



STONE ENVIRONMENTAL



Native Bees: Ecology, Distribution, and Declines

Leif Richardson

Stone Environmental, Inc., Montpelier, VT

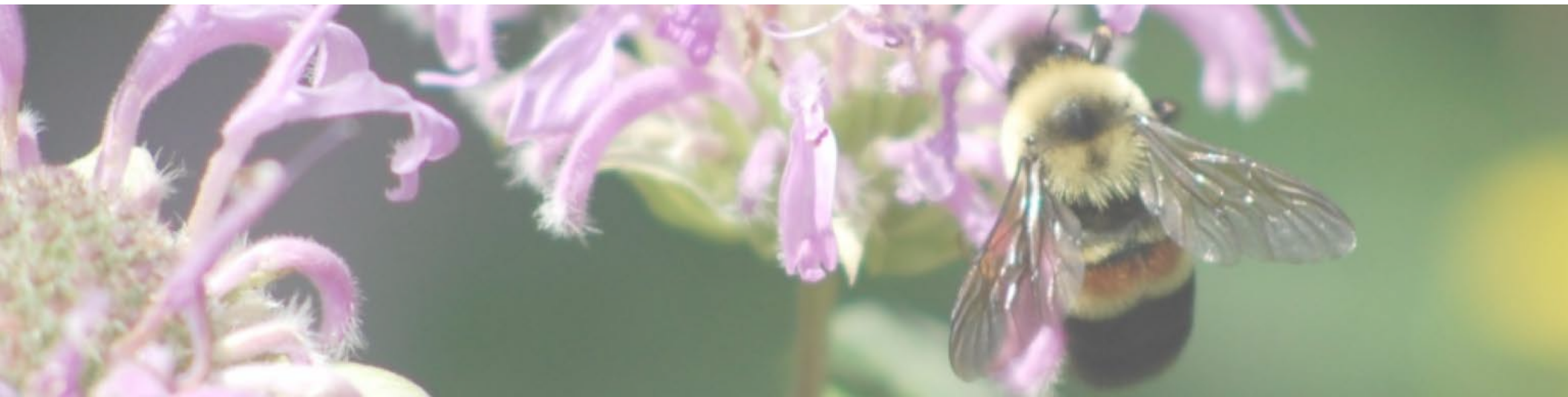
leif@stone-env.com / @leifr7

September 10, 2018

Northeastern Transportation and Wildlife Conference

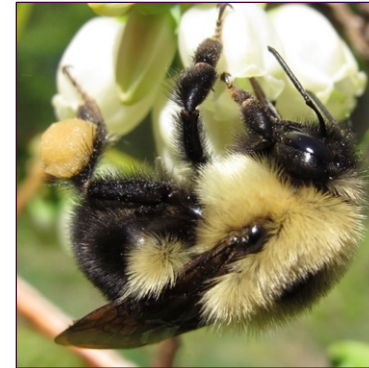
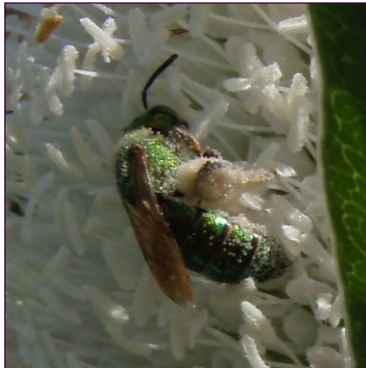
Native bees

