# Interspecific competition between resident and wintering warblers: Evidence from a 3D removal experiment


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# Acknowledgements


- Field Techs
  - Junior Carson
  - Barbara Heindl
  - Tom Ryan
  - Justin Saunders
  - LTREB crew
- On the ground help
  - Petroleum Company of Jamaica
  - Garth Lee
  - Jamaica Nat'l Envt & Planning Agency
- Funding
  - NSF postdoctoral fellowship
  - James Bond Fund
- Other help
  - Andre Dhondt
  - Rob Dobbs
  - SMBC postdoc discussion group



Western Flyway
Central Flyway
Eastern Flyway
BOREAL FOREST
CANADA
UNITED STATES OF AMERICA
MEXICO
VENEZUELA
COLOMBIA
BorealBirds.org

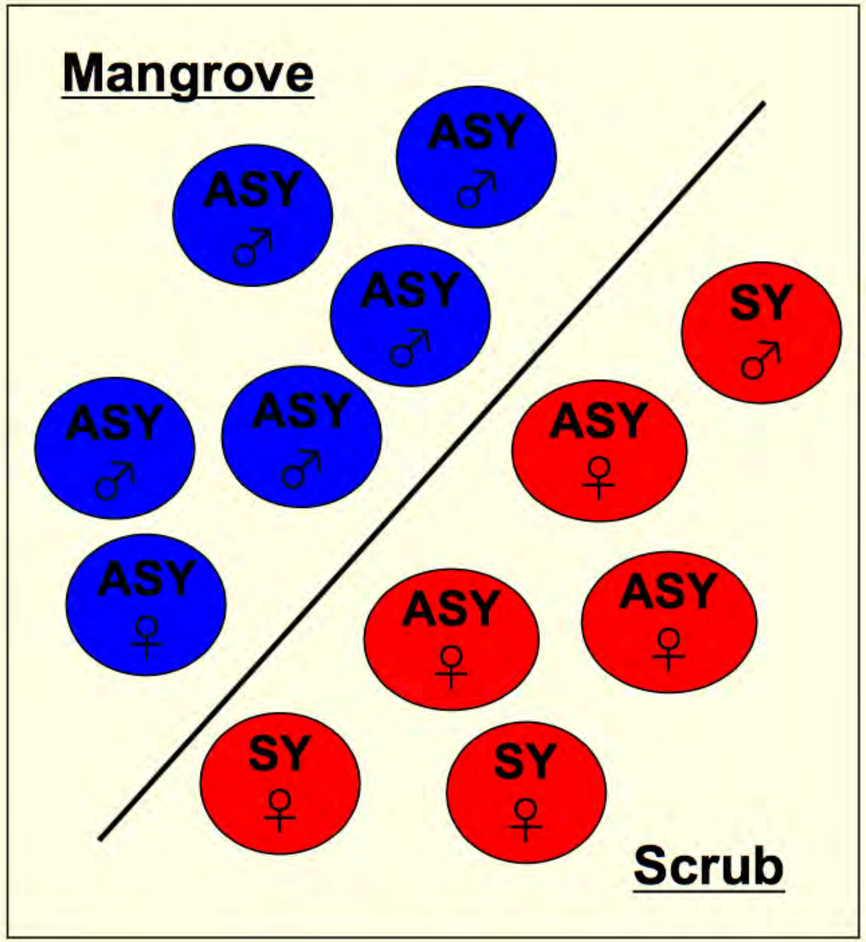
# Jamaica
# Font Hill Nature Preserve
# 2014-2016

# Performance depends on habitat occupancy

| | Black mangrove | Second-growth scrub |
|---|---|---|
| Food availability | *high* | *low* |
| Body mass | *maintain* | *declines* |
| Spring departure date | *early* | *late* |
| Annual survival | *high* | *low* |

# Experimental Upgrade
## - redstarts moved from scrub to mangrove

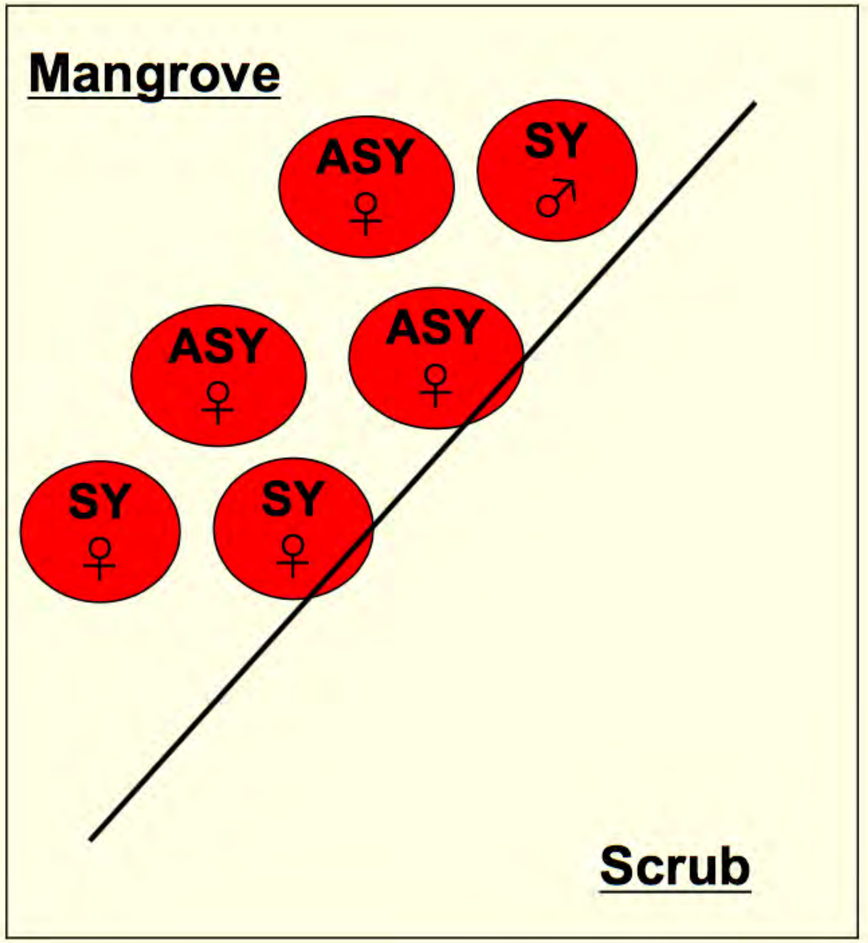
- Removed behaviorally dominant redstarts from mangrove
- Provided territorial vacancies for redstarts from scrub to colonize




