

# EPRI Pollinator Update

**Jessica Fox**  
**Sr. Technical Executive**  
**Environment Sector**

October 25, 2018





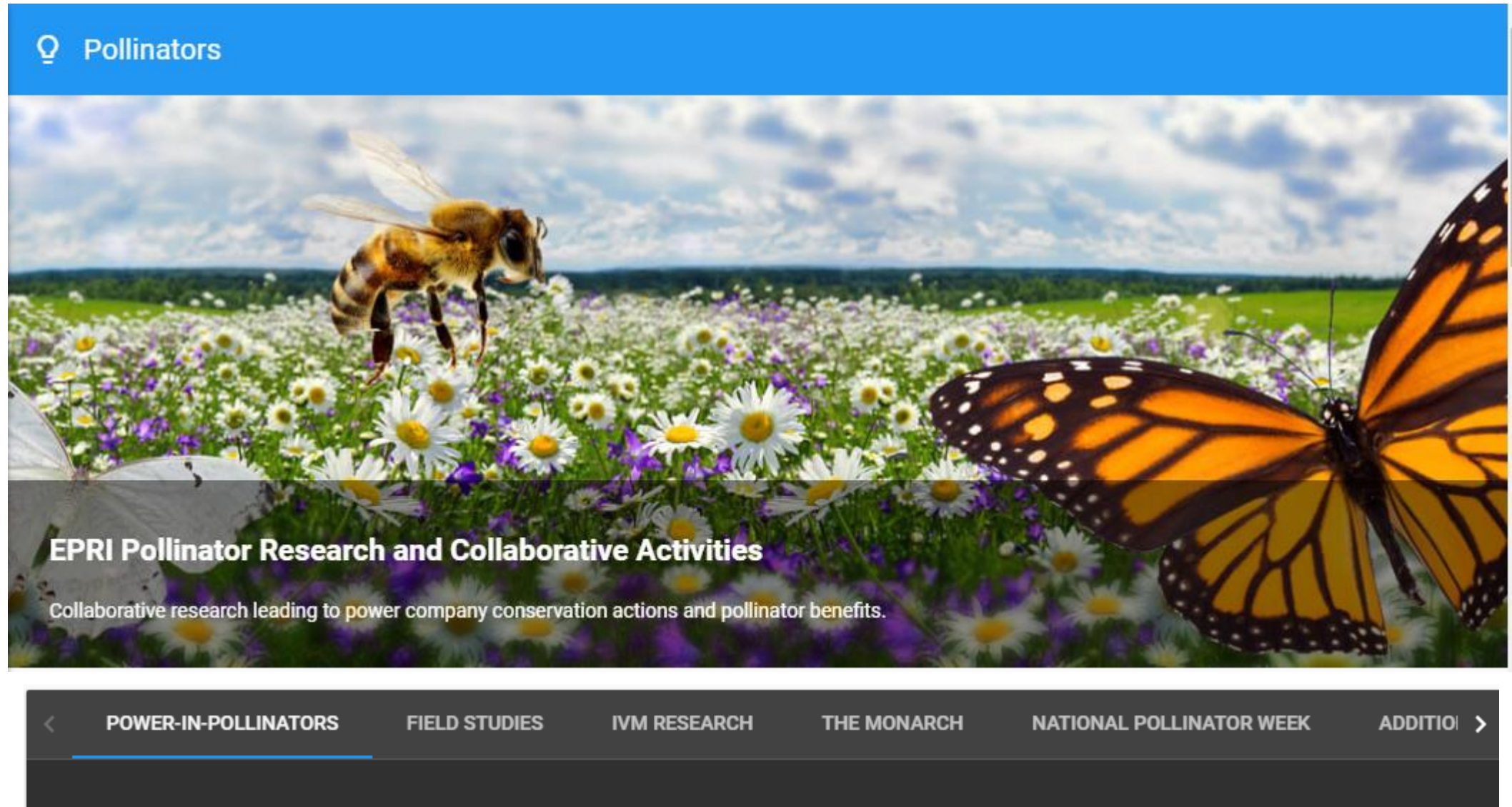
## EPRI Promotes Pollinator Research and Collaborative Conservation Actions

## Advanced Overhead Line Design

Globally, electric utilities are facing challenges when designing and constructing new overhead lines. EPRI initiated research to develop a design strategy that unifies, incorporates and



[Http://www.epri.com/pollinators](http://www.epri.com/pollinators)



