast Headlight, accessed March 2, 2025, at <https://www.spacecoastheadlight.com/headlight/pop1900>.

² Randall W. Parkinson, “Relevance of Ongoing Mitigation Efforts to Reduce Indian River Lagoon Water Quality Impairment and Restore Ecosystem Function under Conditions of a Changing Climate,” *Florida Scientist* 86, no. 2 (2023): 199-210, <https://search.ebscohost.com/>.

Using the mixed-methods research design, this project captures the inherent interconnectedness of our modern world. My analysis reveals a consistent theme: human development is the primary driver of water quality degradation and habitat loss; therefore, the health of the lagoon is fundamentally tied to human activity. My research reinforces the idea that we are not separate from nature, but exist in a constant, reciprocal cycle with it.

I extended my research into the field of environmental art, specifically exploring its capacity to raise ecological awareness and promote change in human behavior. This intersection is central to my practice, as I aspire to create work that highlights the consequences of human activity on the Indian River Lagoon. To ground this inquiry, I examined a range of peer-reviewed literature, focusing on how aesthetic experiences can shift consumption patterns and promote environmental stewardship. My analysis begins with the pioneers of the ecological art movement, Helen and Newton Harrison, and expands to contemporary art exhibits that inspire action. Finally, I explored the works Chris Jordan, Benjamin Von Wong, and Alicja Wróblewska to understand how modern artists translate environmental crisis into compelling visual narratives.

To bridge theory and practice, I translated my research findings into a series of artistic productions. First, I created a ceramic box depicting underwater scenes of the Indian River Lagoon, topped with a sculpted oyster. In the next phase of production, I explored the use of site-specific materials sourced from the lagoon, including Australian pine (*Casuarina*) needles, discarded oyster shells, and palm bark. This body of work features an oil painting of pine needles, a study of an oyster shell on palm bark, and a series of three hand-woven pine needle baskets. Each basket incorporates a foundational element of the lagoon: an oyster shell, a ceramic disk imprinted with pine needles, and a vessel glazed in the hues of the Red Mangrove (*Rhizophora mangle*), designed to hold a mangrove propagule. These pieces celebrate the

lagoon's natural beauty while grounding a systems-based framework in local, tactile materials.

By showcasing the flora and fauna of this region, I aim to foster a deeper awareness of the lagoon's inherent fragility.

Literature Review

Impacts on Seagrasses, Oyster Reefs, and Mangroves

Central to understanding the lagoon's health is the status of its core habitat-builders. By examining the loss of seagrasses, oyster reefs, and mangroves, we can begin to see the cascading effects of water quality degradation on the region's natural infrastructure. Seagrass provides food and habitat for marine organisms and plays an important role in stabilizing the seafloor and nutrient cycling; oysters are a key component of estuaries because they provide many important natural services that keep the ecosystem balanced including habitat for species, reducing shoreline erosion, and acting as a natural filtration system; and mangroves provide habitat for many species and help to protect coastlines from erosion. Safeguarding these core habitats is a critical step in restoring the water quality and long-term stability of this coastal ecosystem.

The article, *Diversity and Distribution of Seagrasses as Related to Salinity, Temperature, and Availability of Light in the Indian River Lagoon, Florida*, considers water conditions such as salinity, temperature, and light availability while examining the changes in growth of the seven species of seagrass supported by the Indian River Lagoon. Since 2011, the Indian River Lagoon has experienced a series of phytoplankton blooms that have reduced light penetration and decimated seagrass populations by over 50%.³ Because the lagoon's unique geography results in limited tidal movement in many areas of the lagoon, it is particularly susceptible to these nutrient loads, which trigger algae growth that blocks essential sunlight. Author Lori Noris notes that the "species richness was higher near the four southern inlets, and fewer species were found in areas with longer residence times for water."⁴ According to the article, *Effects of Surrounding*

³ Lori J. Morris, "et al." "Diversity and Distribution of Seagrasses as Related to Salinity, Temperature, and Availability of Light in the Indian River Lagoon, Florida," *Florida Scientist* 84, no. 2/3 (January 2021): 119–37, <https://search.ebscohost.com/>.

⁴ Morris, "Diversity and Distribution of Seagrasses," 119.

Land Use and Water Depth on Seagrass Dynamics Relative to a Catastrophic Algal Bloom, “seagrass in sections of the IRL surrounded by conservation lands hardly changed during the 2011-2012 algal superbloom in contrast to completely urban areas that lost 84% of their seagrass meadows.⁵” This study confirms that seagrass is more vulnerable when located near urban development than when it is in a protected area. Human waste products, including plant fertilizer and sewage, create excessive loads of nutrients in the lagoon. Consequently, these pollutants trigger phytoplankton blooms, reducing light penetration and hindering the growth of seagrass.

In the article, *Boating Impacts and Boat-Wake Resilient Restoration of the Eastern Oyster Crassostrea Virginica in Mosquito Lagoon, Florida, USA*, researchers report on the primary drivers of oyster reef depletion in the Mosquito Lagoon, the northernmost section of the Indian River Lagoon. They attribute these losses to a combination of factors, noting that “overharvesting, ecosystem degradation and diseases have led to dramatic declines in oyster reefs, with global surveys reporting an 85% loss of shellfish reefs over the past century.”⁶ Boating is another driving factor in oyster reef depletion. Studies conducted in 2002 (Grizzle et al.) and in 2015 (Garvis et al.) “both reported that all dead reefs in Mosquito Lagoon were located in primary boating channels.”⁷ The article highlights that “...boating activity has increased greatly in recent decades and increases in the numbers of boats and dead reefs occurred together,” a particularly pressing issue given that Florida leads the nation in registered boaters

⁵ David R. Breininger, “Effects of Surrounding Land Use and Water Depth on Seagrass Dynamics Relative to a Catastrophic Algal Bloom,” *Conservation Biology* 31, no. 1 (2017): 67–75, <http://www.jstor.org/stable/44134650>.

⁶ Linda J. Walters, “Boating Impacts and Boat-Wake Resilient Restoration of the Eastern Oyster *Crassostrea Virginica* in Mosquito Lagoon, Florida, USA,” *Florida Scientist* 84, no. 2/3 (April 2021): 173–99, <https://search.ebscohost.com/>.

⁷ Walters, “Boating Impacts,” 176.

with approximately 1 million registrations per year as reported by Florida Fish and Wildlife Conservation Commission in 2020.⁸ While restoration efforts such as oyster mats and gabions, the Shuck and Share program, and living docks⁹ are underway to restore oyster reefs, implementing measures to reduce boat-wake impacts near live reefs would provide a more proactive and effective conservation strategy.

