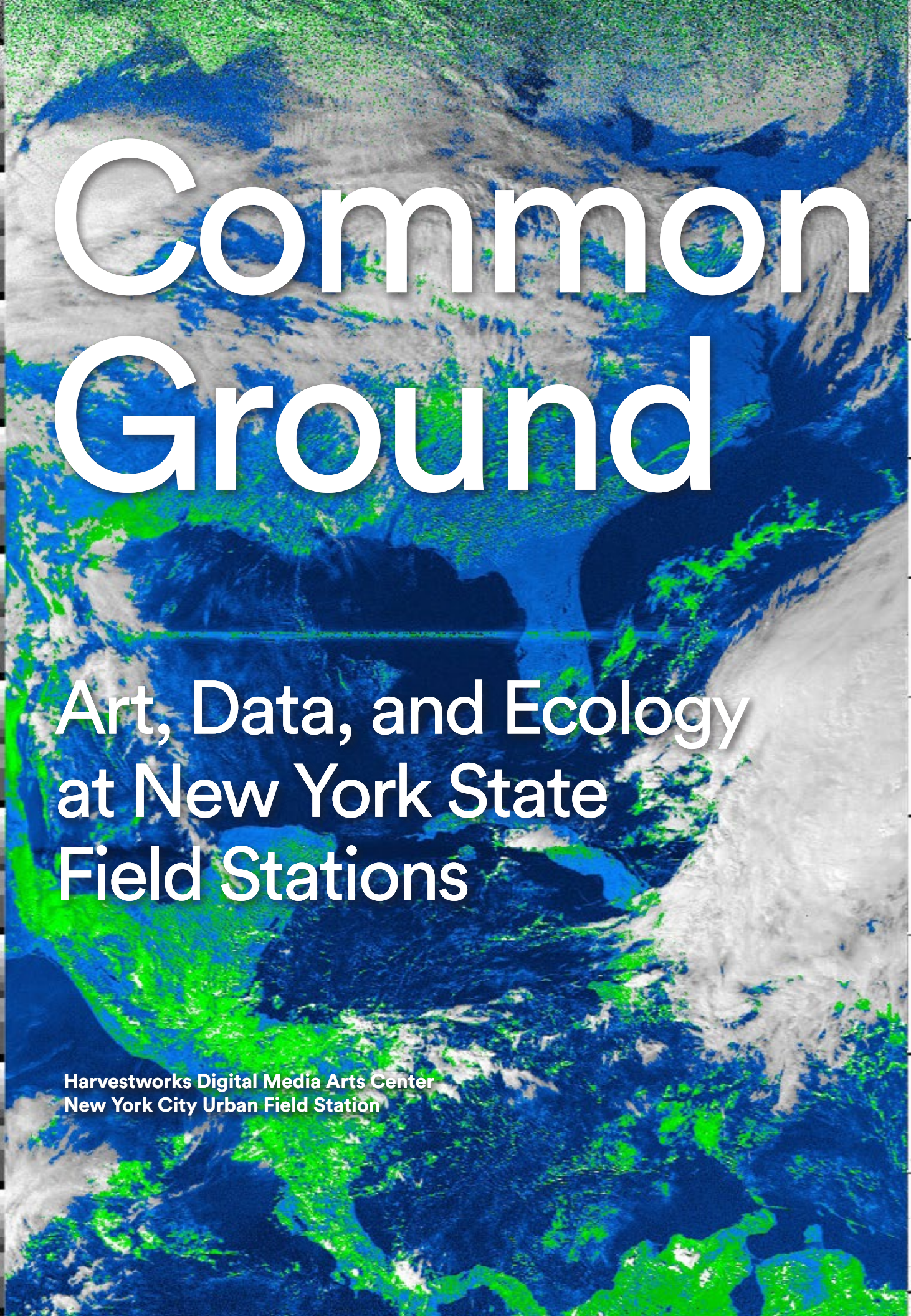

Common Ground

Art, Data, and Ecology at New York State Field Stations

Harvestworks Digital Media Arts Center
New York City Urban Field Station

Common Ground

Art, Data, and Ecology at New York State Field Stations

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with
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Harvestworks Digital Media Arts Center | New York City Urban Field Station

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Common Ground:
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New York State Field Stations
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Executive Summary

"The data we currently collect are valuable and represent a vital piece of our story. But I don't think it is by information alone that we will be saved. My students, once they are filled up with new ecological knowledge and have developed an awareness of our situation, always say, 'We have to tell people what's happening in the world. If they only knew what they were doing, they would stop.' But, it's not true. We are all saturated with data. We do know what we are doing...The data may change our minds, but we need poetry to change our hearts."
—Robin Wall Kimmerer, *Interview with a Watershed* (Kimmerer, 2004)

This report assesses the potential for collaboration in New York State between the arts and field stations: places and programs where scientific researchers conduct long-term studies of diverse ecosystems. It provides an overview of how and where this transdisciplinary work is currently taking place, and makes recommendations to advance this effort across the state. It seeks to encourage further opportunities for artists that, when combined with environmental research, can aid community development and quality of life by advancing awareness of social-ecological systems: how people use, perceive, and shape our environment.

This project itself is a reflection of the benefits of such collaborations. It is a partnership between Harvestworks, a NYC-based media arts organization, and the New York City Urban Field Station, which advances research, environmental stewardship, and ecological literacy to improve well-being in New York City and many other urban areas, cities, towns, and regions. The project was made possible by a generous grant from New York State's Regional Economic Development Council.

Context

Over the past decade, there have been well-documented efforts to bring art and environmental science together at field stations across the country, including artist residencies and collaborative, transdisciplinary projects. Efforts to coordinate and promote such collaborations are increasing, both at the grassroots and facilitated by national membership organizations such as the Alliance for Artist Communities and the Organization for Biological Field Stations.

Field stations reflect one sector of environmental research, but especially lend themselves to transdisciplinary efforts with the arts. Against a backdrop of accelerating environmental change, field stations increasingly seek common cause with the arts to share their knowledge and help the public develop "ecological literacy" to better participate in how we conserve, manage, experience and appreciate our natural resources. Collaboration with the arts sector can enhance the reach and relevance of a field station's work by connecting with the public and building awareness in novel, engaging new ways that go beyond traditional research models.

Many arts residencies offer access to nature and creative time. But field stations offer something unique for artists: the opportunity to conduct artistic inquiry in parallel to scientific research in a shared landscape. As centers of scientific research embedded in the environment, field stations offer

artists a special kind of place-based investigation. Field stations also offer troves of environmental data for the growing number of artists who use data as source material.

Trends in the arts—such as the increasing numbers of artists and curators exploring the "Anthropocene," creative placemaking, social practice and community-based art interventions— also support art at field stations. Lastly, such partnerships can contribute to regional and community efforts to leverage both cultural experiences and local natural resources, driving community development for the benefit of residents and visitors.

Findings

Against this national backdrop of increasing dialogue and collaboration between the arts and field stations, we investigated how this movement was being manifested in New York State, and its potential for growth. Activities included: a scan of the state's field stations followed by a short questionnaire, interviews with a number of field station administrators and resident artists, and a look at three residency programs in greater depth. This was complemented by a scan of relevant arts and culture resources, and a brief questionnaire for a select group of artists. A half-day convening with a variety of stakeholders from arts, science, and government produced a wide-ranging and animated dialogue.

Almost universally, field stations seek to engage the public, most commonly through lectures, workshops or seminars or through outdoor education (such as guided hikes) or "citizen science" programs. Many also have some kind of art activity, typically art exhibitions or art classes. While only three field stations have active artist residency programs, there is a near unanimous belief among the rest that art can inspire deeper understanding and appreciation of local ecosystems. Most respondents agreed that art can be effective in communicating science and the work of researchers and land managers, can increase participation in public programs, and can inspire individual and collective action on environmental and land use issues. Field stations expressed a desire to learn from case studies at peer organizations, to see examples of work by artists exploring the environment, and to better understanding how the impact of such programs can be evaluated.

Harvestworks (through residencies, commissions, or sponsorship) increasingly supports projects that address environmental issues or explore the natural world. A review of recent applicants to its residency programs also showed an increase in the number of projects focused on data of the sort that field stations generate—about a third of proposed projects in a recent round were inspired by, or used data, in visualization/sonification projects. A brief questionnaire of a small but representative group of artists showed that a majority value residencies in order to access collections, databases, or other kinds of information. Like the field stations, artists believe that art can improve public engagement and increase understanding of environmental issues. Asked about their own work, 70% felt it has the potential to inspire deeper understanding and appreciation of local ecosystems; 82% believing their work could increase the number and diversity of participants in public programs, and 70% feeling it could inspire individual and collective action on environmental and land use issues.

New York State is well suited to support cross-sector collaborations between the arts and environmental organizations. It is an arts leader among all the states, with socially-engaged artists in all disciplines, organizations that support them, community-based cultural organizations committed to improving regional quality of life, and robust funding for the arts. It is well known that New York City is one of the world's cultural capitals, and abounds in artists and the types of resources described below. But arts and cultural organizations exist in every part of the state, and when mapped together, constellations of field stations, residency programs, and other cultural organizations emerge that suggest the potential for local and/or regional collaboration.

Recommendations

There are clear mutual benefits to collaboration: artists at field stations can encourage greater public engagement, promoting immersion in natural areas (especially for youth), citizen science, and conservation efforts. Field stations offer artists opportunities to explore new kinds of art making, access to new ideas, data, content, and social engagement. Ultimately, collaborative spaces for artists and scientists can yield new forms of knowledge and practices to inform society on the sustainability of natural resources.

Furthering this work will require investments by funders, including government agencies and foundations, along with leadership and coordination provided by a stakeholder organization or a consortium that can act as a bridge between arts and environmental organizations.

The conclusion of this report details a set of recommended next steps with a focus in three areas:

1. **Advance existing art residencies at field stations:** These programs would benefit from support for planning and implementation of programs; evaluation; and connection to national gatherings and conversations.
2. **Share information and best practices from across the field:** a centralized and accessible information resource—including case studies, best practices, documentation, and a directory of representative artists—would help field stations conceptualize programs and make the case for support within their institutions and externally, and in NYS and beyond, spread documentation of the transformative outcomes of this work.
3. **Create formal and informal opportunities for cross-sector networking:** Our convening demonstrated the value of cross-sector dialogue, and underscored the need for more such opportunities including facilitated conversations between field stations, regional art and science salons, a statewide conference, and a data, art, and environment working group.

Context

What is a Field Station?