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 pollinated

75% of crop plants benefit from pollination

Pollination = 10% of total value of agriculture



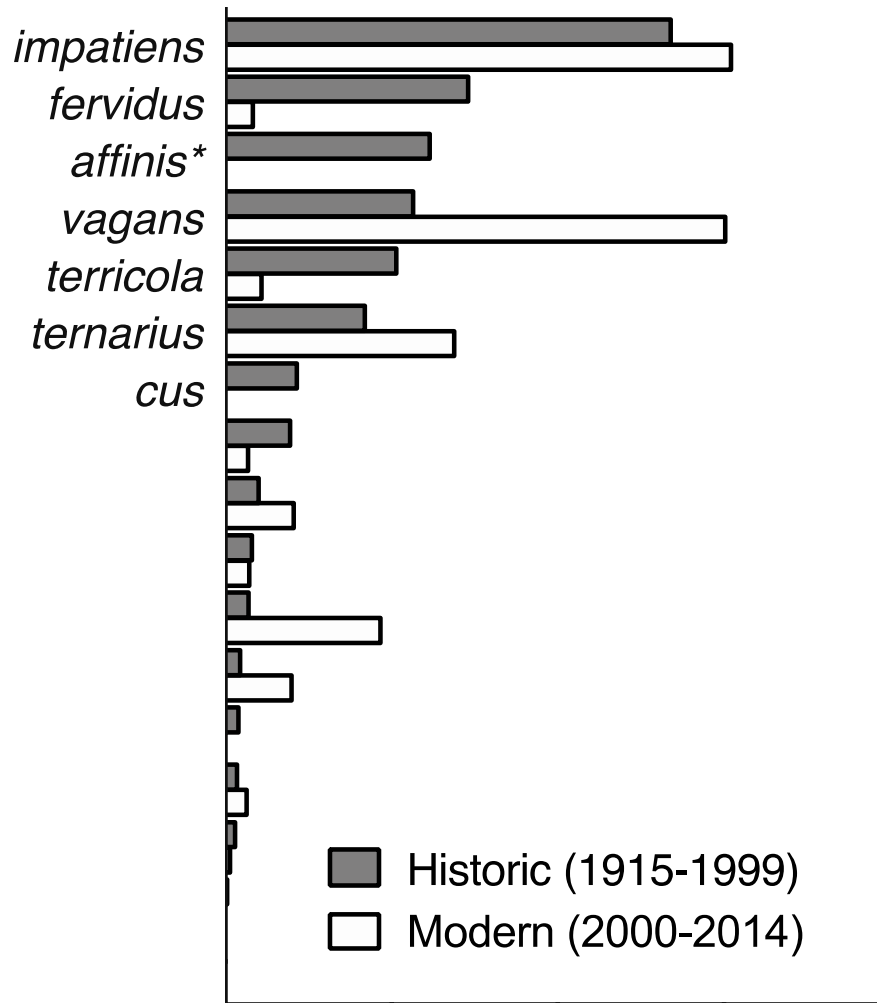
Are bees in trouble?