In the Indian River Lagoon, mangroves play a vital role in protecting shorelines, improving water quality, and providing critical habitat. In the article, *Mangrove Forest Cover Change in the Conterminous United States from 1980-2020*, researchers examine how these forests have shifted over four decades. While mangrove health is often threatened by factors such as “coastal development, urbanization, hydrological pattern alterations, global warming, sea level rise, and natural disasters,”¹⁰ the study found that total coverage in Florida, Texas, and Louisiana actually expanded by 13.5% between 1980 and 2020.¹¹ This growth is driven by a complex multitude of factors, including sea level rise, a decrease in sub-freezing temperatures, and restoration efforts through mangrove planting.¹² Expanding mangrove cover is good for the lagoon, but these forests can only survive if we manage coastal development alongside shifting environmental conditions.

Toxins and Pollutants in the Indian River Lagoon

The ecological collapse of the Indian River Lagoon is driven by a complex influx of human-generated contaminants. The lagoon is currently overwhelmed by a 'cocktail' of pollutants: sewage contamination, stormwater runoff, nutrient-heavy lawn fertilizers, and the

⁸ Walters, “Boating Impacts,” 190.

⁹ Restore Our Shores. “Projects.” Accessed April 25, 2026. <https://restoreourshores.org/projects/>

¹⁰ Chandra Giri, “et al.” “Mangrove Forest Cover Change in the Conterminous United States from 1980–2020,” *Remote Sensing* 15, no. 20 (October 2023): 5018. doi:10.3390/rs15205018.

¹¹ Giri, “Mangrove Forest Cover Change,” 15.

¹² Giri, “Mangrove Forest Cover Change,” 15.

illegal dumping of waste. Together, these stressors have transformed a once-thriving estuary into a compromised environment struggling to maintain its biological integrity

Wastewater contamination is a frequent occurrence in the Indian River Lagoon due to outdated sewage and septic systems and stormwater runoff. A U.S. district judge declared that Florida has violated the federal Endangered Species Act in its regulation of wastewater discharges into the Indian River Lagoon.¹³ In the Orlando Weekly article, *Judge says Florida violated federal Endangered Species Act, backs more manatee protections*, Judge Carlos Mendoza writes

...under the Department of Environmental Protection's regulations, it would take at least a decade for conditions in the northern part of the Indian River Lagoon to start to recover. That area is primarily in Brevard County. This is due to the previously and currently permitted discharge of legacy pollutants via wastewater into the north IRL (Indian River Lagoon). These legacy pollutants caused the death of seagrasses — the manatee's natural forage — and the proliferation of harmful macroalgae.¹⁴

These regulatory failures of wastewater discharge extend beyond the negative impact to species of the Indian River Lagoon; they often reach directly into the homes of local citizens impacting municipal water supply. In Brevard County, often cities will be placed on a boil water alert due to contamination in drinking water. In April of 2025, the City of Melbourne issued a boil water advisory for all areas it serves due to the detection of E. coli in a water sample impacting 167,000 residents. In addition to sewage contamination, stormwater runoff, lawn fertilizers, and the dumping of waste are polluting the Indian River Lagoon. These pollutants reduce water clarity, cause muck deposits, and fuel algae blooms killing seagrass, fish, and other species that

¹³ Jim Saunders, "Judge says Florida violated federal Endangered Species Act, backs more manatee protections," *Orlando Weekly*, April 15, 2025, <https://www.orlandoweekly.com/news/judge-says-florida-violated-federal-endangered-species-act-backs-more-manatee-protections-39302042>

¹⁴ Saunders, "Judge says Florida violated."

rely on the water of the Indian River Lagoon.¹⁵ Ultimately, these systemic failures in waste management not only jeopardize the survival of keystone species like the manatee but also pose a direct and recurring threat to the public health of the surrounding communities.

Some environmental interventions of the past have resulted in long-term ecological damage that modern conservationists are now taking action to reverse. The Fox 35 Orlando News article, “‘Toxic environment’: 500+ tires finally being removed from Indian River Lagoon after five decades,” covers the removal of tires that were placed in the Indian River Lagoon during the 1970’s as an effort to prevent erosion. However, the tires are killing mangroves and polluting the water. Volunteers with Waterway Warriors are working to remove the tires from this island. At the time of this article, the group had removed over 300 tires. They plan to remove the remaining tires mid-May. Waterway Warriors is working with Brevard County to recycle the tires, so they do not end up in the landfill.¹⁶ Based in Brevard County, Florida, “The Waterway Warriors is a community funded nonprofit group of volunteers dedicated to the prevention and removal of trash from the waterways of Florida.”¹⁷ The removal of these tires serves as a reminder that artificial solutions to natural problems, such as erosion, can often facilitate a toxic environment that may require decades of community effort to remediate.

Throughout the months of July and August, bioluminescence can be seen in the evening while paddling through the Indian River Lagoon. This phenomenon is alluring tourists and residents alike. While this glow is often celebrated as a natural wonder, it is an indicator of a troubled ecosystem. In the article by Terry Ward, *In this bioluminescent Florida lagoon, glowing*

¹⁵ “Water Quality,” One Lagoon, accessed May 4, 2025, <https://onelagoon.org/water-quality/>

¹⁶ Esther Bower, “‘Toxic environment’: 500+ tires finally being removed from Indian River Lagoon after five decades,” Fox 35 Orlando, April 21, 2025, <https://www.fox35orlando.com/news/toxic-environment-500-tires-finally-beingremoved-from-indian-river-lagoon-after-five-decades>.

¹⁷ “Who Are We?” Waterway Warriors of Florida, Accessed May 3, 2025, at <https://waterwaywarriorsfl.org/who-we-are/>

waters can be a warning, Edith Widder, CEO of the Ocean Research & Conservation Association in Fort Pierce, states that “The ecological balance of the Indian River Lagoon is a delicate web under constant stress from human factors, exacerbated by Florida’s population growth.”¹⁸ The article, *Toxin Dynamics among Populations of the Bioluminescent HAB Species Pyrodinium from the Indian River Lagoon, FL*, documents a study linking bioluminescence and toxicity in the development of *P. bahamense* (a dinoflagellate) blooms.¹⁹ While bioluminescence occurs in both the ocean and the Indian River Lagoon, *Pyrodinium*, the strain in the Indian River Lagoon, thrives in warm water. When combined with nutrients from manmade sources including septic tanks and fertilizers, *Pyrodinium* fuels the development of harmful algal blooms.²⁰ In the article, *Remote Sensing of Harmful Algal Blooms in the Indian River Lagoon and Connected Waterways in Brevard County*, researchers report that *Pyrodinium bahamense* is the most dominant algal species present in the Indian River Lagoon.²¹ “For decades, the integrity of the IRL has been negatively impacted by the persistent occurrence of HABs (harmful algal blooms) that lead to low dissolved oxygen, limited light availability as well as subsequent losses of important flora and fauna.”²² Ultimately, the glowing waters of the summer months are more than a tourist attraction; they are a warning that the lagoon’s ecological health is compromised due to nutrient pollution and rapid development.