Field stations are places and programs where scientists conduct long-term research on diverse ecosystems. These place-based, outdoor laboratories are a critical source of data and scientific insights into the environment and society. The Organization of Biological Field Stations (OBFS) enumerates their critical roles: they are "living libraries" and "crucibles of innovation and discovery," and are "hubs of integrated research [and] storehouses of critical historical information" (Billick et. al. 2013).

There are more than 300 field stations in the United States, both terrestrial reserves and marine laboratories. They vary widely in size and facilities, from a few simple trails with a single employee to thousands of acres with state-of-the-art laboratories. They can be in urban areas, national parks, or extremely remote wilderness. Many of the larger stations operate within one or more networks. Twenty-eight field stations comprise the Long-Term Ecological Research (LTER) network and provide long-term data to the scientific community, policymakers, and the public. Similarly, the United States Forest Service maintains a network of 80 experimental forests and ranges that have been monitored and researched for decades, providing fundamental insights into ecosystems. What unites these diverse field stations is a "commitment to advancing our understanding of the Earth by supporting research, teaching, and public education" (OBFS web site).

Field stations have existed for over a hundred years, but today many face challenges. Despite providing a crucial infrastructure for scientific knowledge, they often fly under the radar, even within their host institutions (a majority of field stations are part of a university). Sarah Oktay, past president of the OBFS, lamented that few people know what a field station, at a time when they need public appreciation of their "intrinsic value" similar to national parks and other protected land (Oktay, 2015).

Communicating the value of scientific research to the general public is also a priority of the National Science Foundation (NSF), a principal source of funding for field stations and researchers. NSF's "broader impact" mandate encourages grantees to explain to the general public "the role that science plays in the quality of everyday life" with NSF Director France Córdova stating that "in both formal and informal venues, we need to engage the public in order to help improve understanding of the value of basic research" (NSF, 2017).

A report from the National Research Council, *Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century*, sounded the alarm: field stations needed to evolve by "developing stronger networks, establishing more entrepreneurial leadership and planning, and documenting their impacts in science and society" (NRC, 2014). Against a backdrop of climate change and environmental disturbance, there is both urgency and an opportunity to convey this essential work conducted literally on the frontlines of ecological study. And to do so, a growing number of field stations are looking to the arts as allies.

OPPOSITE:
Hara Woltz,
Did you see me (Butterflies and Moths)? Fieldbook 25.
Cary Institute of Ecosystem Studies,
2015, Paper, guache, pen, photographs, tape, 8" x 15".

Fertile Ground for Art

Across the field station community, the call for relevance and visibility has invigorated a nascent movement to connect with art and artists. Over the past decade, there has been an upsurge in residencies and site-specific projects; increased information sharing, evaluation, and documentation; organizing efforts, including a NSF proposal to network arts-oriented field stations; and formal and informal dialogue with the arts sector. The extent and variety of these initiatives can be seen at the *#ArtSciConverge* blog and the LTER *Ecological Reflections* web site.

Many arts residencies offer access to nature and creative time. What makes residencies at field stations unique? Field stations offer artists a special kind of place-based investigation. They provide an opportunity to conduct artistic inquiry in parallel or in dialogue with scientific research in a shared, studied landscape. Collaboration with scientists, land managers and conservationists on new forms of inquiry, public engagement, and conservation is possible.

Frederick Swanson is emeritus scientist of the H. J. Andrews Experimental Forest, an LTER site promoting interaction among artists, writers, and scientists under the *Ecological Reflections* rubric for a number of years. He summarized the unique aspects of field station residencies in a survey, *Confluence of arts, humanities, and science at sites of long-term ecological inquiry*.

Swanson says that "sustained, place-based inquiry . . . forms fertile ground for dissolving disciplinary boundaries" and that joint study, by artists and scientists, enhances "the cultural and scientific value of places of sustained inquiry." Both artists and scientists benefit, as "scientists to see ecosystems and their own work in new ways" and collaborative "creative thinking among both scientists and humanists [is] a way to address environmental ethics issues prevalent in research and conservation topics at many sites." The public benefits from this "intensive ecology-arts-humanities interaction" because field stations are empowered to bring "science-inspired stories to diverse audiences" (Swanson, 2015).

To reap these benefits, Swanson and others argue that artists should not act simply as translators or illustrators. Rather than paraphrase science, artists must bring another dimension of understanding to ecology, grounded in their own process and expertise. An NSF-funded convening at the Nevada Museum of Art in 2015 (with OBFS, LTER, and arts representatives) entitled *Perspectives: Examining Complex Ecological Dynamics through Arts, Humanities and Science Integration* brought this into focus. Bill Fox, Director of the Museum's Center for Art + Environment, stated that an artist should not act as a "'translator' of someone else's science, but as a 'creator' of new work that is inspired by science and that can illuminate new lines of inquiry and meaning in both scientific and artistic realms." (Hessenius, 2015).

Janet Brown of Grantmakers in the Arts (GIA) who also attended, echoed this idea in her convening summary. Ideally, "the artist is not replicating science in an artistic format but rather creating art that is based on the inspiration of the scientific encounter" (Brown, 2016). Three examples of artist residencies and outcomes are offered in the appendices.

Convergence—as cross-disciplinary collaboration between art and science is sometimes called—is in the DNA of field stations. "Field stations have been doing this for decades and some for centuries," according to Jerry R. Schubel (President and CEO of the Aquarium of the Pacific), who led the NRC report on the future of field stations. "But they can do much more. Field stations are ideal places to bring scholars and students from different disciplines together not just for a seminar or a lecture but . . . to live and work together, to share ideas, and to benefit from the creative abrasion that results from the collision of ideas—particularly ideas from different disciplines" (Schubel, 2015).

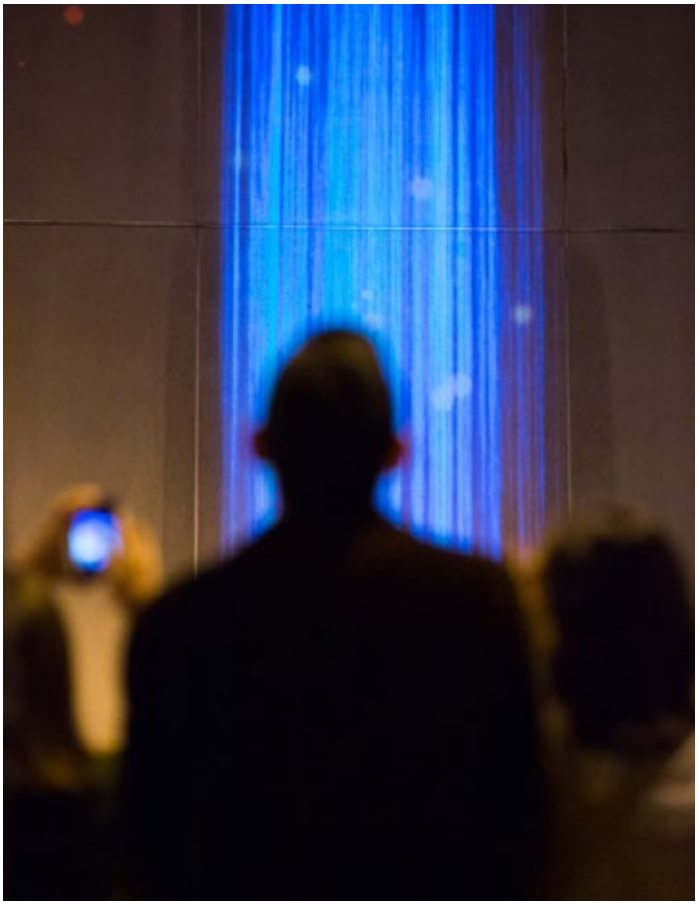
Artists in the Field

Field station efforts at convergence are mirrored by trends in the arts sector. First, parallels can be seen between how scientists use field stations and artist residencies. The Alliance of Artists Communities (AAC) describes residencies as places that provide artists with dedicated time and space for the creation of new work. Like field stations, over 500 residency programs are distributed throughout the United States varying in size and location. About 60% are in rural areas or small towns, and many are also part of a university, museum, or cultural center. And like field stations, residency programs are often are out of public view, yield intangible benefits, but are linked by a common thread: supporting career-advancing research and creative production.

In *The Convergence of Art & Science*, AAC's past director Caitlin Strokosch noted that residencies, like field stations, are "well-suited for collaboration and synergy" with "artists and scientists as equal partners, where neither discipline is compromised" (AAC, 2005). The AAC formed an Arts + Ecology cohort of residency programs, and arts and ecology has also been a theme explored at recent AAC annual conferences.

Artist residencies that "embrace ecological themes either in structure or programming are growing each year" according to Molly Rideout, an Arts + Ecology cohort leader. Residencies "are perfectly situated for this theme. First, many of the traditional artist retreats are located in a natural landscape—in a wood, in a garden, next to a lake—with the intent of giving natural inspiration to visiting artists. Second, whether rural or urban, residencies connect an artist to a place, typically a new place, and one's environment, food, water and health are all crucial to that place" (Rideout, 2015).

Funders have also taken note of the growing interaction between the arts and environmental work. In *Funding at the Intersection of Art and Environment: A Field Scan*, Grantmakers in the Arts found that "increasing numbers of artists and arts organizations are engaging with environmental issues" with arts funders seeing "a powerful, and under-realized, role for art and culture to advance environmental goals in ways that other methods cannot." Art and artists "bring awareness to issues in emotionally compelling ways, influencing people's opinions and behaviors, bringing innovative perspectives to complex challenges, and helping to galvanize people around a shared vision." (Frasz, 2015).

