STONE ENVIRONMENTAL



Native Bees: Ecology, Distribution, and Declines

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Native bees

- 1. Patterns of diversity and distribution in North America
- 2. Declines and conservation
- 3. Sensitive bee species and transportation infrastructure



Native bees

•20,000 species of bees (> 4,000 in North America)
•Crop pollinators, whether honey bees used or not
•Some: declines in diversity, abundance, range size



Pollination is critical to agriculture

88% of flowering plants are animal pollinated75% of crop plants benefit from pollinationPollination = 10% of total value of agriculture



Are bees in trouble?

- •Widespread reports of decline—and persistence
- •Trends hard to detect



Parallel Declines in Pollinators and Insect-Pollinated Plants in Britain and the Netherlands

J. C. Biesmeijer,^{1*} S. P. M. Roberts,² M. Reemer,³ R. Ohlemüller,⁴ M. Edwards,⁵ T. Peeters,³ A. P. Schaffers,⁷ S. G. Potts,² R. Kleukers,³ C. D. Thomas,⁴ J. Settele,⁸ W. E. Kumin⁴

Bees and Colory Collapse - NYTimes.com

Ehe New Hork Eimes http://nyti.ms/1yjqLQb

THE OPINION PAGES | OP-ED CONTRIBUTOR | NYT NOW

Our Bees, Ourselves Bees and Colony Collapse

By MARK WINSTON JULY 14, 2014

VANCOUVER, British Columbia - AROUND the world, honey are dving in huge numbers: About one-third of hives collapse pattern going back a decade. For bees and the plants they polli well as for beekeepers, farmers, honey lovers and everyone else appreciates this marvelous social insect - this is a catastrophe

Cell Global pollinator declines: trends. impacts and drivers Simon G. Potts¹, Jacobus C. Biesmeijer², Clair

Review



Bee Die-Off Soars, Putting Crops at Risk By MICHAEL WINES

A mysterious malady seems to have expanded drastically in the past year, wiping out as many as half of the beehives needed to pollinate much of America's produce.

Patterns of widespread decline in North American bumble bees

Sydney A. Cameron^{a,1}, Jeffrey D. Lozier^a, James P. Strange^b, Jonathan B. Koch^{b,c}, Nils Cordes^{a,2}, Leellen F. Solter^d, and Terry L. Griswold^b

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Edited* by Gene E. Robinson, University of Illinois, Urbana, IL, and approved November 24, 2010 (received for review October 3, 2010)

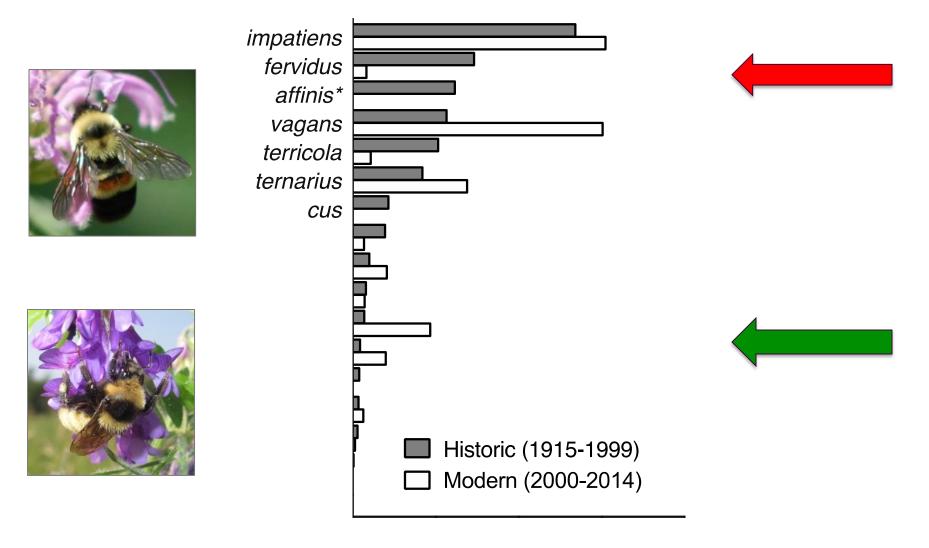
hele bees (Bombus) are vitally important pollinators of wild study in the United States identified lower genetic diversity