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



Bumble bee declines in Vermont

- Changes in bumble bee species abundance, distribution

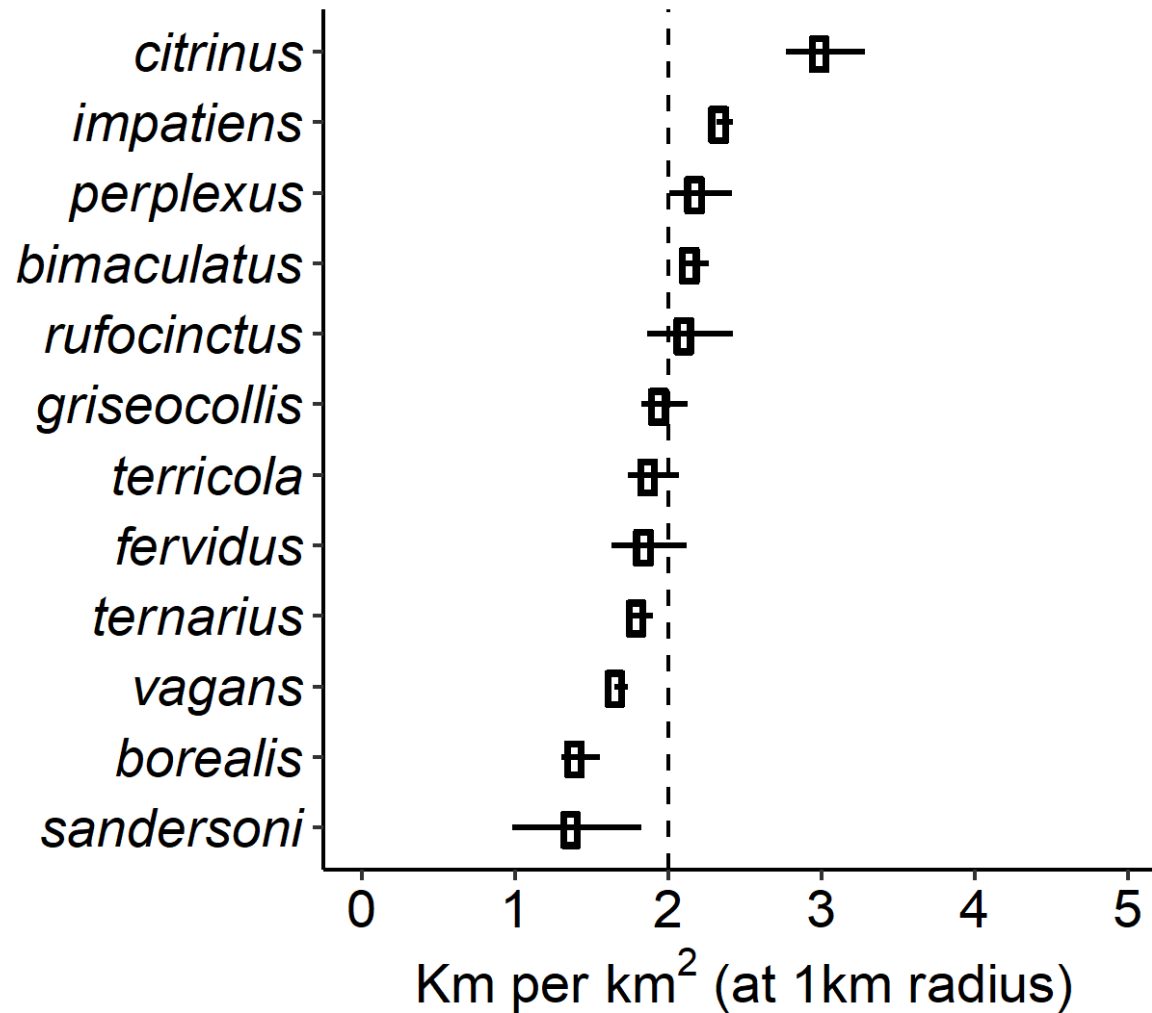


Relative abundance

Richardson et al. *in review*

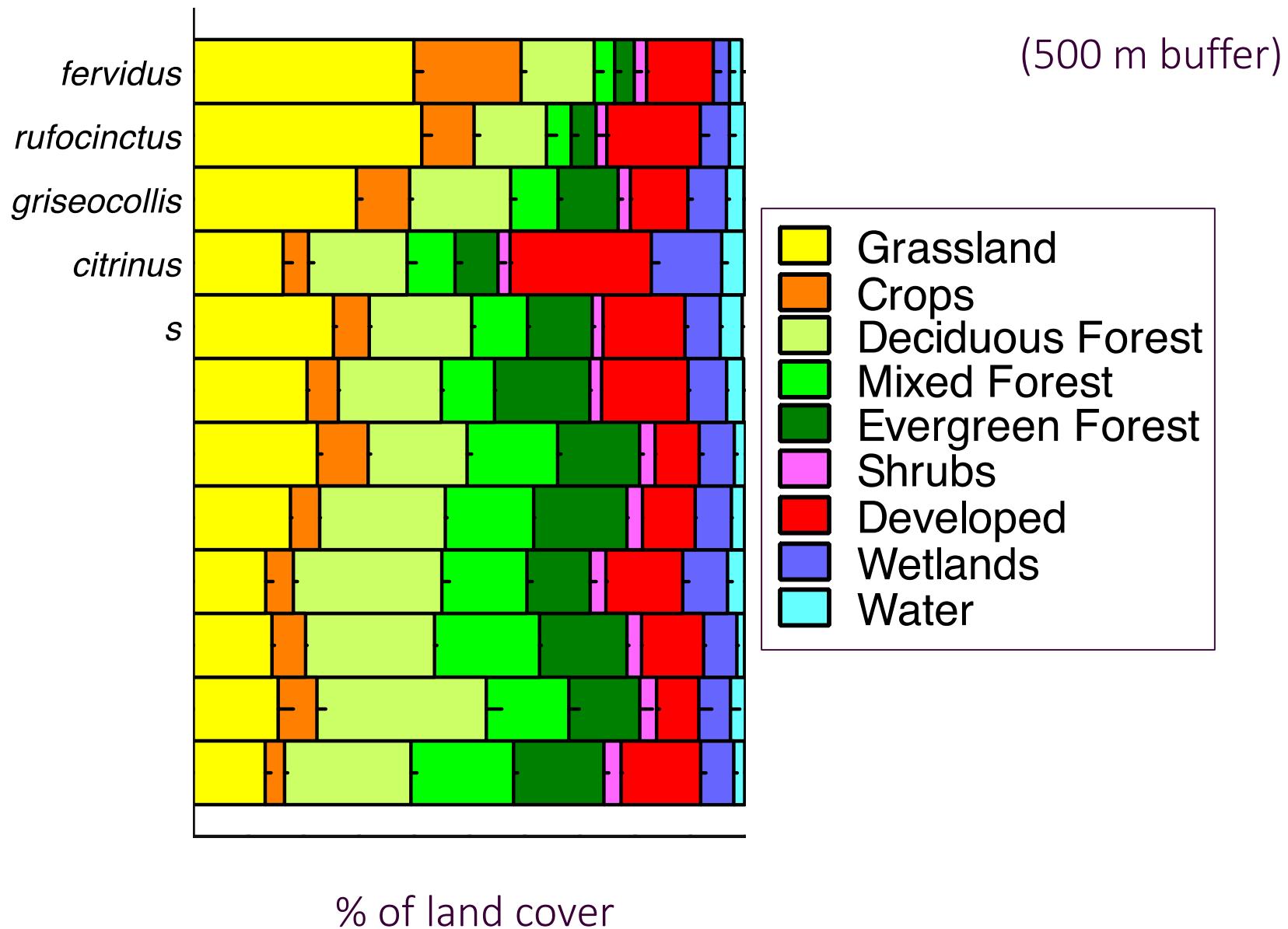
Transportation infrastructure

- Road density correlated with bee species occurrence



Richardson et al. *in review*

Effect of landscape on bee occurrence

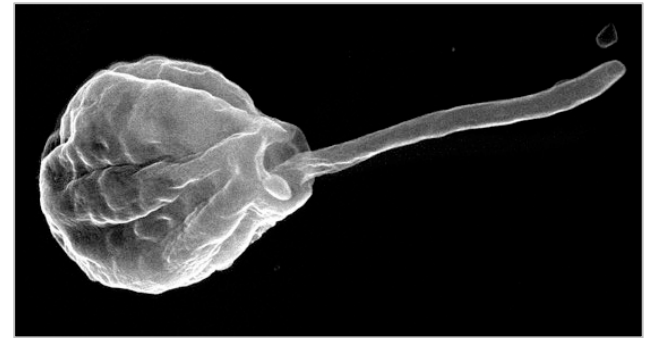


Richardson et al. *in review*

Why are bees declining?

