Improving forest conditions for pollinators

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Pollinator diversity

- ~4,000 bee species in the U.S.
- 575 butterfly species
- Also many flies, moths, beetles

Source: beesinyourbackyard.blogspot.com
Forests support very diverse pollinator communities!

A single site in central Georgia:

• 102 species of bees
• 42 species of butterflies
Forest-dependent species

- Wood-nesting bees
- Resin bees

Photos by M Ulyshen
General Recommendations for improving forest conditions for pollinators

- Pollinators are sun-loving and broadly benefit from
  - thinning and gap creation
  - prescribed fire
  - removing non-native shrubs
  - maintaining forest road margins
Example 1: Thinning and regular burning increase bee richness in Georgia (Hanula et al. 2015)
Example 2: Shrub-layer removal and burning improved habitat for pollinators in North Carolina (Campbell et al. 2007)

Photos by T Waldrop
Example 3: Removing Chinese privet benefits bees and butterflies (Hudson et al. 2013)
Creating open road edges can provide floral resources for pollinators (Hanula et al. 2016)
Legacy of fire suppression...

Have changing forests conditions contributed to pollinator decline in the southeastern United States?

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Historical condition:
Open canopy
Herbaceous understory
Consequences of fire suppression
Insights from lepidopteran surveys – Ouachita National Forest shortleaf pine/bluestem restoration
Restored condition
*3 year fire return interval
Relative Number of Butterflies and Nectar Resources

- Butterflies
  - Control
  - 1st yr post-fire
  - 2nd yr post-fire

- Nectar resources
  - 1st yr post-fire
  - 2nd yr post-fire
  - 3rd yr post-fire

Number
Relative Number of Fall Monarchs and Nectar Resources

Monarchs
- Control
- 2nd yr post-fire

Nectar resources
- 1st yr post-fire
- 3rd yr post-fire
Fall Migrating Monarchs

*Nectar resources peak post-fire

*Monarch abundance tracks nectar resources

*Fuels fall migration to central Mexico
Nectar Resources are Key to Pollinator Abundance

Photos by C Rudolph
*Benefits extend to most species in the local fauna.

*Populations recover, or expand in 1st. Growing season post-fire.

*Major declines by 3rd year post-fire.

* Evidence that conclusions generalize to Bees, moths, beetles, flies.
Take-home message

• Efforts to create more open forest conditions will broadly benefit pollinator communities
• Techniques for minimizing SPB risk (thinning and burning) should also benefit bees

Ongoing work

• How does burn size affect pollinator communities?
• How does the diversity of fire history in a region affect pollinator communities?
• How can “undisturbed” pollinator communities inform restoration efforts?