Sam Droege, USFWS



Bumble bee declines in Vermont

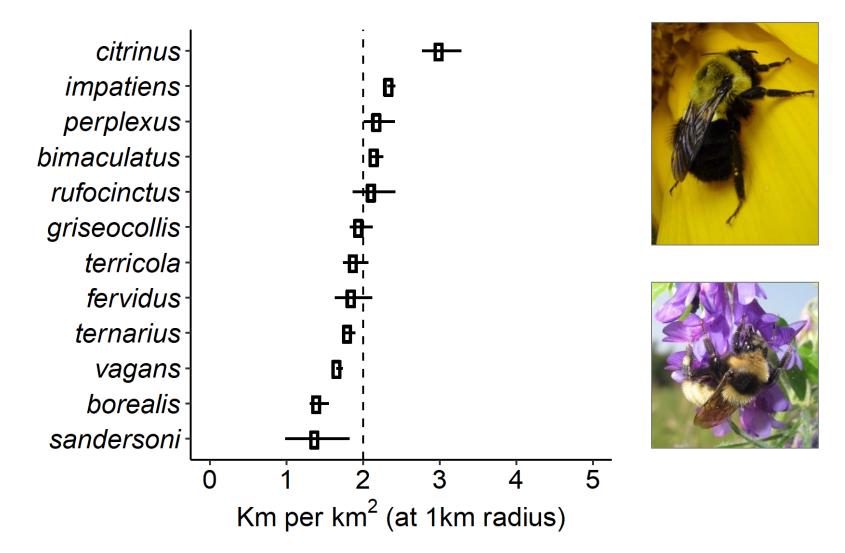
•Changes in bumble bee species abundance, distribution



Relative abundance

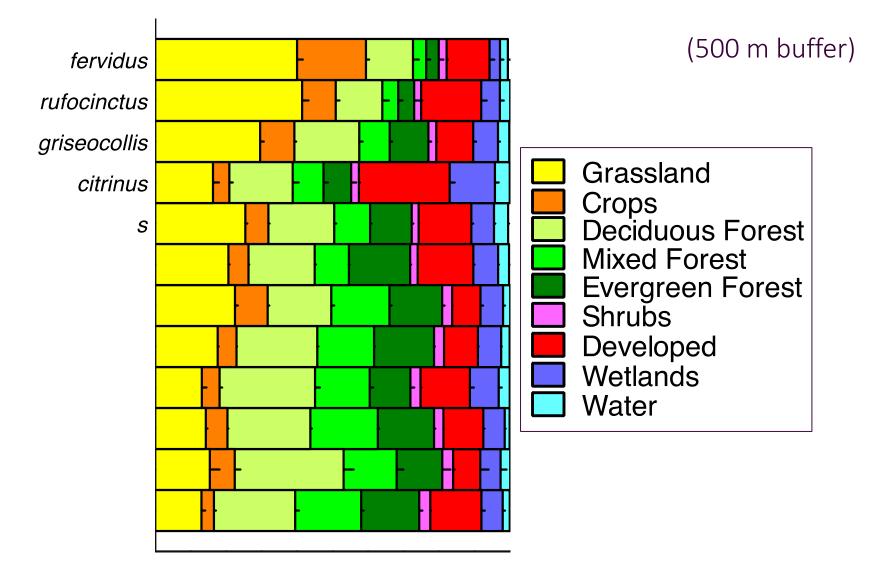
Transportation infrastructure

•Road density correlated with bee species occurrence



Richardson et al. in review

Effect of landscape on bee occurrence



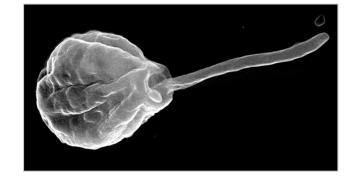
% of land cover

Richardson et al. in review

Why are bees declining?