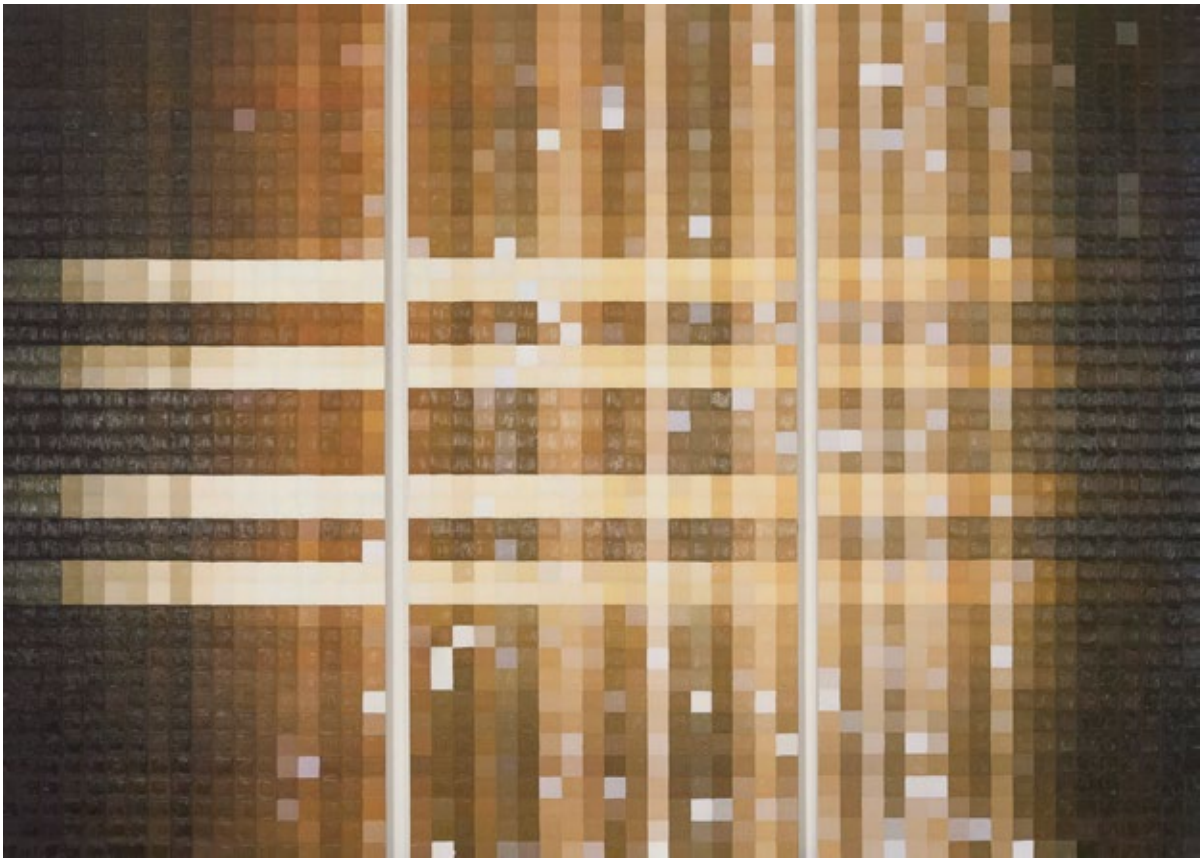


Another trend, "creative placemaking" has emerged as one of the most visible, studied, and debated movements in the arts in recent years. The National Endowment for the Arts describes it as when the arts are deliberately integrated into "local efforts to enhance quality of life and opportunity for existing residents, increase creative activity, and create a distinct sense of place" (NEA web site). As field stations emerge as sites of place-based, cross-disciplinary creativity—and use art to connect to, and benefit, local communities—they too could be viewed as part of the creative placemaking movement.

Art and Data

One further trend in the arts is particularly relevant to convergence. "From Paint to Pixels," an article in *The Atlantic*, describes data-inspired work as an art form for our time, fostering a "greater awareness of complex matters in a modern world." The article surveys "a growing community of 'data artists' . . . creating conceptual works using information collected by mobile apps, GPS trackers, scientists, and more" (Urist, 2015).

Decades of environmental data collected by researchers at field stations and LTER sites offer a rich trove for the rising number of artists who use data as source material. This is particularly true for media artists using digital tools for visualization or sonification projects, manifesting the invisible or obscure. For example, artist Andrea Polli often presents data in real time, as in Particle Falls (developed in partnership with the Environmental Protection Agency) which "projects



THIS PAGE: Leah Wilson, *Solstices/Equinoxes: Winter Solstice*; Oil on 3 wood panels; 40" x 56" (each panel is 40" x 18"); 2016.

OPPOSITE: *Particle Falls* light art work by Andrea Polli in Philadelphia, PA. 2013.

a cascading stream of current air quality data, enabling passersby to visualize the effect of their presence on the atmosphere in bright orange bursts." To Polli, "If you can see that in real-time, you have a different kind of emotional reaction to it" (Yoerger, 2013).

Like artists, some field stations have recognized the potential for art to provide innovative, and sometimes interactive, ways for the public to better understand the natural world and how field stations document environmental dynamics. WaterViz is an online water cycle visualization tool created by the Hubbard Brook Experimental Forest in New Hampshire that also uses real-time data. Hubbard Brook enlisted visual and sound artists to work with scientists to help represent real-time data to show how water moves through a small, forested watershed.

Not all data-inspired environmental art is digital, however. And some artists collect their own data, like scientists, conducting observation in the field. Leah Wilson has used Andrews Experimental Forest as the base for "extended place-based projects informed by ecological changes." In a series of "place-based paintings" Wilson found that working with scientists helped her "create my own systems that enable me to collect and process data. I use the information . . . to initially deconstruct an image of a landscape, then to construct an alternative way of interpreting the environment" (www.leahwilson.com).

Wilson's practice suggests that the act of gathering data—or more broadly, the act of sustained observation—is where scientists and artists find true common ground or a "connection through curiosity" as Wilson puts it. One of the most important outcomes of the dialogue between art and science is being able to see a subject—an ecological system or landscape—through sympathetic but dissimilar eyes. The benefits can be mutual. Wilson's long-term presence at Andrews has led to her creating a body of work and advanced her career in tangible ways, but has also influenced the scientists she encounters there who have told her of their "renewed enthusiasm for, and connection to, the places" they study by seeing it anew.

Findings

Against this national backdrop of convergence, we investigated how collaboration between field stations and the arts was taking place in New York State. We did a scan of the state's field stations, circulated a brief questionnaire, conducted interviews with a number of field station administrators and resident artists, and looked at three residency programs in greater depth. This was complemented on the arts side by a scan of relevant arts and culture resources, and a brief questionnaire for a select group of artists. A half-day convening brought together stakeholders from arts, science, and government for a wide-ranging and animated dialogue. A summary of our findings follows.

New York State Field Stations: A Scan

We identified twenty-three field stations in New York State. These include OBFS-listed stations (ten member field stations and eight non-members), members of the Environmental Monitoring and Management Alliance (a network of organizations in the Hudson Valley), and several unaffiliated field stations. A list and map are included in the appendices.

Like the national profile, NYS field stations reflect a variety of sizes, affiliations, and locations, from rural to urban. Nearly half are part of a university or college, and five of those are part of the State University of New York (SUNY) system. There are small nonprofits (Huyck Preserve, Shingle Shanty), large ones (Mohonk Preserve), and even larger organizations whose research and science communication efforts have an international reach (Cary Institute of Ecosystem Studies, New York Botanical Garden.) A few have government affiliations: Westchester County Parks, the NYC Urban Field Station (affiliated with federal and municipal governments), and SUNY (which is state-supported). Altogether, they reflect the state's variety of ecosystems, from the Shawangunk Mountains to the Adirondacks, the Great Lakes to the Hudson Valley, and from old growth forests to city parks.

Statewide, field stations share similar missions: conducting scientific research into the natural world and/or social-ecological systems, promoting conservation, engaging the public, and training of the next generation of scientists and conservationists. How do these field stations view the role that art can play in advancing this work? Sixteen of the field stations, representing a cross-section of the entire community, responded to a short questionnaire as follows.

Public Engagement Programming: Almost universally, field stations engage the local public, most commonly through events (such as lectures, workshops or seminars on environmental topics), by providing in-person, outdoor education (such as guided hikes) or "citizen science" programs. Many also have some form of educational programming for youth or adults.

Current Art Programming: 75% of respondents have some kind of art activity, typically exhibitions or classes. The three field stations that have active artist residency programs are profiled as case studies below. (The Huyck Preserve recently discontinued their longstanding residency program for natural science illustrators to focus resources on core programs for researchers and youth.)

OPPOSITE:
Matthew Jensen, *Flotsam Arrangement with Mosquitos* from *The Wonder Under: Photographic Cabinets of Curiosity*, 2017, hand-cut c-prints on linen.

Perceived Benefits of Art: Almost all respondents believe that art can inspire deeper understanding and appreciation of local ecosystems. More than three-quarters agreed that art can be effective in communicating science and the work of researchers and land managers, increasing participation in public programs, and inspiring individual and collective action on environmental and land use issues.

Existing Resources for Art Programming: Field stations currently have resources and capacities that could be applied to art programs. Scientific data and information could be made available to artists (per 87% of respondents), opportunities provided for artists to connect with scientists, researchers, land managers, policy experts, etc. (75%), facilities offered for hosting for meetings, workshops, or public events (69%), web and social media channels to promote arts programs (62%), gallery space or other exhibition facility (50%) could be made available. However, only a third have lodging to offer.

Priority Needs: What would help facilitate arts initiatives at field stations? Considering next steps, over three-quarters of field stations said they wanted to 1) learn from case studies at other field stations, 2) see examples of work by artists exploring the environment, and 3) understand how the impact of art programs is being evaluated.

CASE STUDY

Cary Institute of Ecosystem Studies

Founded in 1983, the Cary Institute is one of the world's leading independent environmental research organizations. The scope of the organization is shown in the title or a recent annual report, "Local Roots, Global Reach." Locally, the Institute maintains nearly 2,000 acres in Hudson Valley for field studies, recreation and learning, but also operates a research, education, and public information program international in scope. Staff scientists work across the globe in areas including disease ecology, forest and freshwater health, climate change, urban ecology, and invasive species, and the Institute also guides the Global Lake Ecological Observatory Network (GLEON) effort at managing freshwater resources. Nationally, Cary leads two LTER sites: the Baltimore Ecosystem Study and the Hubbard Brook Ecosystem Study, both of which have piloted arts and science convergence projects.

The Institute has been conducting ongoing studies on Hudson River ecology since 1985, and leads the Hudson River Environmental Conditions Observing System, a network of high-frequency monitoring sites. The Institute's Education Program provides hands-on ecological science for K-12 students and professional development for teachers. Data Jams are offered in the Hudson Valley and in Baltimore, challenging middle and high school students to interpret ecological data and creatively communicate findings to the public. Public engagement activities include talks, walks, and forums, including a Friday night public lecture series with leading ecologists.

The Cannoo Hills Creative Arts Residency at the Institute was founded in 2009. Like many other field station art initiatives, it originated with a convergence advocate: the Institute's then-president, Dr. William H. Schlesinger, saw art as a new pathway for engaging with nature and understanding science. His vision was enabled by a donor who endowed the residency. The resulting Cannoo residency is both broad (including visual and performing artists, poets and journalists) and flexible: artists are immersed in Cary's ecological community without required outcomes.