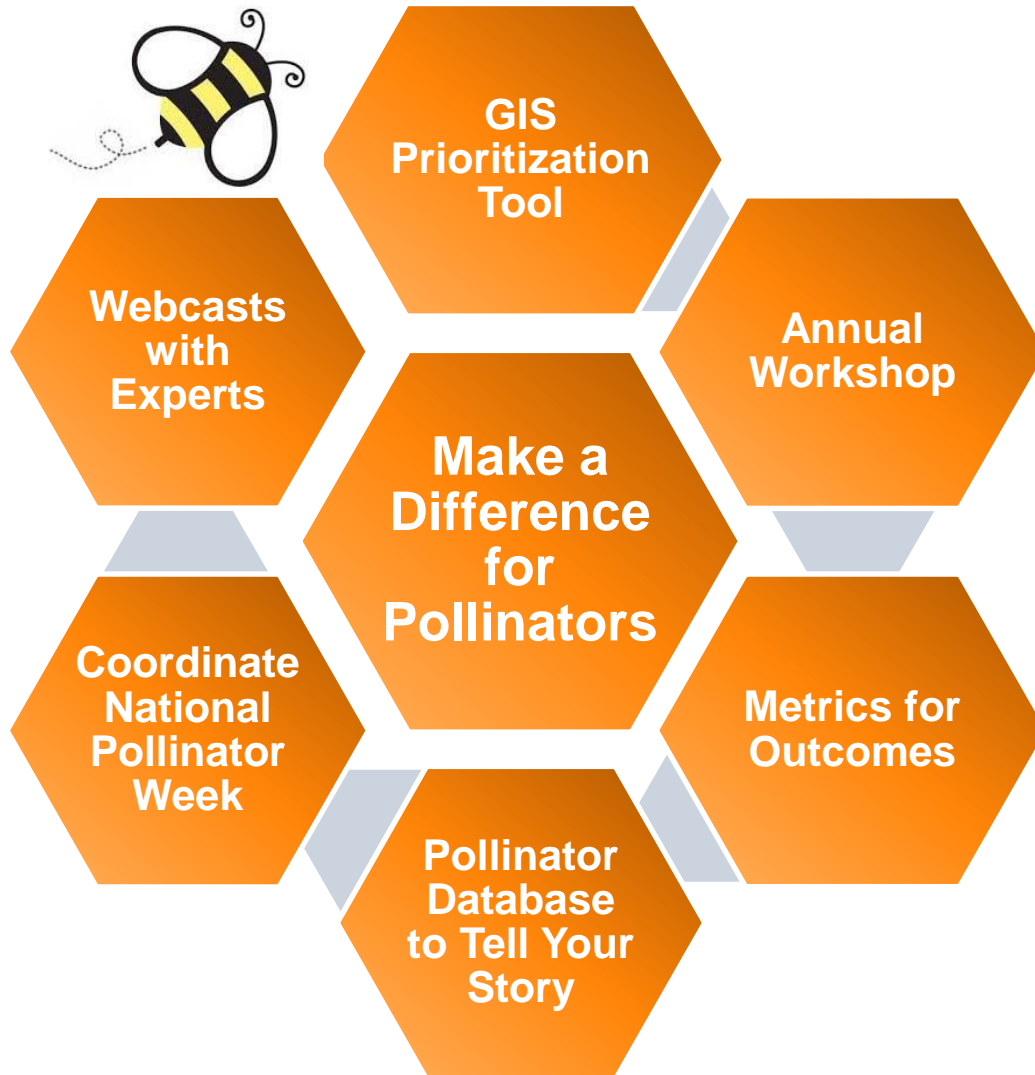
# New Hire: Dr. Ashley Bennett

- PhD in Entomology from the University of Wisconsin
- Postdoctoral research positions at University of Illinois and Michigan State University
- Recently: Urban IPM position at New Mexico State University
- Extensive pollinator knowledge





# Power-in-Pollinators Initiative



## Value

Hone in on high-value opportunities, develop shared tools, and identify industry-level collaborations that make a difference



**The first research forum designed for power companies and pollinators.**

# Power-in-Pollinators Initiative



EVERYTHING MATTERS

Portland General Electric



## OVERVIEW OF POWER COMPANIES AND POLLINATORS



Photo copyrighted by the Terra Society

June 2018



Overview of Power Companies and Pollinators

For financial, health, and cultural reasons, serious declines in pollinator populations are causing global alarm. Many electric power companies are concerned about the decline in pollinators and would like to understand more about pollinator science, conservation opportunities, and associated costs and risks. Through management of large real estate assets, there is ecological potential to enhance pollinator habitat through well-designed, ecologically meaningful, and cost-effective actions on property that power companies manage. This technical brief provides an overview of pollinators, considerations for power companies, and an introduction to conservation strategies.