(Studds and Marra 2005)

# Experimentally upgrades .

- Maintained mass
- Departed earlier
- Higher annual survival




(Studds and Marra 2005)

# Interspecific Competitors?

## Year-round Resident

"Golden" Yellow Warbler (YEWA)
*Setophaga petechia eoa*

Male: ~10.4g  Female: ~10.0g

- Pairs defend year-round territories
- Medium-sized, shared territories: 0.6 ha
- ♂s & ♀s mated

## Wintering Migrant

American Redstart (AMRE)
*Setophaga ruticilla*

RS Male: ~7.0g  Female: ~ 6.6g

- Individual territories, winter only
- Tiny individual territories: 0.18 ha
- ♂s behaviorally dominant over ♀s

# Aggressive Interactions

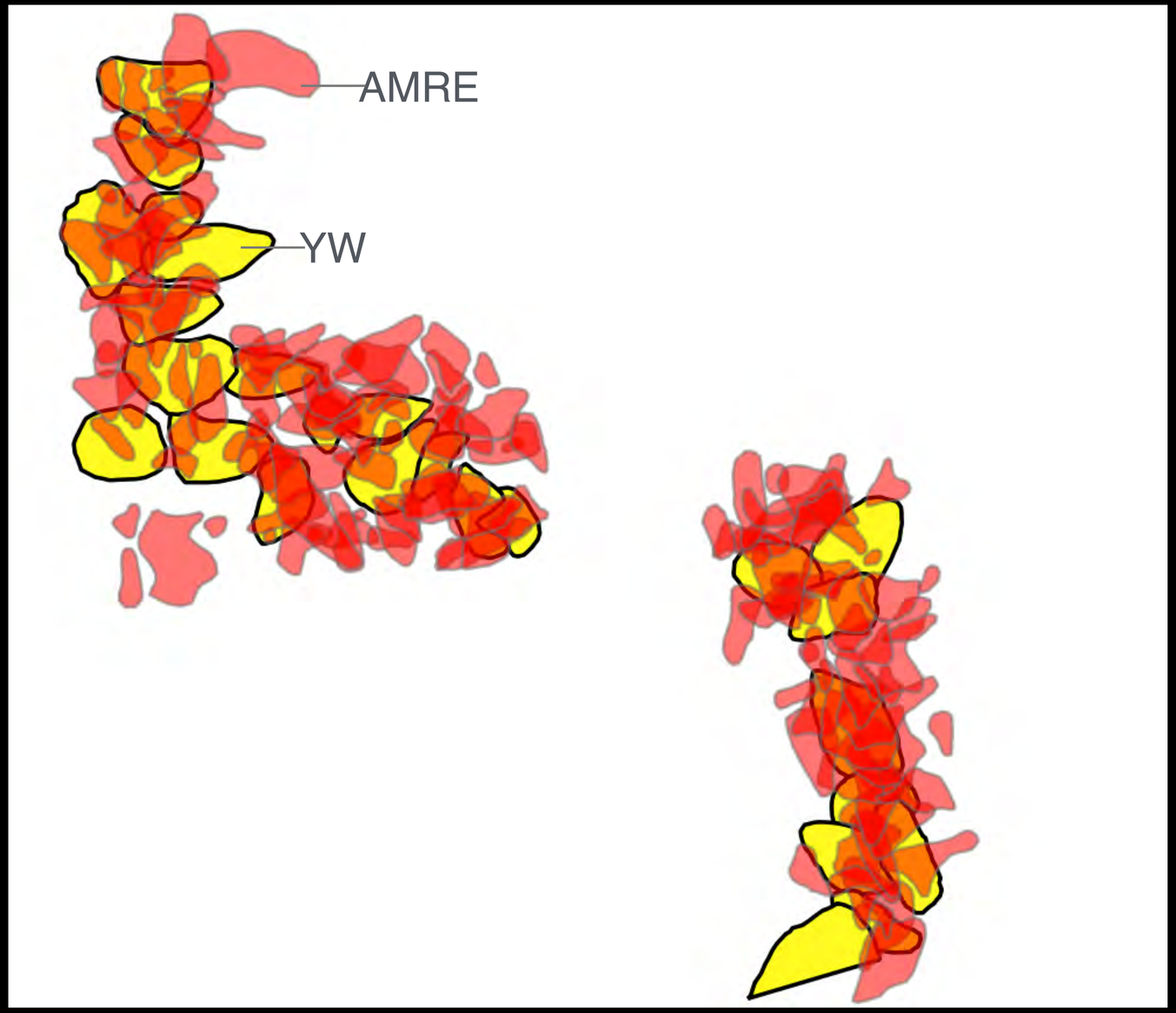
(Chases)