Mitigation and Restoration Efforts

¹⁸ Terry Ward, “In this bioluminescent Florida lagoon, glowing waters can be a warning,” *Nationalgeographic.com*, July 14, 2022, <https://www.nationalgeographic.com/travel/article/in-this-bioluminescent-florida-lagoon-glowing-waters-can-be-a-warning>.

¹⁹ Kathleen D. Cusick, “et al.” “Toxin Dynamics among Populations of the Bioluminescent HAB Species *Pyrodinium bahamense* from the Indian River Lagoon, FL,” *Marine Drugs* 22, no. 7 (July 2024): 311. doi:10.3390/md22070311.

²⁰ Ward, “In this bioluminescent Florida lagoon.”

²¹ Andrew Kameronosky, “et al.” “Remote Sensing of Harmful Algal Blooms in the Indian River Lagoon and Connected Waterways in Brevard County,” *Florida Scientist* 86 (2) (2023): 386–99. <https://search.ebscohost.com/>.

²² Kameronosky, “Remote Sensing of Harmful Algal Blooms.”

In response to the lagoon's decline, local municipalities and non-profit organizations have initiated various mitigation and restoration strategies aimed at reversing water quality degradation. These multi-faceted interventions include fertilizer ordinances, oyster reef restoration, muck removal, storm-water improvements, septic system upgrades, wastewater treatment plant improvements, and the introduction of filtering organisms. Ultimately, these human-led interventions are essential; without sustained restoration efforts, the Indian River Lagoon faces a trajectory of continued deterioration, threatening the survival of the countless species that depend on its stability.

In the article, *Relevance of Ongoing Mitigation Efforts to Reduce Indian River Lagoon Water Quality Impairment and Restore Ecosystem Function under Conditions of a Changing Climate*, researcher Randall Parkinson reports on mitigation efforts made to improve the water quality of the Indian River Lagoon. Estuaries are especially vulnerable to climate change events due to the exchange of seawater and freshwater at ocean inlets. This vulnerability is further compounded by the already degraded water quality of the Indian River Lagoon. Parkinson states that “the resilience of an estuary under conditions of a changing climate may be further stressed if the system is currently impaired by the effects of coastal urbanization and ... water quality degradation due to elevated pollutants.”²³ In 1990, the Indian River Lagoon was recognized by the Environmental Protection Agency as an Estuary of National Significance. This designation catalyzed a push to expand conservation efforts and mitigate water quality degradation. The Indian River Lagoon National Estuary Program developed a Climate Change Adaptation Plan, which included a three-year investigation to identify water quality vulnerabilities and create an

²³ Parkinson, Randall W. “Relevance of Ongoing Mitigation Efforts to Reduce Indian River Lagoon Water Quality Impairment and Restore Ecosystem Function under Conditions of a Changing Climate.” *Florida Scientist* 86, no. 2 (January 1, 2023): 199–210. <https://search.ebscohost.com/>.

action plan to reduce these risks. The team identified a total of 472 risks to the IRL... Of those, fifty percent were associated with three vital signs: impaired waters, wastewater, and surface water. Climate change stressors induced ninety-seven percent of these risks: change in precipitation, increasing storminess, and sea-level rise.²⁴ This study resulted in mitigation strategies and projects to improve water quality and ecosystem function such as living shorelines, seagrass planting, oyster reefs, muck removal, retention and detention ponds, wetland restoration, septic system upgrades, and wastewater treatment plant improvements.²⁵ By addressing these diverse stressors through tangible restoration projects, these mitigation efforts aim to rebuild the lagoon's natural resilience against the accelerating pressures of a changing climate.

Brevard county has implemented fertilizer ordinances to minimize nutrient runoff into the lagoon. The county has a ban on fertilizer application containing nitrogen or phosphorus from June 1 to September 30, a 15-foot fertilizer-free zone along water bodies, and restrictions on application rates and timing.²⁶ The article, *Impacts of Residential Fertilizer Ordinances on Florida Lacustrine Water Quality*, analyzes "...changes in water quality of lakes throughout the State of Florida from 1987 to 2018, comparing trends in water quality parameters before and after county-wide fertilizer ordinances."²⁷ The study supports the effectiveness of fertilizer ordinances.

Oyster reefs are important water filtering ecosystems in the Indian River Lagoon, and initiatives are in place to restore these reefs. In the article, *Oyster Reef Restoration: Impacts on*

²⁴ Parkinson, "Relevance of Ongoing Mitigation," 200.

²⁵ Parkinson, "Relevance of Ongoing Mitigation," 204.

²⁶ "Ordinances," Brevard County, Accessed May 4, 2025, at <https://www.brevardfl.gov/NaturalResources/Ordinances>.

²⁷ Samuel J. Smidt, "et al." "Impacts of Residential Fertilizer Ordinances on Florida Lacustrine Water Quality," *Limnology & Oceanography Letters* 7, (2022): 475–82, doi:10.1002/lol2.10279.

Infaunal Communities in a Shallow, Katherine Harris states that oyster reefs "...provide habitats to many species, including threatened and endangered wading birds and commercially important fishes and crabs. Infaunal organisms (i.e. aquatic, sediment-dwelling organisms) are also supported by oyster reef habitats."²⁸ Harris' research investigated the effectiveness of restored oyster reefs in relation to supporting infaunal organisms. She collected infaunal organisms off dead, live, and restored oyster reefs and concluded that "live reefs consistently had high infaunal abundance and dead reefs consistently had low abundance, while restored reefs were intermediate..." suggesting that "restored reefs are more productive than their dead counterparts."²⁹ In the article, *The Impact of Benthic Organisms to Improve Water Quality in the Indian River Lagoon, Florida*, researchers report on the investigation of the presence of benthic organisms on Living Docks in the Indian River Lagoon. Living Docks is a restoration program "...implemented in the Indian River Lagoon with the goal of affixing oyster restoration mats to dock pilings to promote the growth of filter feeding benthic organisms which can help improve local water quality." The study "...identified five main functional groups that dominated the benthic community growing on oyster shells: barnacles, biofilm, encrusting bryozoans, oysters and sponges."³⁰ By turning private infrastructure into active habitats, initiatives like Living Docks transform the lagoon's shoreline into a functional network of biological filters that support both water clarity and species diversity.