### Importance of Pollinators

Pollination is movement of pollen within or between flowers of the same plant species and is critical for seed production, plant reproduction, and food growth. These services provided by pollinators are essential to human well-being and agricultural and ecosystem health. Thirty-five percent of global crop production is dependent on insect and animal pollinators, including 87 of the world's 124 most commonly cultivated crops (Klein et al. 2006). From the coffee you drink to start your day to the apple pie that wraps up dinner, an estimated one out of every three mouthfuls of food and drink that you consume comes from a pollinator-dependent crop. In addition to production of many fruits, vegetables, spices, nuts, and seeds, pollinators are also important to forage plants, such as alfalfa and clover, that provide feed for livestock. Many minerals, vitamins, and nutrients, such as vitamin C, calcium, and folic acid, which are needed to maintain human health, are found in crop plants that rely partially or fully on animal pollinators (Eilers et al. 2011). The value of crops directly dependent on pollination by insects (see Table 1 for examples) was estimated at \$15.1 billion annually in the United States, and the value of crops that indirectly rely on pollinators (such as alfalfa hay or onions, harvested crop yield of which is not reliant on pollination but pollinators are required in order to produce seed to grow the crop) was estimated at \$1.2 billion annually (Calderone 2012).

An estimated 85% of the world's flowering plants depend on animals—mostly insects—for pollination (Ollerton et al. 2011). In most terrestrial ecosystems, pollinators are a keystone group necessary for flowering-plant reproduction and important for wildlife food webs (Kearns et al. 1998; Summerville and Crist 2002). Fruits, seeds, and nuts—the result of animal pollination—are

Table 1. Examples of crops with yields dependant upon pollinators

Crop	Crop
Almond	Cocoa*
Apple	Coffee*
Avocado	Peach
Blueberry	Pumpkin
Canola	Watermelon
Cherry (tart and sweet)	Vanilla*

\*Crops grown outside the United States

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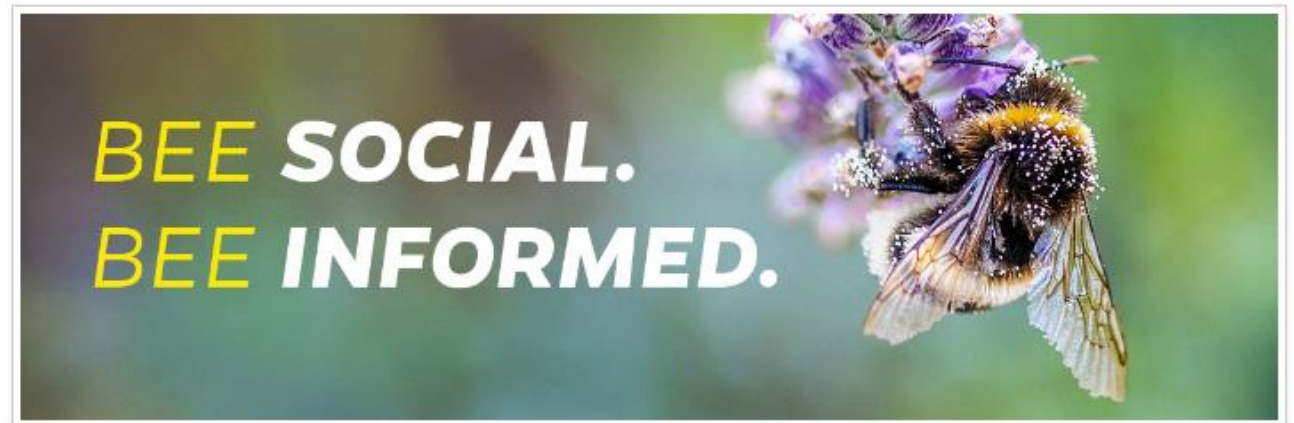


# EPRI Hosting Pollinator Mixer

- Monday, December 3  
6:00 PM – 8:00 PM  
Washington DC
- The Electric Power Research Institute ([EPRI](#)) [Power-in-Pollinator Initiative](#), the [National Ecosystem Services Partnership \(NESP\)](#), and the [United States Department of Agriculture \(USDA\)](#).
- *Don't get stung. Come to the fun!*



