New York City Urban Field Station
2016 Annual Progress Report

The New York City Urban Field Station ***improves the quality of life in urban areas by conducting, communicating, and supporting research about socio-ecological systems and natural resource management.***

The NYC Urban Field Station (NYC UFS) is both a physical place to conduct research and a network of relationships among scientists, land managers, designers, practitioners, artists, other professionals, and community members that facilitates discussion and science on urban ecology. The NYC UFS is sustained through a core partnership between the US Department of Agriculture Forest Service (USDA FS) Northern Research Station, the NYC Department of Parks & Recreation (NYC Parks), and the non-profit Natural Areas Conservancy (NAC). Since its founding in 2006, the NYC UFS has actively collaborated with non-profit, academic, local stewardship, and government partners to support urban land management and sustainability initiatives in New York City through innovative and stakeholder-driven research in action.

2016: Cultivating Stewardship in New York City and Beyond

The U.S. Forest Service was created in 1905, at a time when the U.S. population was 80% rural, for the purpose of restoring degraded landscapes and watersheds that had been affected by irresponsible logging practices. This purpose was translated into a mission "[t]o sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations." The Forest Service has always been a conservation agency engaged in restoration and stewardship activities. Today, as the U.S. population is over 80% urban, we find that urban landscapes are in need of the same stewardship and restoration, and our calling to care for the land and serve the people applies just as strongly in urban areas. Through the work of the urban field stations and other urban investments throughout the country, the U.S. Forest Service engages in stewardship partnerships that yield social-ecological scientific research to improve the lives of all.

Figure 1. Workshop Group Visit Post Disturbance Site, Beach 41st Houses in Rockaway

The NYC UFS believes in natural resource management based on sound information and partnerships with community-based stewardship groups. Public engagement is essential to improving the quality of life in our neighborhoods and the long-term sustainability of urban nature. To this end, we continue to play a strong role in the legacy of the MillionTreesNYC initiative. We remain focused on engaging the thousands of volunteers and their networks that were activated through this initiative's street tree and forest restoration work. We marked the 15-year anniversary of a founding research program, the Living Memorials Project, by returning to stewardship sites throughout the region where community residents used the resonating power of trees and nature to memorialize and heal from the events of September 11th. By revisiting these sites and the people behind them we can better

understand how to use nature to bring communities together in the aftermath of tragic events. We prepared for the re-launch of STEW-MAP, a user-friendly mapping tool that has been highly effective in charting stewardship networks and sites in NYC and as a means to strengthen the capacity of local stewardship efforts.

This year we convened, "Cultivating Stewardship, Recovery, and Resilience Workshop", in New York City, June 7-9, 2016. Approximately 60 people attended, representing a variety of stakeholders in local non-profit organizations, community leaders, researchers and program managers from the USDA FS, Environmental Protection Agency, and Federal Emergency Management Agency. The workshop was co-sponsored by The Nature of Cities.

The core of the workshop focused on how conservation activities, including tree planting and other greening efforts, can help restore nature and revitalize neighborhoods. Research and experience have demonstrated that these activities can play a key role in helping communities prepare for, respond to, and recover from natural disturbances such as climate related events and human disasters such as mass violence. The workshop was convened to help advance knowledge and catalyze new networks focused on:

- **Facilitating mid to long-term disturbance recovery** through stewardship activities that strengthen social trust, enhance civic participation, and foster creative innovation.
- **Reducing vulnerability to future disturbances** through locally led and multi-agency collaborative efforts that yield green infrastructure and community stewardship investments, especially in vulnerable communities.
- **Improving quality of life** through community-driven green infrastructure investment, design, and care.

TreesCount! is a powerful example of civic engagement and citizen science in action. A total of 2,241 volunteers citywide helped NYC Parks count 666,134 trees in their third census in three decades. Like MillionTreesNYC, TreesCount! engaged communities citywide in the act of hands-on tree stewardship. These initiatives bond people together, create working networks, encourage civic action, and represent collaborative conservation. TreesCount! also yielded the NYC Street Tree Map, which is an interactive web-based tool that tells the live story of each of the city's street trees. The story includes a profile of the tree, work done by local stewards, and the tree's ecosystem value including what it does to clean our air and water. The Street Tree Map cultivates stewardship by making the nature outside our doorsteps interactive and connected to our everyday lives.

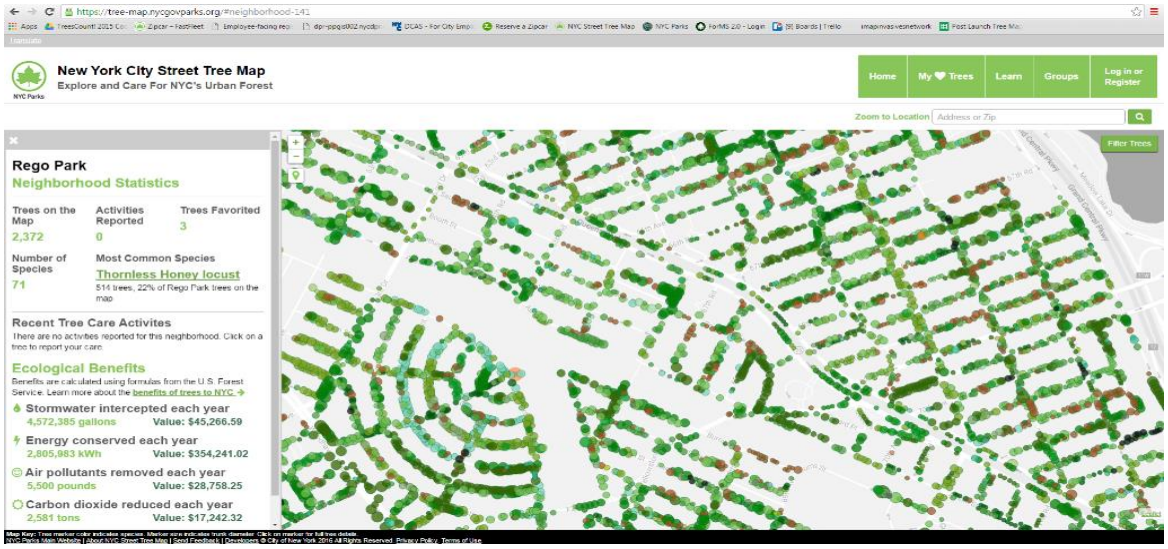

Figure 2. New York City Street Tree Map

Report Contents

Research Updates

The mission of the New York City Urban Field Station is to improve the quality of life in urban areas by conducting, communicating, and supporting research about socio-ecological systems and natural resource management. Our research has the intended outcomes of:

- enhancing the green identity and ecological health of New York City
- improving health and wellbeing of New York City's residents through civic engagement and access to green space
- cultivating social and ecological resilience that will improve readiness, response, and recovery from natural and human-caused disasters

The following research projects, programs, and partnerships reflect the variety of outcome-oriented work being done at and through the NYC UFS.