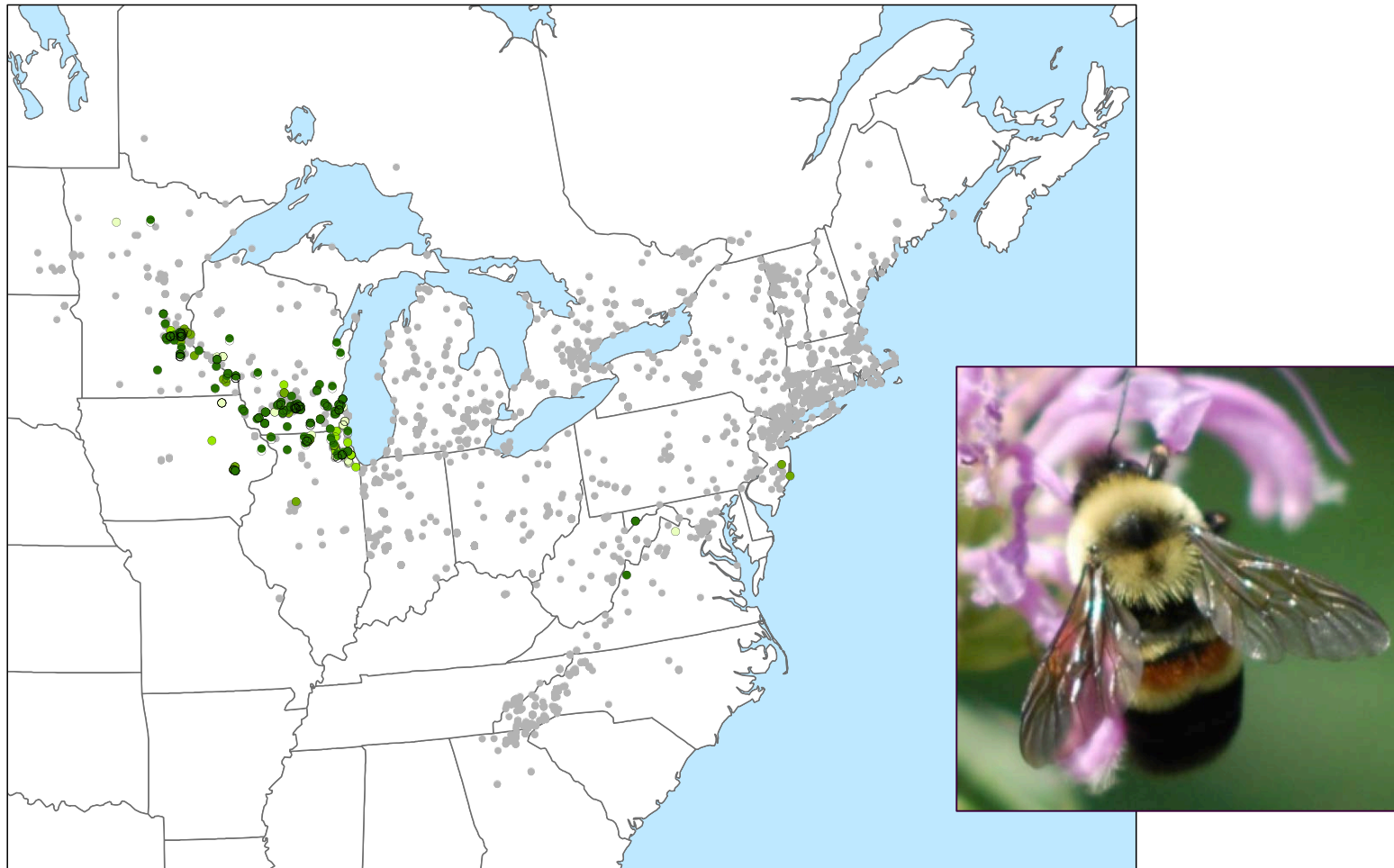
- Habitat loss
- Disease
- Pesticides
- Climate change