(R. Dobbs unpublished), 2009

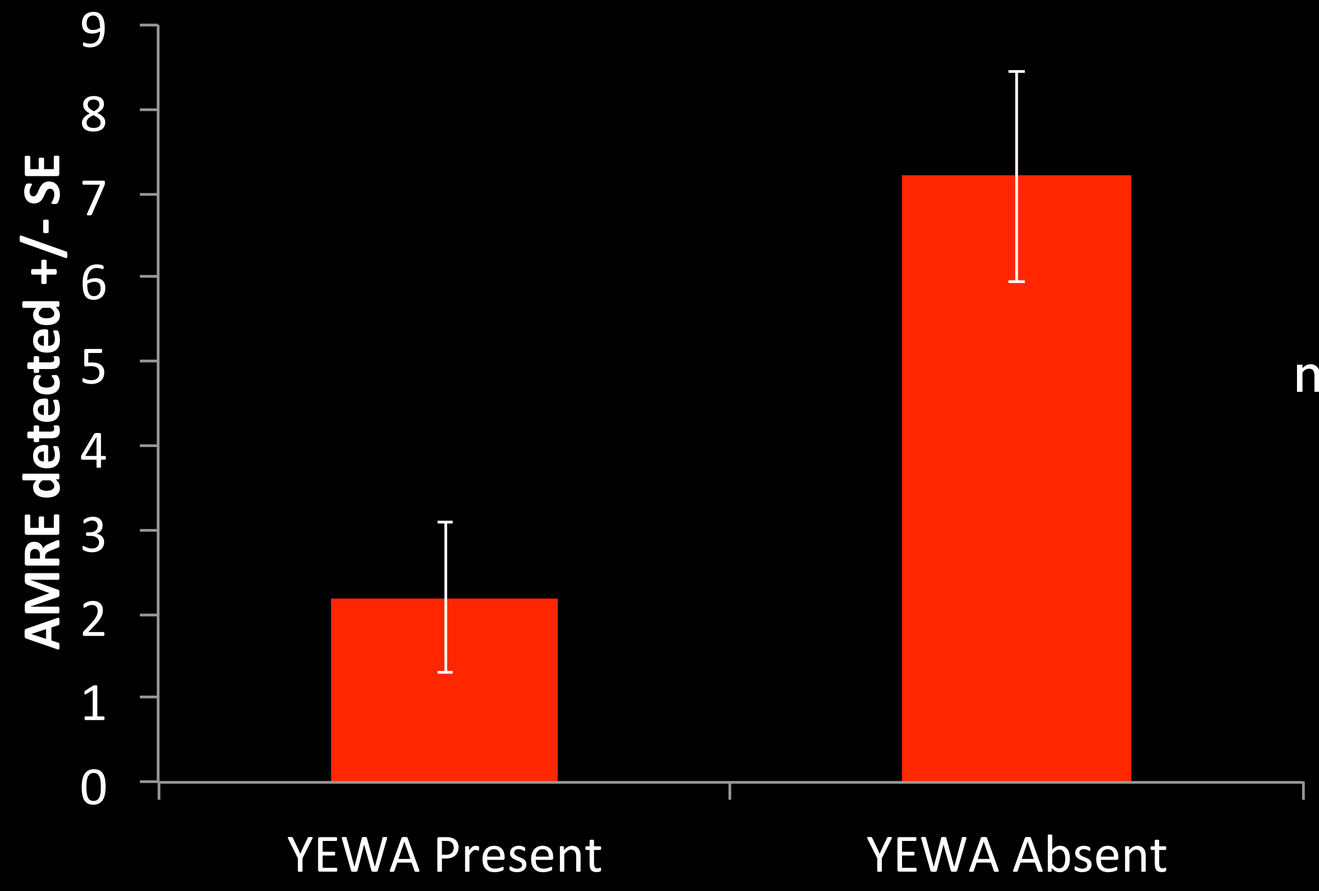
# “Proof” of competition

1. Resources use of one species affects resources use by another
2. Fitness of individuals of one species is reduced by the presence of another
3. Distribution or abundance of one species reduced by presence of another