- •Habitat loss
- •Disease
- •Pesticides
- •Climate change

Agriculture



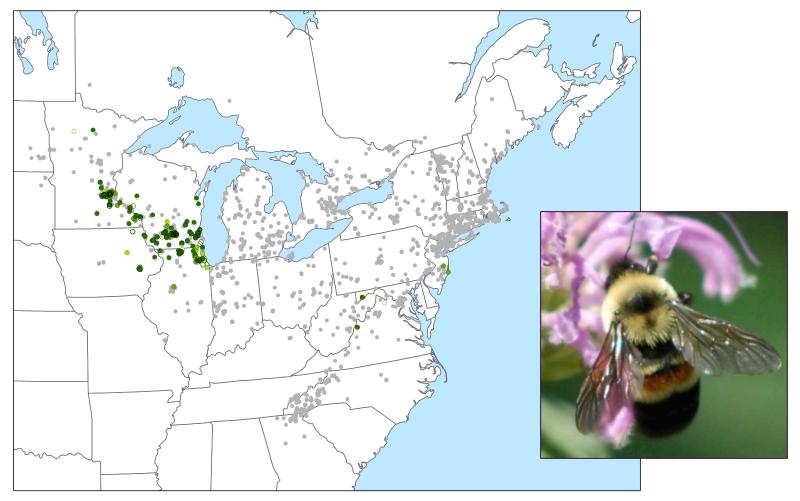




Monitoring for a rare bumble bee in transportation

•Rusty-patched bumble bee (*Bombus affinis*)

•Distribution: eastern North America, with many historical (gray) and few recent (green) observations

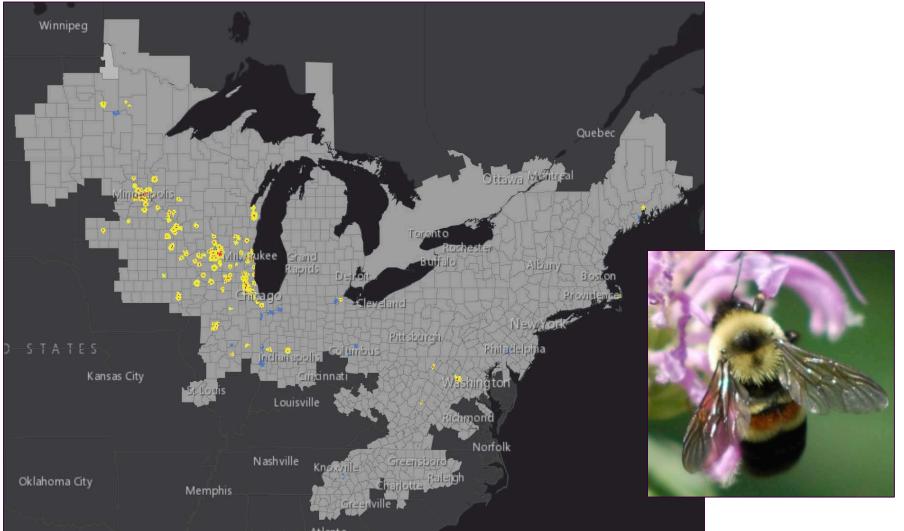


Stone Environmental



Rusty-patched bumble bee

Listed by USFWS as endangered in 2017 Management focus: "High Potential Zones" (yellow/red)



USFWS

Rusty-Patched Bumble Bee: still found in MA?



Tetra Tech; MDOT; Stone Environmental

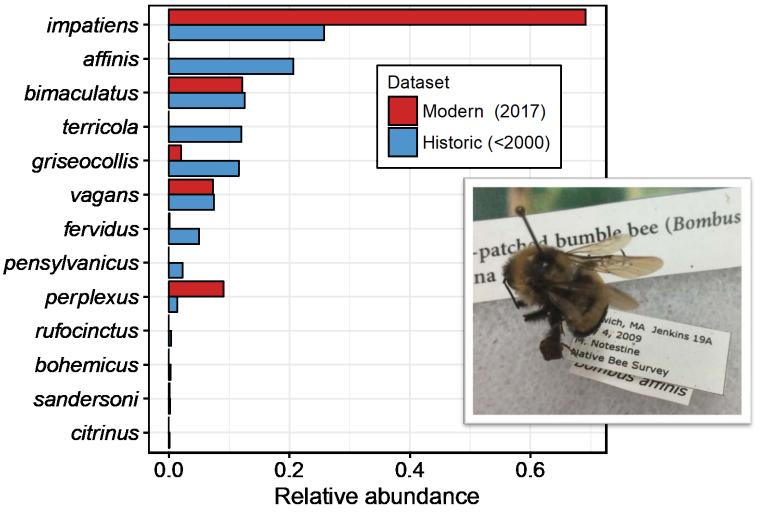


Rusty-Patched Bumble Bee: still found in MA?



Results

- Rusty-patched bumble bee extirpated (?) from Massachusetts
- Declines of other species



Stone Environmental unpublished; photo: L. Richardson





Thank you

For more information / www.stone-env.com Contact / leif@stone-env.com