Mosquito communities across a city

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Have you heard about this Zika disease?

Yup, we've been following it since it is transmitted by mosquitoes.

Are we going to get it up here?

Or in Georgia

It's probably too cold to be worried where you are.

Your mom ordered this just in case.
Range maps may not be relevant at fine-scales

Range of *Aedes aegypti*

**Nationwide**

Mosquitoes’ ability to live and reproduce:
- very unlikely
- unlikely
- likely
- very likely

Extent of Zika outbreak in Miami, FL

**Several city blocks**

Area previously designated as Zika active transmission (red) area

Area previously designated as Zika cautionary (yellow) area

CDC 2017
How does an urban mosquito community change across the landscape?
Heterogeneity in urban **microclimate** impacts mosquito demographics

**Summer**

- Rural
- Suburban: a
- Urban: b

**Fall**

- Rural: c
- Suburban: c
- Urban: d

Murdock et al. 2017
Biotic interactions can lead to habitat segregation

Hopperstad and Reiskind 2016
Mosquito habitat type and availability differs across an urban area
Mosquito habitat type and availability differs across an urban area.
How does an urban mosquito community change over the landscape?

What role does seasonality play in this?
Surveyed larval habitat from June 2016 - May 2017

- Rural
- Suburban
- Urban

Surveyed within 100m radius
Frequency sampling approach

Noted all standing water as potential habitat

Habitat with larvae marked as positive

Subset of larvae were reared in the lab and identified to species

OzWildlife
Frequency sampling approach

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Abundance = # of positive habitats
Mosquito community dominated by *Aedes albopictus*

- 11 total species
- 5 genera

*Aedes* species most common, particularly *Aedes albopictus*

Vector species are highly abundant
Mosquito community dominated by *Aedes albopictus*

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*Aedes* species most common, particularly *Aedes albopictus*

Vector species are highly abundant
Species presence differed across land class

- **Rural**
- **Suburban**
- **Urban**

Species:
- Aedes albopictus
- Aedes japonicus
- Aedes triseriatus
- Aedes vexans
- Anopheles crucians
- Anopheles punctipennis
- Culex coronator
- Culex quinquefasciatus
- Culex restuans
- Orthopodomyia signifera
- Toxorhynchites rutilus
Species abundances are seasonal

- **Toxorhynchites rutilus**
- **Orthopodomyia signifera**
- **Culex restuans**
- **Culex quinquefasciatus**
- **Culex coronator**
- **Anopheles punctipennis**
- **Anopheles crucians**
- **Aedes vexans**
- **Aedes triseriatus**
- **Aedes japonicus**
- **Aedes albopictus**

**Date**
Summer

Abundance of Habitats

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- Empty habitat
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- Empty habitat

**Abundance of Habitats**
- Summer
- Winter

**Legend**
- Rural
- Suburban
- Urban
How does an urban mosquito community change over the landscape?

Higher diversity in rural areas, with suburban areas dominated by container breeders.

What role does seasonality play in this?

Rare species persist in spring and fall, when temperatures are too cold for dominant competitors.
What about disease risk?

- Vectors of different diseases are abundant at different times of the year.
- Rural areas have fewer vectors of disease year round.
- Highest abundance of vectors is in the suburbs in the summer.
- Clear patterns across season and land class in mosquito communities.
Thank you!

The Murdock Lab

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