Stewardship and Public Engagement

Stewardship Mapping and Assessment Project (STEW-MAP)

Ten years after our first city-wide survey, we launched a new STEW-MAP in New York City, in collaboration with the Mayor's Office. A kickoff meeting was held on November 21, 2016, with more than 50 attendees representing organizations throughout the city. In 2017, USDA FS researchers will send out the STEW-MAP survey to thousands of NYC stewardship organizations. STEW-MAP is operating in many cities throughout the U.S. and an analysis of this multi-city data is taking place this year on the social networks of groups in collaboration with Lorien Jasny at the University of Exeter. A new multi-city website is in development with Jarlath O'Neill Dunne and Jim Duncan at the University of Vermont, which will serve as a portal to STEW-MAP data across the country. Michelle Johnson has been collaborating with Camille McCarthy in Forest Service International Programs to develop a STEW-MAP project in Valledupar, Colombia, to support urban forest management planning efforts. Lindsay Campbell, Michelle Johnson, Erika Svendsen and Dexter Locke are working with collaborators in Paris and Strasbourg to develop comparative research on civic stewardship in France. This builds upon prior work facilitated by the National Science Foundation Research Coordination Network on Urban Sustainability. The full STEW-MAP team includes Forest Service (FS) researchers and collaborators throughout the US and, increasingly, the globe.

Motivations of TreesCount! Volunteers

A survey of TreesCount! Participants closed in January 2016, with responses from over 600 of the more than 2,000 volunteers involved in TreesCount! This survey explored motivations and experiences of volunteers, along with their level of overall civic engagement. Lindsay Campbell presented the results of this survey at the May 2016 Citizen Science Symposium that engaged over 70 participants and was held at the Philadelphia Urban Field Station. The survey was complemented by in-depth interviews to further understand learning outcomes and civic actions of census volunteers. Preliminary survey results suggest that motivations for volunteer participation are highly personal including a call to contribute to one' community, a desire for education or learning, and enjoyment. A white paper and journal articles with additional findings are forthcoming in 2017. Core team members include Lindsay Campbell, Michelle Johnson, Erika Svendsen, and Phil Silva of Cornell University.

New Street Tree Planting in New York City: Surveys, Service, and Stewardship

This study surveyed service satisfaction and tree care practices of city residents who requested new street trees. The New Street Tree Request Survey investigated recipients' motivation for requesting street trees, their

satisfaction with the NYC Parks' tree planting service, and respondents' current tree stewardship activities. Survey responses collected over four years have resulted in adaptive management practices and improvements to NYC Parks' tree planting program. This included the providing clear information to residents prior to planting via email and the installation of physical flags and decals to increase awareness among the general public that a tree planting is taking place in the community. Research was conducted by Ruth A. Rae, Tessa Leverone, Neil Barrett, and Matthew Stephens from NYC Parks and submitted for review. In the meantime, a white paper is available to those interested in the study.

Discovery Agents

The USDA FS, NYC Parks, and American Recreation Coalition have teamed up with Discovery Agents. Developed in Canada by Discover Agents Inc., this augmented reality game brings conservation education to families across the US. Using Pokémon Go technology, Discovery Agents is an interactive game that kids can play in parks year-round while exploring and learning about nature. The project has brought together environmental and educational staff from multiple USDA FS research stations, the Washington office, and two NYC Parks divisions. Alley Pond Park in Queens was chosen to be the first NYC Park site to host the game in the five boroughs. The game will be free to download for all park patrons as they walk through a mile long hike through tulip – oak forest with glacial kettle ponds and a wide variety of wildlife.

Social Assessment

The social assessment explores the use and social meaning of greenspace in New York City. In 2016, social assessment research began in Prospect Park, working in collaboration with Prospect Park Alliance, interns from The Nature Conservancy, and field researchers Donna Loppa and Nadia Elkodah. In Prospect Park, we expanded our previous methods to incorporate a rapid collection of demographic data of park users and ethnographic observation. Our primary focus was to explore the use and meaning of the wooded areas in Prospect Park. Several publications have come from the city-wide social assessment and white papers are available on-line. By analyzing the varied use and practices in urban parkland, researchers were able to make connections to resilience planning and socio-cultural ecosystem services in Campbell et al 2016. An article by Svendsen et al. 2016 finds that urban natural areas create a range of psycho-social-spiritual benefits for many park users. Finally, the work of McMillen et al 2016 draws a distinct connection between urban environmental stewardship and social resilience. This work was also presented at the 2016 IUCN World Conservation Congress.

Power in Urban Social-Ecological Systems

Lindsay Campbell and Nate Gabriel (Mississippi State University) co-edited a special issue of the journal *Urban Forestry and Urban Greening* (Issue 19C) on this topic. The special issue focused on understanding the politics and power dynamics that shape urban ecosystems in an age where expanding urban populations test the limits of the ecological strata on which urban life depends. Simultaneously, dense human populations make cities fertile sites where new organizations, policies, and practices emerge to manage urban nature. The journal offers a collection of papers on critical social theory to examine the social processes that govern the management of urban ecosystems by drawing on the traditions of community forestry, community-based natural resource management, and political ecology. Focus points were: the Gowanus Canal Superfund site in Brooklyn, New York; urban agriculture movements in New Orleans; equity planning and green infrastructure in Philadelphia; arborists and marginalization in Ontario, Canada; state/civil society boundaries in urban food systems in New York City; neo-liberalism in the management of urban parks in Philadelphia; and beavers as active participants in urban environmental management and governance in Fairfax County, Virginia. The issue built on prior work developed in collaboration with the Totten Fellows of the UFS.