## Pollinator Workshop





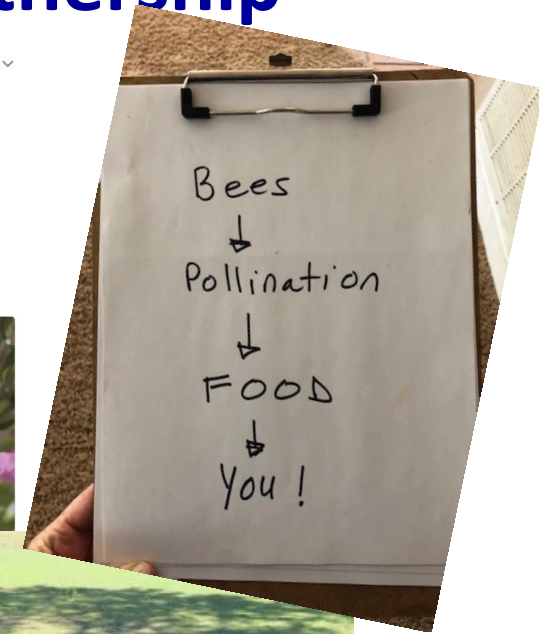
# National Pollinator Week with Pollinator Partnership

## #Power-in-Pollinators

- Impressions:
- Engagements:
- New Followers:
- Actively Reached:
- Total Reach:



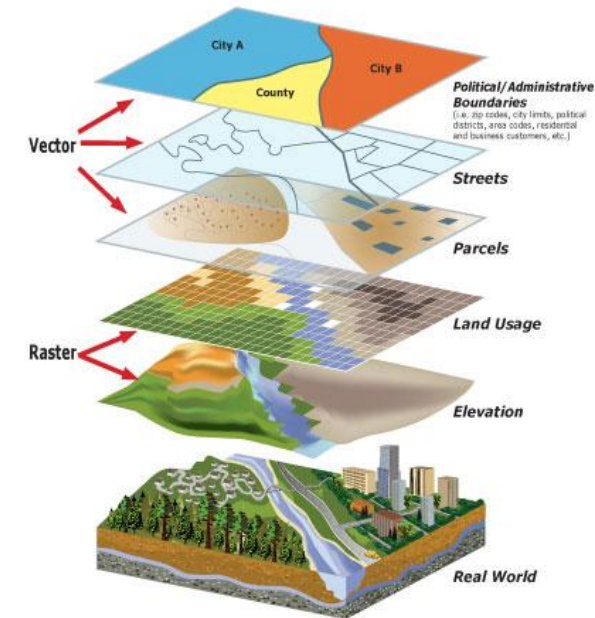
Join us for the [#PollinatorWeek](#) Live Twitter Chat next Thursday, June 21 at 12pm ET. Pollinator experts from [@xercesociety](#), [@Pollinators](#) and utilities across the nation will be answering your questions on why pollinators matter & what can be done to help them! [#PowerinPollinators](#)



# Wild Bee GIS Prioritization Tool

*“Where is the best place for me to do projects? A lot of my land is leased or on federal property.”* Power company manager

- Mapped-based approach to honing in on opportunities
- Land use, land ownership, species ranges, T&D lines.
- Identify *collaborative conservation*.
- Desk-top analysis, does not include site visits or field work.





# GIS Wild Bee Tool: Steps Completed

- Performed light literature search.
- Interviewed Experts
- Discussed User Needs
- Pilot Testing in 2018



## Modeling the status, trends, and impacts of wild bee abundance in the United States

Insu Koh<sup>a,1</sup>, Eric V. Lonsdorf<sup>a,2</sup>, Neal M. Williams<sup>c</sup>, Claire Brittain<sup>c</sup>, Rufus Isaacs<sup>d</sup>, Jason Gibbs<sup>d</sup>, and Taylor H. Ricketts<sup>a,\*</sup>

<sup>a</sup>Gund Institute for Ecological Economics, University of Vermont, Burlington, VT 05405; <sup>b</sup>Biology Department, Franklin and Marshall College, Lancaster, PA 17604; <sup>c</sup>Department of Entomology and Nematology, University of California, Davis, CA 95616; <sup>d</sup>Department of Entomology, Michigan State University, East Lansing, MI 48824; and <sup>e</sup>Rubenstein School of Environment and Natural Resources, University of Vermont, Burlington, VT 05405

