# Protecting Pollinators in Urban Landscapes 2019 Conference

Photo courtesy of: Bill Ravlin

3rd National Conference

Cincinnati Zoo & Botanical Garden

Cincinnati, OH

October 7-9, 2019

www.protectingpollinators.org

CINCINNATI ZOO & BOTANICAL GARDEN

MICHIGAN STATE UNIVERSITY Extension

NC STATE UNIVERSITY

MICHIGAN POLLINATOR INITIATIVE

# Conference at a Glance

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|---|---|
| **Monday, Oct. 7th** | **Hilton Netherland Downtown Cincinnati** |
| 7—7:15 p.m. | Welcome ~ Steve Foltz, Cincinnati Zoo & Botanical Garden |
| 7:15—8:15 p.m. | Opening Keynote ~ Dennis vanEngelsdorp, University of Maryland |
| 8:15—10 p.m. | Reception |
| | |
| **Tuesday, Oct. 8th** | **Cincinnati Zoo & Botanical Garden** |
| 7:45 & 8:15 a.m. | Shuttle pick up at Hilton |
| 8—9 a.m. | Breakfast available at Cincinnati Zoo (included for conference registrants) |
| 9—10:35 a.m. | *Session 1: Pollinators in the Urban Environment: Coping with a complex landscape* |
| | Katherine Baldock, University of Bristol |
| | Kevin McCluney, Bowling Green State University |
| | Karmi Oxman, Pennsylvania State University |
| 10:35—10:50 a.m. | Break |
| 10:50 a.m—12:50 p.m. | *Session 2: Urban Pollinator Gardens: Navigating plant choice and design* |
| | Bob Geneve, University of Kentucky |
| | Adam Baker, University of Kentucky |
| | Anne Spafford, NC State University |
| | David Smitley, Michigan State University |
| 12:50—2:15 p.m. | Lunch at the Zoo (included with conference registration) |
| 2:15—4:35 p.m. | *Session 3: Scaling up from Gardens: Connecting habitats across urban landscapes* |
| | Kris Braman, University of Georgia & Jim Cane, Logan Bee Lab |
| | Mary Phillips, National Wildlife Federation |
| | James Wolfin, University of Minnesota |
| 4:35—6 p.m. | Break, optional zoo horticulture tour, poster set-up |
| 6:30—7:30 p.m. | Dinner at the Zoo (included with conference registration) |
| 7:30—9:30 p.m. | Poster Session |
| 8:30 & 9 p.m. | Shuttle pick-up from the Zoo to Hilton Netherland |

# Conference at a Glance

| **Wednesday, Oct. 9th** | **Cincinnati Zoo & Botanical Garden** |
|---|---|
| 7:30 & 8 a.m. | Shuttle pick up at Hilton Netherland to the Zoo |
| 8—9 a.m. | Breakfast available at Cincinnati Zoo |
| 9—10:55 a.m. | *Session 4: Integrating Pest and Pollinator Management*<br>Kim Stoner, Connecticut Agricultural Experiment Station<br>Alexandra Harmon-Threatt, University of Illinois at Urbana-Champaign<br>David Held, Auburn University<br>Elizabeth Long, Purdue University |
| 10:55—11:05 a.m. | Break |
| 11:05 a.m.—1 p.m. | *Session 5: Beyond Pollinators: The human and wildlife dimensions of pollinator habitat*<br>Catherine Zimmerman, The Meadow Project<br>Patrick Fitzgerald, National Wildlife Federation<br>Damon Hall, University of Missouri<br>James Quinn, University of Missouri |
| 1:15 p.m. | Shuttles from the Zoo to Hilton Netherland for those not participating in the tour |
| 1:45 —5 p.m. | Optional Tour– Spring Grove Cemetery & Smale Park |

# Session Descriptions

**Monday, Oct. 7th**

Opening Keynote — Dennis vanEngelsdorp, University of Maryland

<u>On average 39% of all managed honey bee colonies die in the US each year. Why?</u>

Managed honey bees have been dying in the US at high rates for over 10 years. Many factors, either acting alone or in synergy, are contributing to these loss rates, chief among them the parasitic mite, *Varroa*, and the viruses it transmits. The beekeeping industry in the US is made of two distinct segments – the relatively few commercial beekeepers, who manage the vast majority of US Colonies, and the small-scale back yard beekeepers, who are numerous but collectively manage few colonies. Unlike commercial beekeepers, the long-term trend of losses suffered by backyard bee keepers is increasing, highlighting the importance of understanding the drivers of these losses specifically.

Long-term surveillance of beekeepers, management practices suggest that huge improvements in wintering success could be realized if small-scale beekeepers would adopt more appropriate management practices, especially Varroa control practices. A minority, but significant proportion of urban beekeepers do not implement mite management practices, and as a result let colonies die from mites. These dying colonies pose risk to all surrounding beekeepers, as mites emigrate from collapsing colonies to colonies as far as 3 km away. In short, improving colony survivorship requires collective landscape scale action.

While lack of *Varroa* management can explain most losses, there is little doubt that pesticides and poor nutrition also play important roles in colony health. Evidence for the risk posed by these factors will also be presented.

**Tuesday, Oct. 8th**

Session 1 — *Pollinators in the Urban Environment: Coping with a complex landscape*

Keynote: **Katherine Baldock, University of Bristol**

<u>Identifying urban pollinator conservation opportunities: integrating research with policy and practice</u>

Land use change is a key driver of pollinator declines, with urbanisation regarded as a major threat to biodiversity. Yet urban areas could offer a huge opportunity for pollinator conservation. An increasing number of studies suggest that urban areas can harbor high pollinator diversity compared to farmland, and the appetite of the general public (many of whom reside in towns and cities) for pollinator conservation seems to be ever-growing.

I will outline the findings from the Urban Pollinators Project, a national scale study of insect pollinators in UK towns and cities. The project involved academics as well as practitioner partners from local councils and Wildlife Trusts. The research addressed three questions: (1) How do pollinator communities in urban areas compare to rural landscapes? (2) Where are the hotspots of pollinator biodiversity in urban areas? (3) What are the conservation opportunities for pollinators in urban areas?

