The background of the slide is a photograph of a landscape at sunset or sunrise. The sky is filled with horizontal bands of orange, yellow, and blue clouds. Below the sky, a dark silhouette of a mountain range is visible. In the foreground, there is a dark, calm body of water reflecting the light from the sky.

ESA P-IE Section Symposium: Broadening the Horizons for Pollination of U.S. Specialty Crops

Organized by Cory Stanley-Stahr & Theresa Pitts-Singer

Portland, Oregon
November 18, 2014

Integrated Crop Pollination: From Concept to Reality



Theresa Pitts-Singer





United States Department of Agriculture
National Institute of Food and Agriculture

Specialty Crops Research Initiative Coordinated Agricultural Project



***“Developing Sustainable Pollination Strategies
for U.S. Specialty Crops” 2013-2018***



Project Director:

Rufus Isaacs: Berry Crops Entomology Extension Specialist,
Michigan State University

Co-Project Directors:

Neal Williams: University of California Davis, Dept. Entomology

Theresa Pitts-Singer: USDA-ARS Pollinating Insects Research Unit

Mace Vaughan: The Xerces Society

Kelly Garbach: Loyola University Chicago, Environmental Science Dept

Taylor Ricketts: University of Vermont, Mapping Pollination
Services, Gund Institute for Ecological Economics

Eric Lonsdorf: Franklin & Marshall College, Biology Department

Co-Principal Investigators & Postdocs:

> 20 people

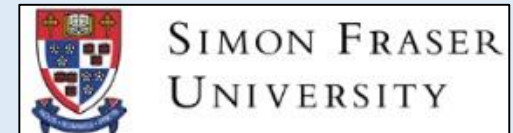
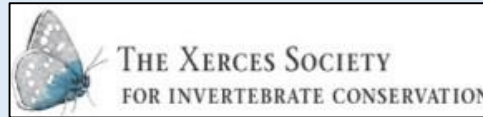


Planning Meeting in January 2013 University of Florida, Gainesville



Webinar 2014; University of California Davis 2015

Project Team Affiliations



Advisory Committee Affiliations



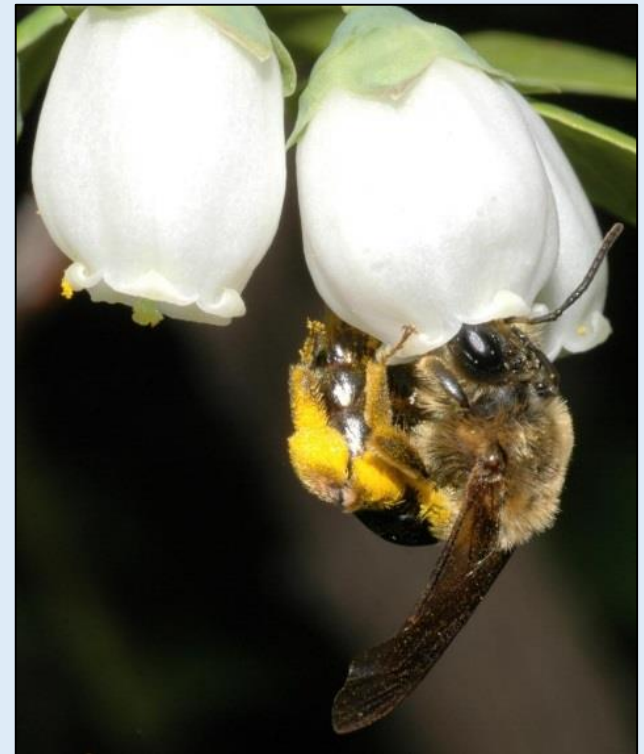
Stakeholder Need and Long Term Goals

Conventional Ag Systems

Responding to pollinator declines and increasing need for crop pollination:

integrates **entomology, pollination biology, sociology, economics, and extension approaches** to address priority issues of **specialty crop pollination identified from commodity groups, surveys, and grant team.**