Edited by May R. Berenbaum, University of Illinois at Urbana-Champaign, Urbana, IL, and approved November 20, 2015 (received for review September 4, 2015)

Wild bees are highly valuable pollinators. Along with managed honey bees, they provide a critical ecosystem service by ensuring stable pollination to agriculture and wild plant communities. Increasing concern about the welfare of both wild and managed pollinators, however, has prompted recent calls for national evaluation and action. Here, for the first time to our knowledge, we assess the status and trends of wild bees and their potential impacts on pollination services across the coterminous United States. We use a spatial habitat model, national land-cover data, and carefully quantified expert knowledge to estimate wild bee abundance and associated uncertainty. Between 2008 and 2013, modeled bee abundance declined across 23% of US land area. This decline was generally associated with conversion of natural habitats to row crops. We identify 139 counties where low bee abundances correspond to large areas of pollinator-dependent crops. These areas of mismatch between supply (wild bee abundance) and demand (cultivated area) for pollination comprise 39% of the pollinator-dependent crop area in the United States. Further, we find that the crops most highly dependent on pollinators tend to experience more severe mismatches between declining supply and increasing demand. These trends, should they continue, may increase costs for US farmers and may even destabilize crop production over time. National assessments such as this can help focus both scientific and political efforts to understand and sustain wild bees. As new information becomes available, repeated assessments can update findings, revise priorities, and track progress toward sustainable management of our nation's pollinators.

crop pollination | ecosystem services | habitat suitability | land-use change | uncertainty

**B**ees and other flower-visiting animals provide essential pollination services to many US crops (1) and to wild plant species (2). Bees contributed an estimated 11% of the nation's agricultural gross domestic product in 2009 (3), equal to \$14.6 billion per year (4). Of this, at least 20% (\$3.07 billion) is provided by wild pollinators that depend on suitable land for nesting and foraging (5). As the consumption of specialty fruit and vegetable crops has grown (6), the demand for pollination services has increased. However, the supply of managed honey bees (*Apis mellifera* L.) has not kept pace (7), due to management challenges and colony losses over the last decade (8). There is growing evidence that wild, unmanaged bees can provide effective pollination services where sufficient habitat exists to support their populations (9, 10). They can also contribute to the long-term stability of crop pollination, thereby reducing the risk of pollination deficits from variable supply or activity of honey bees (11, 12). As a result, wild pollinators should be integrated into crop pollination management plans as a supplement or alternative to managed bees (13).

Despite the agricultural importance of wild bees, there is increasing evidence that multiple species are declining in range or abundance. Some of the most important crop pollinators, such as bumble bees (*Bombus* spp.), have declined over past decades in the United States (14–16). Among the numerous threats to wild bees, including pesticide use, climate change, and disease (17), habitat loss seems to contribute to most observed declines (18).

Indeed, a National Research Council committee on the status of pollinators in North America reported that conserving and improving habitats for wild bees is important for ensuring continued pollination services and food security (19).

Recognizing both the growing need for pollination services and increasing threats to wild bees, a recent presidential memorandum called for a national assessment of the status of wild pollinators and available habitat in the United States (20). The resulting report sets a goal of 7 million acres of land for pollinators over the next 5 y (21). However, there has been no assessment at the national level of the current status of native pollinator habitat, where and at what rate this habitat is being degraded, and the impact of these changes on bee populations and the pollination services they provide.

A national assessment is challenging because plant–pollinator interactions and dynamics occur at relatively fine spatial scales. Wild bee populations are largely determined by the spatial distribution of habitat resources within their foraging range (22–24), and this varies from ~100–2,000 m (25, 26). Accordingly, most of our understanding of native bee populations is at the scale of landscapes and local sites. Several field-based assessments of habitat resources for native bee species have been developed at landscape scales (23, 27–29). However, the required cost and time to scale this type of field assessment to cover all habitat types and bee species nationwide is logistically challenging and prohibitively expensive.

When field observations are lacking, careful use of expert-derived data has been shown to provide informative estimates that enable habitat assessments (30, 31), including studies on

### Significance

In 2014, a presidential memorandum called for an assessment of the nation's pollinators, in response to growing awareness of their economic importance and recent declines. We assess, for the first time to our knowledge, the status and trends of wild bee abundance and their potential impacts on pollination services across the United States. We develop national maps of wild bee abundance, report land-use-driven changes over time, and relate them to trends in agricultural demand for pollination. We estimate uncertainty in the findings, so future research can target the least-understood regions and topics. Our findings can also help focus conservation efforts where declines in bee abundance are most certain, especially where agricultural demand for pollination services is growing.