Each year, one artist is invited to spend two weeks or more on campus. Housing is provided, and the artist is encouraged to engage with scientific staff, including a lunch presentation to the Cary community. The residency has no formal call for participation, but receives many requests via word of mouth. A selection committee, which includes past residents, scientists, and educators, chooses the annual resident. Residents have included painter Rebecca Allan (who also exhibited her work and presented a joint lecture with Institute ecologist Dr. David Strayer); Hara Woltz, who is both an environmental artist and scientist in conservation biology; and Akiko Busch who writes about design, culture, and the natural world including *The Incidental Steward*, essays about citizen science and stewardship.

Discussion is underway about including more literary non-fiction or journalist residents, influenced in part by the *Ecological Reflections* project at the Andrews Experimental Forest, which has hosted many writers and humanities scholars. Going forward, The Cary Institute sees its residency program as a response to the growing urgency to communicate the work of scientists to broader audiences, and encourage interaction among artists, journalists, and scientists, rooted in place-based reflection.

Making an Impact: Emma Percy

Emma Percy's art practice is centered in papermaking, book arts, and printmaking. Based in Buffalo, New York, and a recent graduate of Alfred University's School of Art and Design, Emma's work draws inspiration from a sense of place, close observation, and ecological mindfulness.

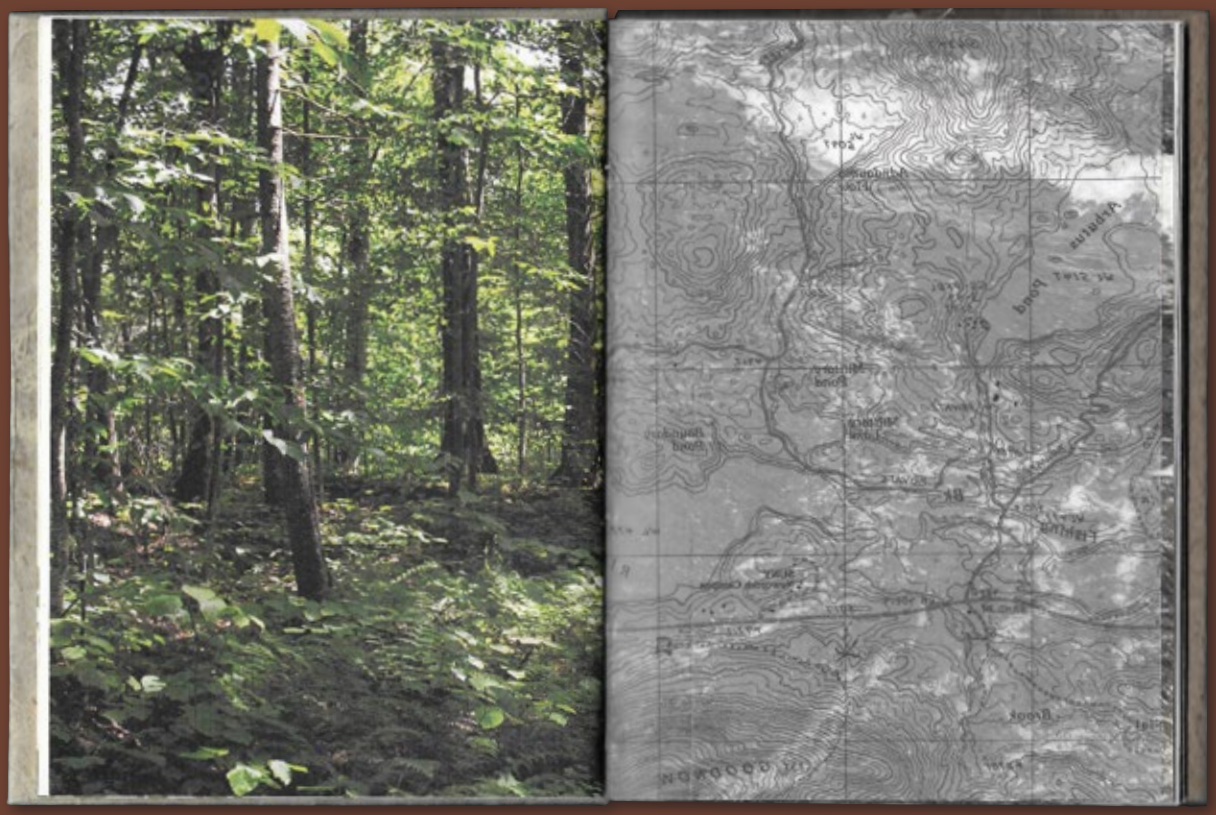
In their artist statement, Emma notes that "I exist as part of an ecological community…I have a responsibility to familiarize myself with my landscape, care for it, and try to understand how I relate to other beings." Emma's work "encourages curiosity toward the living system one is a part of and evokes collective responsibility to care for it."

Emma was well-suited to an artist residency at the Northern Forest Institute at SUNY ESF in the Adirondacks, which emphasizes the artist as an accessible presence at the field station, interacting with visitors while working on trails or in the studio. Each day was enriched by conversations between visitors, the artist, and students working at the NFI, sharing perspectives on the forest's ecology. In addition to these informal interactions, Emma conducted several workshops including a papermaking class and bookbinding class.

The artist also spent time sourcing natural dyes from plants around the forest, culminating in a small guidebook and a series of trail signs pointing out plants that can provide pigment. This gave visitors a new perspective, and connects with the history of artists and makers maintaining creative practices in relationship with local plant life.

Emma's process and the work itself invites viewers to shift their relationship to the natural world and to be present in an intimate, considerate way. In an interview with NFI's Dr. Marianne Patinelli-Dubay, Emma noted that handmade paper and books encourage a "delicate touch, stopping and noticing the physical features of something…[inspiring a viewer] to slow down and to notice." An artists' book entitled seven days of rain created during the residency reflects on living in the rainy forest of the Adirondack Mountains, and the idea that all living things are, in a sense, bodies of water. This is embodied in the work, as water is integral to the paper making process.

Through time spent patiently regarding a place, expressed through handmade materials, Emma seeks to conjure a spiritual experience of the natural world. This aligns with NFI's multi-disciplinary perspective to ecology, such as an Environmental Philosophy program led by Patinelli-Dubay. By bridging arts, science, and humanities, the goal is to encourage field station visitors to see the landscape through different lenses, or as Patinelli-Dubay puts it, fully "in the round."



Emma Percy, *seven days of rain* (detail), 2017, mixed digital + handmade media, 7" x 5", 80 pages.

Emma Percy, *seedling*, (detail), 2016, cast recycled paper, soil, vegetable seedlings, and fence posts.

CASE STUDY

Northern Forest Institute

The College of Environmental Science and Forestry (ESF) is part of the State University of New York, and has campuses and field stations across the northern part of the state. Located on 15,000 acres in the heart of the Adirondack Forest Preserve is the Newcomb Campus, home to several year-round centers: The Northern Forest Institute for Conservation Education and Leadership (NFI), the Adirondack Interpretive Center (a public education facility), and the Adirondack Ecological Center (which has supported research in applied ecology, forestry and wildlife management since 1932). Collectively, these three centers combine research, education, nature programs for children and youth, recreation, and leadership development to further ESF's goal of building "societal consensus on the great environmental challenges of our time."

As the outreach program for the campus, NFI provides place-based environmental education and programs for the public, students, and professionals. NFI explores the diverse ways in which humans connect to the natural world, including through art, which resonates with the origins of the campus. NFI is situated in Huntington Wildlife Forest which was donated by Archer and Anna Hyatt Huntington; Anna, a sculptor, used the forest for field studies.

The Artist-in-Residence program serves NFI's mission to promote inter-disciplinary, place-based experiences and learning. Like the Cary Institute's Cannoo Hills residency, it drew inspiration in part from the Ecological Reflections project at the Andrews Experimental Forest, as well from NFI's Environmental Philosophy program, which explores applied ethics and environmental justice through workshops and retreats. The residency was also inspired by a chance encounter with artist Frances Gaffney at NFI's annual Rockwell Kent Day (celebrating an artist closely identified with the Adirondacks); Gaffney prompted the idea and become the inaugural resident artist. A fundamental expectation is that the resident artist will interact with the general public, both informally—encountering visitors while working along the trails or in the studio—and formally through workshops. Artists are encouraged to write for the AIC blog, and may also display and sell their work.

The program typically hosts one artist at a time, and although there is a periodic public call, artists have also been handpicked. The residency is open to artists at all levels, including masters degree students, and runs for around twelve weeks during summer months. Because of the emphasis on personal interaction, an interview is key to the selection process, which also helps artists to determine if they are suited to the rustic environment. Housing is in an efficiency cabin, meals are provided at the campus dining center, and a classroom can be used as a private studio. Artists receive a weekly $100 stipend. The Adirondack Park Institute, a not-for-profit organization that supports programming at Newcomb, funds the residency. In 2017, the program hosted Buffalo-based artist Emma Percy, a recent graduate of Alfred University, whose practice reflects on the ecology of place expressed through paper- and bookmaking.

CASE STUDY

NYC Urban Field Station

The New York City Urban Field Station (UFS) promotes basic and applied research on urban social-ecological systems, environmental stewardship, and ecological literacy to improve human well-being and environmental quality in New York City and other urban areas. The UFS works with land managers to create innovative "research in action" programs that support urban ecosystems, and conducts comparative research and shares findings with decision makers and researchers. A unique partnership between a federal agency (the USDA Forest Service Northern Research Station), a city agency (NYC Department of Parks and Recreation) and a non-profit (the Natural Areas Conservancy), the UFS is both a physical place to conduct research (a city park in Fort Totten, Queens) and a network of relationships among scientists, practitioners, and facilities focused on urban ecology.

Public engagement is an essential component of the UFS's work, and to this end, it created the Science of the Living City program to shed light on urban conservation. Workshops, symposia, scholarly residencies, fellowships, internships, and youth engagement speak to a wide professional and general audience. The UFS launched its Arts and Humanities Residency Program in 2016 to add perspectives from the arts and humanities to urban social-ecological systems, to inform UFS research and land management, and to communicate the value, diversity, and wonder of urban nature to the public. UFS staff felt the time was ripe for such a program, and launched a streamlined pilot project that didn't require new resources. Drawing on the experience of NYC Parks which has worked with artists for over 50 years also informed the pilot.