Andre Dhondt, 2012, Interspecific Competition in Birds


AMRE
YW

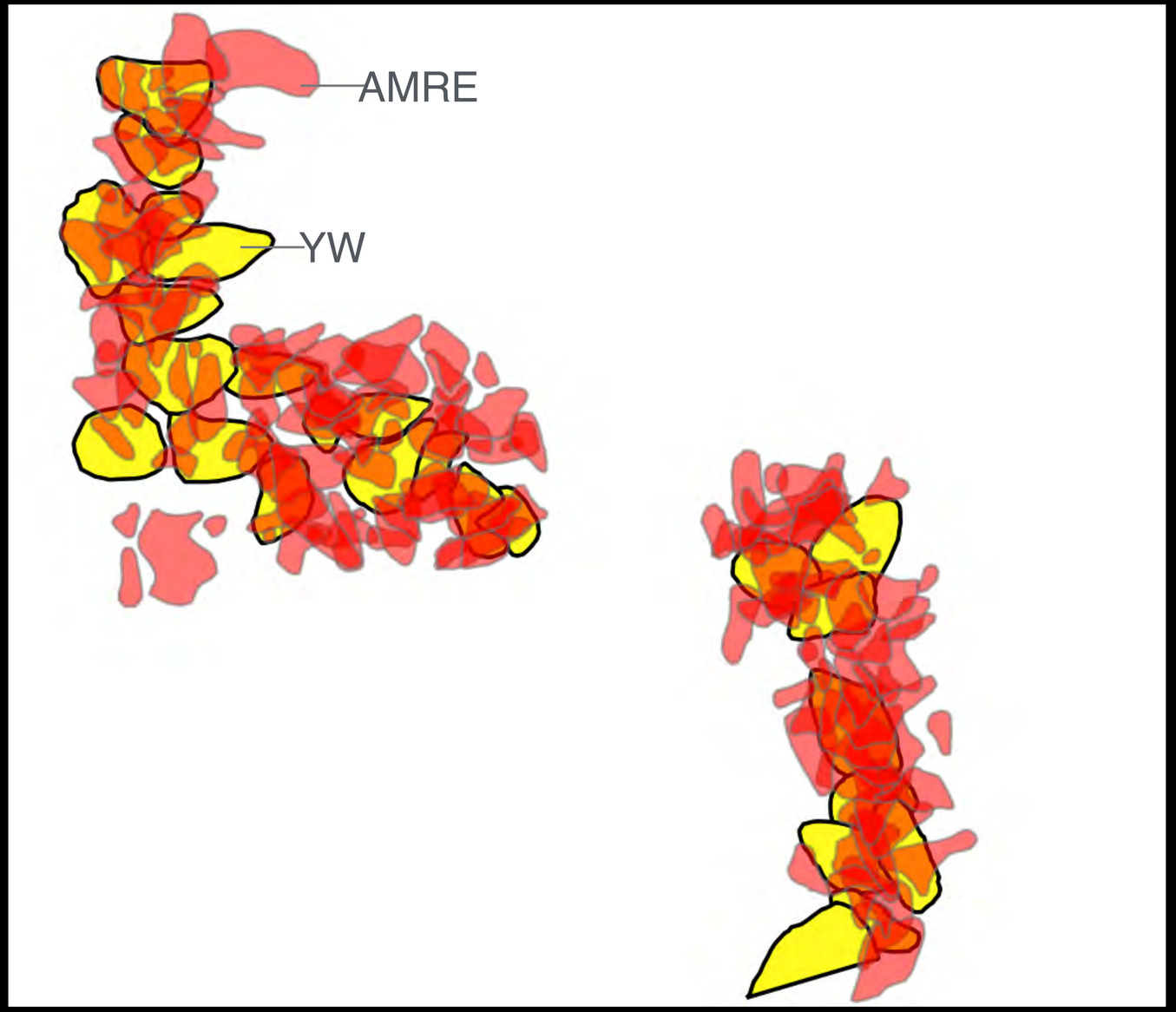
# 2D space use by AMRE & YEWA "natural experiment"