# Session Descriptions

**Tuesday, Oct. 8th**

Session 1

Keynote: **Katherine Baldock, University of Bristol**

Identifying urban pollinator conservation opportunities: integrating research with policy and practice (continued)

The team studied multiple urban areas across the UK and used a plant-pollinator network approach to compare urban and rural landscapes (Q1) and to identify urban pollinator hotspots and conservation opportunities (Qs 2 & 3), developing models to test the effects of different management interventions.

I will also describe knowledge exchange activities I am undertaking during my current fellowship to incorporate the research findings into policy and practice, including partnerships with local and national governmental organisations, seed companies and NGOs.

**Kevin McCluney, Bowling Green State University**

Physiological approaches to understanding the effects of urban warming on bees

Kevin McCluney and Justin Burdine
Although it is well recognized that climatic variability can influence populations and communities of arthropods and other organisms, most studies have focused on single aspects of climatic variability and often fail to identify mechanisms. Moreover, relatively few studies have examined how changes in climate directly influence bees. Here we describe the physiological limits and safety margins of bees, in terms of both body temperature and water content, across a gradient of urbanization in Toledo, OH. We find that urban honey bees are closer to their water content limits, whereas urban bumble and sweat bees are closer to their thermal limits. Thus, we describe how this approach can be used to assess climatic risk for pollinators. We also discuss how risks might differ in other cities and potential methods of mitigation.

**Karmi Oxman, Pennsylvania State University**

Decoded honey bee dances reveal seasonal transition from broadly distributed to spatially discrete foraging in Philadelphia's urban landscape

Approximately 1/3 of global biodiversity consists of flowering plants and their arthropod visitors. The ecological centrality of flowers-as-food extends to systems in which floral communities have been dramatically altered, such as urban landscapes characterized by novel assemblies of native and exotic flora. Over two field seasons, we used honey bees to sample the floral resources of Philadelphia, PA, revealing spatial and temporal patterns of taxonomic composition and cumulative availability, which we interpret as a coarse proxy for the floral resource dynamics that provide the trophic foundation for the larger urban pollinator community. In the present study, we decode honey bee waggle dances to provide a spatial complement to the taxonomic and temporal patterns already documented in our system.

# Session Descriptions

**Tuesday, Oct. 8th**

Session 1

## Decoded honey bee dances reveal seasonal transition from broadly distributed to spatially discrete foraging in Philadelphia's urban landscape (continued)

Results from this season suggest that during the spring and early summer there were quality foraging resources broadly distributed across the landscape, while the August dearth left bees with less locational variety and only concentrated discrete locations that were worth foraging and recruiting to. These spatial trends from decoded dances are consistent with patterns of taxonomic composition and availability of floral resources that were observed during the previous years. This project also offers a valuable and reproducible model for civic engagement in urban ecology. We created and implemented outreach activities that provide a window into our city, a sense of place for its inhabitants, and a basis for cross-city comparisons. The use of foraging clouds created by decoded waggle dances, superimposed upon a familiar map, guides Philadelphians in the convergence of their sense of locational self and the seasonal foraging range of metropolitan bees.

Session 2

*Urban pollinator gardens: Navigating plant choice and design*

Keynote: **Robert Geneve, University of Kentucky**

## Floral adaptations – the magical interactions between flowers and their pollinators

This presentation takes a closer look at flower morphology and diversity as it relates to pollination. Various systems used by flowers to facilitate pollination are described. Special attention is given to adaptations in flower morphology designed to attract and interact with general or specific pollinators. Flowers signal pollinators with nectar guides, trick insects into visiting flowers by mimicking other organisms, lure pollinators into traps and even have moving floral parts. If you look close, you can see the magic in flowers.

**Adam Baker, University of Kentucky**

## Building a better monarch conservation garden

The eastern North American migratory population of monarch butterflies (*Danaus plexippus*) is in serious decline. Most of the efforts to conserve this iconic pollinator focus on habitat restoration in the agriculturally dominated landscapes of the US Midwest. Often overlooked are small butterfly-centric gardens (e.g. Monarch Waystations) that can act as stepping stones between urban and rural areas that are likely to contain remnant populations of monarch host plants. This presentation will help attendees to better understand the environmental pressures faced by the monarch butterfly, why their conservation matters, and initiatives to offset their decline. I will be addressing how applying sustainable agriculture theory and butterfly host finding theory to conservation gardens can increase their findability, usage, and the overall ecological value for monarch butterflies and other pollinators. In addition, I will be discussing the viability of milkweed 'nativars' as monarch host plants and their potential use in conservation plantings.

# Session Descriptions

**Tuesday, Oct. 8th**

Session 2 *Urban pollinator gardens: Navigating plant choice and design (continued)*

**Anne Spafford, North Carolina State University**

Urban pollinator gardens: plants and design

Residential gardens, in aggregate, can play a huge role in providing much needed habitat, food and water supplies, and nesting places for pollinators. No garden is too small to make a difference. With over 40 million acres of lawn in the United States alone, there is ample opportunity to make room for pollinator habitat. While there is much concern for the plight of pollinators, many gardeners are unaware or unsure how they can help. In this presentation, I hope to change the tide of misinformation and inspire great gardens everywhere. Latest scientific findings, plus readily accessible and applicable landscape design guidelines will be shared that enable gardeners and pollinator-enthusiasts to tackle their home and community gardens through strategies that will help them implement practical on-the-ground actions with an eye towards pollinator protection.

**David Smitley, Michigan State University**

Planting annual flowers to give pollinators a boost in yards and gardens

With total sales of garden center flowers and herbs being $4.16 billion per year[1] it is surprising how little we know about their value as food plants for pollinators. A USDA NIFA – supported research team has been working on evaluating the top 20 annual and perennial flower types to provide educators, garden centers, growers, landscapers and homeowners solid information on which flowers are the best food plants. Results are being analyzed and publications written following two years of field plot research. Smitley will provide a sneak preview of results that are sure to be published in scientific journals over the next two years.

[1] Anonymous. 2019. USDA NASS Floriculture Crops 2018 Summary. ISSN: 1949-0917

Session 3 *Scaling up from gardens: Connecting habitats across urban landscapes*

Keynote: **Kris Braman, University of Georgia**

Where the wild things grow: connecting people and projects to advance urban pollinator protection in Georgia

Kris will provide an overview of a variety of pollinator initiatives in Georgia. Research, instruction and outreach initiatives are often interdisciplinary and multiagency synergizing individual efforts. Topics addressed include assessment of floral resources, citizen science, honey bee genetics and evolution, crop pollination, land area use, pollinator census, pollinator conservation and others.