Each year, up to three artists are selected; UFS seeks artists whose work aligns with the "research in action" agenda. Applicants are asked to reflect on how their work addresses urban environmental stewardship; fosters urban ecological health through biodiversity and connectivity; or explores the restoration, creation and management of NYC nature. The first year, three artists were handpicked; in year two, 35 artists were invited to submit proposals and 23 applied. The first cohort of artists included Mary Mattingly, Lize Mogel, and Adam Stoltman; the second included Katie Holten, Matthew Jensen, and Heidi Neilson. Artists receive a $1,500 honorarium.

Resident artists and writers are embedded with UFS staff, projects, and sites, and are eligible (but not required) to stay at the Fort Totten facility for up to three months during the year. Artists are paired with a researcher who serves as a peer-mentor and as a conduit to Forest Service and NYC Parks resources as necessary (such as research, field sites, datasets, and venues). Artists give a public lecture, panel, walk, or interactive event as part of the Science of the Living City program, participate in residency cohort meetings, and deliver a "brown bag" talk at the field station for staff, students, and researchers.

Looking forward, the UFS is considering how best to expand the program to include more artists, provide a larger honorarium, increase visibility, and partner with more city agencies and cultural organizations. As part of Forest Service's Urban Field Station Network—which includes Baltimore, Chicago, Philadelphia, and San Juan, Puerto Rico, as well as other hubs of urban research in Denver, Los Angeles, and Seattle—the UFS can encourage other stations in the network and share its knowledge and experience.

Harvestworks: Artists, Data, and Ecology

As the lead partner on this study, Harvestworks and its community of artists provides a unique window into the practices and perceptions of artists related to the environment, data, and collaboration with scientists. Harvestworks represents a segment of the contemporary arts field that is particularly suited to field stations residencies and projects using data. It includes artists who are skilled at using or creating digital tools, and whose practice often includes working with technical collaborators such as programmers.

Harvestworks provides training, commissions, and produces work by composers, sound, visual, and multi-disciplinary artists. Over the course of forty years, Harvestworks has advanced and reflected how artists use—and shape—technology in contemporary artistic practice. In recent years, Harvestworks has curated the New York Electronic Art Festival on Governors Island to showcase work by resident artists. Because of these unique services and its longevity Harvestworks has become the locus of both established and emerging artists with innovative approaches to technology. For this study, Harvestworks undertook a scan of these artists, including an analysis of recent applicants to its residency programs, and a short questionnaire to select artists.

Artist Projects: In recent years, Harvestworks has seen an increase in artist projects focused on data, using emerging technologies such as biosensors, immersive audio and video, camera and eye tracking systems, data sonification or visualization, mobile, new computer interfaces and controllers, and social media. Of one hundred proposed projects in response to two recent calls for Harvestworks residences (including New Works, a national program with a $5,000 stipend, and a program targeting emerging NYC artists) about a third involved use of data or were visualization/sonification projects.

There has been an increase in artist projects that explicitly address environmental issues or explore the natural world supported by Harvestworks through residencies, commissions, or sponsorship. Examples include:

- *Bird Song Diamond*: media artist Victoria Vesna and evolutionary biologist Charles Taylor's interactive meditation on our relationship to birds;

- *Dance with FlARmingos: Multispecies Dance*: media artist Kristin Lucas's mixed-reality experience in response to the impact of human activity on wetlands and flamingo populations;

- *Wave Crossings*, a site-specific installation by Liz Phillips, a pioneer in environmental sound art, that explores New York Harbor to reveal life under and above the water's surface;

Making an Impact: Mary Mattingly

Mary Mattingly creates sculptural ecosystems in urban spaces. Her work has been exhibited widely, from the Brooklyn Museum to the Palais de Tokyo, and she has been awarded many grants and fellowships. Mattingly's public art includes *Waterpod Project* (2009), a barge-based public space and self-sufficient habitat that hosted over 200,000 visitors in New York.

As an Artist-in-Residence at the NYC Urban Field Station (NYC UFS), Mary worked on a floating food forest called *Swale*. The work embodies the themes of art, data, and ecology, and raises provocative questions about food justice, food systems, and the 'commoning' of urban land.

For *Swale*, Mary transformed a 130-foot barge, once used for hauling sand to construction sites, into a public food forest with free edible and medicinal treasures. *Swale* also served as a hub for community events, scientific monitoring, public talks, and workshops, developed in collaboration with local communities and stewardship groups. Docked at several sites in NYC, it spent the longest period of time on the Bronx River at Concrete Plant Park in the South Bronx: one of the largest food deserts in the country, where healthy, fresh options are hard to come by. At the Park, *Swale* became the centerpiece of the Foodway, a NYC Parks pilot project that allows plants that were traditionally foraged for food (but not to be foraged today) to be grown on city park land for the first time, focusing attention on food issues, community gardens, and the relationship between park users and vegetation.

Mary's residence at the NYC UFS gave her access to data on ecosystem management, community gardens, and foraging issues, among other relevant topics. Issues with permitting and maintenance of *Swale* were more efficiently resolved as a result of being "embedded" within the NYC UFS. Through her residency, Mary moderated a panel called "Public Food" as part of the Science of the Living City program alongside *Swale* when it was docked at Brooklyn Bridge Park. The event featured the voices of researchers, land managers, and activists discussing growing, foraging, and harvesting public food in public spaces.

Mary's residence at the NYC UFS is a great example of the kind of intimate collaborations that can occur with a residency, how art and ecology can be woven together to produce art that spurs new ways of land management and policy, enhanced park user experience, and increased ecological literacy and community environmental awareness.

Swale, 2017, Mary Mattingly's project "Swale", a public floating food forest in New York

Making an Impact: Kristin Lucas

Kristin Lucas is an interdisciplinary artist whose work has encompassed video, installation, net.art, performance, and more recently, augmented reality (or AR, where computer-generated images are superimposed on the real world). Her innovative projects have been incubated at arts and technology residencies that New York State specializes in, including Harvestworks, Eyebeam, Pioneer Works, Signal Culture, and the Institute for Electronic Arts (Alfred University).

In recent years, Kristin's interest has turned to the unlikely subject of flamingos. Flamingo images in popular culture abound, but the bird itself is conspicuously scarce in the wild. Flamingos are also threatened, in the United States and elsewhere. While researching wetland habitats in Florida, Kristin learned that American flamingos were hunted to near extinction there over one hundred years ago, but that a movement to name them as native could provide protections as an endangered species.

Lucas was attracted to flamingos because they were "far out, charismatic other-worldly creatures" but were in many ways like us, "social beings who enjoy the beach, like to dance, and tend to squabble with one another." To learn more, she embarked on research, pairing arts residencies with place-based studies at nearby flamingo sanctuaries at Tour du Valat (in Arles, France) and the International Birding and Research Center (Eliat, Israel) to consult with scientific researchers and conservationists. Her goal was to bring their research to a wider audience and inspire public interest in this embattled species.

The result was *Dance with flARmingos*, a series of technology-enabled experiences that bring audiences virtually into contact with the birds. In an installation, participants first sample a flamingo wetland fragrance, then view data on banded wild flamingos (including twenty Kristin adopted in the wild), and finally don AR headsets to join in a dance with life-sized, virtual flamingos. (When Kristin finally saw flamingos in the wild, she was intrigued by their complex "courtship march" and virtually mimicked their dance-like moves.) She recently launched a FLARMINGOS iPhone app at the Okeechobee Music and Arts Festival, reminding festivalgoers that flamingos once wintered in nearby wetlands.

Kristin uses technology to bring us closer to other species in an ecologically ethical way, move us from a human-centered worldview, and encourage action (such as adopting birds through Tour du Valat's flamingo sponsorship program.) As an artist/citizen scientist she has forged ongoing, mutually-beneficial relationships with researchers. Through these partnerships, she is creating unique new works of art that can inspire public engagement on conservation issues.

Kristin Lucas, *Dance with flARmingos: Interspecies Dance*, 2017.

- *Sonic Planetarium*, where sounds representing satellites passing overhead in real time are played across a surround-sound speaker array, created by interdisciplinary artist Heidi Neilson, GIS programmer Kim Fisher, technologist Tommy Martinez.

Artist Questionnaire: A brief assessment was circulated among past applicants to Harvestworks. While the relatively small sample size (17) limits generalizations, responses illuminate ways that experienced, working artists are currently thinking about residences, collaboration, and the environment:

- 82% of respondents said they valued residencies for the opportunity to conduct place-based work immersed in a community or landscape, and to connect or collaborate with non-artists. Nearly 60% also use residencies to access collections, databases, or other kinds of information.

- In characterizing their work, virtually all the respondents explored ecological, environmental, natural resource, or land use subjects in some of their work, and all benefited from creative collaboration with non-arts professionals including subject experts, researchers, scientists etc.

- Like field stations, artists also believe that art can improve public engagement and increase understanding on environmental issues. Asked about their own work, 70% felt it has the potential to inspire deeper understanding and appreciation of local ecosystems.

- Artists felt even more strongly than field stations that their work could drive public engagement, with 82% believing it could increase the number and diversity of participants in public programs, and 70% feeling it could inspire individual and collective action on environmental and land use issues.

Cultural Resources for Field Stations

What resources can the state's cultural sector offer field stations to support capacity building, information sharing, and collaboration to advance residency and other kinds of arts programming at field stations? New York State is well suited to support cross-sector collaborations between the arts and environmental organizations. The state is an arts leader, with socially engaged artists in all disciplines, artist-centered organizations that support them, community-based cultural organizations committed to improving regional quality of life, and robust funding for the arts compared with other states.

While New York City is obviously one of the world's cultural capitals, arts and cultural organizations exist in every part of the state—and in proximity to virtually every field station. With the sole exception of the New York City Urban Field Station, field stations are upstate, with a particular concentration in the Hudson Valley. (A map in the appendices focused on the Hudson River shows how field stations, arts residency programs, and other cultural organizations form constellations with the potential for local and/or regional collaboration.) Therefore, the following are examples of cultural resources most relevant to upstate field stations.

Arts Residency Programs: Field stations could benefit from the expertise and resources of artist-centered organizations, especially to identify and select suitable artists. The AAC lists 95 residency programs in New York State, although there may be many more. Many residency programs are rooted in—and derive their uniqueness from—a sense of place, i.e. connections to specific landscapes, ecosystems, and communities. This creates a potential kinship with field stations in their region, based on shared concerns for local and regional natural areas, land use, community development, and other issues. For example, there are more than a half dozen residency programs in the Hudson Valley, from New York City to Albany, including The Hudson Valley Center for Contemporary Art (Peekskill), The Shandaken Project at Storm King (New Windsor), Residency 108 (Clermont), The Wassaic Project (Wassaic), Women's Studio Workshop (Rosendale), Omi International Arts Center (Ghent), and Post Contemporary (Troy).

