RESEARCH HIGHLIGHTS

Smithsonian
Institution

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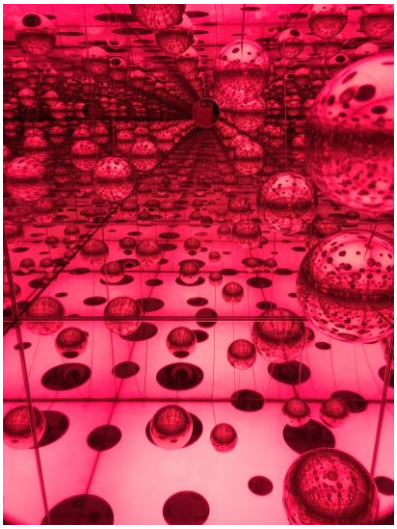
HIRSHHORN MUSEUM AND SCULPTURE GARDEN

CONNECTING THE DOTS: VISITOR INTERACTION IN CONTEMPORARY ART COLLECTIONS

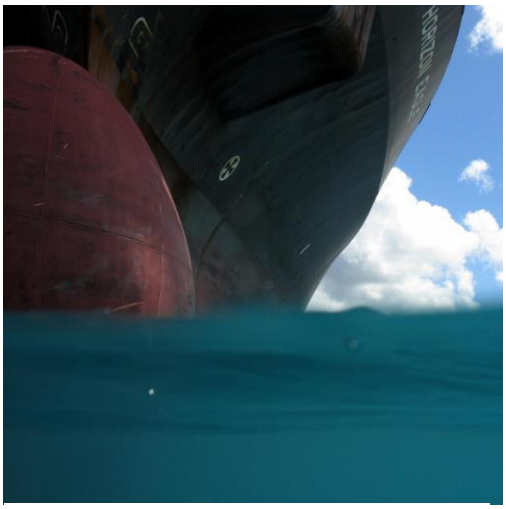


Unlike more traditional forms of art, contemporary art collections are often composed of unconventional materials and may be displayed without platforms or vitrines, making it unclear to visitors which objects are artworks and which are objects are not. Anouk Verbeek, Post Graduate Conservation Fellow at the Hirshhorn Museum and Sculpture Garden ("HMSG"), is currently conducting research exploring the considerations in the display of contemporary artworks as it pertains to visitor interaction. Utilizing the *Yayoi Kusama: Infinity Mirrors* exhibition as a case study, the aim of her research is to gain insight into visitor behavior and to provide an overview of risks—and possible solutions—for artworks that do not lend themselves to traditional forms of protection during display. The approach to her study is collaborative, incorporating input from the various museum stakeholders who partake in the decisions relating to how artwork is displayed and protected, both within HMSG and beyond by surveying staff in institutions throughout the U.S. and Europe.

Yayoi Kusama: Infinity Mirrors is a celebration of the legendary Japanese artist's sixty-five-year career and proved to be a compelling art experience. During the three-month run of the show, HMSG welcomed 475,000 visitors—the highest spring visitation in its history, and double the average attendance for that period. The exhibition itself, which had a strict cap on daily visitors, drew 160,000 people. Instagram users posted 34,000 images of the exhibition according to the museum. The Smithsonian installation closed as scheduled on May 14. The show will now travel to five major museums in the United States and Canada making its next stop at the Seattle Art Museum on June 30.

SMITHSONIAN ENVIRONMENTAL RESEARCH CENTER

SHIPS STRUGGLE TO BATTLE INVASIVE SPECIES AS GLOBAL TRADE SURGES



What lies beneath, a diver's view of a commercial ship. Photo by Ian Davidson

In the battle against invasive species, giant commercial ships are fighting on the front lines. However, marine biologists from the Smithsonian Environmental Research Center ("SERC") recently discovered that even when they follow the rules, one of their best weapons is coming up short.