Tree and Ecosystem Health

NYC Afforestation Project, Kissena Park, Queens

In coordination with the NYC Parks Forest Restoration team (led by Kristen King), a team of ecologists and foresters collected data on over 1,100 trees that had been planted through MillionTreesNYC. This marked the sixth year of tracking the growth and health of this particular plot in order to better understand recruitment dynamics in a young urban forest. Rich Hallett presented on the role of tree health in predicting tree height and volume at the Ecological Society of America conference in Ft. Lauderdale, Florida. Danica Doroski, a Master's student in Mark Bradford's lab at Yale University, spent the field season measuring the role of non-planted seedlings, saplings, and trees in these experimental plots.

Long-Term Forest Restoration Plan

NYC Parks and the NAC worked together to create a long-term Forest Management Plan for comprehensively managing all forested City parkland. The report includes goal setting, but also a detailed analysis of the costs associated with all aspects of restoration and management practices, which were used to generate budget requests in 2016. The report helps practitioners and researchers alike to assess the impact of management efforts toward high-level goals of forest health and structural composition.

Ecosystem Service Benefits Provided by NYC's Street Trees

This year NYC Parks completed its decadal Street Tree Census, or TreesCount!, surveying 666,134 street trees with the help of staff and volunteers. Using the USDA FS's i-Tree Streets software, NYC Parks staff calculated the value of ecosystem service benefits provided by NYC's street trees, including storm water interception, energy conservation, air pollutant removal, and carbon dioxide storage and uptake. The benefits are valued at over $150 million annually.

Freshkills Landfill to Park Transformation

USDA FS researchers, Lindsay Campbell and Rich Hallett serve on the Freshkills Park Science Advisory Group. The research of the UFS is featured on the Freshkills Park website, along with the work of others researchers. Through the Rutgers Center for Resilient Landscapes and the Freshkills Park team, the UFS organized a panel titled "Re-envisioning Post-Industrial Public Landscapes: Freshkills Park and Liberty State Park" at Rutgers University on April 27. The New York-New Jersey region has many former industrial, brownfield, and contaminated sites. Creative reuse of these landscapes presents opportunities for the development of new public assets, such as parkland. This panel examined the role of multi-disciplinary research from ecology, biology, landscape architecture, planning and social science in re-envisioning and understanding the transformation of Freshkills Park in Staten Island and Liberty State Park in Jersey City. It included Campbell and Hallett among the speakers. Over 1,800 trees in the Freshkills afforestation study (installed October 2015) were assessed for deer browse and considerable mortality in the spring. Max Piana, Rutgers Ph.D. candidate, installed seed traps as part of a broader effort to understand limitations to native tree recruitment in urban areas. The site will be re-planted in the fall of 2017.

Figure 3. TNC interns collecting data in the field.

Long-Term Street Tree Plots with The Nature Conservancy

Long-term monitoring of Street Tree Plots is essential to supporting a healthy tree canopy in the city. This collaboration between the USDA FS and led by Rich Hallett and The Nature Conservancy's (TNC) Healthy

Trees, Healthy Cities initiative continued by expanding data collection into Brooklyn to evaluate changing street tree conditions over time. As with 2015 data collection, TNC interns collected tree health data on trees located along ½-mile lengths of streets distributed across the borough. In addition, this year included measures of stewardship observed at individual street trees. Over 2,000 street trees were assessed on 17.5 miles of city streets. TNC released the Healthy Trees Healthy Cities app for IOS and Android. The app incorporates the same tree health method used by TNC interns, allowing citizen scientists to keep an eye on urban tree health.

Green Infrastructure Plant and Soil Research Project

Understanding how soil and tree health varies over time is critical to the success of green infrastructure projects. The third year of data collection was completed for this project, which assesses tree health and soil properties across different green infrastructure designs: right-of-way bioswales, storm water, green streets, and street trees. The study also accounts for differences across tree species, surrounding land use, volume of storm water intercepted, and signs of stewardship. This year, high school students Isaiah Jeremie, Harrison Min, and Gauri Patel from the Wave Hill Woodland Ecology Research Mentorship (WERM) program helped collect data and conduct basic statistical analyses. Preliminary analysis shows that tree health has improved over time and that the tree health in right-of-way bioswales is slightly lower compared to other green infrastructure designs. The project was led by Novem Auyeung.

Figure 4 The WERM's collecting street tree data.

Ecological Assessment in Gateway National Recreation Area

The Natural Areas Conservancy expanded its' city-wide ecological assessment in partnership with Brooklyn College, the Science and Resilience Institute at Jamaica Bay and the National Park Service (NPS) into Gateway Area National Park natural areas to measure the health of Jamaica Bay's grasslands, woodlands, and shrublands. This collaboration was an expansion of the 2014 ecological assessment of 10,000 acres of New York City Parks' natural areas, and was NAC's first research project on NPS property. The project provided paid work force training for 25 students. Over the course of 8 weeks, students were trained in research protocols using customized tablet applications and GPS technology. Students gained experience in conducting research in a real world setting and had the opportunity to contribute to meaningful, ongoing science impacting the health and resilience of natural areas in their community. The data will be used to develop strategies to manage, restore and preserve parkland across jurisdictional boundaries on both city and federal lands, and enables researchers and managers to measure change over time and resilience to disturbance. The summer assessment was led by Helen Forgione and Leila Mougoui.