# Session Descriptions

**Tuesday, Oct. 8th**

Session 3 *Scaling up from gardens: Connecting habitats across urban landscapes (continued)*

**James Cane, Bee Lab, Logan, Utah**

The dirt on accommodating the nesting needs of diverse urban mining bees

Most of our bee species dig subterranean nests whose only surface evidence is a cylindrical hole amid a small heap of excavated soil. A soil substrate affords versatility in nest architecture, which will be reviewed along with some nesting generalities. In towns and cities, most land uses – including typical landscaping practices – are detrimental to these bees, yet given several simple accommodations and timely floral displays, some species will colonize and prosper in even the most intensively urban areas. Their presence provides multiple benefits, including useful pollination, learning opportunities in ecology and behavior, and even a smile for savvy observers in places where most other native wildlife is absent.

**Mary Phillips, National Wildlife Federation**

Mobilizing a million pollinator gardens – Increasing plant & pollinator abundance marinating momentum of the national pollinator garden network

It is estimated each community has at least one or more pollinator gardens on a block near you. This is due in larger part, to the approximately 8 million people who planted and registered 1,040,000 pollinator gardens in the NPGN's Million Pollinator Garden Challenge across North America in just three years!

This session will share the impact of this effort from both a science and social perspective and why it is important to maintain its momentum for scaling up pollinator habitat in "people populated" areas. 90% of flowering plants rely on pollinators to produce, many fruits and vegetables, fiber crops and medicines. Pollinators are in significant decline, and are cited in the most recent report that estimates that up to one million animal and plant species are threatened with extinction in the coming decades - nearly 40 percent of all species - that requires urgent conservation action.

The good news - people planting really makes a really difference! Recent studies confirm, floral rich pollinator friendly plants provide "pollinator garden hot spots" which support greater bee density and diversity.

As such, the NPGN 2019 targeted Call to Action asks people to enhance existing gardens with a minimum of three pollinator-friendly plants that bloom in different seasons (spring, summer and fall) to help ensure a consistent food supply for pollinators. New gardens continue to be necessary to counteract vanishing habitat. The MPGC map remains open for new garden registrations

The National Pollinator Garden Network began such work in 2015 and has become the largest pollinator conservation effort to engage the environmental, horticultural and voluntary sectors to restore and connect essential habitat.

NPGN applauds efforts across small spaces, private yards, neighborhood gardens, to public gardens, where passion translated into results. The Million Pollinator Garden Challenge Impact report, documents the impact these floral rich sites provide, and lists top performing states, provinces, towns and cities.

# Session Descriptions

**Tuesday, Oct. 8th**

Session 3 *Scaling up from gardens: Connecting habitats across urban landscapes (continued)*

**James Wolfin, Metro Blooms and University of Minnesota**

If you build it, who will come? Evaluating bee diversity in flowering lawns.

Bee losses and declines in health and productivity are often associated with a number of factors, including a lack of high quality forage. One potential route for improving bee health within urban and suburban areas is through habitat enhancement in turfgrass areas. Turf lawns are typically maintained as a highly managed mixture or blend of different turfgrass species to maintain a desired aesthetic, or recreational function. In this study, we attempt to reduce lawn inputs while also enhancing turfgrass areas with low-growing flowers that can provide valuable forage for bees. Additionally, we attempt to quantify the abundance and diversity of bees within parks with naturally occurring white clover, and parks that have been enhanced with low growing flowers. In total nearly 5000 bees have been collected over three years off of lawn flowers, representing over 40 species of bees.

**Wednesday, Oct. 9th**

Session 4 *Integrating pest and pollinator management*

Keynote*:* **Kimberly Stoner, Connecticut Agricultural Experiment Station**

Whatever happened to integrated pest management?

Integrated pest management (IPM) is an approach to reduce pesticide use and make better pest management decisions through designing ecosystems to reduce pest damage, monitoring pest abundance, evaluating the range of control options for multiple goals, taking action as needed, and evaluating the results. Although IPM has been the official policy of the US since 1972, its use has declined in the last two decades in major commodity crops in favor of default use of a seed treatments with neonicotinoids and fungicides combined with genetic engineering for insect resistance and herbicide resistance. Because of widespread insecticide use and other aspects of agricultural intensification, urban landscapes have become refuges for bees in many areas. That makes it important for people living in those areas to think carefully about their own goals and to design and manage land in accordance with those goals (which I hope will include a home for pollinators!)

# Session Descriptions

**Wednesday, Oct. 9th**

Session 4 *Integrating pest and pollinator management (continued)*

**Alexandra Harmon-Threatt, University of Illinios at Urbana-Champaign**

Contaminated soils, contaminated plants: Are we luring bees into pretty but dangerous habitats?

Increasing pollinator habitat is critical to slowing the observed declines. However, recent concern has been raised about how soil contamination in restored habitat may affect native bees. With most bees nesting belowground they may experience two routes of exposure: contaminated soils and contaminated plants. Due to legacy effects of restored habitats and continued direct and indirect contamination, soils may retain a number of pesticides and other contaminants that can effect pollinators. We explored the routes of exposure and effects of neonicotinoids, a common agricultural pesticide, on native bee diversity and nesting. In habitats designed to support pollinators we found significant levels of pesticides in soils and effects of this on bee diversity. Conserving pollinators may require considering the soils and history of the habitats we designate for restoration. The relationship between this agricultural system and urban systems will be discussed.

**David Held, Auburn University**

Defining and mitigating the impacts of crape myrtle bark scale management on pollinators

Crape myrtle bark scale [CMBS] (Eriococcidae: *Acanthococcus lagerstroemiae*) is a recently introduced pest in the United States. CMBS attacks crape myrtle (*Lagerstroemia* spp.), a plant ubiquitous in southern landscapes, as the primary host. Neonicotinoid insecticides including imidacloprid and dinotefuran, are being used primarily to reduce damage and spread. Because bees and beneficial insects commonly visit crape myrtle flowers for pollen, this study evaluated the risk of translocation by imidacloprid and dinotefuran into flowers following a soil application. Soil applications of both insecticides were made using maximum label rate. Three timings: post-bloom/pre-dormancy, pre-bud break, and post-bud break/pre-bloom were used. Pollen and leaf samples were collected from trees and analyzed using a modified QuEChERS method of LC/MS. Lab assays were also performed with new growth to evaluate treatment efficacy against CMBS crawlers and foliage-feeding crape myrtle aphids. The results of these experiments will be discussed and placed into a context of minimizing the impacts on pollinators from CMBS management with insecticides.