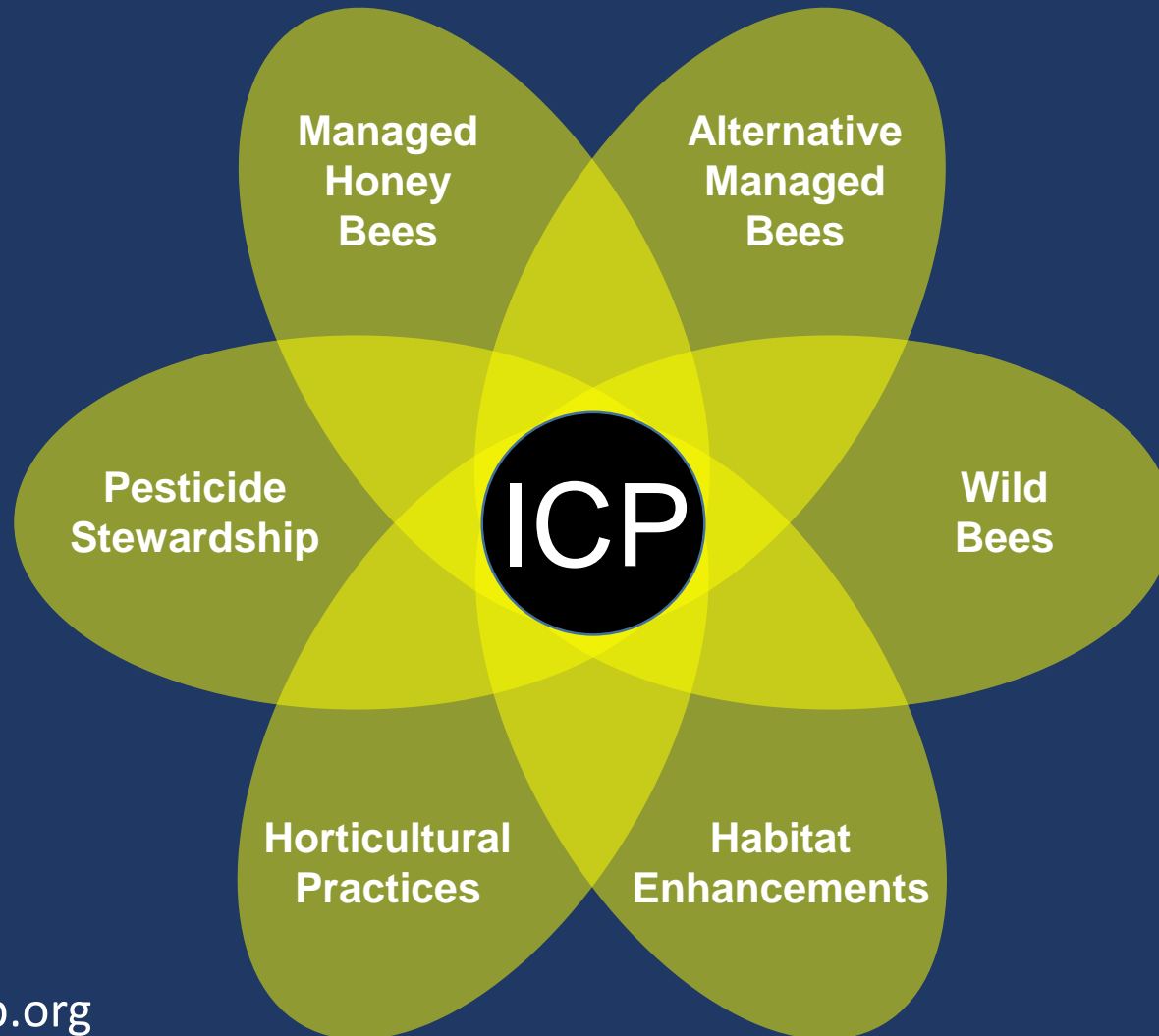
Develop region- and crop-specific **Integrated Crop Pollination (ICP)** management approaches to diversify pollination sources and maintain consistent crop yields.