New York State uniquely has a long history and concentration of residency programs that serve digital media artists, who as noted above may be particularly suited to projects using environmental data. Media residencies often also provide access to technology and training, and foster collaboration with skilled technicians, all necessary for data-driven projects. In addition to Harvestworks, examples of media and technology residencies include Eyebeam (New York City), Wave Farm (Accra), and Signal Culture (Owego).

Arts Service Organizations: New York also has an extensive network of community-oriented arts councils and arts service organizations, many funded by the New York State Council on the Arts (NYSCA) through its State and Local Partnerships program. Through these organizations NYSCA ensures that there is support for arts and culture at the local level throughout the state. The Council's statewide Decentralization (DEC) program provides funds to be regranted to community-based arts activities throughout the state. DEC sites may serve single or multiple counties, such as Arts Mid-Hudson (Dutchess, Ulster, and Orange), the Arts Center of the Capital Region (Albany, Rensselaer, Schenectady), and Greene County Council on the Arts (Columbia, Greene, Schoharie). In addition to regranting state arts funds within their counties, these organizations act as regional cultural hubs, advocates, and consultants; many also provide other cultural programs and services including exhibitions, educational programs, workspace for artists, and more. All of these services could to be relevant to the development of arts programming at field stations within DEC regions.

University Arts: As noted previously, many field stations are hosted at universities or colleges, including SUNY, Vassar College, Bard College, and Rensselaer Polytechnic Institute. These institutions have art departments and degree programs, art faculty, art centers, exhibitions, performance spaces and visiting artist programs all of which could be points of

collaboration and capacity building for field stations. An example of one such collaboration is Rot: The Afterlife of Trees, between the HJ Andrews Experimental Forest, Oregon State University (including both the School of Forestry and the Spring Creek Project, a center for exploration into urgent environmental issues), and a local arts organization, The Arts Center. Dr. Mark Harmon, a nationally recognized forest researcher on tree decomposition and OSU faculty member instigated the project in part to creatively address the "broader impacts" mandate and to help convey to the public the significance of his work. The Arts Center helped select artists who Harmon then led to sites of his decomposition research in the Andrews Experimental Forest; artists gathered information and raw material, creating new work that was curated for an exhibition at the Center. A catalog included essays reflecting science, art, and humanities perspectives.

Equity, Access and Diversity: A growing movement in the cultural sector seeks to advance equity and inclusion in the arts. For example, the Ford Foundation has dedicated its grantmaking to challenging inequality, including in the arts, and the NYC Department of Cultural Affairs recently issued the CreateNYC plan, which includes recommendations for equitable access to arts opportunities, services, and resources.

Residency programs are increasingly striving to respond to the call for equity, and to create programs that reflect the diversity of their communities and regions. These approaches, and a diverse pool of artists can offer practices for field stations to follow to address the challenges of diversity. For example, the photography-based artist-in-residence program at The Center for Photography at Woodstock was "created to expand the dialogue around diversity, race and identity, and to provide concrete opportunities for US-based artists, scholars and curators of color, who have often been under-represented in general programs."

The movement towards socially-engaged, community focused art includes residency programs such as Blue Mountain Center (Blue Mountain Lake) which supports writers, artists, and activists and "serves as a resource for culturally-based progressive movement building" while The Laundromat Project (New York City) envisions "building a corps of artists inspired and equipped to work alongside everyday folks in creative endeavors right where they live." Both these organizations advised on an AAC toolkit on "social practice" residency programs that "enable artists-in-residence to engage in community-based work in significant ways throughout a residency." As field stations consider residency programs and public engagement projects, the cultural sector can offer best practices in ensuring equity and diversity.

Many field stations reside on the traditional land of indigenous peoples, and thanks should be offered to the first peoples for use of this land. Efforts to acknowledge and incorporate indigenous knowledge into conservation efforts and foster the full and equitable participation by indigenous people in science—such as the SUNY-ESF Center for Native Peoples and the Environment led by Robin Wall Kimmerer—suggest a path for field stations to foster opportunities for indigenous artists as part of residency programs.

A Conversation on Collaboration and Community

Harvestworks and the NYC Urban Field Station hosted a half-day convening at NYC UFS in Fort Totten Park, Queens in June 2017 for a wide-ranging discussion on many of the topics introduced above. The thirty participants included a variety of stakeholders, thinkers, practitioners, and policymakers: artists and scientists, curators and conservationists, arts administrators and leaders of field stations, state and city culture funders and representatives from city parks.

The afternoon was organized into two sessions. The first focused on *Artistic Practice and Scientific Inquiry: A Creative Collaboration*, and the second explored *Public Engagement and Community Development*. A set of prompts asked: How can a dialogue between artistic practice and scientific inquiry generate new works? And how can these new works be the basis for partnerships between environmental and cultural organizations for greater public engagement and community development? Each of the two sessions began with two presentations, followed by facilitated discussion. The conversation was wide-ranging, but key ideas and challenges emerged, summarized below with illustrative quotes (in italics) from participants. The convening agenda and list of participants is included in the appendices.

Artistic Practice and Scientific Inquiry: A Creative Collaboration

1. Communicating beyond the facts

- Science requires interpretation, and can benefit from being viewed through different lenses; this may be especially true of data, where art can bring obscure data files to life. Using data, artists can address the evolution of a topic over time, and reveal something that is hidden.

- Artists can connect people to science by generating experiences, emotion, and empathy to provoke a new response to a place or phenomenon that otherwise is abstract or distant.

- Artists can give insight into the process of science and how scientists work. The artists can study, comment on the role of the scientist, or collect data themselves through other modes of knowledge production and inquiry, not rooted in the scientific method.

"We cannot comprehend the world in all its diversity . . . we always have to interpret it through some kind of lens."

"We'd like to believe [decision making is] based on the facts but we all know it's based on the storyline, the narrative . . . [we need to focus on how to] create new meaning, new knowledge."

"I'm interested in taking what we know and leveraging [it] . . . twisting [what we know] to reveal things that we do not understand."

Liz Phillips recording for *Wave Crossings*, Governors Island.

2. Cross-sector collaboration is worth it, but presents challenges

- There is common ground in scientific process and artistic practice: observation is key, and science, like art, doesn't always go in a straight line.
- Some science organizations are interested in results, usually a report or other product, whereas artists are often more about process. Collaboration needs to be an exchange that can yield a more reflective process, but still have concrete results.
- The artist's response to data may or may not be to communicate its scientific essence; the response can be also aesthetic, imaginative, or interpretive. The intention of the artist vis-a-vis the audience is key. Some artists manipulate data, and so it needs to be acknowledged when there is fabricating or fictionalizing.
- Collaboration adds to the capacity of organizations, internally by helping them learn new kinds of expertise, or externally through partnerships or participation in collective efforts.

"We see artists as researchers . . . using different methods for their inquiry. We're not going to get this pretty picture, but that's not what we're really going into it for."

"In order for successful collaborations to occur, you need to match the right scientists with the right artists."

"Our task is: How do we create opportunities where people from these different disciplines have time to create trust, embeddedness? . . . so you really know the landscape as well as that scientist? So that you meet on equal footing, and then see what comes out of that?"

3. Recommendations for successful collaborations

- Take advantage of the empirical knowledge that many artists have regarding collaboration.
- Understand the artist's intention from the beginning.
- Treat artists like peers.
- True collaboration is time-consuming, a back and forth—not just a handoff of data.
- Invest in collaboration at the project level: artist, scientists and/or land managers working over time towards a common goal.
- Create discursive spaces that are sustained over time to address challenging transdisciplinary questions.
- Allow plenty of time and process to build trust.

Heidi Neilson, *Beachball Antennas*, 2016. Four designs based on 3 antenna structures, using beachballs, vinyl, coax cable, copper foil, and software-defined radio. Temporary installation on Miami beach.

Public Engagement and Community Development

1. Art can provide new ways for organizations to be present in, and interact with, communities

- For research organizations in the public interest there is a need to move away from only producing peer reviewed articles to engaging in other modes of communication that meet people where they are.
- Artists can talk about issues differently, put them in a different context, and help communities grapple with hard facts.
- The artist can be an on-the-ground presence in a community, and community engagement needs constant reinforcement, ongoing trust-building, and reciprocity.
- Artists can play a role in thinking about barriers—cultural or physical—and bring the creativity needed to get beyond them.
- Artists can provide a creative "intervention" in ways researchers cannot.

"Don't appeal to intellect but to emotion . . . to [get people] to care about ecosystems, [inspire] an emotional caring that then goes into their actions."

"Think of artists as researchers not producers, collecting a different kind of data [working in ways] to benefit the community."

2. But as important, artists can be advocates for communities, and speak to decision-makers

- Artists can also speak to policy makers: power can move from the grassroots up. A dialogue can be created between the public and decision makers, with the artist as a go-between, facilitator, or relationship-broker.
- Science may be performed in service of a mission, such as conservation, and inform complex or challenging policy decisions. Art can play a role by fostering informed public engagement and a dialogue between public and policy makers.
- Artists can take on an advocacy role that is not possible for many scientists funded by federal money; (however, arts projects might also be seen as an inappropriate use of science funding).

"People do *understand issues that affect them. Why [does persuasion need to be] an individual thing? . . . [we shouldn't] focus solely on convincing individuals but also on convincing agencies."*

". . . if you want to affect policy, you need a variety of voices, including the arts."

Liz Mogel, *Performing Infrastructure (NYC Watershed) workshop,* 2017. Documentation of a workshop in which participants make a "human diagram" of the NYC water system.

3. Recommendations for successful engagement

- Communities need to know what your intention is: Are you ethical? How long is your commitment?
- Rethink it: "going into a community" should be "working with a community" for the long haul.
- Explore citizen science with artists.
- Invest in projects that create accessible online datasets, tools, maps, etc. that can be used by the public—they are data users too.
- Create a space for different kinds of people and expertise to come together.
- Arts interventions need to be undertaken without presumptions about outcomes—it is about the process.