Brevard County and Indian River County are taking steps to protect the land surrounding the Indian River Lagoon. In Indian River County, "The county will buy more than 560 acres to

²⁸ Katherine Harris, "Oyster Reef Restoration: Impacts on Infaunal Communities in a Shallow Water Estuary," *University of Central Florida Undergraduate Research Journal* 11, no. 2 (October 2019): 7–17, <https://search.ebscohost.com/>.

²⁹ Harris, "Oyster Reef Restoration," 7.

³⁰ Alain Despeignes, "et al." "The Impact of Benthic Organisms to Improve Water Quality in the Indian River Lagoon, Florida," *Water, Air & Soil Pollution* 234, no. 8 (August 2023): 1–24. doi:10.1007/s11270-023-06528-w.

preserve environmentally-sensitive lands, especially along the Indian River Lagoon.”³¹ Once the county purchases these properties, they will become conservation land and may include wetland restoration and trail building. Brevard County is pushing for sustainable growth to protect the Indian River Lagoon as “most of the damage to the lagoon comes from rapid development in Brevard County. Environmental advocates said they wanted to educate people so they could make small changes to their daily habits to help.”³² By adopting simple practices such as landscaping with native plants, managing pet waste, and participating in shoreline cleanups and restoration projects, homeowners play a vital role in the collective effort to revive the health of the Indian River Lagoon.

In March 2025, Governor Ron DeSantis announced the allocation of \$100 million to the Indian River Lagoon Protection Program to support 25 priority water quality projects. Fifteen of these projects are located in Brevard County and aim to address nutrient pollution and restore the lagoon’s ecological balance. The primary focus of these efforts is mitigating septic pollution; consequently, the program is working to eliminate aging septic systems by extending municipal sewer lines.³³ This substantial state investment represents a critical turning point in the effort to modernize Brevard County's infrastructure and secure a cleaner, more resilient future for the lagoon’s fragile ecosystem.

³¹ Jon Pine, “County selects first batch of environmentally sensitive properties to purchase and preserve,” VeroNews.com, March 25, 2025, at <https://veronews.com/2025/03/25/county-selects-first-batch-of-environmentally-sensitive-properties-to-purchase-and-preserve/#:~:text=The%20County%20Commission%20last%20week,approved%20by%20voters%20in%202022>

³² Meghan Moriarty, “Brevard County pushes for sustainable growth to protect Indian River Lagoon,” Wesh 2 News, March 30, 2025 at <https://www.wesh.com/article/brevard-county-pushes-sustainable-growth-protect-indian-river-lagoon/64022134>

³³ Charles Boyer, “Governor Announces Indian River Lagoon Protection Program to Receive \$100 Million In State Grants,” *Talk of Titusville*, March 30, 2025, at <https://talkoftitusville.com/2025/03/27/governor-announces-indian-river-lagoon-protection-program-to-receive-100-million-in-state-grants/>

Environmental Art

As the Indian River Lagoon faces an era of unprecedented environmental stress, the role of the artist shifts from observer to advocate. Environmental art functions as a form of ecological awareness, exposing the consequences of modern consumption. This section explores how visual art can effectively raise public awareness and inspire a transformative shift in consumer patterns.

Helen and Newton Harrison were pioneers in the field of the ecological art movement. The Harrisons were a husband-and-wife team that created “art that draws attention to imperative environmental struggle.”³⁴ Their first major exhibit, titled Full Farm, 1971, was a self-sustaining indoor farm with fish, plants, and solar energy. This installation was part of the “Survival Pieces” series. The Harrisons “worked for almost forty years with biologists, ecologists, architects, urban planners and other artists to initiate collaborative dialogues to uncover ideas and solutions which support biodiversity and community development.”³⁵ Unlike land art, which “usually involves using earth as a material, which destroyed the surrounding ecology, the Harrisons chose to work with the earth nondestructively – as a medium for life.”³⁶ The Harrisons brought attention to environmental issues leading to changes in government policy, defining what we now call environmental art.

Inspiring Environmental Action Through Art

Researchers Louise Arnal and Corinne Schuster-Wallace reported on the responses of visitors who attended the in-person art exhibit, *The Virtual Water Gallery*, with the intention to “evaluate the impact of art specifically designed at the intersection of climate and water...”³⁷

³⁴ Carinne Knight, “Eco-Art: On the Topography of the Harrisons,” *Leonardo* 56, no. 3 (2023): 306–7, doi:10.1162/leon_a_02382.

³⁵ “Helen and Newton,” The Harrison Studio, accessed July 6, 2025, <https://www.theharrisonstudio.net/>

³⁶ Carinne, “Eco-Art,” 306.

³⁷ Louise Arnal and Corinne Schuster-Wallace, “The Virtual Water Gallery: Art as a

This exhibit was launched virtually in 2021 and moved to an in-person exhibit in Canada in 2022. The purpose of the exhibit was to bring exposure to critical “water related challenges such as droughts, floods, water quality, degradation, permafrost thaw, and glacier melt, exacerbated by climate change”³⁸ Through the use of artistic mediums, exhibitors hoped to reach a broader audience. Scientists and artists explored water challenges and collaborated to co-create the artworks. The research team created surveys to evaluate the responses of gallery visitors regarding knowledge, attitudes and behaviors regarding water-related climate mitigation. Responses were analyzed and results suggested that the exhibit increased knowledge levels of visitors with self-reported low prior knowledge of climate change consequences and of climate change impacts on water resources. In visitors who indicated high prior knowledge, attitudes around knowledge changed. Most gallery visitor respondents thought that *The Virtual Water Gallery*, and ArtSci in general, is effective for science communication, would like to see more



ArtSci collaborations, and are likely to visit similar exhibits in the future.

Van Rees, Ken. *Summit to Sea*. 2020. Acrylic on canvas, 40x72 in.
<https://www.virtualwatergallery.ca/summit-to-sea>

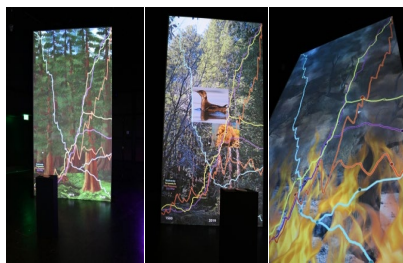
In the article, “Enviro-Envision: Visualizing Climate Change through Art,” researcher Kathleen Deck reports on climate change and investigates the effectiveness of communicating climate change issues through eco-art and new media art practices. In this article, new media practices are “defined as anything that can be created, viewed, modified, and/or distributed through computers and/or the Internet.”³⁹ Deck’s installation, *Enviro-Envision*, “is an

Catalyst for Transforming Knowledge and Behavior in Water and Climate.” *PLoS Climate* 4, no. 4 (2025): 1–23, doi:10.1371/journal.pclm.0000398.