Integrated Crop Pollination



The combined use of different pollinator species, habitat augmentation, and management practices to provide reliable and economical pollination of crops.



Outreach Plan

Surveys, interviews, and workshops are used to engage with diverse communities:

growers, extension, professionals, and researchers.

Focus on:

**the value of pollination;
habitat enhancements;
and alternative managed bees:**

- inform stakeholders regarding the **costs and returns of different pollinator options and pollination practices** to increase farm profit and crop yield reliability.

Education and outreach uses **communication pathways to integrate ICP strategies** into crop production approaches and cooperative extension initiatives.



Potential Benefits

Support long-term sustainability of U.S. specialty crop agriculture by increasing growers' ability to better manage pollinators for improved yield.

Recommendations on **manipulating farm landscapes to support bee populations.**

Lead to **greater farmer involvement in USDA-funded pollinator support programs,** and help **train a new generation** of research, extension, and consultants for future crop pollination challenges.





Project Objectives

1. Identify economically-important wild pollinators and factors affecting their abundance.
2. Evaluate habitat management practices to improve crop pollination.
3. Determine performance of alternative managed bees as specialty crop pollinators.
4. Deliver ICP practices for specialty crop producers.
5. Determine optimal methods for ICP information delivery and measure ICP adoption.
6. Develop predictive models to determine where and when ICP practices provide economic return.



Specialty Crops: fruits and vegetables, tree nuts, dried fruits, and horticulture and nursery crops, including floriculture, that are intensively cultivated.

Cucurbits:

Watermelon (California & Florida)

Pumpkin (Pennsylvania)

Berries:

Blueberry (Oregon, Michigan,
& British Columbia)

Raspberry (Oregon)

Tree crops:

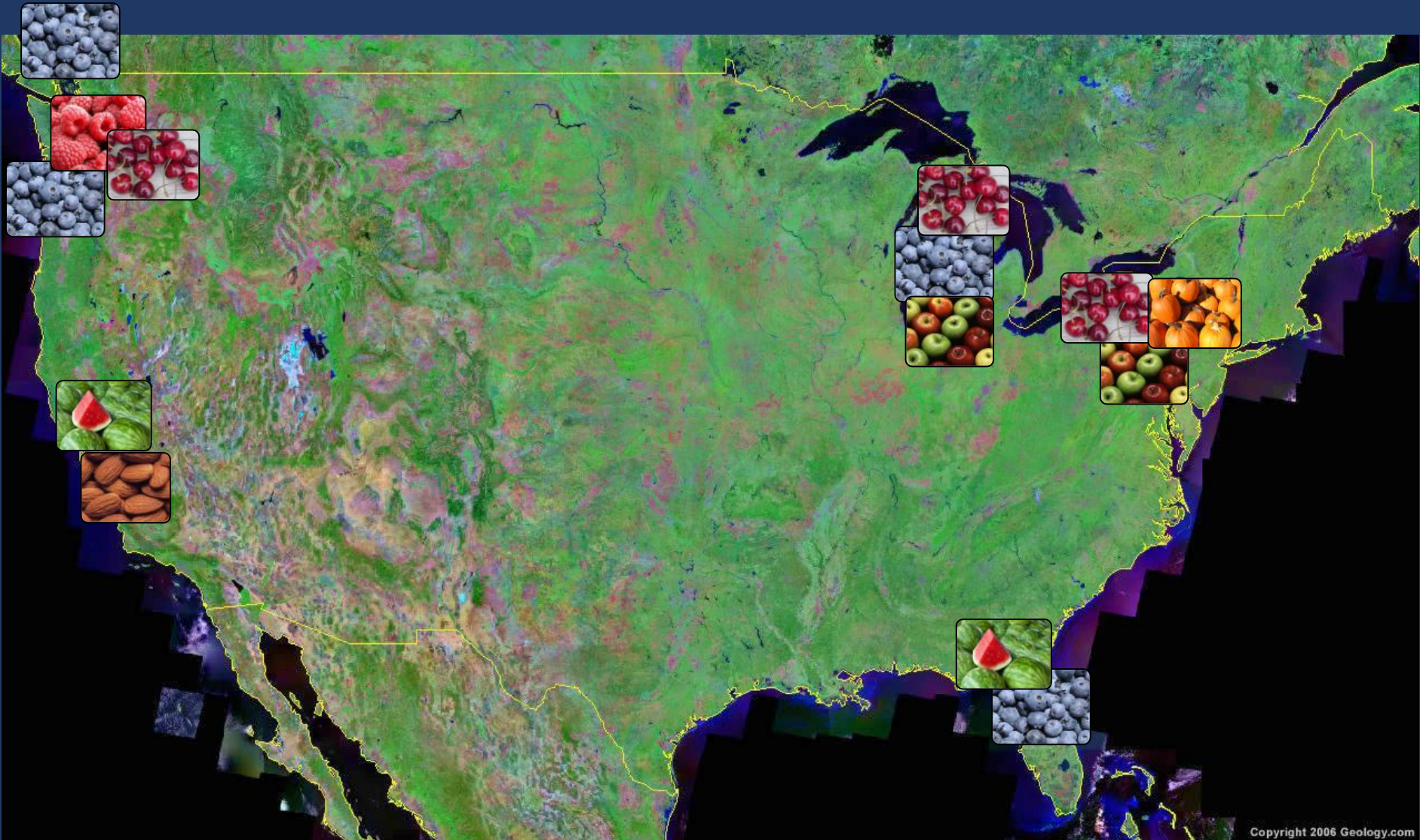
Almond (California)