Conclusion

In 2016, Grantmakers in the Arts convened an *Arts and Environmental Sustainability Thought Leader Forum*. A subsequent report described the sense of urgency and opportunity among funders, who saw "substantial momentum for cross-sector work...both in the funding community and among artists and environmental organizations on the ground. All agreed that effective action requires shifting old paradigms of thinking and working to break down silos, better coordinate action, and advance and amplify what works." (Frasz, 2016)

The efforts to "break down silos" seem to be gathering momentum. NSF-funded research underway includes a collaborative project among universities and LTERs exploring the role scientists can play in public engagement (NSF grant #1713204); University of Colorado gatherings of experts from natural and social sciences, arts, and conservation to strengthen collaboration (#1746106); and a Colorado State University project documenting how outreach activities at field stations serve informal science learning. ArtPlace America, a leader in creative placemaking, recently commissioned and published a field scan and report from their Arts, Culture and Environment Working Group (Helicon Collaborative, 2018). National conferences including The Alliance of Artists Communities, the Organization of Biological Field Stations, LTER All Scientists Meetings, and the Environmental Society of America will continue to provide platforms for networking, information sharing, and collaboration.

As our findings show, New York State is positioned to contribute to this cross-sector movement. There are art and environmental organizations throughout the state, with the potential for regionally-focused collaborations. Leadership at both arts and environmental organization increasingly recognizes the benefits of trans-disciplinary collaboration. There is a cohort of artists committed to exploring environmental issues through their work. And the state boasts robust funding resources committed to the arts and environmental sustainability.

Based on these findings, what we heard at our convening, and echoing GIA's call "to break down silos, better coordinate action, and advance and amplify what works" below are three areas where investment of funding and field-building work would have impact:

1. Advance existing art residencies at field stations

The three residency programs currently offered by field stations were largely piloted with existing resources. Each is now at a point where it could evolve—to expand, experiment, or refine programs—based on past experience and emerging priorities. Investment of funding and capacity-building resources could:

- Support planning and implementation of the next iterations of residency programs, connecting them to new partners, funding, artists, and other collaborators.
- Evaluate, document, and share program outcomes.

- Bring program managers and projects to national platforms to share and report out, including the national arts and environmental conferences.
- Incubate exemplary artist projects developed from residency relationships.
- Nurture common cause and goals amongst the organizations.

2. Share information and best practices from across the field

Field stations expressed a need for more information about how existing arts programs have been shaped and outcomes evaluated, and especially, examples of artist and their work exploring ecological issues relevant to field stations (see appendices). A centralized and accessible information resource on such projects would help field stations communicate with each other, advance common goals, reinforce activities, and strengthen bonds. In NYS and beyond, it would spread documentation on the transformative outcomes of this work. Types of information that would support regular communication are:

- Case studies from field stations and art and ecology programs.
- Best practices in evaluation: current thinking on how to evaluate arts-based interventions.
- New reports, papers, and documentation from the field.
- A directory of representative artists who are engaging environmental issues and examples of work.

3. Create formal and informal opportunities for cross-sector networking

The GIA report noted that funders saw "relatively few opportunities...to connect around this nascent area of practice ...[and] that an important next step is to create 'safe spaces for exchange.'" Our convening demonstrated the importance of cross-sector dialogue, and highlighted the need for more such opportunities. NYS could also model how to link "site level" activity by individual field stations with coordination, information sharing, and perhaps a unified public-engagement effort at a statewide "network level."

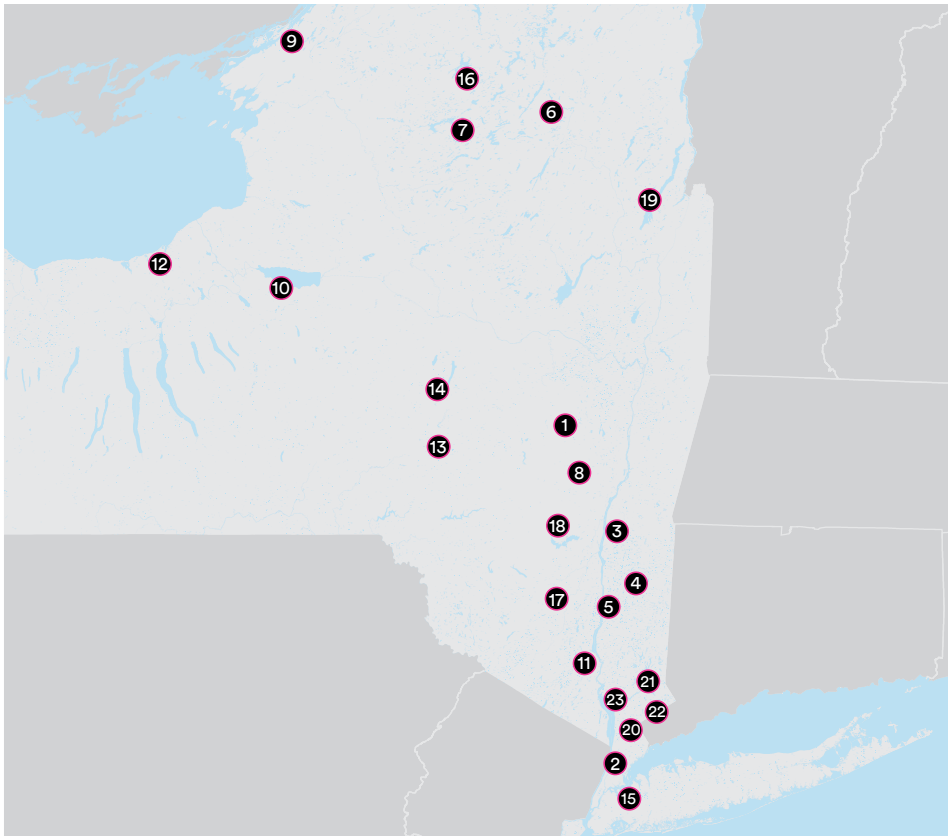
- Facilitated "community of practice" conversations for field station personnel to share ideas, experiences and questions at the intersection of art, science, and public engagement.
- Regional salons to bring together artists, administrators from field stations and arts organizations, and community development leaders for presentations on key topics, informal conversation, and relationship building.
- A statewide conference with a broad composition of participants from throughout the state for continued exploration of topics introduced at our convening.
- A data, art, and environment working group that would bring together representatives from different fields—art, environment, land use, data science and visualization, technology—for a deep dive into the practical, creative, and ethical issues of interpreting data, and the emergence of data as a medium.

Making this work possible will require investments by funders, including government agencies and foundations. This is more likely to happen with leadership and coordination provided by a stakeholder organization that can act as a bridge between arts and environmental organizations. It is our hope that this report will inform, encourage, inspire, and guide help these efforts.

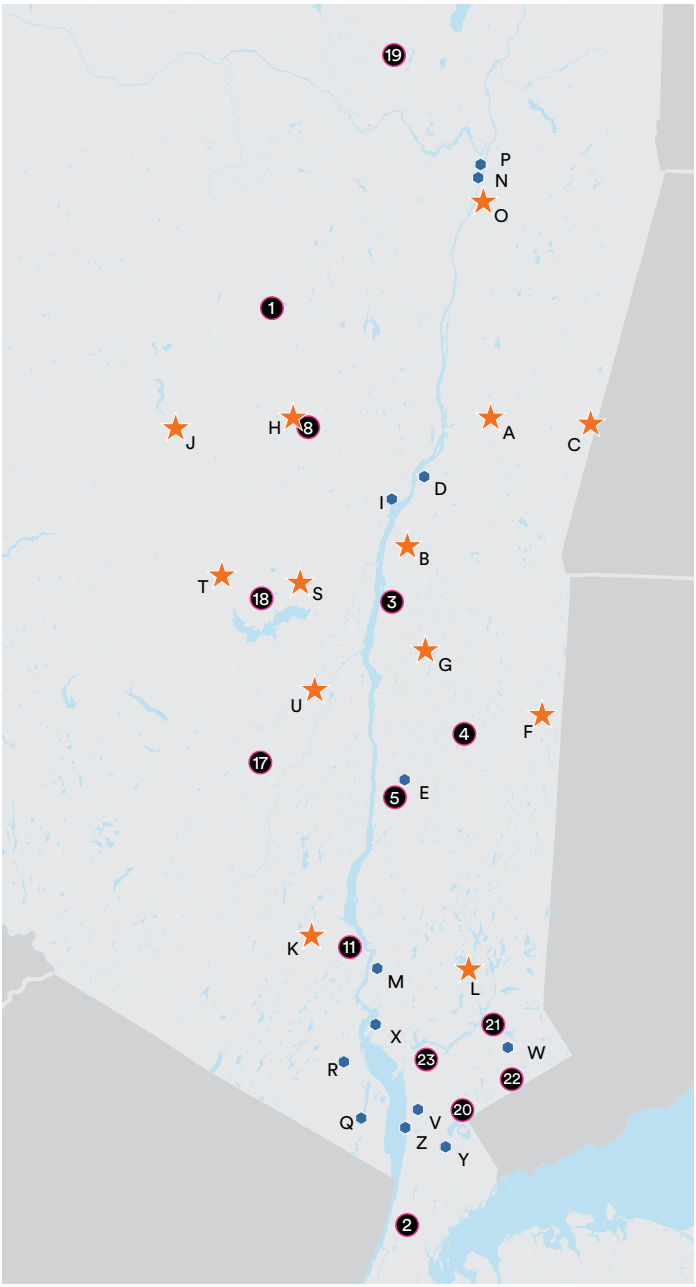
Appendices

Maps: Field Stations and Cultural Organizations

The maps in this appendix show 1) all field stations identified and reviewed for this report and their location throughout the state and 2) a close-up of the Hudson Valley (from Westchester to Albany) that shows the regional convergence of cultural resources and field stations. The list of cultural organizations is not meant to be comprehenseive, but to show a representative range of artist-centered organizations (including residency programs), multi-arts organizations, and NYSCA decentralization sites and arts councils.



