



New York City Urban Field Station 2011 Accomplishment Report

The New York City Urban Field Station (UFS) is both a physical place to conduct research and a network of relationships among scientists, practitioners, university cooperators, and facilities focused on urban ecology. The UFS is sustained through a core partnership between the USDA Forest Service Northern Research Station and the NYC Department of Parks & Recreation. Since its founding in 2006, the NYC Urban Field Station has engaged over 30 non-profit, academic, and government partners creating innovative “research in action” programs to support urban ecosystem management and sustainability initiatives in New York City. The main facility was opened in September 2010 and is located at Fort Totten in Bayside Queens, NY.



In March 2011, Chief Tidwell joined Northern Research Director, Michael T. Rains, and Pennsylvania Horticultural Society Director, Drew Becher, to launch **a new field station in the City of Philadelphia**. <http://nrs.fs.fed.us/philadelphia/>. Joining the National Association of State Foresters (NASF) for a recent tour of the District of Columbia’s urban forest, **US Forest Service Chief Tom Tidwell remarked on the importance of urban forests**, stating:

“At the Forest Service, we recognize that our responsibilities go beyond the national forests. We have a role to play, directly or indirectly, and that includes the nation’s 100 million acres of urban forests. Our goal is a continuous network of healthy forested landscapes, from remote wilderness areas to the urban neighborhoods where most people live.”

ULTRA-Ex: Urban Long-term Research Areas

UFS staff and collaborators conducted research on the National Science Foundation-funded Urban Long Term Research Area-Exploratory grant project entitled **“Understanding the Dynamic Connections Among Stewardship, Land Cover, and Ecosystem Services in New York City’s Urban Forest.”** This interdisciplinary research involves conducting multi-scale, multi-temporal, spatial analyses of stewardship group activities and evolution of the urban forest in New York City over the past 25 years, and collecting plot-level data on long-term outcomes of forest restoration efforts. Some highlights from 2011:

Publications:

- Dana Fisher, Lindsay Campbell, and Erika Svendsen. 2012. The organizational structure of urban environmental stewardship. *Environmental Politics* 21(1): 26-48.
- Dana Fisher, James Connolly, Erika Svendsen, and Lindsay Campbell. 2011. Digging Together: Why People Volunteer to Help Plant One Million Trees in New York City. Environmental Stewardship Project at the Center for Society and the Environment of the University of Maryland White Paper. 36 pp.

Conferences:

- Erika Svendsen (USFS), Dana Fisher (University of Maryland), Lindsay Campbell (USFS), James Connolly (Columbia University), Lynne Westphal (USFS), Michelle Romolini (Baltimore Ecosystem Study), Cherie



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LeBlanc Fisher (USFS), and AlakaWali (The Field Museum) presented “Understanding Urban Environmental Stewardship Networks: Findings from Citywide Stewardship Research in New York City, Seattle, Baltimore, and Chicago” at the Resilience 2011 international conference at Arizona State University.

- Erika Svendsen, Kristy King (NYC Parks) and Dexter Locke (USFS/NYC Parks) presented “Cultivating Resilience in Urban Socio-Ecological Systems” at the CUNY: Nature, Ecology and Society conference

Field Work and Analyses:

- Brady Simmons (NYC Parks) and Rich Hallett (USFS) completed the second season of data collection and initiated analysis on a research project investigating the long term outcomes of forest restoration in Pelham Bay, Bronx. This study aims to determine whether the restoration efforts resulted in a more native and diverse ecosystem and will examine how maintenance affects restoration success. Plots were established to assess the abundance of non-native species, planted tree survival, and native shrub and herbaceous species diversity and abundance. Crown transparency and canopy layer density and composition were measured with two new camera techniques developed for this project in order to examine the vertical profile of native and non-native species composition.
- James Connolly worked with USFS social scientists to conduct and analyze open-ended semi-structured interviews with the most connected “hub” organizations in a survey of New York City stewardship groups. Preliminary research suggests that the civic-to-civic network is much more decentralized and polycentric than the civic-to-public network.
- NYC UFS staff have completed interdisciplinary spatial analyses on the relationship between stewardship activity and decadal scale changes in greening at the neighborhood level, as well as analyses examining land use and development drivers in land cover change. Manuscripts are in preparation for submittal in 2012.