A new study published in PLOS ONE on March 20, 2017, reveals that as ships move goods around the world, they inadvertently ferry invasive species as well. These new species travel over in the ships' ballast water and the water ships pump on board for stability, to keep them from becoming top-heavy. But when the ships arrive to port, they often discharge their ballast water from distant global regions, along with the unseen, unwanted hitchhikers.

Shipping companies and biologists have known about this problem for decades and are still struggling to combat it. Currently, their main strategy is called "open-ocean exchange." The idea is to flush out ballast water from their original port in the open ocean, remove most coastal organisms, and replace it with water more than 200 miles from shore. When they arrive at their destinations and discharge their new ballast water, any open-ocean organisms picked up are unlikely to survive in ports and coastal waters.

"Ballast-water exchange provides a stop-gap measure until new technologies can be implemented to further reduce species transfers," said Greg Ruiz, SERC senior marine biologist and a co-author of the new study. Since 2004, the U.S. Coast Guard has required most commercial ships entering the U.S. from overseas to do an open-ocean exchange before discharging ballast in ports. Unfortunately, this strategy has some serious limitations and may not be as effective as scientists and policymakers once hoped.

Ruiz and a team of SERC biologists led by Jenny Carney examined the ballast water of large bulker ships entering the Chesapeake Bay for a period of 20 years, comparing samples from vessels before the open-ocean exchange rule went into effect to those from afterward. All the later ships sampled had performed open-ocean exchange, while the earlier groups had not; however, instead of going down, the concentrations of potential coastal invaders scientists found in ballast water were five times higher in recent ships, despite the routine use of open-ocean exchange.

"We were surprised that we found more organisms in our samples. We were expecting the numbers to be lower," Carney said. One possible explanation is that the water ships are taking in today has more organisms to start out with—making it harder for ballast-water exchange to get rid of them all. It is also possible that more organisms could be surviving the journey to the Chesapeake, a scenario made more likely by shorter voyages.

The authors noted other changes as well, largely associated with the coal trade. Besides increases in the concentration of ballast-water organisms, the total volume of ballast water discharged in the Chesapeake is also spiking. Since 2005, when the open-ocean exchange was adopted, overseas ships have discharged almost five times more ballast water into the Chesapeake Bay each year. Most of that increase came from bulkers, massive cargo ships that transport coal and other bulk products in one direction, and return loaded with overseas ballast water from elsewhere in the world. From 2005 until the end of the study, the more coal the Chesapeake exported, the more bulkers came into its ports. This does not mean open-ocean exchange does not work, the authors point out, but rather that it is facing unprecedented difficulties.

In December 2016, the Deputy Under Secretary for Collections and Interdisciplinary Support, Scott Miller, together with the National Invasive Species Council and other organizations hosted an Invasive Species Innovation Summit at the National Museum of the American Indian. SERC, the Smithsonian Conservation Biology Institute, and the National Museum of Natural History also participated in the Summit. The Summit explored new technologies for the detection, management, and elimination of invasive species, which constitute major economic and environmental risks. "The speakers and the audience shared a 'we can do this!' perspective that has the potential to transform a field historically characterized by frustration and, sometimes, surrender," said Jamie Reaser, Executive Director of the National Invasive Species Council. A new Executive Order on invasive species management was announced at the Summit which was funded by the Laura and John Arnold Foundation.

SMITHSONIAN CULTURAL RESCUE INITIATIVE AND MUSEUM CONSERVATION INSTITUTE

SMITHSONIAN AND U.S. DEPARTMENT OF STATE PARTNER ON EMERGENCY CULTURAL HERITAGE WORK IN IRAQ

In March, the Smithsonian and the U.S. Department of State announced a new $400,000 project to enable Iraq's State Board of Antiquities and Heritage and others to conduct on-the-ground work to document and stabilize the recently liberated ancient city of Nimrud. Nimrud, located about 20 miles south of Mosul, was under the control of the Islamic State group until November 2016. During the city's occupation, many important historical sites and artifacts were damaged or destroyed. The project builds on the Smithsonian's work at the Iraqi Institute for the Conservation of Antiquities and Heritage in Erbil, Iraq, which was established by the State Department in 2009 for the purpose of supporting the preservation of the country's cultural heritage.