Disturbance and Recovery

Landscapes of Resilience

Fall marked the completion of research and design engagement at the community garden site at Beach 41st Street Houses in Rockaway, Queens, NY. With support by the TKF Foundation and the US Forest Service, the construction of a new garden space, which includes additional plots for residents, a pergola for social gathering, new common area beds, and a large bioswale for flood mitigation were completed. The work was done through collaboration with Green City Force that offered 2 weeks of volunteer time to dig and amend soil using hand

tools. A planting day was coordinated in May where 100 volunteers consisting of residents, neighbors, and representatives from local organizations including the Rockaway Youth Task Force, Edgemere Farm, Seagirt Community Garden and the Ocean Bay Resident Green Committee, to name a few. Volunteers planted hundreds of native saltwater tolerant plants. Residents now have access to a newly designed green space for reflection, contemplation and healing. Two gardeners were honored at York City Housing Authority's 53rd annual Garden and Greening Awards Ceremony and the site has received media coverage from the Queens Ledger as well as local news station New York 1. Our research has produced a peer-reviewed article: "Recognizing Stewardship Practices as Indicators of Social Resilience in living memorials and a community garden", published in *Sustainability* (McMillen et al. 2016). Another product of this work-The Cultivating Stewardship workshop-described earlier in this report, is now leading the development of a USDA FS General Technical Report, *Green Readiness, Response, and Recovery: A Collaborative Synthesis,* which will share cases and analysis of various post-disturbance experiences, offering perspectives from a broad range of researchers and practitioners. Work at the B14st Garden was spearheaded by NYC UFS program coordinator, Renae Reynolds and garden design by TILL design.

Living Memorials Project

This September 11th marked the 15th year anniversary of the terror attack on the World Trade Center. In anticipation of the anniversary, Erika Svendsen, Lindsay Campbell and Heather McMillen revisited sites from the Living Memorial Project to learn what the project means today. Researchers updated the National Registry and offered reflection on select sites in the New York City region that have been studied longitudinally to understand how community stewardship persists and changes over time. They also created a new ArcGIS Storymap that tells the story of 9/11 Survivor Trees as symbols of community recovery. Articles in press include "Co-creators of Memory, Metaphors for Resilience, and Mechanisms for Recovery: Flora in Living Memorials to 9/11" and "Remembrance, recovery, and resilience: 9-11 memorials in NYC metropolitan landscapes."

Wildlife and Habitat

Citywide White-Tailed Deer Management Program

NYC Parks continues to work with other agencies to research and implement a deer management strategy. This year marked the beginning of a public education and deer population control program in Staten Island through surgical sterilization. NYC Parks is simultaneously involved in monitoring deer population dynamics, deer vegetation impacts, and testing various means of protecting natural resources such as fencing, tree guards, deer repellent, and the use deer resistant plants. Over the summer, they established over 100 permanent plots in NYC Parks-owned forests in Staten Island and the Bronx to monitor vegetation impacts of deer and the effectiveness of fencing and deer repellent. These plots will be monitored for at least the next two years.

Breeding Bird Surveys

NYC Parks has been conducting breeding bird surveys for over 10 years. In collaboration with ornithologist Brian Olechnowski (Farleigh-Dickenson University), NYC Parks is developing a manuscript to look at changes in urban bird territories over 10 years. In addition, the Van Cortlandt breeding bird survey was initiated based on concern by the local birding community that restoration activities, with their removal of large amounts of vegetation, would harm the bird community. Pre-restoration surveys were completed 2009-2010. Restoration was done between 2012 and 2014. The first year of breeding bird survey post-restoration was completed. Early results suggest that restoration has not resulted in the degradation of habitat, despite the removal of much vegetation. In fact, wood thrushes, an indicator of healthy forests, were discovered in restored areas of Van Cortlandt Park for the first time. This work was led by Ellen Pehek.

Terrestrial Salamander Monitoring in Urban Forests

Terrestrial salamander monitoring continues in older forest restoration projects. Some findings are beginning to take shape across boroughs. Initial results from salamander monitoring done in Van Cortlandt Park in the Bronx, over 8 years, confirmed a pattern seen at Inwood in 2003: after restoration, previously smaller salamanders grew to be the same size as specimens at un-invaded sites, indicating a healthier forest. *See graph above.* The lead here is Ellen Pehek of NYC Parks.

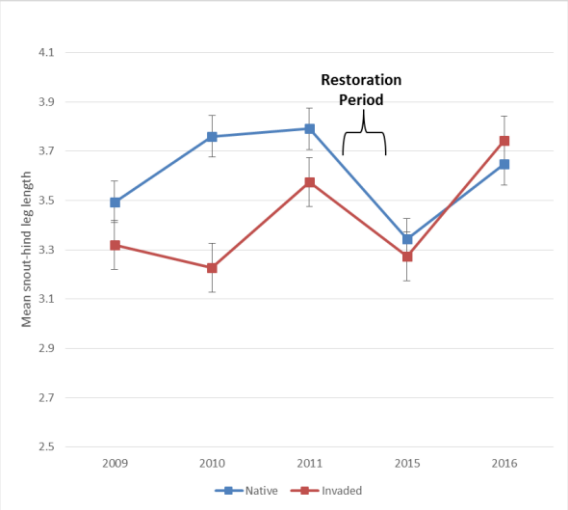

Figure 5. Eastern red-backed salamander (*Plethodon cinereus*) body length before (2009-2011) and after (2015-2016) forest restoration

Natural Resource Group Archive Project

The goal of this project is to convert NYC Parks' archived records to digital documents, in order to support public access and use of important natural resource data. The project converted over 5,000 documents and maps into a searchable digital format, making it easier for the general public to explore and interact with information. Many of these documents represent one-of-a-kind permanent records for New York City and consist of the environmental history of our city, state, and region. Parks staff can quickly access the collection for management decisions as well as filling outside research requests on a wide variety of habitats and management practices dating back to the late 1980s. The project was funded through the New York State Archive Office and the Local Government Records Management Improvement Fund.

Natural Resource Group/Urban Field Station iMapInvasives Project

Since 1986, NYC Parks has been mapping the vegetation communities of parks citywide. This vegetation database has continued to grow. It serves as a source of information for natural areas management while also supporting increased environmental literacy among the general public. NYC Parks has joined New York Natural Heritage and the iMapInvasives team to provide invasive plant inventory data covering over 15,000 point observations spanning all 5 boroughs. The data provides spatially referenced locations for 102 invasive plant species, with surveys ranging in dates from 1986 to present. NYC can now be counted in the regional effort to map the spread of invasive species and resultant management across 9 states and one Canadian Province. New York Natural Heritage Project is part of a multi-state effort to map invasive species in the US. They are joined by a host of other partner organizations, including The Nature Conservancy, NatureServe, and the Florida Natural Areas Inventory. This work is led by Brady Simmons.