Papers in Press/Review:

- Erika Svendsen and Dana Fisher’s book chapter in press: “Hybrid arrangements within the environmental state” in *The Routledge International Handbook of Social and Environmental Change*, Lockie, Sonnenfeld and Fisher, eds.
- Kristy King, Rich Hallett, and Tim Wenskus (NYC Parks) submitted a manuscript about long-term restoration outcomes at Givans Creek Woods, now in review. The research focuses on differential growth and mortality rates for eight native tree species planted in high pH construction fill soils in a Bronx park.

MillionTreesNYC Research and Evaluation

The **Special issue of Cities and the Environment (CATE) dedicated to the MillionTreesNYC, Green Infrastructure and Urban Ecology Research Symposium** was published in early 2011 and had over 6,000 full-text downloads this year (accessible at: <http://digitalcommons.lmu.edu/cate/vol3/iss1/>). The issue features peer-reviewed articles and posters resulting from the 2010 Symposium, and includes topics ranging from urban pollinator communities to civic engagement in urban forestry. A primary motivation for the symposium was to improve communication between researchers and practitioners and leverage the ambitious MillionTreesNYC initiative (a public private partnership in New York City to plant and care for 1 million new trees by 2017) as an opportunity to learn more about urban ecosystems. CATE is published by the USFS, Loyola Marymount University, and Boston College.

New York City Afforestation Project: Collaborating with Yale University researchers Alexander Felson, Mark Ashton, Mark Bradford, and Robert Warren II, NYC UFS staff are investigating the sustainability of constructed, native, urban forests and their resilience to invasive species. Although such reforestation efforts are thought to enhance conservation and ecosystem function in the urban landscape, it is unknown whether planted trees will grow to



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comprise the dominant vegetation of the urban forest. The study will track recruitment from the planted, native vegetation as well as the proliferation of invasive plant species and will investigate the impact of planted species diversity and organic amendments on these processes.

Assessing Survival on MillionTreesNYC Reforestation Sites: NYC Parks is leading a large-scale, citywide reforestation effort as part of the MillionTreesNYC goal to plant one million trees in sites across the city by 2017. A tree survival study was developed by NYC Parks ecologists to accompany this large scale environmental restoration effort. This study addresses the basic survivability and health of the container trees planted as part of MillionTreesNYC by in-house staff, volunteer groups, and contractors. Forty parks were included throughout the five boroughs. Since data collection began in 2009, we have found that spring plantings have lower survival rates compared to fall plantings; and tree survival was higher for trees that were planted in the shade of a mature overstory. To further understand the interactions between the trees and the planting areas soil samples were taken from 110 plots around the city and are currently being processed. Sampling will continue in 2012 with existing plots as well as adding plots in the most recent plantings.

The New School's Tishman Environment and Design Center (TEDC) and Columbia University are leading a city-wide multi-year study on the **Effects of the MillionTreesNYC Forest Restoration Efforts on Urban Ecosystem Structure and Functioning** with additional support from Hofstra University and Yale University. Eleven permanent research sites in nine parks across the city have been implemented in collaboration with NYC Parks. The research examines the dynamic interactions between vegetation, soils, and management practices and how they change over time, focusing on ecosystem structure and function as well as species diversity and abundance. Field and lab research in 2011 included scientists who collected data and trained, mentored, and provided service-learning experiences for students. Study results have been integrated into an "Urban Ecosystems" undergraduate course at TEDC and four student theses. Results of the study were presented at Cornell University, the U.N. Urban Biosphere meeting, and as part of a collaborative exhibit at the Sheila C. Johnson Gallery. The research team is funded through the TEDC and the team has applied for continued funding from NSF.