³⁸ Arnal, “The Virtual Water Gallery,” 11.

³⁹ Kathleen Deck, “Enviro-Envision: Visualizing Climate Change through Art,” *Leonardo* 53, no. 5 (October 2020): iii-40. <https://search.ebscohost.com/>

interactive installation on the effects of human impact and climate change in the past, present, and future of a Santa Cruz redwood ecosystem...”⁴⁰ Kathleen Deck’s exhibit looks into the past, reconstructing the environment five hundred years ago, and reminds us of what has been destroyed, changed, removed, or forgotten since that time. Deck “...uses data, research, and future scenarios to create visually accurate digital paintings navigated by gallery visitors in an interactive installation.”⁴¹ Pairing the visuals with audio provides the audience with a multi-sensory experience. As art adds an emotional component to environmental issues, the author concludes “that eco-art and new media art practices, together, can effectively communicate the effects of climate change... The emotions evoked by art have the power to promote change and comprehension of complicated issues like climate change.”⁴² The ability of new media art to



visualize lost ecosystems and potential futures serves as a powerful catalyst for change moving the viewer beyond simple awareness towards environmentally conscious decision-making.

Deck, Kathleen. *Enviro-Envision* at the Receivership exhibition, the past, present, and future. 2019. Digital Arts Research Center at UC Santa Cruz.

The next article evaluates “the impact of a public art project within the framework of ecological urban planning on various parameters.”⁴³ In the City Gather Park Project, located in a densely populated area of Changsha, China, designers were tasked with integrating artistic design with ecological urban planning. They utilized the concept of an urban forest: a synthesis of environmental design and public art. By increasing green space and adding modern

⁴⁰ Deck, “Enviro-Envision,” iii.

⁴¹ Kathleen Deck, “Start Lab.” *Enviro-Vision*. Wordpress.com, Accessed July 6, 2025. <https://startpointlab.wordpress.com/enviro-envision/>

⁴² Deck, “Enviro-Envision,” 3.

⁴³ Wang Diefan, “Ecological Design and Public Art: Impact on the Perception of the Urban Environment,” *Prostor* 32 no. 2 (2024): 202–13. doi:10.31522/p.32.2(68).2.

installations and sculptures, the designers created an environmentally friendly area that prioritizes both ecological health and human relaxation. In the article, *Ecological Design and Public Art: Impact on the Perception of the Urban Environment*, Wang Diefan reports on “two samples of residents and visitors of Changsha (China) chosen as participants in the study. The first sample was recruited in 2020, when The City Gather Park project had not yet been implemented...The second sample participated in 2023, when the art design project had already started functioning.”⁴⁴ Through a statistical analysis of surveys completed by residents and visitors, the author concludes significant changes in the perception of the urban environment. “The project enhanced the overall image of the city and key aspects such as dynamism,



sociability, innovation, creativity, and quality of life.”⁴⁵ These findings emphasize the significance of incorporating public art and environmentally friendly design into urban space to enhance the standard of living and aesthetic allure of urban areas.

Compiled by the author, Diefan Wang, *Amazing Architecture*. 2024. Photography.

Contemporary Artists as Catalysts for Ecological Change

To understand the potential for art to drive restoration efforts in the Indian River Lagoon, it is essential to examine the strategies employed by contemporary artists to translate complex environmental data into compelling narratives for change. I will begin with Benjamin Von Wong, a multidisciplinary artist best known for his hyper-realistic installations created with trash. He and his team work with communities and organizations around the world to bring awareness to issues such as ocean plastics and electronic waste. The installation,

⁴⁴ Diefan, “Ecological Design and Public Art,” 207.

⁴⁵ Diefan, “Ecological Design and Public Art,” 210.

#*Strawpocalypse*, was created in collaboration with Starbucks as they announced the removal of



Benjamin Von Wong, *Parting of the Plastic Sea*, 2019,
Photograph of installation made from drinking straws, Ho Chi Minh City.

straws from their stores.⁴⁶ It is made from 168,000 drinking straws recovered from the streets of Vietnam. Von Wong has taken a global approach to promote sustainability.

In the collection, *Midway*, photographer Chris Jordan captures the albatross birds of Midway Atoll. While the nearest continent to these islands is more than 2,000 miles away, the albatrosses are greatly affected by trash floating in the ocean. Jordan's photographs capture the albatross birds in both life and death, so the viewer can witness the beauty of the birds and the



Chris Jordan, *Unaltered stomach contents of a Laysan albatross fledgling*, 2010,
Photograph, Midway Island.

darkness that has been inflicted on these creatures through human consumption.⁴⁷ Jordan's art raises awareness of this tragedy by revealing its harsh reality, making it a particularly impactful approach.

Artist Alicja Wróblewska creates colorful sculptures from plastics to bring awareness to the impact of plastics on the oceans. Rather than revealing the ugliness of the plastics polluting our oceans, Wróblewska chooses to create colorful, eye-catching sculptures from discarded plastics "to show us how the medium is not always the message." In an interview Meera Subramanian titled *Strange Gardens: An Effervescent Vision of Plastic's Impact on the Ocean*, Wróblewska states that her aim is to compel the viewer "to work towards reviving a natural

⁴⁶ Benjamin Von Wong, "Parting of the Plastic Sea" Accessed June 22, 2025, <https://www.vonwong.com/>.

⁴⁷ Chris Jordan, "Midway," Accessed May 9, 2025, <https://www.chrisjordan.com/>.



world that can actually thrive again.”⁴⁸ By elevating discarded plastics into vibrant forms, she compels the viewer to engage with the message behind the medium.

Alicja Wróblewska, Sculpture Created from Plastic, *Virginia Quarterly Review* 97 (3) (2021): 76–101.

⁴⁸ Meera Subramanian, “Strange Gardens: An Effervescent Vision of Plastic’s Impact on the Ocean.” *Virginia Quarterly Review* 97 (3) (2021): 76–101. <https://search.ebscohost.com/>

Methodology

Utilizing a mixed-methods research design grounded in a systems-based framework, this directed project examines the correlation between habitat loss and declining water quality in the Indian River Lagoon. A systems-based approach is suited for this inquiry, as it moves beyond isolated observations to emphasize the complex, interconnected dependencies within the estuary. My quantitative analysis of environmental data reveals a consistent downward trend in water quality linked directly to human development. Furthermore, my qualitative review of restoration literature underscores the relationship between human intervention and the recovery of natural resources. By synthesizing these diverse data sources, the research demonstrates that the health of the lagoon is a functional output of the social and biological systems surrounding it.