**Elizabeth Long, Purdue University**

Surrounded by perilous pollen? Evaluating contaminated honey bee resources in field crops landscapes

This presentation will provide a brief summary of our understanding of the ways in which pollinators are exposed to pesticides through unexpected routes in agricultural and urban systems. Special emphasis will be placed on the role of non-crop plants as sources of pesticide exposure for bees, and the potential sources of these compounds in ag and urban environments.

# Session Descriptions

**Wednesday, Oct. 9th**

Session 5 *Beyond pollinators: The human and wildlife dimensions of pollinator habitat*

Keynote: **Catherine Zimmerman, The Meadow Project**

Habitat heroes, making natural landscaping the new landscaping norm

Before manicured lawns, with their chemicals, mowers and blowers, there were ecological meadows with their butterflies, birds and bees. Zimmerman looks at the growing movement to reduce over 48 million acres of thirsty, pesticide ridden, energy consuming lawns. Included are clips from her film, "Hometown Habitat," which make the connection that planting diversity building native plants, is at the core of reclaiming critical habitat for wildlife. *"Everything we do to help wildlife actually helps people too. We need clean air, we need clean water, we need healthy soil. Everything we do to create healthy wildlife habitat helps people and wildlife. We can create an environment where both can thrive. That's the future."* Naomi Edleson, NWF, "Hometown Habitat, Stories of Bringing Nature Home"

**Patrick Fitzgerald, National Wildlife Federation**

Empowering communities to save the monarch, pollinators and wildlife

Our collective work to benefit pollinators in urban areas can also have profound impacts for other wildlife species. With more that 80 percent of Americans living in urban areas, it is critical to engage people to save wildlife species in their own communities. The National Wildlife Federation works with nearly 700 cities, towns, counties, neighborhoods and homeowners' associations in an effort to benefit wildlife (including pollinators) and people. This presentation will highlight some of the ways that the National Wildlife Federation and its partners are increasing the amount of native habitat, wildlife-friendly gardens, open spaces and corridors in cities, towns, and counties while working to ensure that the benefits of urban biodiversity are enjoyed by all Americans, especially vulnerable populations.

**Damon Hall, University of Missouri**

US state-level insect pollinator policies 2000 - 2017

Damon Hall, University of Missouri
Rebecca Steiner, Saint Louis University
In the absence of any sweeping international agreements addressing insect pollinator declines, we discuss sub-national level policy concerning insect pollinator conservation. We look at US state laws passed by state legislatures as 2000–2017 as routes for piloting new policy instruments amenable to all political parties. This timeframe captures pre- and post-publicity of pollinator declines via colony collapse disorder, the evolving research on neonicotinoids, and highly-visible bee kills. We found 109 new laws covering apiculture, pesticides, awareness, habitat, and research. Together, they narrate an evolution of bureaucratic thinking on insects. Yet when compared to policies proposed by biologists, legislators failed to address critical policy targets. Notwithstanding, we showcase areas of legal agreement useful for authoring international, national, state, and municipal policies.

# Session Descriptions

**Wednesday, Oct. 9th**

Session 5

*Beyond pollinators: The human and wildlife dimensions of pollinator habitat (continued)*

**James Quinn, University of Missouri**

Missouri's Master Pollinator Steward Program

The Master Pollinator Steward Program began as a partnership opportunity with Missouri State Beekeepers Association (MSBA) in late 2014. While modeled after Missouri's Master Gardener program, it is shorter and does not require volunteering (but encourages it). It is typically taught in six parts of three hours each and incorporates a range of hands on activities. A series of five publications were created specifically to teach it. A stakeholder group is sought to co-teach or host the program, such as a local beekeeping group; a monetary incentive is available. Over 80 individuals were trained in 2018 and over 60 took it in the spring of 2019. Summer and fall registrations will be provided. Evaluations have shown that over 90% found it was very worthwhile attending and 100% found the curriculum of good value (publications, hands on activities & PowerPoints). When asked "Are you likely 'to do' anything with what you've learned?", over 80% said very likely or absolutely. Four examples are: my wife is working on making our 2.5 acre yard pollinator friendly, as a Master Naturalist I will advocate there, I will now read pesticide labels to avoid killing bees, and I'm going to rehab property I recently inherited and needed a plan. One summed it up with 'I want to be a better land steward and now know how to protect pollinator habitat.'

# Speaker Profiles

**Adam Baker**

Adam M. Baker is a PhD Candidate in the Entomology Department at the University of Kentucky where he studies conservation of the monarch butterfly and other pollinators under the direction of Dr. Daniel A. Potter. He has been investigating the iconic monarch butterfly for the past four years and pays close attention to backyard and small garden conservation in urban and suburban areas. Adam hails from Southwest Michigan and studied environmental journalism and agricultural sciences as an undergraduate.

**Dr. Katherine Baldock**

Dr. Katherine Baldock is a Knowledge Exchange Fellow at the University of Bristol, funded by NERC, one of the UK research councils. She is a community ecologist who uses ecological interaction networks to study plant-pollinator communities and her current research has a particular focus on pollinators in urban areas. Katherine is working with a range of stake-holders, including local councils, wildlife trusts and policymakers, to examine how urban land management can be improved to benefit pollinators. Prior to her fellowship, Katherine's postdoctoral research, also at the University of Bristol, involved managing the Urban Pollinators Project, a UK wide project assessing pollinators in urban environments. She has also researched pollinators in more tropical environments, including the African savannah during her PhD research and the Costa Rican dry forest.

**Dr. Kris Braman**

Dr. Kris Braman joined the University of Georgia Entomology faculty in 1989 after earning degrees from the State University of New York (SUNY) in Forestry and the University of Kentucky. She served as Director of the Georgia Center for Urban Agriculture from 2011 - 2016. She has developed management plans for insects that affect turf and ornamentals; taught General Entomology, Biological Control and Plants and Pollinators for undergraduate and graduate students; and provided training for Green Industry Professionals. She has served as President of both the Georgia Entomological Society and the South Eastern Branch of the Entomological Society of America (SEB-ESA).