Freshkills Park

The NYC Urban Field Station launched **three collaborative research projects with Freshkills Park**, which is currently the largest landfill to park conversion in the world:

- **"Attitudes towards and Intentions to Visit Freshkills Park"** is led by David Klenosky of Purdue University with cooperators Christine Vogt from Michigan State University, Stephanie Snyder from NRS in St. Paul, Herb Schroeder from NRS in Evanston, IL (now retired), Rich Flanagan and Deborah Popper from the College of Staten Island, and Urban Field Station and FreshkillsPark staff to develop a large scale, quantitative assessment of Staten Island residents' attitudes towards the park. The survey has been deployed, receiving a 31.4% response rate. Data are currently being analyzed and will be presented at conferences and developed into papers over the course of 2012.
- **"Legacies of the Dump"** is a qualitative research project that seeks to understand Staten Island residents' memories of the landfill and their perceptions, fears, and interests in using the future Freshkills Park and is coordinated locally by Urban Field Station and Freshkills Park staff. Four focus groups were conducted with diverse groups of senior citizens and young adults. Transcripts are now being coded for emergent themes and analyzed. The qualitative study helped shape the development of the quantitative assessment and results will also inform Freshkills Park messaging in the near term and site programming in the long term.



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- **“Improving Ecosystem Health and Functioning at Freshkills Park through Phytotechnologies”** is led by Ron Zalesny of NRS in Rhinelander, WI as well as Urban Field Station staff and Freshkills staff from NYC Parks and Sanitation departments. This project proposes to use plants of the *Salix*, *Populus*, and *Panicum* genera to enhance the physical, chemical, biological, and agronomic characteristics of soils imported to the Freshkills site as well as enhance the soil usage classification. The initial plant material will be selected from native Staten Island populations. Specific genotypes with the greatest ability to remove compounds and/or metals from the soil will be determined through phyto-recurrent selection in greenhouse studies and at Freshkills Park.

Community Gardening

Community Gardens Longitudinal Research: USFS researchers are working with NYC Parks’ GreenThumb division on a longitudinal study of community gardens, examining membership, programming, partnerships, and motivations for gardening. This comprehensive study of the largest community gardening program in the United States aims to understand the evolving role of community gardens in New York City. During the summer of 2011, structured interviews were conducted by phone with representatives from a sample of 102 community gardens for which survey data existed from 2003, 2007, and 2009. These research findings will help assess the ways in which New York City community gardens have evolved and can continue to grow in the future.

Urban Waters

The **Urban Waters Federal Partnership** will reconnect urban communities, particularly those that are overburdened or economically distressed, with their waterways by improving coordination among federal agencies and collaborating with community-led revitalization efforts to improve our Nation’s water systems and promote their economic, environmental and social benefits. As a pilot location, the Bronx & Harlem River Watersheds project strives to improve community access to the water, develop new recreational opportunities, and strengthen open space and park designs through ecological restoration. Federal partner agencies including the USFS and the National Parks Service will work with state and city agencies as well as local community groups.

Health and Well-Being

Jacqueline Lu (NYC Parks) and Kristy King have completed collaborative research on the project entitled **“The Urban Forest, Childhood Asthma and Community Air Quality”** with the New York City Department of Health and Mental Hygiene, Columbia University, the University of Vermont Spatial Analysis Lab, and Queens College’s Center for Natural and Biological Systems, led by PI Andrew Rundle. Funded by the National Urban and Community Forestry Advisory Council, this project investigates the complex relationship between changes in the urban forest, the onset of asthma in children living in the Bronx and Northern Manhattan, and local air quality. Manuscripts in preparation at the close of 2011 include a spatial analysis of the relationship between emissions levels and the pollution removal potential of the urban forest at a citywide level; Land Use Regression (LUR) modeling of the seasonality of tree cover and local measures of pollution; and a methodological comparison of three local measurements of tree canopy cover. A manuscript synthesizing spatial data on tree cover and asthma and allergy rates among at-risk children in Northern Manhattan and the Bronx has been submitted and is in review.