Informed by the documented decline of the Indian River Lagoon, my productions bridge the gap between environmental research and visual advocacy. I extended this systems-based methodology to evaluate the role of environmental art in catalyzing social change. By analyzing qualitative case studies of human responses to exhibits such as The Virtual Water Gallery, Enviro-Envision, and the City Gather Park Project, I have concluded that environmental art exerts a measurable influence on conservation-minded behavior. My research suggests that while data informs the mind, art creates the essential emotional conduits including compassion, grief, and place-attachment. Drawing inspiration from artists who expose the consequences of anthropogenic harm, I aspire to create work that highlights the fragility of the lagoon to inspire a systemic shift toward more sustainable human behavior.

Last, I explored the artwork of environmental artists Chris Jordan, Benjamin Von Wong, and Alicja Wróblewska. Benjamin Von Wong and his team, created the installation, Strawpocalypse, from drinking straws collected from the streets of Vietnam. This installation was created in collaboration with Starbucks as they announced the removal of straws from their

stores with the potential to reach audiences worldwide. Chris Jordan's photos of decomposed albatross birds surrounded by ocean plastics, shocked viewers around the world. His images of the birds of the Midway Atoll were shared across social media, documentaries, art exhibits, and news platforms. Alicja Wróblewska transforms plastic trash into vibrant, stylized sculptures to address environmental crisis. These deceptively pretty compositions are designed to captivate the viewer, using aesthetic appeal as a gateway to bring awareness to the global issue of oceanic plastic pollution. These and other environmental artists across the planet aim to promote change by bringing awareness to global issues created by overconsumption.

By bringing environmental crises to the forefront, environmental art serves as a powerful communication tool with the capacity to reach audiences globally. It goes beyond mere data, reconnecting humanity to the natural world through an emotional lens that inspires direct, systemic action.

Production

Figure 1: Fragile Vessel: What Remains Beneath the Surface, 2025, 6" x 5" x 5", clay, glaze



Figure 2: *Woven Waters: A Propagule Vessel, 2026, 7" x 6" x 5", clay, pine needles, waxed cord, oyster shell*



Figure 3: Bivalve Basin, 2026, 4" x 8" x 7" pine needles, waxed cord, oyster shell



Figure 4: The Permanent Trace, 2026, clay, pine needles, waxed cord



Figure 5: The Living Filter, 2026, 20" x 20" Oil on Canvas

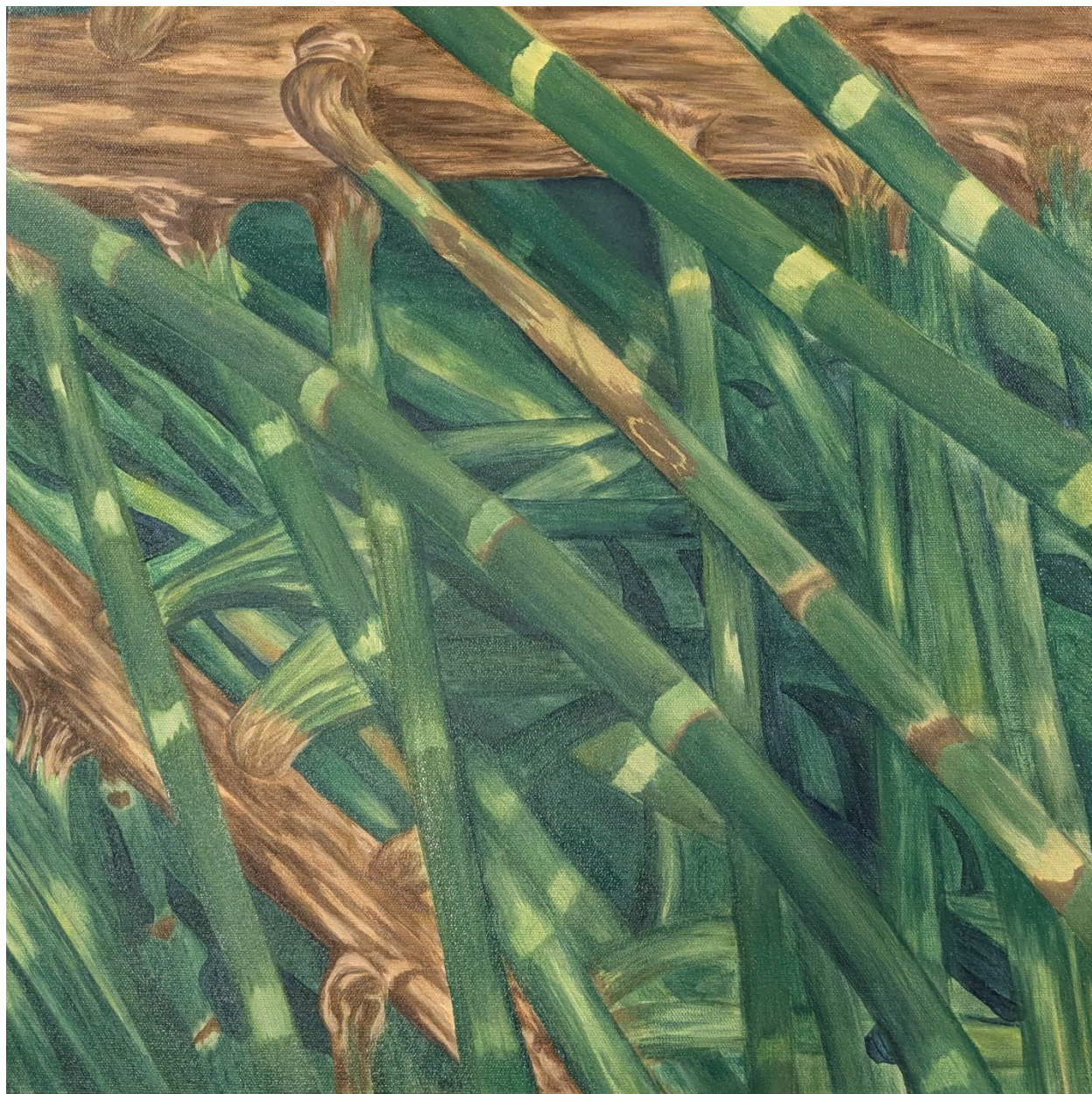


Figure 6: The False Protector, 2026, 20" x 20" Oil on Canvas

Production Analysis

My production begins with a ceramic piece titled *Fragile Vessel: What Remains Beneath the Surface*, which serves as a visual of species found in the Indian River Lagoon. The four walls feature relief sculptures designed to be read chronologically: the narrative starts with mangrove roots and transitions as the viewer circles the box, depicting a progression into deeper waters. Here, silver mullet, a bottlenose dolphin, a manatee, and a green sea turtle swim among the seagrass. Both the manatee and the green sea turtle are currently classified as threatened species, largely due to the critical loss of habitat and seagrasses within the lagoon. Last, the lid features a native eastern oyster (*Crassostrea virginica*), a keystone species of the Indian River Lagoon. This final addition is vital to the health of our lagoon as it serves as a natural filtration system and protects the shoreline from erosion.