Agriculture



Monitoring for a rare bumble bee in transportation

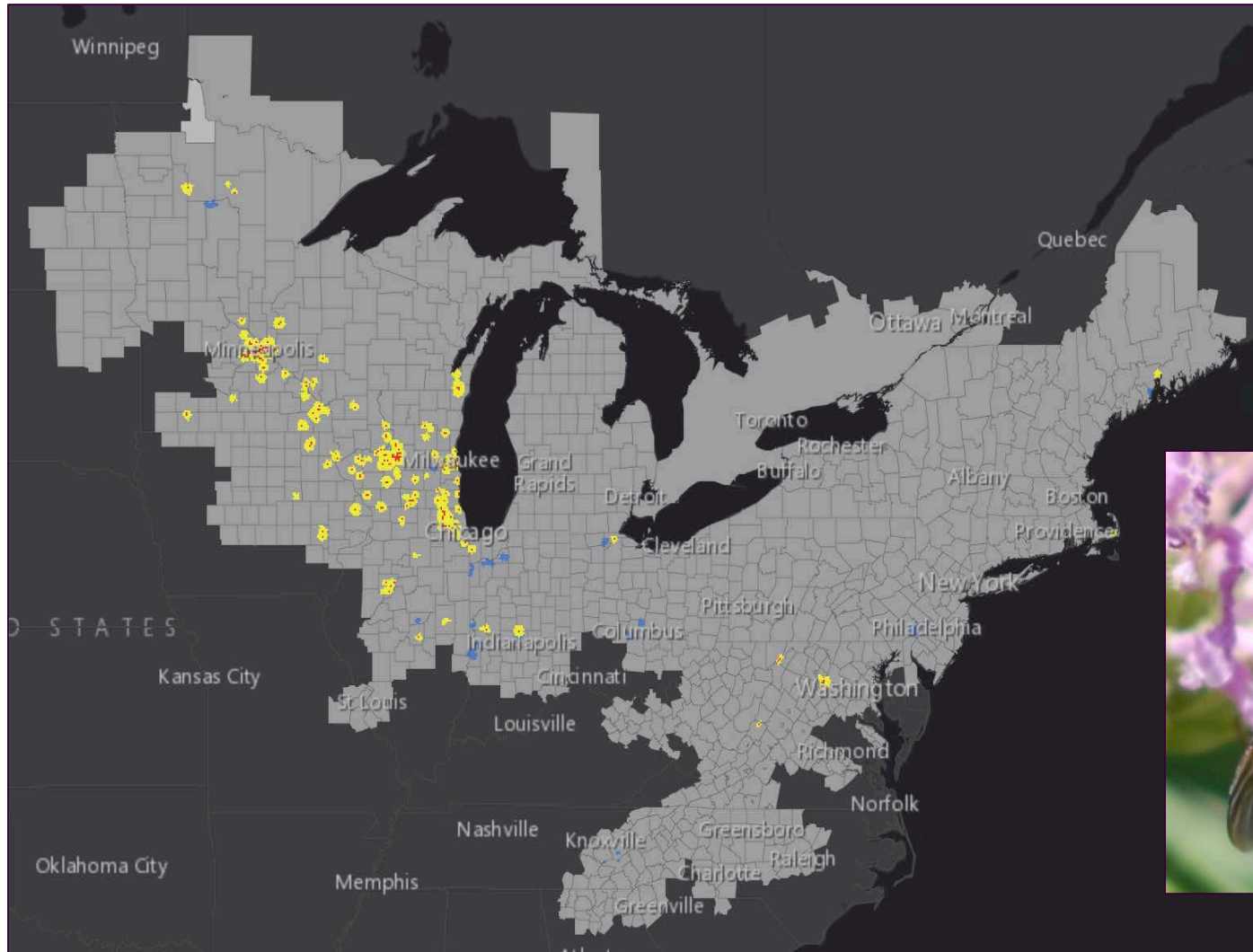
- Rusty-patched bumble bee (*Bombus affinis*)
- Distribution: eastern North America, with many historical (gray) and few recent (green) observations



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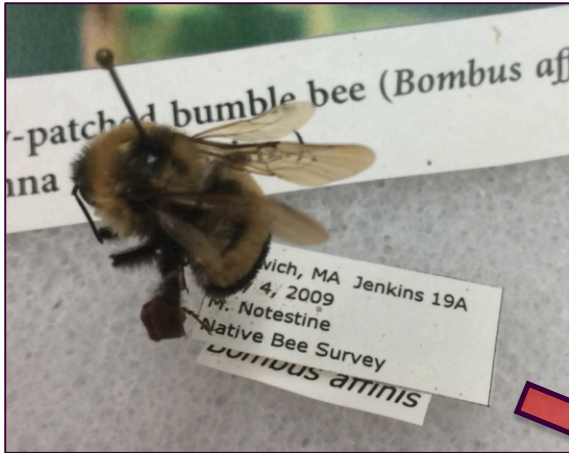
Rusty-patched bumble bee

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



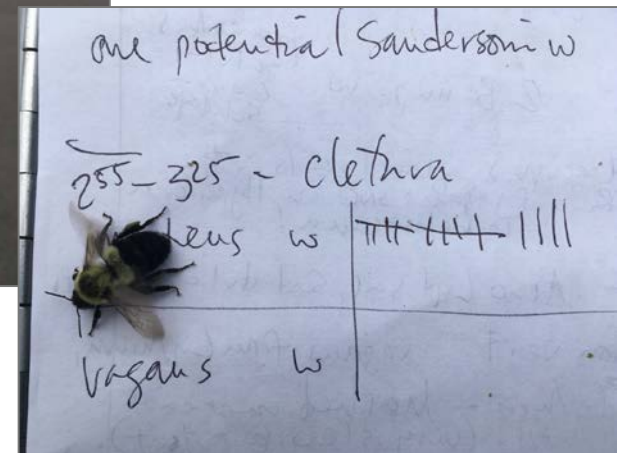
USFWS

Rusty-Patched Bumble Bee: still found in MA?