Author contributions: I.K., E.V.L., N.M.W., C.B., R.I., J.G., and T.H.R. designed research; I.K., E.V.L., N.M.W., C.B., and T.H.R. performed research; I.K., E.V.L., and T.H.R. analyzed data; and I.K., E.V.L., N.M.W., C.B., R.I., J.G., and T.H.R. wrote the paper.

The authors declare no conflict of interest.

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Dr. Mogen's unpublished bee observation data has been deposited online at figshare.com/doi/10.6026/1.151586064041151.

\*To whom correspondence should be addressed. Email: tricketts@uvm.edu.

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www.pnas.org/cgi/doi/10.1073/pnas.1517685113

# Interviews

- Anne Neal and Megan Mehaffey – **U.S. EPA ORD**
- Dr. Rufus Isaacs and Yajun Zhang – **Michigan State University**
- Dr. Eric Lonsdorf – **University of Minnesota**
- Chris Nootenboom – **University of Minnesota**
- Dr. Insu Koh – **University of Vermont**
- Dr. Clint Otto – **U.S. Geological Survey**
- Neal Williams – **University of California, Davis**

MICHIGAN STATE  
UNIVERSITY



The University of Vermont



UCDAVIS

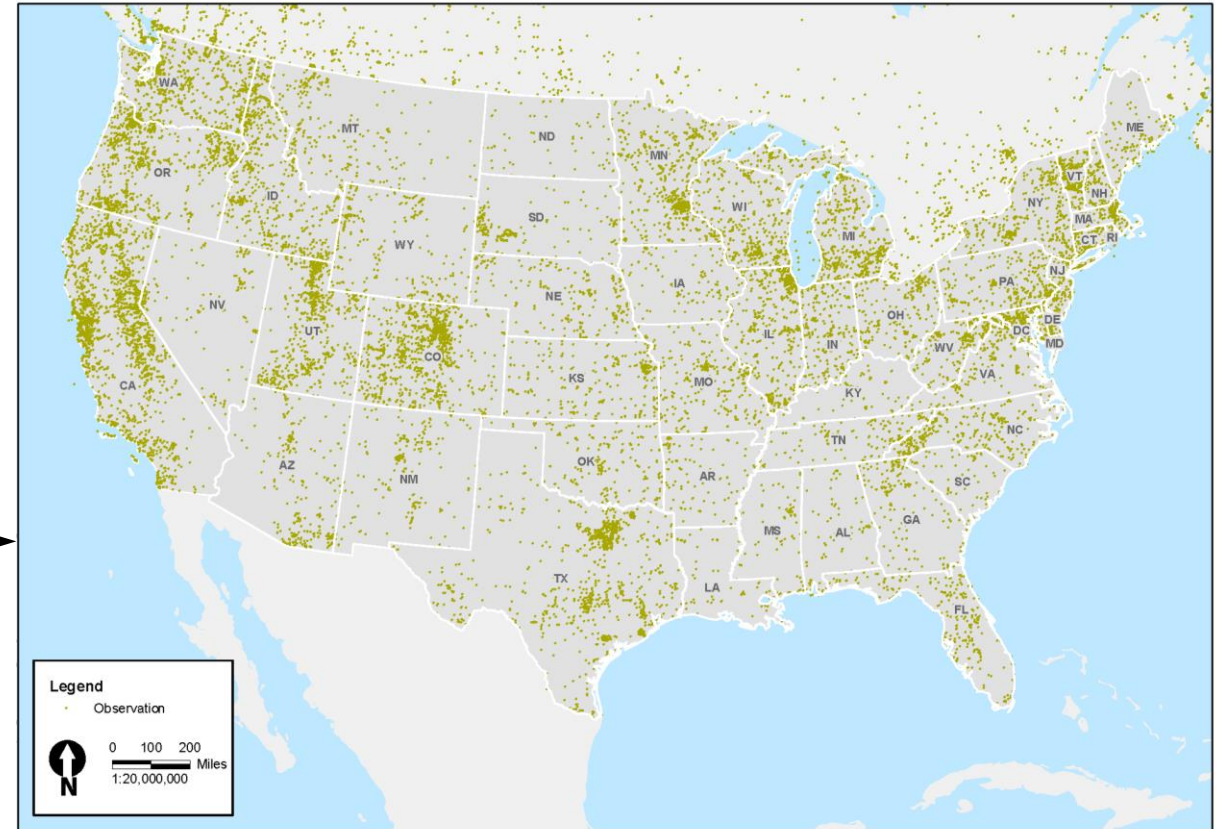


UNIVERSITY OF MINNESOTA



# Data/Models Reviewed

- EnviroAtlas
- InVEST Pollinator Model
- USGS Pollinator Library
- NatureServe Explorer
- USGS BISON