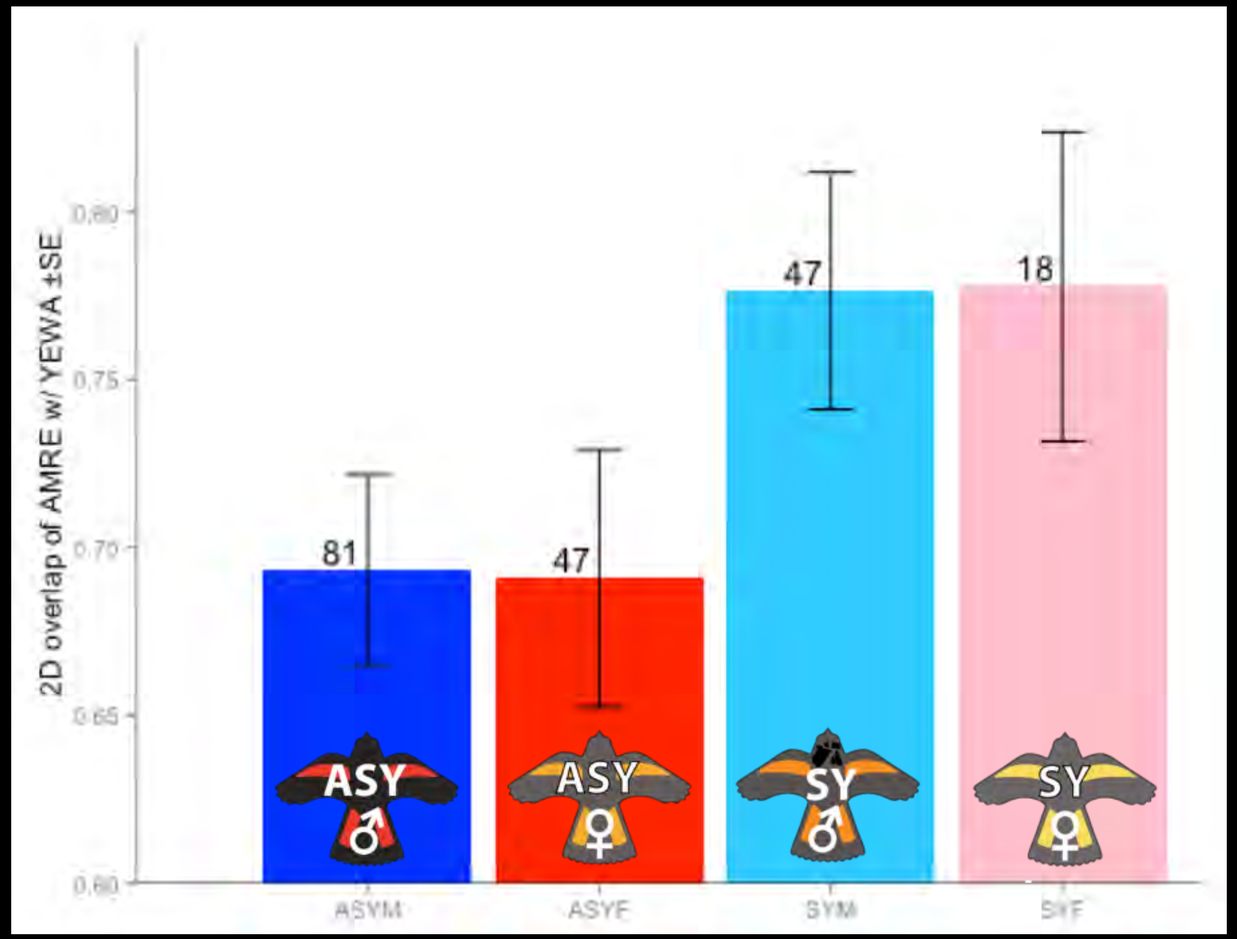

n = 20 unique YEWA territories 2014-2015

# 2D space use by AMRE & YEWA

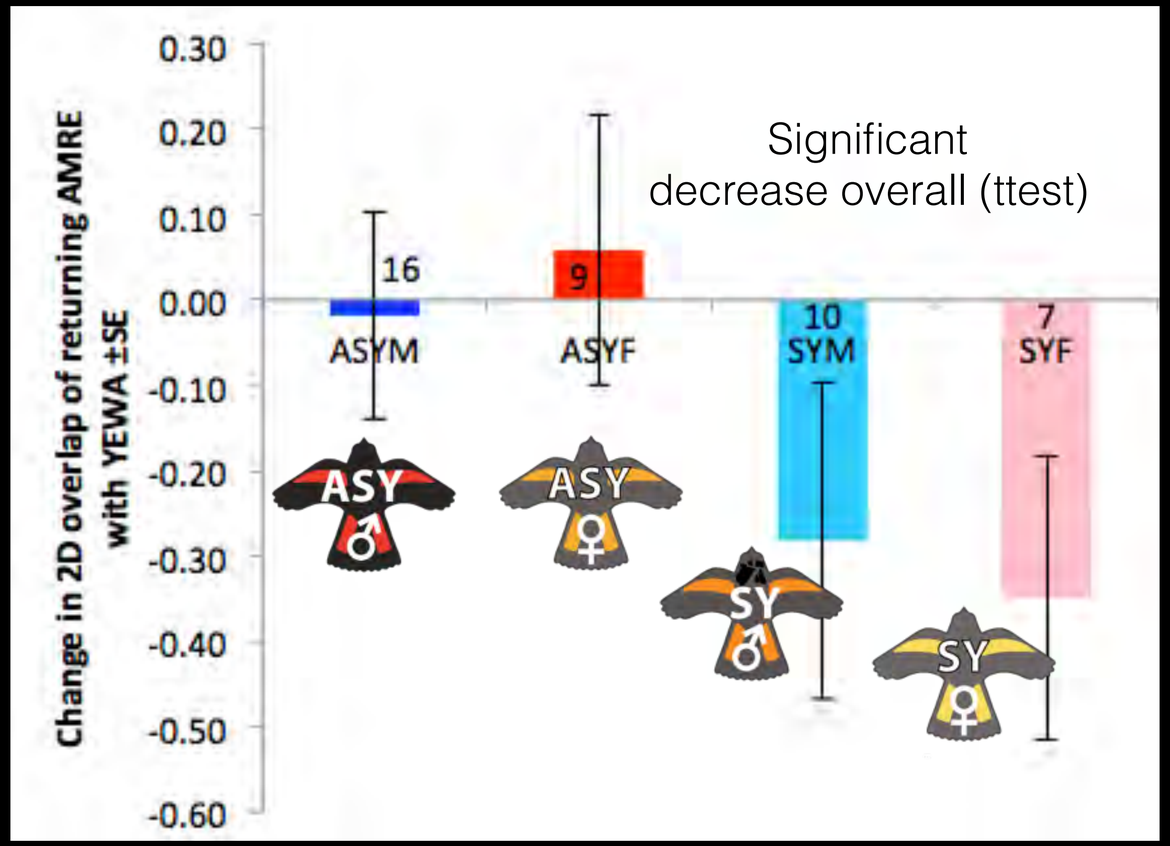
3 plots
2014-2016



# Older AMRE overlap less w/ YEWA



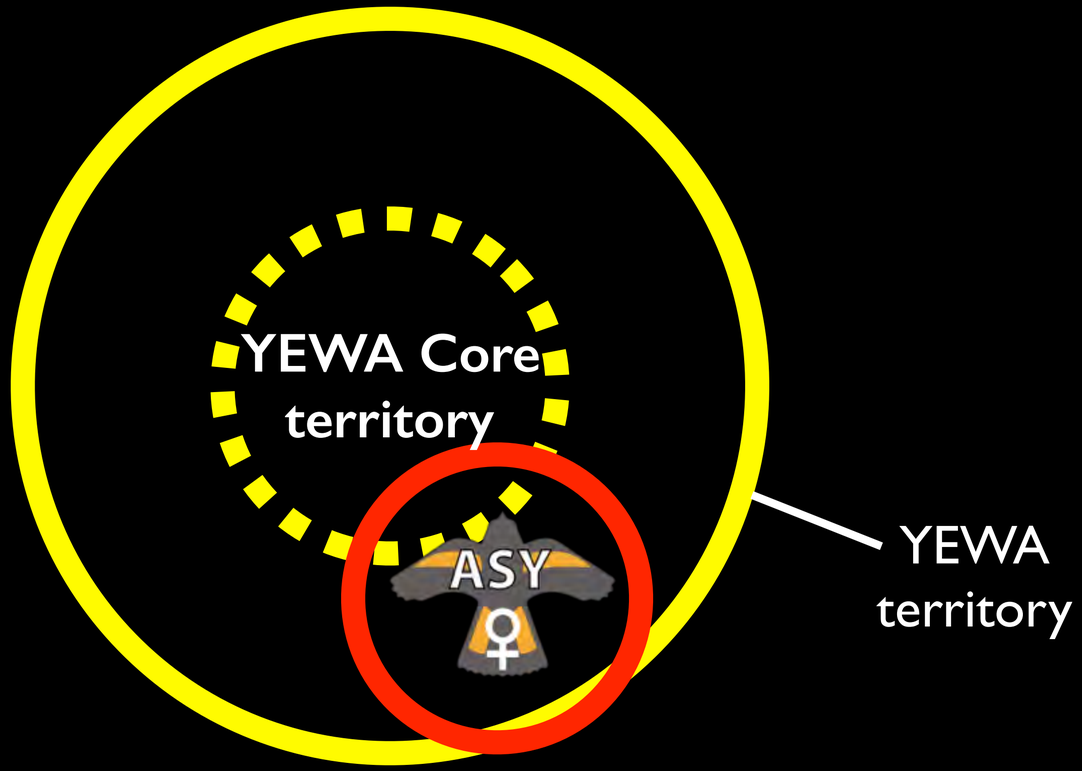

# AMRE avoid YEWA when returning b/w years



# YEWA Removal Experiment

**Field Methods**

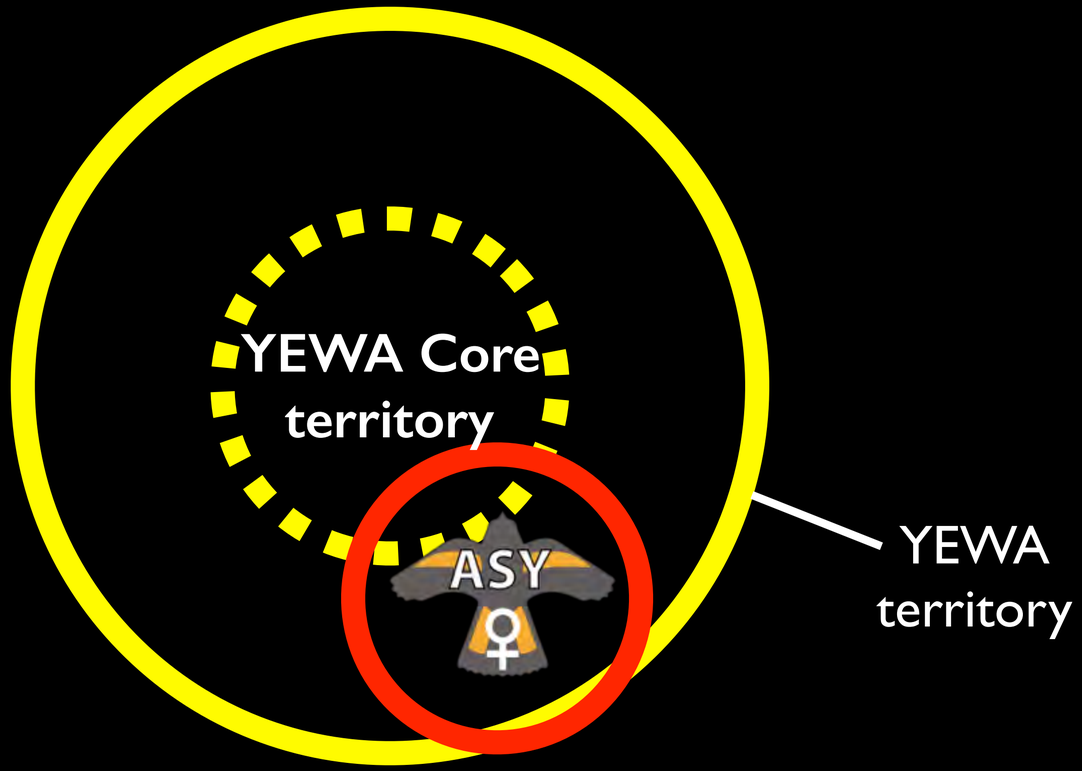