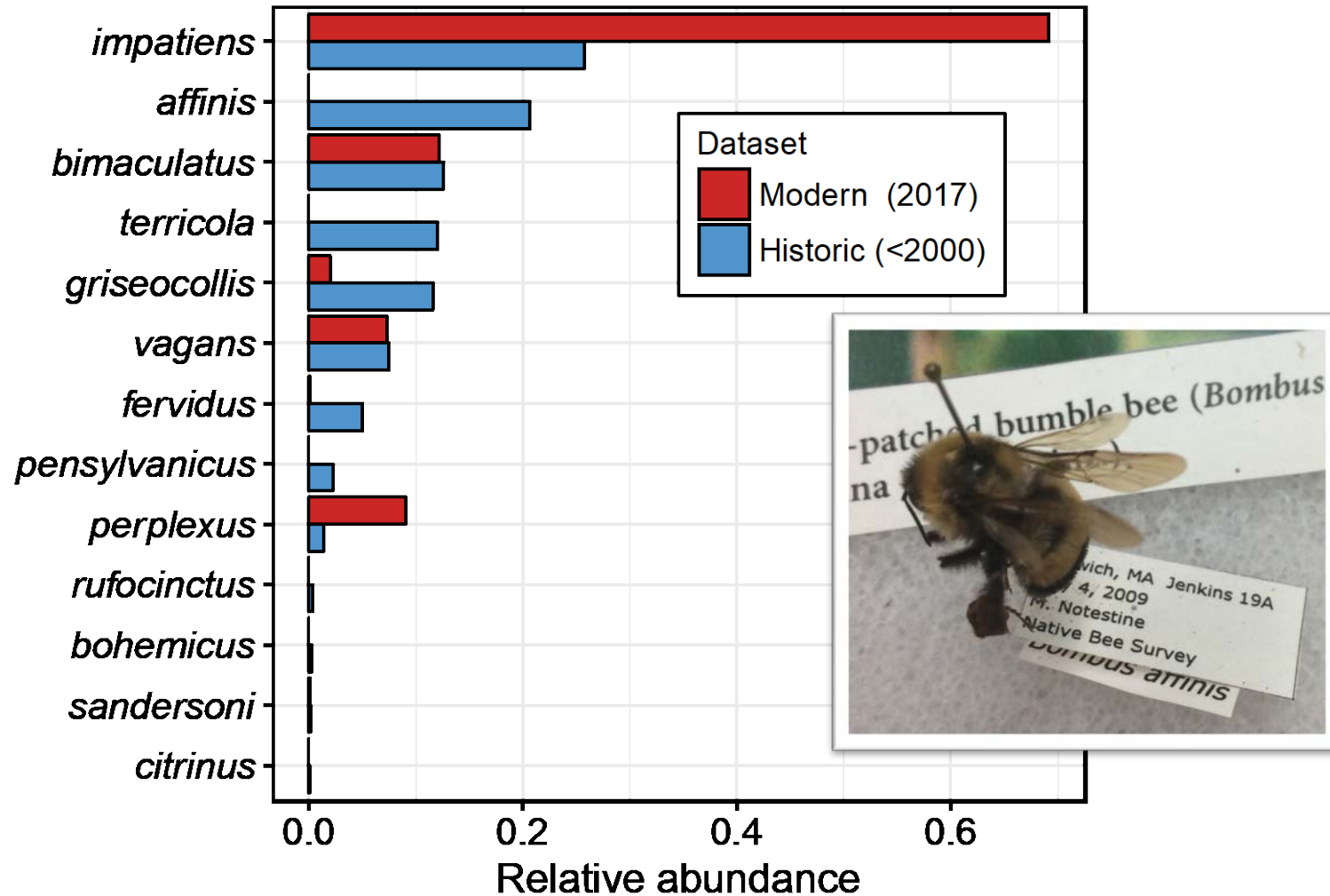
Tetra Tech; MDOT; Stone Environmental

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