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This year, UFS researcher Erika Svendsen began a new collaboration with Mary Northridge (American Journal of Public Health, New York University), establishing a systems framework that highlights **critical relationships between grey and green elements of cities and human health and well-being**. By understanding the underlying structure of urban spaces and the importance of social interactions, urban planners, decision makers, and community members can capitalize on opportunities to leverage resources to improve overall health and well-being and ensure social justice. So far, this collaboration has resulted in a keynote speech at the 2011 American Community Gardening Association national meeting, an editorial in the American Journal of Public Health, and a new research partnership that includes the work of urban geographer Sarah Metcalf (SUNY Buffalo). In addition, with the help of guest editors from the UFS, a special issue of *Cities and the Environment* is in preparation highlighting the work presented at the ACGA conference.

USFS researchers continued collaboration with Keith Tidball (Cornell University) on **disaster, resilience, and community greening research**, publishing results in *Environmental Education Research* and presented at the "Resilience 2011" conference. In addition, USFS researchers contributed the chapter, "Community Based Memorials to September 11, 2001: Environmental Stewardship as Memory Work" to the edited volume *Greening in the Red Zone*. The team received a \$47,000 grant from the TKF Foundation to pursue a project entitled: "Landscapes of Resilience: Understanding the creation and stewardship of open spaces and sacred places in Joplin, MO and Detroit, MI" (PI Keith Tidball). This work investigates how the processes of collaborative planning and stewardship open spaces can support recovery from a wide range of human, natural, technological, and political disasters.

Sustainability Networks

The NYC UFS is part of the core team of the **NSF Research Collaboration Network for Urban Sustainability: Research Coordination and Synthesis for a Transformative Future**. The network, led by PIs Dan Childers (Arizona State University) and Steward Pickett (Cary Institute) has goals of: improving the availability of knowledge about urban systems; generating frameworks that unify critical disciplines around urban sustainability; identifying cross-disciplinary research needs; and engaging in a full range of research, education, and practice. Collaborators include Morgan Grove (USFS), Laura Ogden (Florida International University), Allison Whitmer (Georgetown University), Thomas Elmquist (Stockholm University), Kerry Smith (Arizona State University), and Frederick Steiner (UT Austin).

Vibrant Cities and Urban Forests: A National Call to Action is a nationwide initiative, spearheaded by the USFS and New York Restoration Project, to promote and improve urban ecosystems and green infrastructure in our nation's cities and municipalities. A national Task Force of 25 of the most visionary and respected municipal and state officials, national and local non-profit leaders, researchers, urban planners, and foundation and industry representatives were selected to participate in a workshop in April 2011 towards the realization of this objective. NYC-based Task Force members included Liam Kavanagh (NYC Parks), Mary Northridge (NYU), Phil Silva (treeKIT), and Pat Pineda (Toyota). The three-day workshop addressed the future of our nation's urban ecosystems and green infrastructure; incorporating the health, environmental, social and economic benefits they bring to sustainable and vibrant cities. In November 2011 the *Vibrant Cities* Task Force released their report, crafting a vision, set of recommendations and action steps that will advance urban ecosystems and green infrastructure into the next decade and beyond.

The **New York City Urban Field Station was included in the April 2011 update to Mayor Bloomberg's long term sustainability plan, PlaNYC2030**, under *Initiative 9: Improve collaboration between City, state, and federal partners*. In that initiative, the city aims to "foster partnerships that combine research and practice to improve the health, promote conservation, and strengthen stewardship of our parks and public space."



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NYC Parks' Greenbelt Native Plant Center (GNPC) has been collecting and banking seed for over ten years. In 2011 the GNPC received funding from the United States Botanic Garden and the National Fish and Wildlife Foundation to initiate the launch of **the Mid-Atlantic Regional Seed Bank (MARS-B)** in 2012. MARS-B is envisioned as a cooperative effort to systematically collect and safely store the region's seed, serving long-term national conservation goals as well as regional needs for land management and restoration. Participating organizations include federal, state and municipal governments, botanic gardens and arboreta, universities and colleges, and the non-profit sector.