- 3D mapped YEWA & AMRE territories before & after removal of YEWA pair



# YEWA Removal Experiment

**Field Methods**

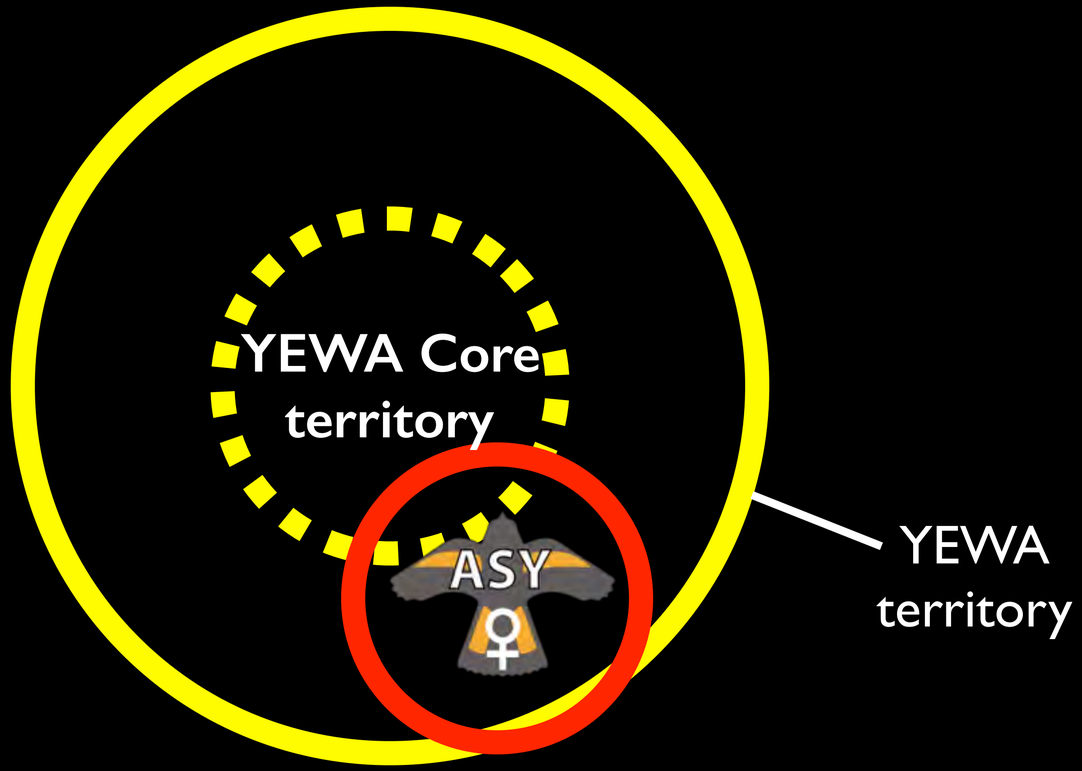
- 3D mapped YEWA & AMRE territories before & after removal of YEWA pair
- Calculated change in overlap between AMRE territory & core of YEWA pair territory