Cherry (Michigan & Pennsylvania)

Apple (Pennsylvania & Washington)



Project ICP Sites



Continuum of Pollinator Needs for Specialty Crops

unmanaged natives

managed bees optional

managed bees only



General Timeline

2013: Identify sites; data gathering begins; survey and outreach development

2014: Data gathering; begin some manipulations; explore models; dispense prelim surveys



2015: Data gathering; more manipulation on additional sites; model development; survey distribution

2016: More data on manipulations; set-up demonstration sites; models and surveys

2017: Last data collection year; demonstration sites; deliverables

What has been accomplished to date?
Fall 2012 - Fall 2014



Objective 1. Identify economically-important wild pollinators and factors affecting their abundance.

- > 140 agricultural fields/orchards sampled.
- Bees and other pollinators sampled, visitors recorded, non-crop floral resources assessed, crop yield and management intensity measured.
- Land use data compiled for areas surrounding sites, using aerial maps.
- In 2014, some sampled sites were modified for Objs. 2 and 3; others remain controls.
- Online specimen database for specimen records and site information.



Symposium Talks Related to Objective 1

*Identify economically-important wild pollinators
and factors affecting their abundance.*

[Inventory of bees on the farm](#)

Jason Gibbs, Michigan State Univ.

[Choosing where to enhance habitat for pollinators on farms](#)

Claire Brittain, Univ. California

[Contributions of managed & wild bumble bees to blueberry pollination](#)

Elizabeth Elle, Simon Fraser Univ.

[Pumpkin pollinators on small diversified farms](#)

Sheena Sidhu, Univ. California

Objective 2. Evaluate farm and habitat management practices for enhancing specialty crop pollination.

- 2013: established habitat plantings CA watermelon, MI blueberry & cherry, and PA apple.
- 2014: established habitat plantings CA almond & FL watermelon.
- 2014: monitored habitat sites/paired controls for bees & plant establishment.
- Establishment success varied.
- Developing strategies for site management:
 - mowing, solarizing with plastic, herbicide sprays.