Next, I will discuss the significance of the use of pine needles in the woven vessel, baskets, and the painting titled, *The False Protector*. The pine needles are representative of the Australian Pine (*Casuarina equisetifolia*) which serves as an example of well-intentioned but ecologically damaging human intervention within the Indian River Lagoon. Originally planted along the lagoon's banks to mitigate shoreline erosion, these trees have instead created a range of environmental stressors. Their dense canopy and fallen needles smother the growth of native plants. Furthermore, their shallow root systems make them prone to toppling, which destabilizes the shorelines. Despite its name, the Australian Pine is not a true pine tree. Because the thin, segmented needles break easily, they are not conducive for weaving. Consequently, these pieces are woven with Longleaf Pine (*Pinus palustris*), a native species that offers strength while embodying the ecological health of the region.

The series continues with three woven works, beginning with *Woven Waters: A Propagule Vessel*. This mixed-media piece features a wheel-thrown ceramic base with a rim

trimmed to mimic the movement of waves. To capture the blue-green color of the lagoon, I layered Amaco C-27 Storm and PC-42 Seaweed glazes. At the center of the weaving, a 'window' holds an Atlantic Kitten's Paw (*Plicatula gibbosa*). This vessel's tall, narrow silhouette is designed to house a Red Mangrove (*Rhizophora mangle*) propagule. The second work, *Bivalve Basin*, features an Eastern oyster (*Crassostrea virginica*), while the final basket, *The Permanent Trace*, incorporates a ceramic disk imprinted with Australian pine needles, serving as a tactile record of the species' environmental impact.

The final two pieces in the production are oil paintings titled *The Living Filter* and *The False Protector*, which serve as concentrated studies of the lagoon's flora and fauna. *The Living Filter* focuses on the oyster emphasizing its role as a purifier of the estuary's waters. In contrast, *The False Protector* provides a close-up view of the Australian pine. By focusing on the dense needles, the painting highlights the irony of a species introduced to stabilize the shoreline that now threatens the lagoon.

Together, the paintings and woven pieces shift the viewer's perspective from the broad ecosystem depicted on the ceramic box, to individual flora and fauna that, alongside human intervention, hold the power to determine the lagoon's future.

Conclusion

This research report and resulting body of work serve as both a scientific inquiry into the degradation of the Indian River Lagoon and a personal testament to its enduring importance. By examining the population growth in Brevard County alongside the resulting decline in water quality, this project has illuminated a critical reality: the health of our estuary is directly related to our anthropogenic footprint. The data confirms that as we develop the land, we inevitably alter the delicate chemical and biological balance of the water that sustains us.

Through the lens of environmental art, this project also identifies a path toward restoration. By exploring the works of environmental artists, including both pioneers in the field and contemporary figures, I have argued that aesthetic experiences possess the capacity to bridge the gap between data and empathy. My creative productions, the ceramic box, the woven pine needle baskets, and the oil paintings, were designed to move beyond the staggering scale of the issues affecting the health of the Indian River Lagoon and return the viewer to the tactile, beautiful reality of the lagoon itself. Using site-specific materials like Australian pine needles and oyster shells allowed me to literally weave the lagoon's story into my art, transforming discarded or invasive elements into vessels of awareness.

As a Guy Harvey Conservation Educator and a resident of this barrier island for nearly four decades, my goal remains clear. This project report is not merely a record of loss, but a call for a shift in human behavior. By integrating the fragility of the Indian River Lagoon into the visual arts, we can foster a deeper sense of stewardship in our community. If we recognize that we exist in a reciprocal cycle with nature, we can begin to ensure that the Indian River Lagoon remains a thriving, foundational part of Florida's landscape for generations to come.

Bibliography

- Arnal, Louise, and Corinne Schuster-Wallace. 2025. "The Virtual Water Gallery: Art as a Catalyst for Transforming Knowledge and Behavior in Water and Climate." *PLoS Climate* 4 (4): 1–23. doi:10.1371/journal.pclm.0000398.
- Bower, Esther. "Toxic environment': 500+ tires finally being removed from Indian River Lagoon after five decades." *Fox 35 Orlando*, April 21, 2025. <https://www.fox35orlando.com/news/toxic-environment-500-tires-finally-beingremoved-from-indian-river-lagoon-after-five-decades>
- Boyer, Charles. "Governor Announces Indian River Lagoon Protection Program to Receive \$100 Million In State Grants." *Talk of Titusville*, March 30, 2025. <https://talkoftitusville.com/2025/03/27/governor-announces-indian-river-lagoon-protection-program-to-receive-100-million-in-state-grants/>.
- Breining, David R., Robert D. Breining, and Carlton R. Hall. "Effects of Surrounding Land Use and Water Depth on Seagrass Dynamics Relative to a Catastrophic Algal Bloom." *Conservation Biology* 31, no. 1 (2017): 67–75. <http://www.jstor.org/stable/44134650>.
- Brevard County. "Ordinances." Accessed May 4, 2025. <https://www.brevardfl.gov/NaturalResources/Ordinances>.
- Brockmeyer Jr., Ronald E., Melinda Donnelly, Jorge R. Rey, and Douglas B. Carlson. "Manipulating, Managing and Rehabilitating Mangrove-Dominated Wetlands along Florida's East Coast (USA): Balancing Mosquito Control and Ecological Values." *Wetlands Ecology & Management* 30, no. 5 (October 2022): 987–1005. doi:10.1007/s11273-021-09843-3.
- Cusick, Kathleen D., Bofan Wei, Sydney Hall, Nicole Brown, Edith A. Widder, and Gregory L. Boyer. "Toxin Dynamics among Populations of the Bioluminescent HAB Species *Pyrodinium bahamense* from the Indian River Lagoon, FL." *Marine Drugs* 22, no. 7 (July 2024): 311. doi:10.3390/md22070311.
- Deck, Kathleen. 2020. "Enviro-Envision: Visualizing Climate Change through Art." *Leonardo* 53, no. 5 (October): iii-40. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=aft&AN=146328529&site=ehost-live>.
- Deck, Kathleen. Start Lab. Enviro-Vision. Wordpress.com. Accessed July 6, 2025. <https://startpointlab.wordpress.com/enviro-envision/>
- Diefan, Wang. 2024. "Ecological Design and Public Art: Impact on the Perception of the Urban Environment." *Prostor* 32 (2): 202–13. doi:10.31522/p.32.2(68).2.