Natural Resource Management

In collaboration with the University of Vermont's Spatial Analysis Lab, a **new high resolution land use land cover dataset** has been developed for New York City using Light Detection and Ranging (LiDAR) data that was acquired in May 2011. This new dataset is the most accurate map of NYC's canopy cover that has ever been created; the last tree canopy map for New York City dates from 2001, and was based on optical imagery in which tall buildings can obscure adjacent trees. LiDAR sensors emit their own energy in the form of a laser and as such are able to detect trees in between buildings as well as small, newly planted street trees. The new land use land cover map will be used for a new **Urban Tree Canopy (UTC) Assessment** which will summarize the new tree canopy estimates for NYC as well as estimate the amount of tree canopy that could theoretically be established at the individual parcel level. Jarlath O'Neill-Dunne (Vermont Spatial Analysis Lab) and Dexter Locke (USFS/NYC Parks) discussed the value of UTC assessments in a presentation to the Urban Natural Resources Institute on "Urban Tree Canopy Analysis: Using the Results in Your Community."

Interviews with **urban foragers** in Philadelphia and New York City have documented dozens of species of plants and fungi being picked in spaces that include cemeteries, public rights of way, and parks. Motivations for foraging range from perceived healthfulness, and enjoyment of special flavors to the need to fill out meager food budgets. Patrick Hurley (Ursinus College) and Marla R. Emery (USFS) have conducted interviews with key New York City natural resource managers to understand their perspective on the issue. The research team is now developing a broader survey for natural resource managers as well as a study plan for reaching out to the foraging communities themselves.

Researchers at the Urban Field Station and NYC Parks' Street Tree Planting staff **continued research on young street tree mortality** in New York City as it relates to a slew of biophysical, social, and built environment indicators. Data collection in Summer 2011 focused on revisiting a cohort of 5,000 trees from the original study ranging from 9 to 15 years post-planting in order to extend the knowledge of street tree longevity past the nine-year mark. Preliminary results from this research indicate that mortality rates for older street trees are substantially lower than newly-planted ones, which supports earlier findings that showed a leveling off of mortality rates at eight years post-planting. This research and data analysis is planned to continue in 2012. An article on the interdisciplinary data collection framework and results was published in the MillionTreesNYC special issue of the journal *Cities and the Environment*.

NYC UFS staff began collaboration with scientists from the NRS in St. Paul and the University of Minnesota to investigate **the marginal cost of carbon abatement from planting trees in New York City**. Marginal costs of carbon abatement will be compared with the marginal costs of carbon abatement from other types of investments (e.g., auto emission control, incentives for energy conservation). This will inform policy makers and managers of carbon emissions about the economic efficiency of carbon abatement from planting trees in urban forests.



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Urban Biodiversity

Ellen Pehek and Susan Stanley (NYC Parks) have been studying **salamanders as indicators of urban restoration success** in Inwood Hill Park since 2003; a manuscript on salamanders' efficacy as bioindicators in urban forests was submitted and is now in review. In the second phase of this project, pre-restoration data was collected at Van Cortlandt Park from 2009 to 2011. Analysis of data from this phase revealed that invasion by non-native plants affects multiple taxa and trophic levels - salamanders were smaller, wood thrushes and blue jays less abundant, and frequencies of slugs greater in invaded forest compared to adjacent less invaded forest. In partnership with the Urban Park Rangers and the Black Rock Forest Consortium, NYC Parks piloted a new phase of the **Woodland Salamander Monitoring Project** with the training and deployment of 285 middle school students from 5 schools to study salamanders in six NYC parks and Black Rock Forest near Cornwall, New York. The event resulted in newspaper articles in the New York Times, Daily News and Wall Street Journal.

In 2011, NYC Parks initiated a multi-year study of **vernal pools** in Queens, Staten Island and the Bronx, with regional reference sites, to better understand these ephemeral freshwater ecosystems in an urban environment. Determining the species composition and level of biodiversity of urban vernal pools and learning more about urban habitat associations can help guide management practice and conservation in the city, especially in areas with new development. Preliminary results show that some of NYC's vernal pools support species characteristic of those in less-developed environments throughout the Northeast such as the spotted salamander (*Ambystoma maculatum*), wood frog (*Ranasylvatica*) and fairy shrimp (Order: Anostraca). Our preliminary data also show that some pools in heavily urbanized areas contain lower overall diversity and species associated with degraded water quality. More data will be collected in 2012 so comparisons can be made across sites, both within and outside the city.