Dr. Braman has been recognized as a Distinguished Alum of the Entomology Department at the University of Kentucky, as a recipient of SEB-ESA's Distinguished Achievement Award in Horticultural Entomology and as a recipient of the GGIA Environmental Friend of the Year Award. Her journal articles and book chapters reflect her research focus on insect-plant interactions, integrated pest management, and environmental conservation issues. Her studies blend basic and applied components to improve the sustainability and profitability of urban plant production and landscape pest management. Research em-phasizes integrating pollinator protection, natural enemies and alternative control technologies into IPM through enhanced understanding of tritrophic interactions in urban plant systems. Dr. Braman currently serves as Professor & Head of Entomology.

# Speaker Profiles

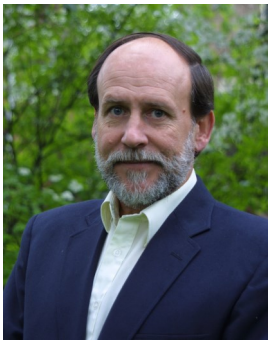
**Jim Cane**

Jim Cane has spent many of the past 4 decades studying the nesting and pollination ecologies of native non-social bees of North America and elsewhere. He has studied pollination and pollinators of alfalfa, cranberries, blueberries, squashes, almonds, onions, and raspberries, as well as 13+ native wildflower seed crops used for restoration seed. He has published on native bee nesting biologies, chemical ecologies, foraging behaviors, floral specializations, community dynamics and conservation, especially with regard to wildfire. He is currently multiplying 5 species of native *Osmia* bees for these applications. For the past 20 years, he worked for the US Department of Agriculture at the Pollinating Insect Research Unit at Utah State University in Logan, Utah, USA. Prior to that, he was on the faculty of Auburn University in Alabama and a post-doc at Berkeley following a Ph.D. from the University of Kansas.

**Patrick Fitzgerald**

Patrick Fitzgerald leads the National Wildlife Federation's Urban Wildlife programs and policy change efforts, including partnerships with nearly 700 cities, counties and communities though the Federations' Community Wildlife Habitat and Mayors' Monarch Pledge programs. Through these programs and others, NWF is committed to helping wildlife and communities thrive by increasing tree canopy, implementing green and natural infrastructure projects, promoting native plant gardening and landscaping and increasing resilience in low-income communities. Patrick created the Mayors' Monarch Pledge in 2015 and authored a guide title "Monarch Conservation in America's Cities: A Solutions Guide for Municipal Leaders."

**Dr. Robert Geneve**



Dr. Robert Geneve has been a faculty member of the University of Kentucky, Department of Horticulture for over 30 years doing teaching and research in ornamental plant production and propagation. He is an author of several books including co-authoring the textbook "Hartmann and Kester's Plant Propagation: Principles and Practices." Dr. Geneve has been recognized as a Fellow of the American Society for Horticultural Sciences and the International Plant Propagator's Society – Eastern region. He is a frequent speaker at national and international conferences on subjects ranging from plant propagation to seed biology and plant morphology.

# Speaker Profiles

**Damon M. Hall, PhD**

Damon M. Hall, PhD is an Assistant Professor in the School of Natural Resources and Biomedical, Biological & Chemical Engineering at the University of Missouri. He completed a PhD in Wildlife and Fisheries Sciences as a Boone & Crockett PhD Fellow in Conservation Policy at Texas A&M University. He holds a MA in Communication and a BS in Agriculture concentrating on Forestry and Natural Resources both from Purdue University. At Purdue, he was apiary manager of Dr. Hunt's Honeybee Genetics Lab. He was a National Science Foundation-supported Sustainability Science Postdoctoral Research Fellow at the University of Maine's Sustainability Solutions Initiative. He joined the faculty at Saint Louis University in 2013. His research examines the interactions between social and ecological systems where science, policy, and culture meet. It is problem-oriented and audience-focused pursuing questions of how to make knowledge usable for transitioning towards sustainability. His current research explores citizen-engaged policy approaches to water resources planning and urban bee conservation. Website: http://www.sustainabilitysciencelab.org/

**Dr. Alexandra Harmon-Threatt**

Dr Alexandra Harmon-Threatt completed her BS in Environmental Studies at Washington University in St. Louis and then continued on to the University of California Berkeley to do her PhD in Environmental Science Policy and Management under Dr. Claire Kremen. Since arriving at the University of Illinois, Urbana-Champaign her work has focused on understanding the patterns and processes that govern plant-pollinator interactions and diversity in natural systems. She is particularly concerned with identifying how bees respond to various environmental disturbances including habitat fragmentation, fire, grazing, and pesticides. Alongside her students, she runs a vibrant research and outreach program that has been awarded over two million dollars to improve our understanding of limitations to pollinator conservation and restoration.

**Dr. David Held**

Dr. David Held is a Professor in the Entomology and Plant Pathology Department at Auburn University. His graduate training in Entomology was received under the direction of Dr. Daniel Potter at the University of Kentucky. Before joining Auburn University in Fall 2008, he had statewide Extension responsibilities for turfgrass and ornamental entomology with Mississippi State University (2003 - 2008). At Auburn University, he has a 75% research-25% teaching appointment including courses in Economic Entomology, General Entomology, and Landscape Entomology. His research focuses on the ecology and management of insect and mite pests of ornamental plants and turfgrass. He has published 11 book chapters, and 63 scientific articles in peer-reviewed journals including two Annual Reviews and a BMP document for pollinator protection in turfgrass. His book, *Urban Landscape Entomology*, is the first text and reference book in this subject area. Most of his 12 previous graduate students now hold prominent positions in the Green Industry, US EPA, US Golf Association, or work as instructors at secondary or post-secondary schools. He has served as a subject editor and reviewer for multiple journals, and on grant review panels for USDA-NIFA. He has held leadership roles in the Entomological Society of America and is currently the Assistant Director of Alabama IPM programs.

# Speaker Profiles

**Dr. Elizabeth Long**

Dr. Elizabeth Long is an assistant professor of entomology at Purdue University, in West Lafayette, IN, with research and extension efforts focused on the integrated pest management of pest and beneficial insects in horticultural crop systems. Prior to joining Purdue University, Dr. Long was an assistant professor at Ohio State, focusing on insect management in winegrapes and specialty crop muck vegetables. Currently, Dr. Long's research program focuses on understanding the ecological interactions between plants, insects, and their environment, and how these interactions scale up to influence pest management strategies.