"Protecting cultural heritage—which includes artifacts, artworks, historical sites, and intangibles such as language and musical traditions—is vital to a community's sense of identity and a matter of respect for human rights and dignity," said the Smithsonian's Acting Provost Richard Kurin. "The Smithsonian, working with partners such as the State Department and the State Board of Antiquities and Heritage, can bring together experts to assist our colleagues in Iraq as they begin the task of reclaiming and preserving what ISIS tried to destroy."

Preserving Northern Iraq's Cultural Heritage is the focus of the upcoming June 8, 2017, moderated panel discussion about cultural heritage protection and stabilization efforts in Northern Iraq. Acting Assistant Secretary at the U.S. Department of State's Bureau of Educational and Cultural Affairs ("ECA") Mark Taplin and Smithsonian's Acting Provost Richard Kurin will offer welcoming remarks. Panel members include: Knox Thames, Special Advisor for Religious Minorities in the Near East and South/Central Asia at the U.S. Department of State; Jessica Johnson, Head of Conservation at the Smithsonian Museum Conservation Institute; Susan Ackerman, President of American Schools of Oriental Research; and moderator Nancy Wilkie, President of the U.S. Committee of the Blue Shield.

The event will be presented by the Cultural Heritage Coordinating Committee ("CHCC"), the principal body for coordination and implementation of cultural heritage protection and preservation initiatives across the U.S. Government, and will be hosted at the Smithsonian's Ripley Auditorium.

SMITHSONIAN MIGRATORY BIRD CENTER, SMITHSONIAN CONSERVATION BIOLOGY INSTITUTE

SMITHSONIAN-LED STUDY LAYS GROUNDWORK TO UNCOVER ROLE OF MIGRATION IN BIRD-POPULATION DECLINES

The period of a migratory bird's annual cycle is thought to be the most perilous—its twice-annual journey over oceans and inhospitable landscapes—is also the least understood. A new collaborative study led by the Smithsonian Migratory Bird Center ("SMBC") synthesizes what is already known about these journeys and outlines the key remaining questions that, once answered, will help researchers complete the picture of the effects of migrating through the critical Gulf of Mexico region on bird populations in order to protect them.

"We're seeing declines in populations of most migratory bird species," said Emily Cohen, lead author on the paper and SMBC research associate. "Humans are really changing the environments through which birds have evolved to make these amazing journeys, and that is likely making it more dangerous to be a migrant.

Only by understanding how these changes are influencing migratory bird populations can we implement effective conservation strategies."

The hooded warbler is one of many migratory bird species that make twice-annual journeys over oceans and inhospitable landscapes, through the critical Gulf of Mexico region. Photo Credit: Kevin Bennett

The study, which was published May 3, 2017, in The Condor: Ornithological Applications, focuses specifically on coastal habitats around the Gulf of Mexico, which provide vital resources for North America's migratory birds during their migration to wintering areas in the tropics. The study found that the coastal habitats around the Gulf of Mexico are being dramatically altered by growing human populations and a changing climate.

Although all of these events may be leading to a population decline of migratory birds, and to what extent are unclear, according to the study's authors.

"Migration is really the final frontier in terms of understanding the annual cycle of migratory birds," Cohen said. "The good news is that we now have large-scale tools—including weather-surveillance radar, lighter-weight tracking devices, and citizen collected eBird data—that can fill in these information gaps for a much more cohesive picture of bird migration through the entire Gulf of Mexico region."