USGS BISON Observations for Bombus



# EPRI's Strategic Landholding Analysis **Now for Bees!**

## Surplus Lands

- Many companies own significant amounts
- Underutilized, accruing taxes
- Unknown risks, opportunities



Theoretical parcels

## Natural Resource Opportunities

- Cost-effective internal mitigation
- Support community initiatives
- Tax savings from eco-asset valuation of property



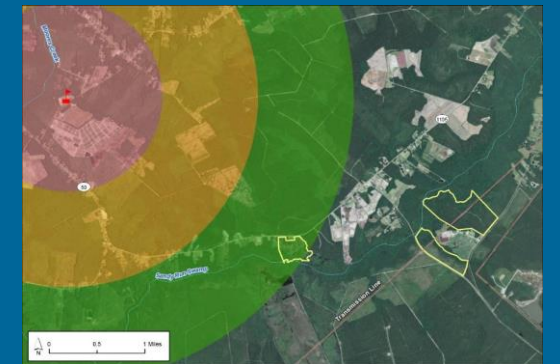
Identification of Potential Species Mitigation

## Apply Geographic Information Systems

### Gather data



### Apply to analysis





# Pollinator Metrics Database

Reference Database for Pollinator Metrics

- Goals & Scorecards
- Track progress
- Guide investments

January 2019 Release

Preview:

1. 100+ Metrics, 60+ Citations
2. Purpose & Issue: Pollinator Community, Habitat, Communication, Planning.
3. Level of human effort to use metric
4. A-Z Metric mapping: Land use, “pollinator” type, State, citation/use
5. Direct vs Indirect Measure



Purpose	Priority Issue
Pollinator Habitat: assessing, improving, or monitoring pollinator habitat	Habitat Quality
	Habitat Quantity
	Invasive Species
	Native Status
	Diversity
	Nesting Habitat
	Create and Manage
	Pesticide Use
	Climate Change Resiliency

# EPRI Monarch Research



## Clarify Nexus with Power Companies

- Causes of monarch decline
- How can power companies help?

## Understand Conservation Actions

- Based on asset type, what action is feasible?
- Planting, mowing, burning, restoration, etc.
- Identify the best conservation opportunities

## Support Monarch

- US Fish and Wildlife Services needs information.
- Avoid assumptions about conservation potential.



# Approach: Monarch Conservation Actions Research

Final Draft: Jan 30, 2019

Published: Feb 28, 2019

**Step 1:** Work with Xerces Society to develop Science-based report on POSSIBLE monarch conservation actions. With Expert Survey

**Step 2:** Overlay reality and current extent of implementing conservation actions.  
EPRI member Survey & Interviews



## EPRI Member Survey Data Collection Worksheet: Monarch Conservation Actions

### Instructions

This data collection worksheet is provided as a convenience to capture information that will ultimately be entered into the on-line survey. EPRI will provide a link to the on-line survey separately.

ONE RESPONSE PER COMPANY.

DEADLINE FOR ENTRY TO ON-LINE SURVEY: TUESDAY OCTOBER 2, 2018.

**Illuminate the assumed role of power companies in Monarch conservation.**

# EPRI Technology Innovation Grant: Monarch Remote Sensing

**NEW!**

- Problem: Cataloging current monarch habitat
- Solution: Use landscape-scale imagery to identify milkweed.
- Approach: Machine Learning to use nationally abundant near real-time 0.3-2m imagery data to identify milkweed.

Year 1 (2019): Analyze imagery, proper timing, train software.

Year 2 (2020): Apply algorithm to power company land & Validate.