Dr. Long received her PhD from the University of Missouri in Plant, Insect & Microbial Sciences where she researched interactions between insect communities and crop plants that have implications for insect-vectored pathogens. After earning her PhD, Dr. Long conducted postdoctoral research at Purdue University in Indiana that focused on understanding the various pathways pollinators are exposed to pesticides in agricultural landscapes.

**Dr. Kevin McCluney**

Dr. Kevin McCluney is currently an Assistant Professor in the Department of Biological Sciences at Bowling Green State University in NW Ohio. He received his PhD at Arizona State University, where he became interested in how animal water balance influences food webs. During his PhD, he worked on a collaborative project with Stan Faeth, studying how water balance influenced ants, aphids, and lady beetles on urban landscaping plants. Post-PhD, McCluney worked with Steve Frank at NC State examining how urbanization influences animal water balance in multiple cities and in food webs in Raleigh, NC. Most recently, McCluney has worked with his former PhD student Justin Burdine (now faculty at, Cornerstone University in MI), investigating effects of urbanization on bee physiology and ecology.

**Karmi Oxman**

Karmi works with Dr. Doug Sponsler and Dr. Christina Grozinger of The Pennsylvania State University and Drexel's Academy of Natural Sciences. They use decoded honey bee dances to reveal the seasonal transition from broadly distributed to spatially discrete foraging in the city of Philadelphia. Karmi is especially interested in the value of the foraging area clouds created by decoded dances, as they are superimposed upon the map of Philadelphia. She is excited to use these maps as a visual method for increasing the connectedness of Philadelphians to bees in their shared landscape. Karmi's interest in pollinators flourished under the mentorship of Dr. Mary Garvin during her BA at Oberlin College. She obtained her MSc (2017) in Agroecology from the Hebrew University of Jerusalem, Israel. Karmi's MSc thesis, under the advisory of Dr. Sharoni Shafir and Dr. Ofer Feinerman, focused on error and reliability in waggle dance communication. Karmi continued her study of animal behavior from 2017 - 2019 at the University of Pennsylvania in Dr. Maria Geffen's Laboratory of Auditory Neuroscience. Karmi began her PhD in the lab of Dr. Sean O'Donnell at Drexel University this fall. She is exploring thermal physiology and behavioral changes in social insects associated with climate change in Israel's Negev Desert.

# Speaker Profiles

**Mary Phillips**

Mary Phillips provides strategic and operational oversight of the National Wildlife Federation's Garden for Wildlife™ movement which has grown to involve 5-7 million people creating habitat where they live, work, play, learn and worship. Garden for Wildlife is the nation's oldest and largest Backyard Habitat program spanning four and half decades. Today there are close to 235,000 NWF Certified Wildlife Habitats® across North America and U.S. Embassies worldwide. The Garden for Wildlife movement provides a strategic umbrella for a suite of programs, including Community Wildlife Habitats®, Schoolyard Habitats, Butterfly Heroes™ and Sacred Grounds™. It involves networks of universities, zoos, aquariums, public gardens and even sports stadiums installing native plants to support pollinators and other wildlife. Since joining National Wildlife Federation in 2014, under Mary's leadership, individual and partner participation has quadrupled to millions planting for the monarch butterfly, pollinators and birds across Garden for Wildlife programs and campaigns.

Simultaneously, Mary facilitates organization wide conservation strategies for pollinators, monarchs and other indicator species. Specifically, she helped to initiate and manage National Wildlife Federation's role in the following collaborations: first, with the United States Fish and Wildlife Service to ''Save the Monarch," then with the White House Office of Science, Technology and Policy and The National Pollinator Garden Network to launch and facilitate the Million Pollinator Garden Challenge. As of one of the co founders of the National Pollinator Garden Network, she facilitates the engagement of over 50 organizations across conservation, garden trade and voluntary civic sectors which resulted in over 1,040,000 registered pollinator gardens. Mary has also been a steering committee member of the Monarch Joint Venture since 2015.

Mary coordinates all aspects of the national program's strategic planning, management, partnership development, program performance and evaluation. She manages integrated workflow processes with vice President's across marketing, philanthropy and policy. By identifying new partners with youth and family serving, faith based and civic organizations, Mary has expanded outreach goals for increased diversity in demographics, expertise, and geographies. The Garden for Wildlife network has also expanded to include over 20 NWF state affiliate organizations. It is also implemented in coordination with conservation education staff across 7 regional offices.

**James Quinn**

James Quinn is a Field Specialist in Horticulture for University of Missouri Extension (15 years). A 'farm boy' from Iowa, he started at Iowa State University but completed his BS at UC Davis in Plant Science (83) and his MS in horticulture at Purdue University (87). He was a greenhouse grower for nine years in Michigan. Since moving to Missouri, he has been involved in a range of agriculture projects. He's led MU's effort developing, the Master Pollinator Stewardship program, conducted several trainings and is co-author on most of its

# Speaker Profiles

**Anne Spafford**

Ms. Anne Spafford, MLA, is a tenured Associate Professor of Landscape Design in the Department of Horticultural Science at North Carolina State University. She has been teaching for 20 years and won many teaching awards, including being inducted into NC State University's Academy of Outstanding Teachers, and Teacher of the Year when she taught in the School of Landscape Architecture at Louisiana State University. Her typical courses include Introduction to Landscape Design, Sustainable Residential Landscape Design, Planting Design; Introduction to Permaculture: Sustainable Living; Green Infrastructure, and a Home Landscape Design course for non-majors and homeowners. In the past she has also taught Plant Material Identification and Use; Site Design (grading and drainage); Landscape Construction; and a course on International Travel, where she took students to see parks and gardens of Berlin and Paris. She and her students have designed and installed several gardens on NC State University's campus—the Gregg Museum Pollinator Garden, the Greenway Edible Garden, and the Talley Student Center Green Roof, which is a living laboratory. She is passionate about all of the subjects that she teaches (and there is substantial overlap between them), but she has a particular fondness for planting design. She received her Bachelor's degree in Horticulture, which provided a foundation in plants, plant sciences, and small scale design. Her Master's degree in Landscape Architecture provided a foundation in cultural and social issues of design and research applied design as well as experience in designing larger projects. Horticultural Science and Landscape Architecture are two exceedingly complementary fields of study, but not nearly enough professionals go this route. Anne co-authored an award winning book, Rain *Gardening in the South: Ecologically Designed Gardens for Drought, Deluge, and Everything In Between* (c. 2009 Eno Publishers; Hillsborough, NC). This book was the first of its kind, one of the first books of the publisher, and the first book for her and her co-author, Helen Kraus. They wrote it in just five months—adhering to a strict writing schedule (and copious amounts of coffee). Despite these "firsts," the book received the prestigious Gold Medal Award for Best Technical Book from the Garden Writer's Association and the Benjamin Franklin Award from Independent Publishers. She just submitted a book manuscript for *Pollinator Gardening for the South: Creating Sustainable Habitats Through Science and Art* (co-authored with Dr. Danesha Seth Carley) which will be published by UNC Press in 2020.