The paper is the result of a collaboration among scientists and conservationists as result of the 2016 Smithsonian-hosted North American Ornithological Conference. The authors call for comprehensive and collaborative Gulf-wide monitoring of migratory birds to address specific research needs, including: identifying stopover habitat hotspots; assessing the threats to airspace corridors; monitoring birds use of oil platforms; and determining mortality as the result of buildings, vehicles, and pesticides.

OFFICE OF THE ASSISTANT SECRETARY FOR EDUCATION AND ACCESS
SMITHSONIAN CENTER FOR LEARNING AND DIGITAL ACCESS AND SMITHSONIAN SCIENCE EDUCATION CENTER

The Smithsonian Center for Learning and Digital Access ("SCLDA") recently presented two sessions at the American Educational Research Association ("AERA") conference in San Antonio, TX, with partners from the University of California, Irvine, based on the research conducted with the Smithsonian Learning Lab's Pittsburgh cohort of middle and high school social studies teachers.

- Promoting Historical Thinking: Lessons from Teachers' Use of the Smithsonian Learning Lab
  The research examines how middle school history teachers used the Smithsonian Learning Lab to teach content and develop historical inquiry skills in their classroom practice. As historical information becomes increasingly digitized and accessible for teachers and students online, scholarly research on the content and use of teaching resources in history and social science classrooms is required. The writers examined the ways that history teachers used the Smithsonian Learning Lab, a repository of the Smithsonian's digitized collections with their students after participating in a professional development training at the Heinz History Center, a Smithsonian Affiliate museum.

- A Design Based Research Approach to Improving Professional Development and Teacher Knowledge: The Case of the Smithsonian Learning Lab
  The research investigates a professional development program, led by Smithsonian and Affiliate museum educators, which is designed to prepare a cohort of middle school social studies teachers to for teaching with the Smithsonian Learning Lab. Incorporating technology in classrooms to promote student learning is an ongoing instructional challenge; however, by using a technological, pedagogical, content-knowledge framework, the writers found that through four iterations of one-day workshops, teachers received increasingly individualized and meaningful opportunities to learn. Teacher feedback and collaborative debrief meetings with practitioners, museum educators, and researchers have emerged as a central component in the professional development series.

SCLDA also presented a published paper in a session at the Museums and the Web conference in Cleveland, Ohio titled "Understanding the Needs of Student Users of Digital Smithsonian Resources."

- Understanding the Needs of Student Users of Digital Smithsonian Resources
  The paper addressed the potential impact that access to Smithsonian digital resources may have on student users of the Smithsonian Learning Lab that was originally designed for educators. The methodology included student observations and interviews and a literature review focused on online learning and the use of digital materials. Environmental scans were designed to understand the features of online learning systems and social media platforms popular with students, and prototyping of the group was conducted in classrooms. The study's conclusions provide recommended approaches that can be used to guide the adaptation of the Learning Lab.

The Smithsonian Science Education Center ("SSEC") contributed a chapter to the anthology "Theories and Fundamentals of Inquiry Based Science Teaching." The Spanish version of the compendium, produced by Innovation in Science Education ("INNOVEC"), is a science education program that promotes the use of Experiential Education Systems and Investigative Science ("SEVIC") among elementary school teachers who teach in public schools in Mexico (https://ssec.si.edu/innovec-mexico-laser-success-story.) Mexico bases their nationwide-reform on the SSEC's Leadership and Assistance for Science Education Reform ("LASER") model. Contributing authors for the compendium include: Dr. Roger Bybee, Lead Writer for the Next Generation Science Standards; Dr. Bruce Alberts, former President of the US National Academy of Sciences; Dr. Carol O'Donnell and Dr. Amy D'Amico of the Smithsonian Science Education Center (SSEC); and the LASER i3 evaluators from the University of Memphis. The second volume of the Anthology "Theories and Fundamentals of Inquiry Based Science Teaching" is now available (http://innovec.org.mx/home/images/7-antologia_v2_digital-min.pdf.)