Threatened and Endangered Plant Monitoring and Protection Project

NYC Parks, NYC Audubon and NYS Department of Environmental Conservation are working in partnership to monitor piping plovers and black skimmers in the Rockaways, Queens, considered a biodiversity hotspot. Piping plovers arrived in late spring right on schedule and fledged 31 chicks over the summer. The small shorebirds were also joined by black skimmers, a New York State species of special concern. Twenty-six skimmer chicks were banded in order to track the regional population and track management actions. As the shorebirds fledged, the ecologists switched to monitoring the federally listed sea beach amaranth with Division botanists. They inventoried over 2,000 individual plants over several weeks. Everyone worked closely with a number of agencies to ensure on-going Hurricane Sandy recovery progressed while protecting these vital populations. The project was led by Susan Stanley.

NYC Salt Marsh Assessment

NYC Parks, NAC, and TNC created a conditions and vulnerability index to rank 25 NYC salt marshes using field data and desktop analyses as indicators. These indices were presented at a stakeholder meeting to local and regional practitioners and were used to prioritize sites for protection and restoration. An upcoming report will outline recommendations for protecting pathways for marsh migration and restoring existing salt marsh. The recommendations include protecting land in tidal wetland buffers through transfer, acquisition, easements, regulatory enforcement, removal of hard surfaces, and restoring existing wetlands by applying a thin layer of sediment to elevate the marsh surface and restore the eroded marsh edge. The team working on this was Marit Larson, Rebecca Swadek, and Chris Haight.

Urban Vernal Pool Creation

NYC Parks ecologists Susan Stanley and Ellen Pehek began discussing vernal pool creation with wildlife biologist and wetland ecologist Tom Biebighauser in 2012. After many years of planning, NYC Parks has just completed construction on the first vernal pool creation project in NYC. Staff ecologists will be watching the pools fill up to monitor activity throughout the "wet" period of these ephemeral wetlands in Alley Pond Park. A monitoring plan has been developed that will track water depth, temperature, various water quality metrics and hopefully future colonization by invertebrates and amphibians.

Science of the Living City

Science of the Living City (SoLC) is a program designed to generate discussion and bring light to bear on urban conservation in new, engaging, and provoking ways. SoLC encompasses all UFS public programs: workshops, symposia, seminars, brown bags, as well as educational exchange opportunities: scholarly residencies, fellowships, internships, youth engagement, curriculum development and a new Artist-in-Residence program (detailed below). SoLC engages diverse partners across the city, speaks to a wide professional and public audience, and addresses a variety of pressing issues related to urban social, biological, and physical ecology and quality of life in cities. This year this program included seminars on themes including food justice, held on the floating forest called Swale. Other themes of Science of the Living City have covered, Green Infrastructure, urban human-wildlife interaction, forest restoration, environmental governance systems, and more.

Figure 6. Public panel alongside swale in Brooklyn Bridge Park

Artists-in Residence

In June 2016, the NYC UFS launched a new Arts and Humanities Residency Program. The program's goals are 1) to include perspectives from the arts and humanities in urban social-ecological systems research to spur creative problem solving, 2) to incubate new relationships with artists and writers to more broadly inform NYC UFS research and land management, 3) to help find new ways to explore and communicate the value, diversity, and wonder of urban nature, and 4) to help plan and design for positive and unique engagement experiences with local nature.

An inaugural cohort of New York City-based artists were selected because of their work at the intersection of art, urban ecology, sustainability, nature, and design. These artists are all interested in exploring ideas that can be incubated via relationships with public agencies working at the nexus of research and natural resource management. They work across different media and have current projects in various stages of conceptualization and implementation. Over the course of the year they have opportunities to be embedded with Urban Field Station staff, projects, and sites, and will share their own work via internal brownbag talks and SoLC public seminars. The residence lasts until June 2017.

Mary Mattingly creates sculptural ecosystems in urban spaces. With the NYC Urban Field Station, she worked on a floating food forest for New York called "Swale". She also recently completed a two-part sculpture, "Pull," for the International Havana Biennial with the Museo National de Belles Artes de la Habana and the Bronx Museum of the Arts. Mattingly's work has been exhibited at the International Center of Photography, the Seoul Art Center, the Brooklyn Museum, the New York Public Library, deCordova Museum and Sculpture Park, and the Palais de Tokyo. In 2009 Mattingly founded the Waterpod Project, a barge-based public space and self-sufficient habitat that hosted over 200,000 visitors in New York. In 2014, an artist residency on the Wetland launched in Philadelphia. It is being utilized by UPenn's Environmental Humanities program.


Figure 7. Mary Mattingly

Lize Mogel is an interdisciplinary artist and counter-cartographer. Her work intersects the fields of popular education, cultural production, public policy, and mapping. She creates maps that produce new understandings of social and political issues. Her work connects the real history and collective imaginary about specific places to larger narratives of global economies. She has mapped public parks in Los Angeles; future territorial disputes in the Arctic; and wastewater economies in New York City. She is co-editor of the book/map collection "An Atlas of Radical Cartography," a project that significantly influenced the conversation and production around mapping and activism. Exhibitions include the Sharjah (U.A.E.), Gwangju (South Korea) and Pittsburgh Biennials, "Greater New York" at PS1, and "Experimental Geography", She has lectured extensively about her work nationally and internationally, including at the 2013 Creative Time Summit.


Figure 8. Lize Mogel

Adam Stoltman is a photographer, editor, media developer and consultant who has been involved in traditional and digital media for over 30 years. At the New York Times Magazine, he was part of the team, which produced award-winning visual coverage of world events including the collapse of the Eastern Bloc, the First Gulf War, Tiananmen Square and the oil fires in Kuwait. He has covered 12 Olympic games, and has also photographed long term feature stories on cultural figures and artists, including Maya Lin, and Leonard Bernstein. His work is part of the permanent collection of the George Eastman House International Museum of Photography and Film, in Rochester, New York. Presently he is working on a long-term photographic documentation project on the relationship between Parks and People in New York City.