**Dave Smitley**

Dr. Smitley is a professor of entomology and the landscape industries extension specialist at Michigan State University. He works closely with the turfgrass, nursery, floriculture and landscape industries in Michigan on developing best management practices and finding long-term biological control solutions when possible. Dr. Smitley worked with Dr. Bauer to introduce *Entomophaga maimaiga*, a natural fungal pathogen of gypsy moth, into Michigan, and has also introduced *Ovavesicula popilliae*, a natural pathogen specific to Japanese beetle. In the last 10 years, his cooperative research on emerald ash borer with Dr. Joe Doccola led to the development of an emamectin benzoate product (TREEäge), the most widely used trunk injection treatment for protecting ash trees. At this time, the Smitley lab is (1) continuing research on *Ovavesicula* for biocontrol of Japanese beetle, (2) studying the movement of the most heavily used systemic insecticides into nectar and pollen of a few model perennial and woody ornamental plants, so that best management practices can be made for greenhouse and nursery growers that will allow production of plants safe to pollinators after they are purchased at garden centers, and (3) evaluating the relative attractiveness of the most popular annuals and perennials sold at garden centers to pollinators. The last two objectives are part of a large Specialty Crops Research Initiative grant, 'Protecting Pollinators with Economically Feasible and Environmentally Sound Ornamental Horticulture.'

# Speaker Profiles

**Kim Stoner**

Kimberly A. Stoner joined the Connecticut Agricultural Experiment Station in 1987, after receiving her PhD in entomology from Cornell University, and spending a year on a fellowship with the Africa Bureau of the U.S. Agency for International Development. Her PhD and early professional work at the Connecticut Agricultural Experiment Station was in vegetable entomology. In her 30 years at CAES, she has moved from studying plant resistance to insects, to other alternatives to insecticides for managing vegetable insects, to holistic case studies of organic farms, to focusing on bees, including both wild bees and honey bees. She is currently studying bee diversity in Connecticut, pollination of pumpkins and squash, and how bees are exposed to pesticides. She also works with people across Connecticut, including farmers, beekeepers, and community groups, in creating habitat for pollinators.

**Dennis vanEngelsdorp, Ph.D.**

Dennis, an Associate Professor at the University of Maryland, has a broad interest in pollinator health. The focus of his current work involves the application of epidemiological approaches to understanding and (importantly) improving honey bee health. Dennis is the founding president of the Bee Informed Partnership (BeeInformed.org) which attempts to provide a platform to collect "big data" on the state of managed honey bee colony health. Analysis of these data is providing important insights into the role management practices and environmental factors (such as landscape, pesticides, and climate) have on colony health.

Dennis was born in the Netherlands but emigrated to Canada when he was two. He grew up on the outskirts of Toronto before completing his under graduate and master's degrees at the University of Guelph. His undergraduate degree was in in Horticulture and International Agriculture. One of the classes in his undergraduate degree was beekeeping. Beekeepers have a saying "once stung – you know you are a beekeeper or not – it gets in your blood". That was certainly the case for Dennis, who ended up doing a master's degree on Honey bee Health as a result of that introductory class.

Dennis has traveled extensively studying and speaking on bee health. His lab helps run several honey bee health monitoring programs including US national honey bee disease survey. His work has been featured in numerous documentaries, print and electronic media (including a story in the *New Yorker*, and *Time* magazine), and he has given a TED talk (https://www.ted.com/talks/

# Speaker Profiles

**James Wolfin**

James Wolfin is a recent graduate of the University of Minnesota, where he received his MSc in Entomology under the advisement of Drs. Marla Spivak and Eric Watkins. His project, commonly referred to as the bee lawn project, aimed to enhance turf lawn monocultures with low-growing flowers to promote forage availability for native bees and honey bees. James' project examined how to most effectively establish a bee lawn and evaluate the bee communities that utilized them. Originally from Queens, New York, James' interest in bees and flowering plants arose as an undergraduate student at The University of Delaware, where he studied the foraging behavior of honey bees. James currently works as the manager of sustainable landscape design at Metro Blooms, a non-profit organization in Minneapolis, Minnesota.

**Catherine Zimmerman**

Catherine Zimmerman, an award-winning director of photography, celebrates her 43rd year as a documentary filmmaker, working primarily on education and environmental issues. Catherine is also a certified horticulturist and landscape designer based in the Yellow Springs, Ohio. She is accredited in organic land care through the Northeast Organic Farmers Association and has designed and taught a course in organic landscaping for the USDA Graduate School Horticulture program. In writing the book and filming the film, *Urban & Suburban Meadows,* Catherine created a stunning and enticing introduction to meadowscaping that will encourage her readers do away with pesticides, reduce lawn and return their land to a beautiful, natural habitat for native plants and wildlife. Catherine's latest film release, *Hometown Habitat*, *Stories of Bringing Nature Home,* is a collaboration with Dr. Douglas Tallamy. The documentary explores how and why native plants are critical to the survival and vitality of local eco-systems. Included are inspiring stories of habitat heroes across the countries, who are working to bring back nature in their hometowns. Catherine hopes that these projects will help fire up the movement toward making natural landscapes the new landscaping norm.

# Posters

Attractiveness of perennial flowers to bee pollinators in North Dakota

Janet, Knodel, NDSU

Bees in the City: The effect of heavy metals on the common eastern bumble bee

Sarah Scott, The Ohio State University

Does aphid presence on milkweed influence monarch butterfly reproduction?