Symposium Talk Related to Objective 2

Evaluate habitat management practices to improve crop pollination.

[Challenges of adding forage for bees in cucurbit crops](#)

***Kristal Watrous, Penn State Univ.; Mark Otieno, Penn State Univ.;
Sheena Sidhu, Univ. California; Cory Stanley-Stahr, Univ.
Florida; Rachael Troyer, Penn State Univ.; Shelby Fleischer, Penn
State Univ.***

Objective 3. Determine performance of alternative managed bees as specialty crop pollinators.

- 2013 & 2014: *Osmia lignaria* used in CA almonds. Bee and nut yield collected to compare with nut yield from controls using only honey bees.
- 2014: *O. cornifrons* used for pollination in MI cherry and PA apple. Data as above.
- 2013: *O. aglaia*, 2014: both *O. aglaia* and *O. lignaria* released near raspberry fields.
Bee reproduction data collected.
- 2014: *Bombus impatiens* used in MI & FL blueberry fields and in FL watermelon fields.
Western *Bombus* spp. used in BC blueberry field trails.
 - Collected bumble bee colony and crop yield data for comparison with control fields.



Symposium Talks Related to Objective 3

Determine performance of alternative managed bees as specialty crop pollinators.

[Use of non-*Apis* managed pollinators](#)

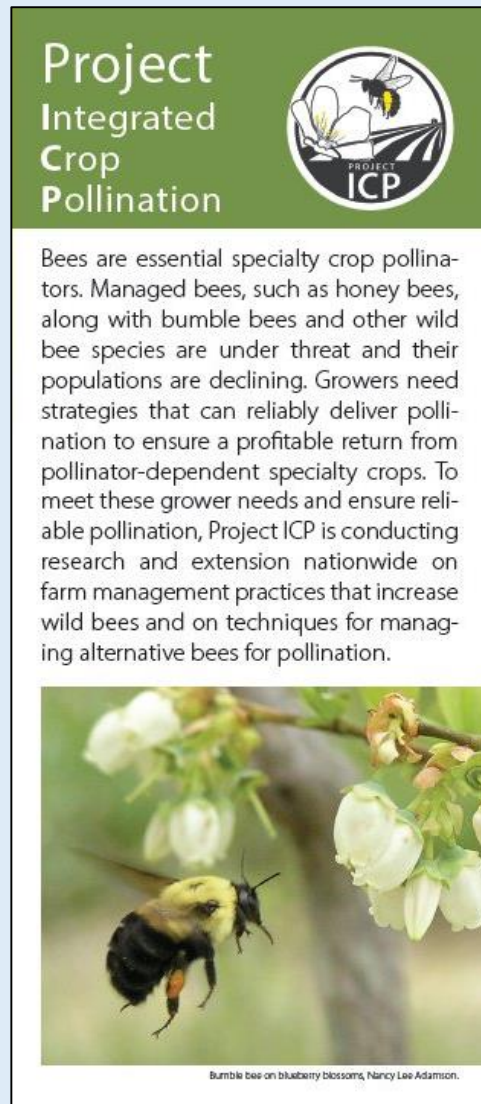
Cory Stanley-Stahr, Univ. Florida

[Mixing it up: Using blue orchard bees as supplemental pollinators to honey bees for almond pollination](#)

Derek Artz, USDA ARS Pollinating Insects Research Unit

Objective 4. Demonstrate and deliver ICP strategies for specialty crops.

- Developed project logo a brochure.
- Distributed the brochure at grower meetings and at short courses.
- Worked with restoration and conservation agency partners to develop protocols for bee habitat establishment.
- Developed a 2013 project newsletter.
- Prepared articles for national trade magazines; emailed to 200 subscribers.
- Hired a full-time outreach & extension specialist.
- Project ICP website (icpbees.org) updated and more info being added.