Figure 9. Adam Stoltman

Partnerships

Center for Resilient Landscapes at Rutgers University: The Center for Resilient Landscapes (CRL) funded four graduate fellows in partnership with USDA FS scientists at the NYC UFS, Philadelphia UFS, and Silas Little Experimental Forest. This culminated in a Fall 2016 Symposium where CRL Fellows and Postdocs presented their research to a Forest Service and Rutgers audience.

Institute for Pacific Islands Forestry (IPIF) in Hilo, HI (USDA FS—Pacific Southwest Research Station): The NYC UFS has engaged in several exchanges with IPIF focused on bio-cultural conservation and environmental stewardship. This includes hosting IPIF staff at the NYC UFS in Ft. Totten and at a roundtable discussion, including them in the Cultivating Stewardship workshop, collaborating to design new project ideas based on the science of stewardship and community-based stewardship training.

Figure 10. Visitors from Hawaii and UFS Staff (left to right): James Akau, Adrena Saarinen, Rich Hallet, Kianana Francisco, Heather McMillen, Renae Reynolds, Cindy MacAurthur, Christian Giardina, Lindsay Campbell, Michelle Johnson, and Erika Svendsen

National Partnerships Office and Forest Products Lab Visit the Field Station: In August 2016, Associate Deputy Chief of the United States Forest System Glenn Casamassa, along with Jacqueline Emmanuel (Director of National Partnerships Office), Ellen Shaw (Deputy Director, NPO) Leanne Veldhuis (National Partnership Coordinator, NPO) and Matt Arnn (National Landscape Architect, NFS), visited the NYC UFS to create an opportunity for mutual learning, exchange, and dialogue. The group stayed for two days, attending a presentation and tour of Fort Totten, followed by a site visit to Prospect Park, and other Green Infrastructure sites in the Gowanus neighborhood of Brooklyn. In September, the Field Station hosted another group of key leaders within the USDA FS network, among them Tom Schmidt, Assistant Director of the Northern Research Station; Michael Ritter Assistant Director of the Forest Products Lab; and Karen Martinson, Program Specialist at the Forest Products Laboratory. This group came for an exchange on a developing dialogue about potential strategies for urban wood reuse in New York City.

Figure 11. Left to Right: Jacqueline Emmanuel, John Jordan (Prospect Park), Leanne Veldhuis, Glenn Casamassa, Rich Hallett, Christian Zimmerman (Prospect Park), Matt Arnn, Lindsay Campbell, and Ellen Shaw

International Forest Day:
On March 22nd 2016, the NY UFS Co-Directors, Bram Gunther and Erika Svendsen addressed the United Nations. They presented a panel for International Forest Day/World Water Day.

Figure 12. Bram Gunther and Erika Svendsen at the United Nations International Day of the Forest

People at the UFS

The Urban Field Station provides opportunities for researchers, undergraduates, and graduate students to visit the NYC UFS through internships, fellowships, and residencies for several days or several months, depending on their research needs. Visitors and residents collaborate with UFS scientists and NYC Parks' managers.

Scholars and Fellows

Frederik Møller, an Urban Landscape Engineering student from the University of Copenhagen worked with Dr. Ruth A. Rae to learn about how NYC Parks Stewardship Team works. Frederik also studied the MillionTreesNYC program and researched other million tree planting and stewardship programs in the United States. Frederik took this experience back home to improve civic engagement in Denmark. He earned a Bachelor's degree in June of 2016 and began a Master's program in Nature Management at the University of Copenhagen.

Figure 13. Frederik Møller

Stephanie Miller is a PhD candidate in Environmental Engineering at Drexel University. Her research investigates the potential role of green infrastructure (GI) as a risk reduction measure, using Hurricane Sandy as a case study. Specifically, the research examines whether the type, size, and configuration of GI played a role in determining the odds of building damages on Coney Island, Rockaway Peninsula, and the South Shore of Staten Island, NY. In a follow up presentation, Stephanie explored the ways that Green Infrastructure could go beyond a single dimensional intervention for storm water management to serve multiple functions to increase capacity and enhance local resilience.


Figure 14. Stephanie Miller

Stockholm Resilience Centre Scholars: Starting in 2016, the Stockholm Resilience Centre (SRC) and the NYC UFS formalized a partnership to advance research and applications on stewardship in urban social-ecological systems, civic engagement, urban ecology, and environmental governance. So far, students engaged in PhD research (Johan Enqvist), master's thesis projects (Johanna Boman), and master's traineeships (Ailbhe Murphy) in SRC's Urban Theme have collaborated with the NYC UFS. The Field Station also hosted a webinar of SRC faculty member Maria Tengö's work on diverse knowledge systems.

Johan Enqvist is a PhD candidate for the SRC at Stockholm University. He is conducting research on Urban Social-Ecological Systems and the Role of Civic Stewardship in the United States with a grant from the Sweden-America Foundation. Research on urban environmental stewardship has shown that citizen initiatives can play an important role in managing cities' greenery and promote ecosystem services. Building on existing research conducted at the NYC UFS about environmental stewardship networks, his project applies methods from sense of place research for engagement in community gardening, tree planting, waterway restorations, and other activities. These will be compared with the place meanings held by participants to identify biophysical forms and functions that carry important meanings and strong attachment.


Figure 15. Johan Enqvist

Johanna Jelinek Bowman is a Master's candidate at the SRC. As part of her Master's thesis, she is collaborating with the NYC UFS under the supervision of Dr. Lindsay Campbell, building on current work in urban environmental stewardship. Johanna holds a bachelor's degree in Architecture, is interested in the development of sustainable cities and the balanced relationship between urban growth and natural resource management. Her time at the Urban Field Station will be used to support her exploration into the ways in which cities can grow and develop without impoverishing the resources upon which they depend.