	Field Station	County
1.	Edmund Niles Huyck Preserve and Biological Research Station	Albany
2.	Thain Family Forest, New York Botanical Garden	Bronx
3.	Bard College Ecology Field Station, Bard College	Dutchess
4.	Cary Institute of Ecosystem Studies	Dutchess
5.	Priscilla Bullitt Collins Field Station, Vassar College	Dutchess
6.	Adirondack Ecological Center, SUNY ESF	Essex
7.	Shingle Shanty Preserve and Research Station, Nonprofit	Franklin
8.	Siuslaw Model Forest, Cornell Cooperative Extension of Greene County	Greene
9.	Thousand Islands Biological Station, SUNY ESF	Jefferson
10.	Cornell University Biological Field Station at Shackleton Point, Cornell University	Onondaga
11.	Black Rock Forest Consortium	Orange
12.	Rice Creek Field Station, SUNY Oswego	Oswego
13.	Smith Environmental Field Station/Pine Lake Environmental Campus,Hartwick College	Otsego
14.	Biological Field Station at Cooperstown, SUNY Oneonta	Otsego
15.	NYC Urban Field Station, Forest Service, NYC Dept. of Parks & Recreation	Queens
16.	Cranberrry Lake Biological Station, SUNY ESF	St. Lawrence
17.	Mohonk Preserve	Ulster
18.	Community Greenways Collaborative	Ulster
19.	Darrin Fresh Water Institute, RPI	Warren
20.	Louis Calder Center, Fordham University	Westchester
21.	Ward Pound Ridge Reservation, Westchester County Parks	Westchester
22.	Mianus River Gorge	Westchester
23.	Teatown Lake Reservation	Westchester



	Cultural Organization	County
A.	Omi International Arts Center	Columbia
B.	Residency 108	Columbia
C.	Millay	Columbia
D.	Hudson Opera House	Columbia
E.	Arts Mid-Hudson	Dutchess
F.	Wassaic Project	Dutchess
G.	Rhinebeck Writers Retreat	Dutchess
H.	Wave Farm / WGXC Acra	Greene
I.	Greene County Council on the Arts	Greene
J.	Prattsville Art Project	Greene
K.	Storm King Art Center	Orange
L.	Putnam Art Council	Putnam
M.	Garrison Arts Center	Putnam
N.	Arts Center of the Capital Region	Rensselaer
O.	PostContemporary	Rensselaer
P.	Media Alliance	Rensselaer
Q.	Rockland Center for the Arts	Rockland
R.	Arts Council of Rockland Inc	Rockland
S.	The Center for Photography at Woodstock	Ulster
T.	Mount Tremper Arts	Ulster
U.	Women's Studio Workshop	Ulster
V.	Historic Hudson Valley	Westchester
W.	Caramoor Center for Music and the Arts	Westchester
X.	Hudson Valley Center for Contemporary Art	Westchester
Y.	ArtsWestchester	Westchester
Z.	Hudson Valley Writers Center	Westchester

Legend

- Field Station
- Artist Residency
- Cultural Institution

Convening Agenda and Participants

Art, Data and Ecology at NYS Field Stations: A Conversation

Date: Thursday, June 22, 2017 – Noon to 5pm
Location: NYC Urban Field Station at Fort Totten Park, Queens
Hosted by: The NYC Urban Field Station and Harvestworks

Agenda
With this conversation, we hope to better understand how successful cross-sector collaboration happens: How can a dialogue between artistic practice and scientific inquiry generate new works? And how can these new works be the basis for partnerships between environmental and cultural organizations for greater public engagement and community development? We also hope this gathering will lay the foundation for follow-on dialogue, activities, and collaboration.

Artistic Practice and Scientific Inquiry: A Creative Collaboration
Field stations and related organizations offer place-based opportunities for scientific inquiry, often yielding long-term data and insights into the environment. At the same time, many artists have developed practices or projects that are also place-based, often as a result of residency opportunities, that draw on data for inspiration or content, or that emulate citizen science to explore ideas about the environment.

Public Engagement and Community Development
The urgency of climate change and other factors are driving field stations and related organizations to seek new ways to inform and engage the public. At the same time, cultural organizations—addressing creative placemaking, cultural equity, and changing demographics—also seek to create new, relevant, cultural experiences. In addition, some regions and communities look to leverage these cultural experiences and local natural resources to drive community development and benefits for residents and visitors.

Participants
Maria Amin, New York City Department of Parks and Recreation
Daniel Atha, The New York Botanical Garden
Novem Auyeung, New York City Urban Field Station
Kerissa Battle, Community Greenways Collaborative
Carmen Bouyer, Artist
Markley Boyer, Catskill Center
Lindsay K. Campbell, New York City Urban Field Station
Kaari Casey, City Parks Foundation
Kevin Duggan, Consultant, Project Manager for Art, Data and Ecology project
Stephanie E. Freeman, U.S. Forest Service White Mountain National Forest
Sarah Garlick, Hubbard Brook Research Foundation
Bram Gunther, New York City Urban Field Station
Karen Helmerson, New York State Council on the Arts
Matthew Jensen, Artist
Galen Joseph-Hunter, Wave Farm
Shirley Levy, New York City Department of Cultural Affairs
David Maddox, The Nature of Cities
Jennifer McGregor, Wave Hill
Lize Mogel, Artist
Eve Mosher, Artist
Heidi Neilson, Artist
Carol Parkinson, Harvestworks
Ruth A. Rae, New York City Urban Field Station
Prerana Reddy, Queens Museum
Renae Reynolds, New York City Urban Field Station
Eric W. Sanderson, Wildlife Conservation Society
Diya Vij, New York City Department of Cultural Affairs
Mariel Villeré, Freshkills Park

Kristin Lucas, 2016, video documentation of AR/VR Artist Research Residency sponsored by Upfor gallery, Oregon Story Board and Eyebeam for *Dance with flARmingos*; Hololenses worn by Lucas and collaborators Thomas Wester and Will Pappenheimer.

Art, Data and Ecology Panel

On December 1, 2017, Harvestworks hosted a panel presentation on the Common Ground: Art, Data and Ecology at NYS Field Stations project, including a briefing on what was learned, a description of the Urban Field Station's artist-in-residency program, and presentations by four artists followed by discussion. The four artists – Ben Neill & Mimi Goese, Kristin Lucas and Tae Hong Park—are all collaborating with scientific researchers and using data drawn from the natural world as part of their creative process. Panelists were asked to reflect on the following questions:

- What makes collaboration between artists and scientists work? How can trust be fostered and expectations be made clear?
- How does artistic and scientific research relate? How does data become art? Can we speak of data as a creative medium? What are the obligations of the artist to be "true" to the data?
- In what ways can art shift individual perceptions of the environment, inform the public, encourage civic engagement, expand or change local management, or impact policy? Or enhance the work of collaboration between research and environmental organizations? Can these, or should these, be artistic goals?

In addition to Kristin Lucas, whose work is profiled in the Making an Impact section, the other participating artists included Ben Neill and Mimi Goese who presented excerpts from Fathom; Hudson River Data as Music, a collaboration with the Beacon Institute for Rivers and Estuaries (BIRE) of Clarkson University. BIRE monitors environmental data in the Hudson River through their REON system, which streams from multiple sensor arrays—Neill and Goese created a musical piece based on this data, with a grant from New Music USA. Tae Hong Park's current interests are primarily in composition of electro-acoustic and acoustic music, technical research in multi-dimensional aspects of timbre, pattern recognition, signal processing, automatic musical instrument classification, and computer-aided music analysis. He described his project Citygram, which aims to deliver a "real-time visualization/mapping system focusing on non-ocular energies through scale-accurate, non-intrusive, and data-driven interactive digital maps." The first iteration, Citygram One, uses information including spatial loudness, traffic patterns, noise pollution, and emotion/mood through audio signal processing and machine learning techniques.

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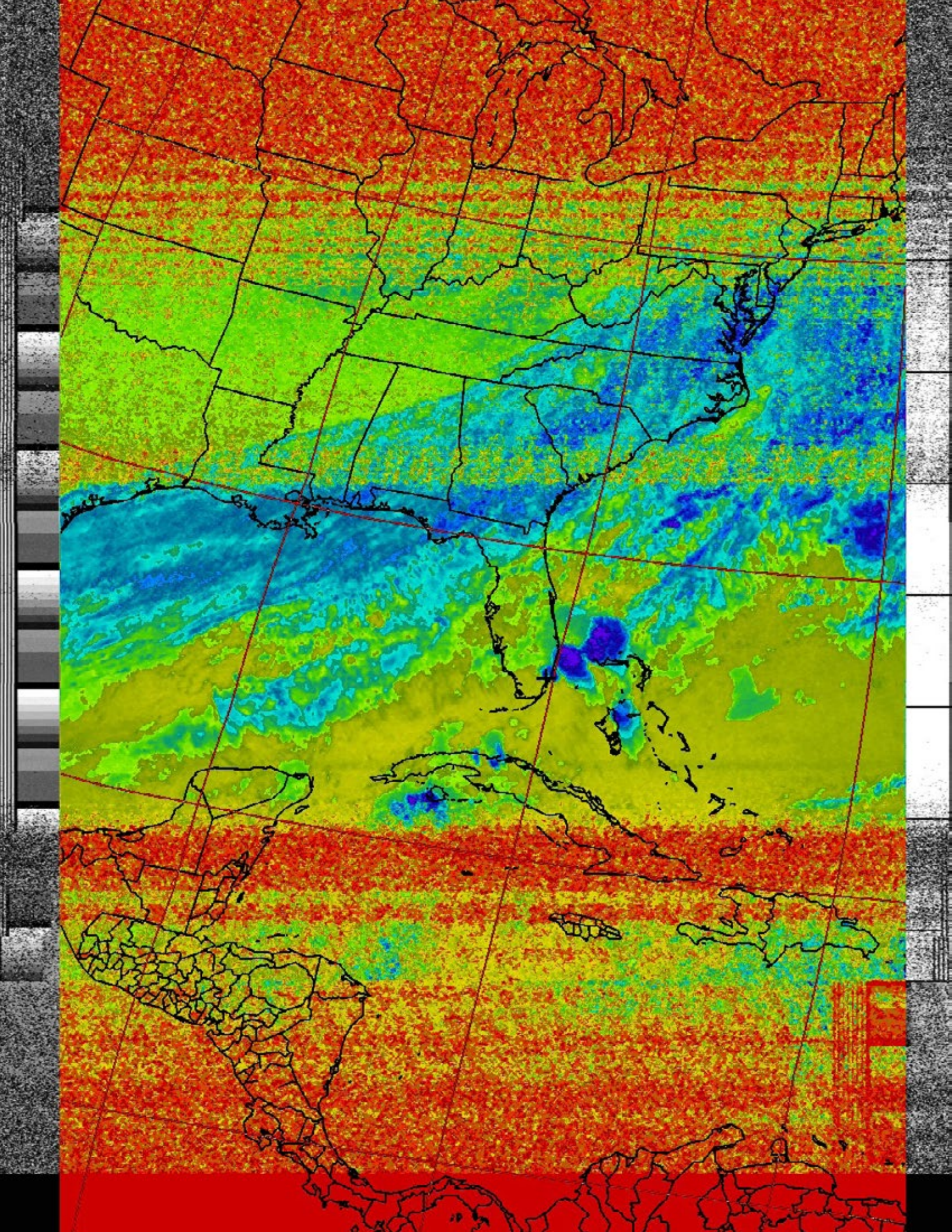
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