- Despeignes, Alain, Alyssa Sharma, Rebecca Beltran, “et al.” “The Impact of Benthic Organisms to Improve Water Quality in the Indian River Lagoon, Florida.” *Water, Air & Soil Pollution* 234, no. 8 (August 2023): 1–24. doi:10.1007/s11270-023-06528-w.
- Florida Department of State. “Florida Division of Arts & Culture: Laura Woodward Landscape Artist.” Accessed March 16, 2025. <https://dos.fl.gov/cultural/programs/florida-artists-hall-of-fame/laura-woodward/>.
- Giri, Chandra, Jordan Long, and Prapti Poudel. “Mangrove Forest Cover Change in the Conterminous United States from 1980–2020.” *Remote Sensing* 15, no. 20 (October 15, 2023): 5018. doi:10.3390/rs15205018.
- Harris, Katherine. “Oyster Reef Restoration: Impacts on Infaunal Communities in a Shallow Water Estuary.” *University of Central Florida Undergraduate Research Journal* 11, no. 2 (October 2019): 7–17. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=asn&AN=139515018&site=ehost-live>.
- Jordan, Chris. “Midway.” Chris Jordan, Accessed May 9, 2025. <https://www.chrisjordan.com/>.
- Kamerosky, Andrew, Claudia Listopad, and Virginia Barker. “Remote Sensing of Harmful Algal Blooms in the Indian River Lagoon and Connected Waterways in Brevard County.” *Florida Scientist* 86 (2) (2023): 386–99. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=edsjsr&AN=edsjsr.27265835&site=eds-live>.
- Knight, Carinne. 2023. “Eco-Art: On the Topography of the Harrisons.” *Leonardo* 56 (3): 306–7. doi:10.1162/leon_a_02382.
- Moriarty, Meghan. “Brevard County pushes for sustainable growth to protect Indian River Lagoon.” *Wesh 2 News*, March 30, 2025. <https://www.wesh.com/article/brevard-county-pushes-sustainable-growth-protect-indian-river-lagoon/64022134>.
- Morris, Lori J., Lauren M. Hall, Jan D. Miller, “et al.” “Diversity and Distribution of Seagrasses as Related to Salinity, Temperature, and Availability of Light in the Indian River Lagoon, Florida.” *Florida Scientist* 84, no. 2/3 (January 1, 2021): 119–37. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=edsjsr&AN=edsjsr.27091239&site=eds-live>.
- One Lagoon. “Water Quality.” Accessed May 4, 2025. <https://onelagoon.org/water-quality/>.

- Parkinson, Randall W. “Relevance of Ongoing Mitigation Efforts to Reduce Indian River Lagoon Water Quality Impairment and Restore Ecosystem Function under Conditions of a Changing Climate.” *Florida Scientist* 86, no. 2 (January 1, 2023): 199–210.
<https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=edsjsr&AN=edsjsr.27265811&site=eds-live>.
- Pine, Jon. “County selects first batch of environmentally sensitive properties to purchase and preserve.” *VeroNews.com*, March 25, 2025. <https://veronews.com/2025/03/25/county-selects-first-batch-of-environmentally-sensitive-properties-to-purchase-and-preserve/#:~:text=The%20County%20Commission%20last%20week,approved%20by%20voters%20in%202022>.
- Pollack, Deborah C. *Laura Woodward: The Artist Behind the Innovator Who Developed Palm Beach*. Blue Heron Press, 2009.
- Restore Our Shores. “Projects.” Accessed March 16, 2025 and April 25, 2026.
<https://restoreourshores.org/projects/>.
- Saunders, Jim. “Judge says Florida violated federal Endangered Species Act, backs more manatee protections.” *Orlando Weekly*, April 15, 2025.
<https://www.orlandoweekly.com/news/judge-says-florida-violated-federal-endangered-species-act-backs-more-manatee-protections-39302042>
- Smidt, Samuel J., Diego Aviles, E. Fay Belshe, and Alexander J. Reisinger. “Impacts of Residential Fertilizer Ordinances on Florida Lacustrine Water Quality.” *Limnology & Oceanography Letters* 7 (6) (2022): 475–82. doi:10.1002/lol2.10279.
- Space Coast Headlight. “Demographics: Population by Decade.” Accessed March 2, 2025.
<https://www.spacecoastheadlight.com/headlight/pop1900>.
- Subramanian, Meera. 2021. “STRANGE GARDENS: An Effervescent Vision of Plastic’s Impact on the Ocean.” *Virginia Quarterly Review* 97 (3): 76–101.
<https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=aft&AN=152599669&site=ehost-live>
- The Harrison Studio. “Helen and Newton.” Accessed July 6, 2025.
<https://www.theharrisonstudio.net/>.
- Von Wong, Benjamin. “Parting of the Plastic Sea.” Benjamin Von Wong, Accessed June 22, 2025. <https://www.vonwong.com/>.

- Walters, Linda J., Paul E. Sacks, and Donna E. Campbell. "Boating Impacts and Boat-Wake Resilient Restoration of the Eastern Oyster *Crassostrea Virginica* in Mosquito Lagoon, Florida, USA." *Florida Scientist* 84, no. 2/3 (April 2021): 173–99.
<https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=asn&AN=151545588&site=ehost-live>.
- Walters, Tim. "Brevard County once was part of biggest county in Florida." *Florida Today*, November 24, 2020. <https://www.floridatoday.com/story/news/2020/11/24/brevard-county-once-part-biggest-county-florida/6077073002/>.
- Ward, Terry. "In this bioluminescent Florida lagoon, glowing waters can be a warning." *Nationalgeographic.com*, July 14, 2022.
<https://www.nationalgeographic.com/travel/article/in-this-bioluminescent-florida-lagoon-glowing-waters-can-be-a-warning>.
- Waterway Warriors of Florida. "Who we Are." Accessed May 3, 2025.
<https://waterwaywarriorsfl.org/>.