Figure 16. Johanna Jelinek Bowman

Ailbhe Murphy is an environmental science graduate from the University College of Cork, Ireland, where she specialized in environmental biology. Currently she is a first year master's student of the Sustainable Development and Social-Ecological Resilience Program, run by SRC. During her masters she hopes to learn more about people's relational values to nature and how these values relate to civic stewardship and sustainable behavior. She is also interested in how civic stewardship and sense of place contribute to psychological wellbeing, particularly in urban settings where maintaining people's access to nature is of increasing importance.


Figure 17. Ailbhe Murphy

Interns and Mentoring

NYC Parks Interns

In the summer, **Leah Jacobsen** joined the NYC UFS as a summer Parks intern. With a background in sociology, she focused on social assessment fieldwork in Prospect Park and researching details on stewardship groups not fully captured in previous STEW-MAP efforts. She also learned about ecological research through data collection at Freshkills Park and field trips to Kissena Park.

Figure 18. Leah Jacobsen and Research Ecologist, Michelle Johnson

In the fall, **Maggie McCabe** was an intern at the NYC UFS as part of a City University of New York Queens College Environmental Studies internship program. She performed literature reviews and helped with the Science of the Living City seminar series. She is receiving her second Bachelor's degree in Environmental Studies. She went back to school to pursue her passion for the environmental field and will be graduating in December.

Figure 19. Maggie McCabe

Wave Hill Woodland Ecology Research Mentorship (WERM) program
Novem Auyeung led two workshops: one focused on photosynthesis and statistics and one focused on soils and experimental design. She also served as a WERM mentor during the summer and worked with Harrison Min (Riverdale Kingsbridge Academy), Isaiah Jeremie (High School for Mathematics, Science, and Engineering at City College), and Gauri Patel (Bronx High School of Science) to collect and analyze data for the Green Infrastructure Plant & Soil Project. See picture of WERMS on page 6 of report.

Ranger Conservation Corps
Novem Auyeung worked with Woo Sung Park (UPR) to bring expertise and meeting space to an after school program for local area high school students that teaches research methods and uses NYC Parks as a living laboratory. The students developed a research project looking at water quality in two distinct urban ponds. They conducted water quality tests with the help of field station staff and equipment, researched the ecology of lakes and ponds, and reported back on the stresses of urban water bodies.

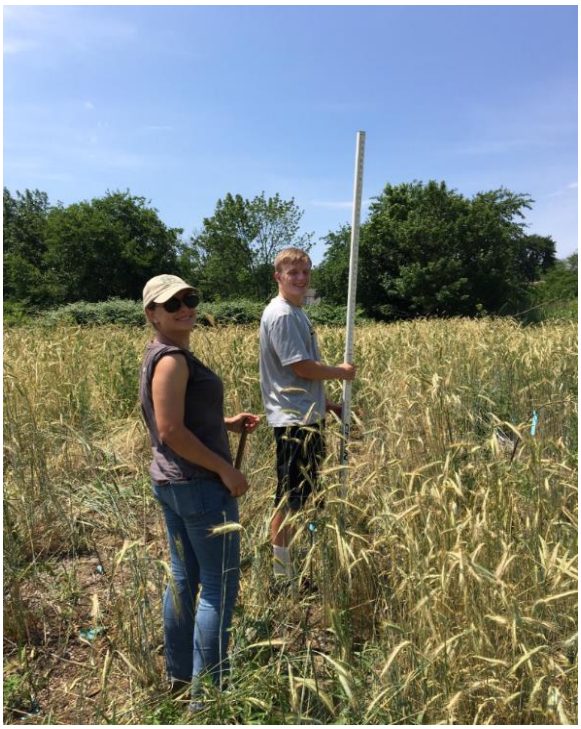
Figure 20. West Point Cadets Katie Silecchia and Ethan Grogan

West Point Cadets
Two West Point cadets, **Ethan Grogan** and **Katie Silecchia**, each spent two weeks in June 2016 interning at the NYC UFS. Both cadets focused on two main projects: measuring newly planted trees and shrubs at Freshkills experimental plots and measuring non-planted seedlings, saplings, and trees in Kissena Park experimental plots.

New UFS Staff

Ryan Baker-Urzua joined the Urban Field Station as a research assistant and lab manager on November 22nd. Ryan attended college at the State University of New York (SUNY) at New Paltz to complete a B.S. in Environmental Geochemical Science. He conducted research on the effects of Mohonk Preserve's prescribed fire regime on chestnut oak leaf physiology, gas exchange, and seedling abundance. This past summer, he presented his research at the Ecological Society of America annual meeting in Fort Lauderdale, Florida. He is excited to be at the NYC UFS to manage the lab and to assist with the research


Figure 21. Ryan Baker-Urzua

projects. During his free time, he enjoys hiking, cooking, foraging, and involving himself with politics.

Renae Reynolds was formerly the Landscapes of Resilience Project Coordinator; she has now transitioned to the Science of the Living City Program Coordinator position. Additionally Renae conducts collaborative communications work with Sarah Hines of the Baltimore Field Station.

Figure 22. Renae Reynolds

Farewells

Figure 23. Susan Stanley, Formerly NYC Parks Ecologist

Susan Stanley (NYC Parks), ecologist at the NYC UFS, has left after 15 years to take a position with the U.S. Fish & Wildlife Service. She began her career as an Urban Park Ranger. She taught environmental education citywide to groups of students and the public. She was able to bring this wealth of knowledge to the Natural Resources Group when she transferred there in 2004. She spent many years wading through wetlands, lunging across saltmarsh ditches and crawling through multi-flora rose to catalog the many species of flora and fauna throughout the city. After many chilly spring months monitoring vernal pools, Susan received her Master's degree from Queens College with a thesis project that surveyed vernal pools along a rural/urban gradient. She brought her passion for NYC's wildlife and natural areas to the many collaborations she worked with over the years, like NYC Audubon, NYS DEC, NYC DEP, and NY/NJ Port Authority. She understands the City as much as she understands the wildlife. There was always something to learn from Susan when you spent hours out in the field with her. We'll always remember her sense of humor and healthy packed lunches. We wish her the best of luck!