Year 3 (2021): Release software

Lead: Christian Newman, EPRI



# Field Studies: Protecting and Promoting Pollinators on Electric Utility Lands

- Multi-year field research projects
- Observational studies to document plant and pollinator assemblages
- Manipulative studies to document vegetative and pollinator response to mechanical and chemical treatments



New York Power Authority

First Energy

Southern Company

Others



August 29, 2018

## Nation's 1st Pollinator-Friendly Right-of-Way Solar Project Moves Forward in Georgia

*The Georgia Public Service Commission (Georgia PSC) has authorized funding for Georgia Power to construct, own and operate a one-megawatt solar array on Georgia Department of Transportation (Georgia DOT) property at Exit 14 off Interstate 85, which is known as **"The Ray."** Georgia will be the third state in the nation to utilize the grassy shoulder of an interstate highway, called the "right-of-way" (ROW), to generate solar energy. This unique project will pilot the use of native flowering plants as ground cover in test plots within the solar array, making Georgia the first in the nation to pilot pollinator-friendly, right-of-way solar.*



# EPRI 2019 Pollinator Workshop Save-the-Date

**THEME: Human Wellbeing, Pollinators, and Power Companies**

*When:* March 27-28  
(Funders-only March 29<sup>th</sup>)

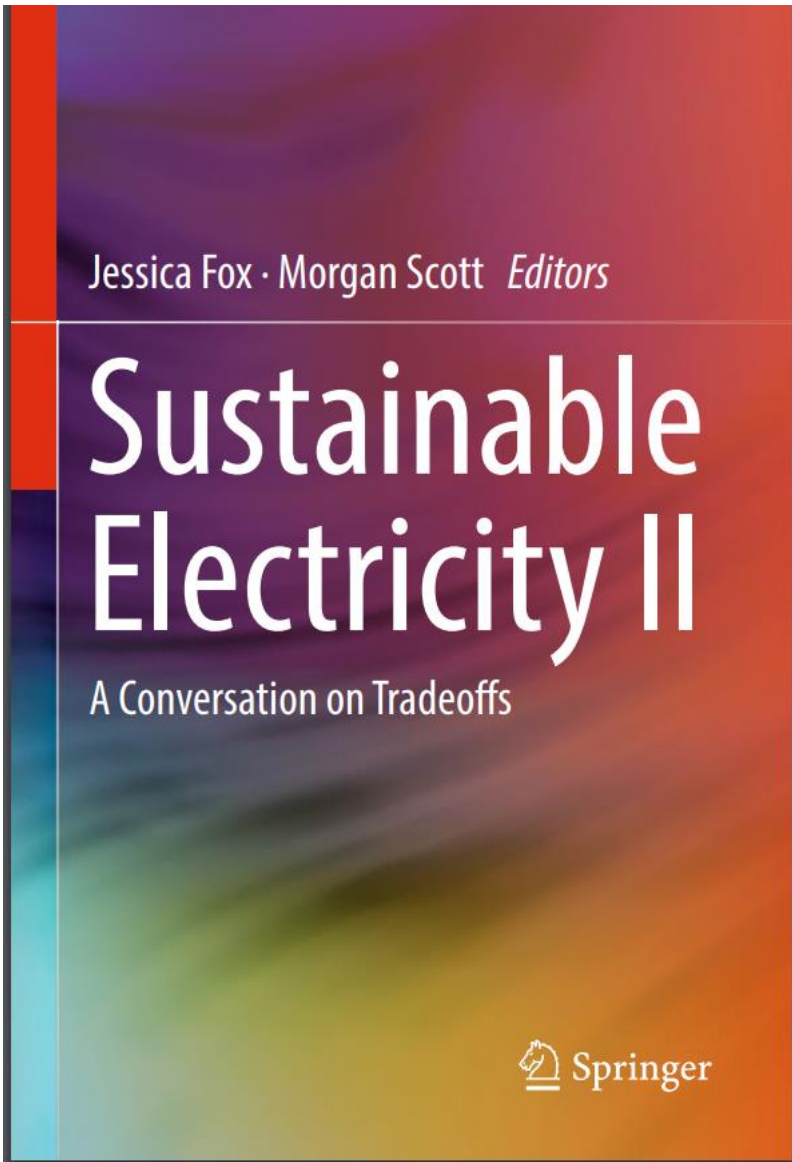
*Where:* Sacramento, CA

*Speakers:* U.C. Davis, U. Minnesota, CA Almond Board, USDA, EPA, and others.

EPRI-Xerces Field Trip!  
Almonds, Managed Bees,  
Monarch site, ROWs.



# NEW BOOK: Sustainable Electricity II: A Conversation on Tradeoffs



What happens when you cannot win?

- 40 contributing authors
  - **Google, Stanford, Facebook**
  - **Responsible Investor**
  - **Regulator**
  - **Power Companies**
  - **Environmentalist**
  - **Generation Z (Forward)**



## Print Release Nov 2018





# Together...Shaping the Future of Electricity