Building upon two decades of breeding bird surveys at salt marsh restoration sites, NYC Parks staff completed a 2011 census of saltmarsh-obligate sparrows. New York City was once a stronghold for the **Seaside and Saltmarsh Sparrows** (*Ammodramus maritimus* and *A. caudacutus*), with hundreds of individuals breeding at large salt marshes around Jamaica Bay. Habitat destruction has eliminated or reduced most populations, but NYC may still have the largest stable populations of these species in the greater metropolitan region at Saw Mill Creek Park on Staten Island. The Seaside Sparrow is listed by New York State as a species of special concern and the Saltmarsh Sparrow is declining throughout the Atlantic Coast. Breeding pairs and nests at Saw Mill Creek Park were censused during the 2011 breeding season using the same methods adopted by an Atlantic coast-wide study led by Brian Olsen (University of Maine). During the census, a strong association was observed between location of nests and their proximity to edges of mosquito ditches and small tidal creeks, which may have implications for restoration as often marshes are restored by filling in or blocking these ditches. Data analysis and reporting are ongoing and in 2012 NYC Parks staff will be lending knowledge of local marsh restoration projects the project and hosting members of the regional research team at the UFS.

NYC Parks' scientists are attempting to determine whether **dragonfly assemblages act as effective bioindicators** for urban wetland health. In 2011 scientists collected vegetation and physicochemical data which will be used to calibrate dragonfly data. Initial results indicate that, although rankings of wetlands by vegetation and dragonfly species compositions are similar, rankings based on vegetation may give lower scores to vernal pools than merited (due to sparse vegetation characteristic of those systems) and higher scores to stormwater wetlands (from inflated species diversity due to installed plantings). Dragonfly assemblages appear to reflect water quality better than vegetation and an index combining both may be the best way of rapidly assessing wetland condition. Further analysis in 2012 will look for correlations between vegetation, dragonflies, and land cover/use around wetlands.



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Outreach and communications

NYC Urban Field Station Visitors: This year, the field station has hosted Professor Tom Whitlow (Cornell University), who is studying how roadside vegetation affects the dispersion of air pollution; graduate students Kim DiGiovanni and Scott Jeffers (Drexel University), evaluating the ability of NYC stormwater capture Greenstreets to affect urban hydrology, water quality, and soil chemistry; and postdoctoral fellow Steve Raciti (Boston University), studying the biogeochemistry of urban soils beneath impervious surfaces, who just had a paper accepted to *Environmental Pollution*. The field station has also hosted several meetings this year, including an EPA Region 2 sustainability workshop, an urban environmental education workshop organized by Keith Tidball (Cornell University), and a staff workshop for the Mayor's Office of Long-Term Planning & Sustainability. Within the Northern Research Station, visitors to the UFS this year have included research scientists Mark Twery, John Brissette, and Marla Emery.

The **NYC Urban Field Station Seminar Series** kicked off this year with John Waldman of Queens College presenting on Diadromous Fish Status & Restoration and FerdieYau of NYC Parks talking about the Bronx River Riparian Invasive Plant Management Plan. The quarterly seminars will continue in 2012 beginning with a presentation by Lea Johnson of Rutgers University on Long-term Outcomes of Urban Forest Restoration in New York City and a talk on Propagation Experiences at the Greenbelt Native Plant Center by Tim Chambers (NYC Parks).

Conferences: UFS staff presented current research at several conferences this year, including an annual meeting of the Cornell Cooperative Extension of Suffolk County on *Managing Landscapes Sustainably*, the Northeastern Area Association of State Foresters Urban Committee Annual Meeting, the Black Rock Forest Consortium Research Symposium and Board Meeting, the American Community Gardening Association Annual Meeting, the Resilience 2001 Conference, the American Association of Geographers 2011 Annual Meeting, the Annual Meeting of the Mid-Atlantic Chapter of the Society for Ecological Restoration, at SUNY-ESF's Adaptive Peaks Seminar Series, and the Urban Tree Growth International Meeting and Symposium.

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