Symposium Talks Related to Objective 4

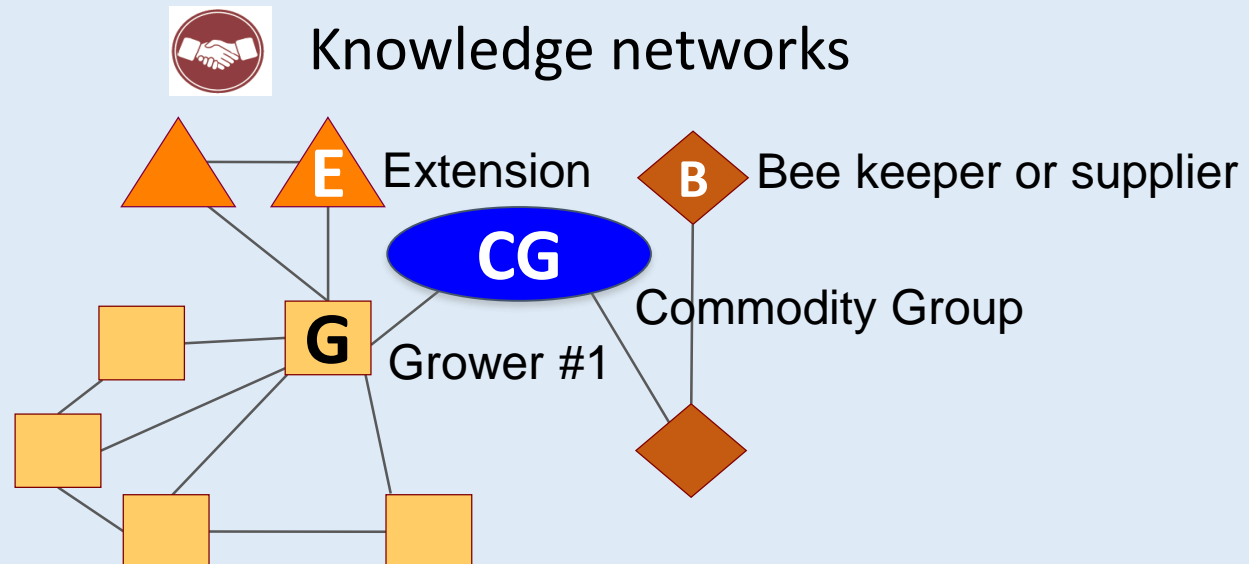
Demonstrate and deliver ICP strategies for specialty crops.

[Outreach for Project ICP: Face-to-face to Facebook](#)

***Jennifer Hopwood**, Mace Vaughan; The Xerces
Society for Invertebrate Conservation*

Objective 5. Determine optimal methods for ICP information delivery and measure ICP adoption.

- Test ICP grower survey was written, delivered, and proven effective.
- Created agreement with the NASS to distribute the survey in FL, MI, CA, and OR.
- Survey will go to growers of almonds, apples, blueberry, cherry, raspberry, and watermelon.
- Survey will be distributed to ~3,000 farmers in fall 2014. Primary distribution by phone; data will be entered at NASS call centers.



Symposium Talk Related to Objective 5

Determine optimal methods for ICP information delivery and measure ICP adoption.

Using communication networks to support management innovations & integrated crop pollination

Kelly Garbach, Loyola University

Objective 6. Modeling and economics of pollination services.

- Goals of current analyses are to:
 - 1) assess current pollinator supply to pollinator-dependent U.S. crops;
 - 2) assess changes in supply of pollinators;
 - 3) determine where research is most needed to improve pollination management.
- Working to improve analysis of the landscape around farms to determine how landscapes improvement could ensure pollinator supply.
- Working to improve ability to assess potential benefits of adding floral resources within farms.



Derek Artz strikes a dreamy pose
among CA almond bloom

Symposium Talk Related to Objective 6

Modeling and economics of pollination services.

Status, trends, and uncertainty assessment of native
bee habitat across the conterminous United States

Insu Koh, University of Vermont



And now....on with the SHOW!