Awards

Brady Simmons (NYC Parks) was NYC Parks Operations "Employee of the Month" for September 2016.

Bram Gunther and Jennifer Greenfeld both received Distinguished Alumni Awards during the Yale School of Forestry and Environmental Studies reunion weekend in the fall of 2016.

UFS Facilities

Residents

The Urban Field Station has hosted a variety of researchers who stayed in our residential facility, conducting NYC-based social-ecological research. The busiest months were June and July when we had an 89% and 98% occupancy rate. We had residents from Sweden, Denmark, Ireland, Canada, Mexico, upstate New York, and various East Coast cities. Research projects facilitated by our residential space examined urban forest restoration, salt marsh sparrow conservation, green infrastructure, and oyster

Figure 24. From left to right: Michael Gamble, Allie Pesano, Nancy Raginski, and Alison Kocek

reproduction. Below are profiles of some of the longer-term research projects and research staff we supported through the UFS residence in 2016.

Alison Kocek, a PhD student at SUNY College of Environmental Science and Forestry (ESF), Syracuse, has been at the UFS for the past 3 summers working on her project, *Effects of Salt Marsh Changes on Breeding Birds, With an Emphasis on Sparrows.* This summer she is accompanied by field technicians Allie Pesano, Nancy Raginski and Michael Gamble who are all students at ESF. The primary research question is, how do salt marsh habitat characteristics, including restoration-related factors, affect density, reproductive success, and breeding-season survival of salt marsh and seaside sparrows and communities of secretive marsh birds.


Figure 25. Sabatino Campellone and Brandon James

Sabatino Campellone and **Brandon James,** from Drexel University, are PhD students working on storm water capture research. They both work in Dr. Franco Montalto's Sustainable Water Resource Engineering Laboratory. Their project is *Green Infrastructure: Planning, Assessment, and Modeling.* The overall goal is to enhance understanding of the key hydrologic mechanisms by which decentralized water management practices (aka green infrastructure) can alter the production of ecosystem services in urban watersheds. They are collecting data at 15 sites citywide, including green streets, bio-swales, rain gardens, green roofs, and constructed wetlands and have been monitoring these sites for several years.

In October 2016, two students **Katelyn Mann** and **Jesse Brekelbaum**, studying Urban Ecology at Green Mountain College in Vermont, stayed at the NYC UFS and conducted several field visits in New York City. They covered a range of urban green space site types, including the Brooklyn Grange, a rooftop farm in Brooklyn, the Beach 41st Houses Garden, and Edgemere Landfill in Queens. Katelyn and Jesse have been supported throughout their research by Lindsay Campbell from the NYC UFS, who advised them along with their professor Kristen Ross, as they created an independent study in Urban Ecology for their academic institution. Katelyn and Jesse designed an interactive StoryMap, detailing their work with the NYC Urban Field Station.


Figure 26. Katelyn Mann and Jesse Brekelbaum

Danica Doroski is currently a master's student at Yale School of Forestry and Environmental Studies and is collecting data at Kissena Corridor Park for her research project, *Factors Driving Woody Plant Recruitment in a Planted Urban Forest.* She is working for Forest Service ecologist Rich Hallett. The project is part of ongoing research, the *New York City Afforestation Project*, which was developed with NYC Parks. Natural regeneration is a challenge to urban reforestation but preliminary results from this study find that recruitment may be enhanced by utilizing a suite of pre-planting site treatments and by nesting new plantings near patches of existing forest.


Figure 27. Danica Doroski

Research Permits
It has been another busy year for the citywide research permits program with 108 permits and 39 renewals. This program aims to promote research in all five boroughs while maintaining oversight for all the flora and fauna found in city parks. NYC Parks has always provided space for a variety of public uses, and part of that mission relates to research that expands the knowledge base for urban systems. This year alone brings expertise from 26 universities and 13 area high schools. The program continues to grow every year with NYC becoming a research hub that has traveled beyond the green space to include grey and blue as well, with research topics ranging from stewardship practices, to public health surveys, to oyster restoration.

Laboratory
The NYC Urban Field Station has a sample-processing lab with equipment for storing, drying, weighing and identifying various field specimen and samples. This year researchers from NYC Parks used equipment from the lab to sieve soil samples, test water quality at Alley Pond's Oakland Lake and Crocheron Park's Golden Pond, and identify invertebrate specimens collected from vernal pools around the city. Visiting researchers from Cornell also used the lab to store and process oyster samples.

UFS in the Media

Queens Ledger: Four years after Sandy, a garden regrows in Rockaway

NY1: Gardens at NYCHA Housing Complex Take Off After Hurricane Sandy

New York Times: In a Jam-Packed City, an Escape in 10,000 Acres of Wetlands, Forest, and Trails

NYCHA Journal: Landscapes of Resilience

The Nature of Cities: Resilience isn't only about infrastructure. How can we better support community-based environmental stewardship in readiness, response, and recovery from disturbance?

The Nature of Cities: Making Connections and Feeding Relationship: Reflections from a Biocultural Axiom of Aloha

ACTrees: Knowledge Co-Production In Urban Research

Joseph Heathcott: New School Grads Rock!

Parsons School of Design: TUP alumni Renae Reynolds – Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and in a Community Garden

Civil Eats: Food Justice in the Rockaways

Wall Street Journal: An Artist Floats an Edible Forest: 'Swale,' currently moored in the Bronx River, is a 130-by-40-foot barge with a food forest on board

Metro New York: Nature in NYC is just as diverse as New Yorkers: Report

USDA Radio News: Urban Forests Benefit Urban Populations and Communities with Forest Service Chief Tom Tidwell

New York Times: With Spring, the Rare Spotted Salamander Emerges

Video from PopTech: Erika Svensden on Studying Stewardship

The Trees: Growing a Forest at Ground Zero - a documentary film that includes research from the Living Memorials Project
Hometown Habitats: a documentary film that includes the NYC UFS and MillionTreesNYC

Thank You!
Contact the Field Station

For additional information, please visit http://nrs.fs.fed.us/nyc

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