Helena Cybriwsky, Adam Baker, D. Bailey Riordan, Carl Redmond, and Daniel A. Potter; University of Kentucky

Effects of elevated nitrogen and plant species richness on milkweed quality and monarch fitness

Rebecca Perry, University of Florida

Getting Buzzed for Bees: a fund and awareness raiser

Sarah Jenkins, American Association of Zoo Keepers, Omaha's Henry Doorly Zoo & Aquarium

Improving Urban Pollinator Habitat

Becky Griffin, University of Georgia Extension

In Defense of Nativars: conservation value of native milkweed straight species versus cultivars for Monarch butterflies and bees in small gardens

Daniel Potter, University of Kentucky

Pollinator attractiveness of native and non-native ornamental plants of Southern California

Lea Corkidi, University of California Cooperative Extension

Pollinator Day

Gina Anderson, Purdue Extension Floyd County

Pollinators and plant nurseries: How ornamental plant management impacts solitary bee fitness

Jacob Cecala, University of California, Riverside

The role of continuous flowering phenology in a neotropical plant - pollinator network

Chelsea Hinton, Eastern Kentucky University

Uncovering exurbia’s potential to serve as a refuge for pollinators

Amelie Davis, Miami University

# Conference Participants

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| Gina Anderson | Purdue Extension Floyd County |
| Sonya Anderson | Denver Botanic Gardens |
| Justina Block | Osmia Bee LLC |
| Natalie Boyle | Penn State University |
| Marilee Burnside | Floyd County Soil & Water Conservation District/Elected Supervisor |
| Molly Chalfin | Toledo Zoo |
| Bradley Clayton | Clayton Garden Center |
| Mark Coffelt | Syngenta |
| Leah Connoly | University of Michigan |
| Jameson Coopman | Denver Botanic Gardens |
| Lea Corkidi | University of California Cooperative Extension |
| Deryn Davidson | Colorado State University Extension |
| Karin Davidson-Taylor | Royal Botanical Gardens |
| Amelie Davis | Miami University |
| Igor DePadova | University of Michigan |
| David Diener | Extension Master Gardener Volunteer, Catawba County, NC |
| Karen Dorff | Illinois Master Gardeners |
| Amara Dunn | New York State Integrated Pest Management Program |
| James Edwards | Minnestrista |
| Paul Eminger | University of Michigan |
| Rosellen Fenell | Columbus Botanical Gardens |
| Jack French | Austin Nature & Science Center |
| Bob Froelich | Bayer Ornamentals |
| Natasha Garcia Andersen | Department of Energy & Environment |
| Stanton Gill | University of Maryland Extension |
| Becky Griffin | University of Georgia Extension |
| Marissa Harrison | Thanksgiving Point Butterfly Biosphere |
| James Hicks | University of Michigan |
| Suzanne Hudnut | Greening of Detroit |
| Loreen Iezzi | Pittsburgh Botanic Garden |
| Laura Ingwell | Purdue University |
| Jim Jasinski | Ohio State University Extension |
| Sarah Jenkins | America Association of Zoo Keepers, Omaha's Henry Doorly Zoo & Aquarium |
| Jane Johnson | Bridgestone Americas, Inc. |
| Janet Knodel | North Dakota State University |
| Brian Kunkel | University of Delaware |
| Lon Lewis | PAL |
| Erin MacGregor-Forbes | Coastal Maine Botanical Gardens |
| Catharine Mannion | University of Florida |

# Conference Participants

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| Marisol Mata | American Public Gardens Association |
| Steve McGaffin | Zoo Knoxville/Tennessee Butterfly Monitoring Network |
| Ester McGinnis | North Dakota State University |
| Cristi Palmer | IR-4 @ Rutgers University |
| Bob Porter | Chicago Park District |
| Daniel Potter | University of Kentucky, Dept. of Entomology |
| James Quinn | University of Missouri Extension |
| Sirila Ray | DC Department of Environment |
| Kathy Rizzi | Michigan State University Extension Advanced Master Gardener |
| Denice Robertson | Northern Kentucky University |
| Connie Schmotzer | Penn State Extension |
| Lesa Smith | Purdue Master Gardener |
| Tom Smith | Michigan State University |
| Lauren StClair | Master Gardeners – Floyd County |
| Linda Thompson | City of Bloomington Planning and Transportation Department |
| Terri Turner | Campbell County Cooperative Extension Service |
| Mary Ellen Van Slembrouck | Michigan State University Extension Advanced Master Gardener & Smart Gardener; Deneweth's Greenhouse |
| Mary Jo Vesper | Ohio State University Extension |
| Bob Walters | FieldWatch |
| Courtney Weatherbee | Michigan State University |
| Rebecca Weersing | Temecula Valley Rose Society (Rose Haven Heritage Garden) |
| Kari Wigler | Cave Hill Cemetery |
| Ann Wilson | University of Michigan |
| Jewel Wise | Kosciusko County Soil and Water Conservation District |
| BreyAn Witt | University of Michigan |

## Student Participants

| | |
|---|---|
| Adam Browning | University of Louisville |
| Jacob Cecala | University of California, Riverside |
| Chelsea Hinton | Eastern Kentucky University |
| Erica Hotchkiss | Michigan State University |
| Caroline Kane | Michigan State University |
| Carlene McGrady | North Carolina State University |
| Melissa McMeans | Malone University |
| Rebecca Perry | University of Florida |
| Sarah Scott | Ohio State University |
| Angela Van Order | Michigan State University Extension |

# Conference Organizers

Scott Beuerlein

Manager of Botanical Garden Outreach

Cincinnati Zoo & Botanical Garden

Rebecca Finneran

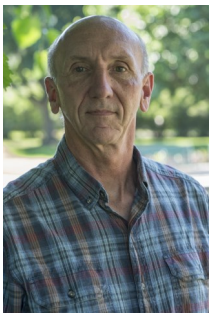
Consumer Horticulture Educator

Michigan State University Extension

Steve Foltz

Director of Horticulture

Cincinnati Zoo & Botanical Garden



David Smitley

Professor of Entomology

Michigan State University


Nathaniel Walton

Home Horticulture Program Instructor

Michigan State University Extension

Elsa Youngsteadt

Assistant Professor, Applied Ecology

North Carolina State University

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