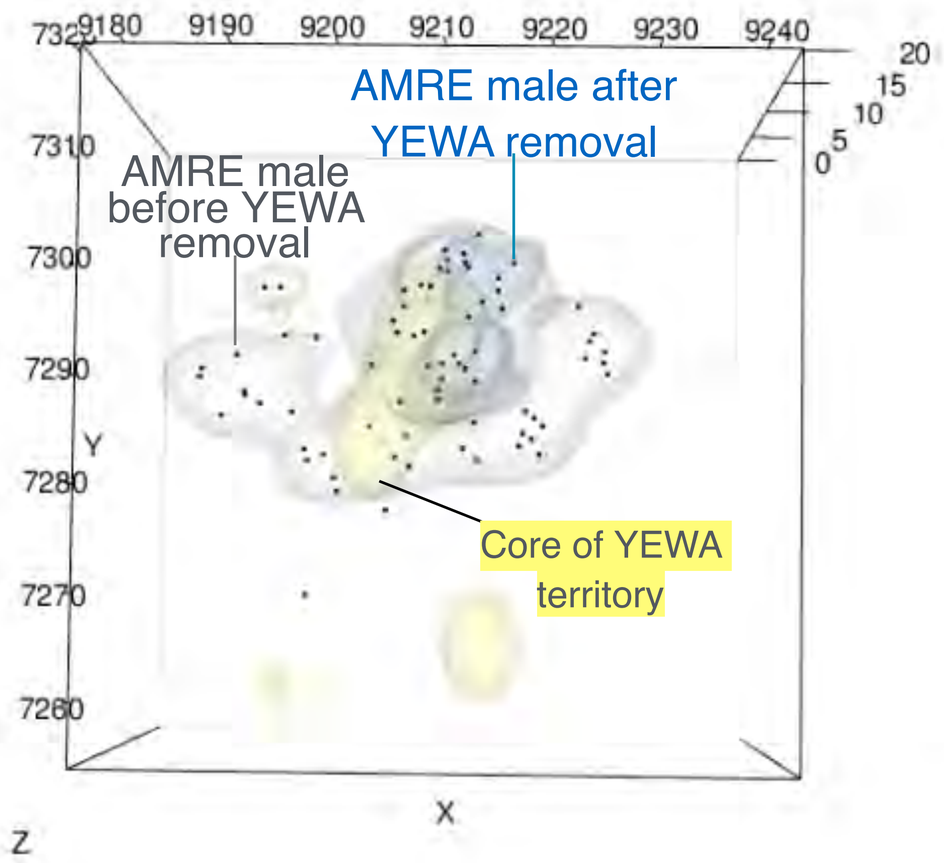


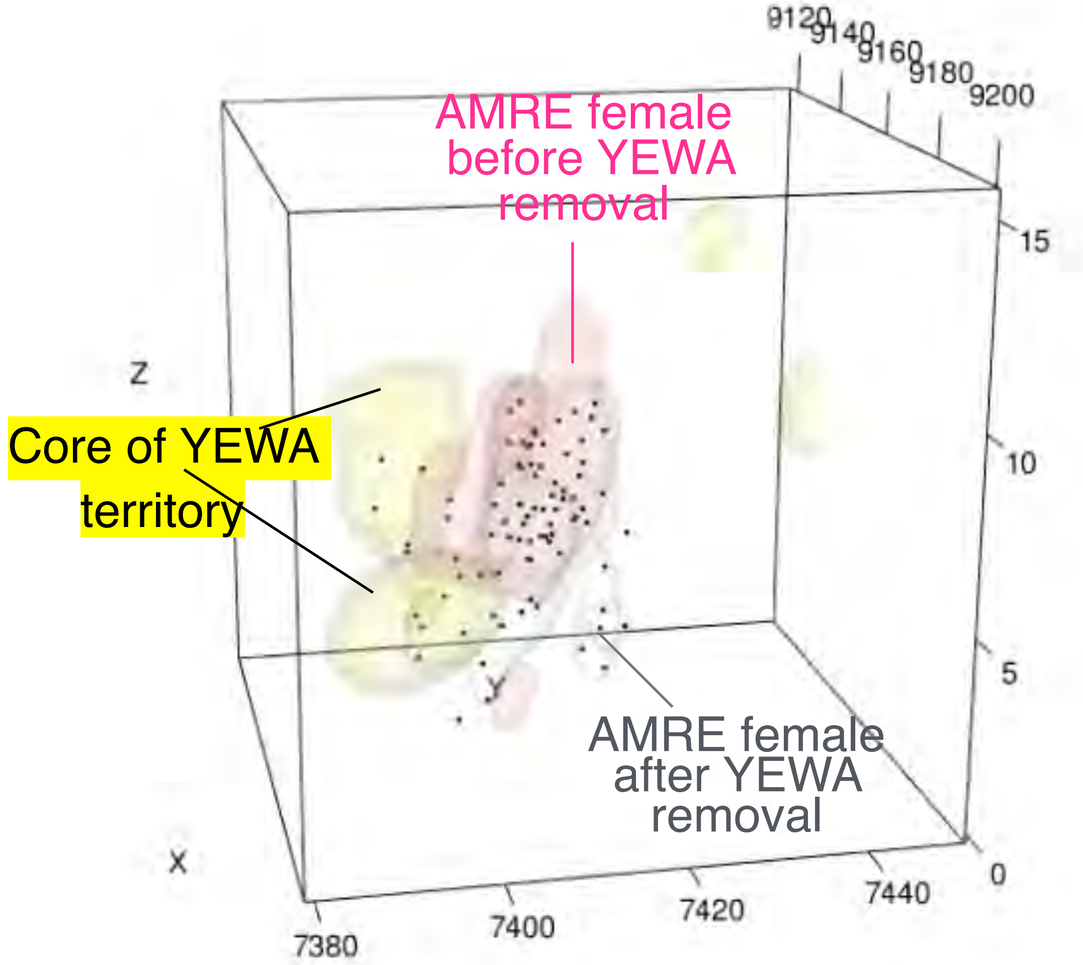
# YEWA Removal Experiment

**Field Methods**

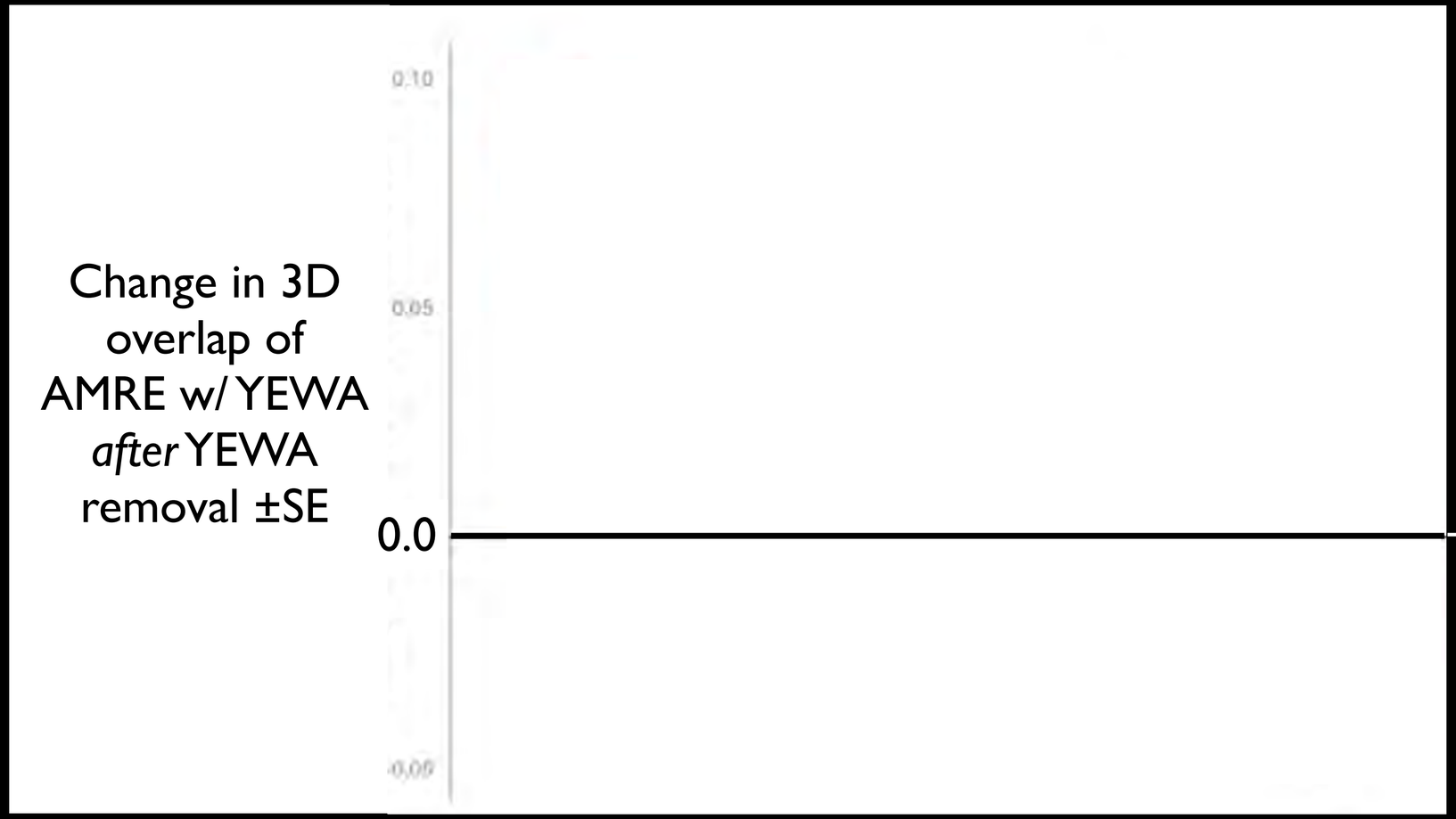
- 3D mapped YEWA & AMRE territories before & after removal of YEWA pair
- Calculated change in overlap between AMRE territory & core of YEWA pair territory
- Quantified whether AMRE moved in or out of the 3D space vacated by YEWAs




9180
9190
9200
9210
9220
9230
9240
7320
7310
7300
7290
7280
7270
7260
Y
X
Z
20
15
10
5
0
AMRE male after YEWA removal
AMRE male before YEWA removal
Core of YEWA territory


AMRE female before YEWA removal
Core of YEWA territory
AMRE female after YEWA removal
9120
9140
9160
9180
9200
15
10
5
0
Z
Y
X
7380
7400
7420
7440

# AMRE Response to YEWA removal

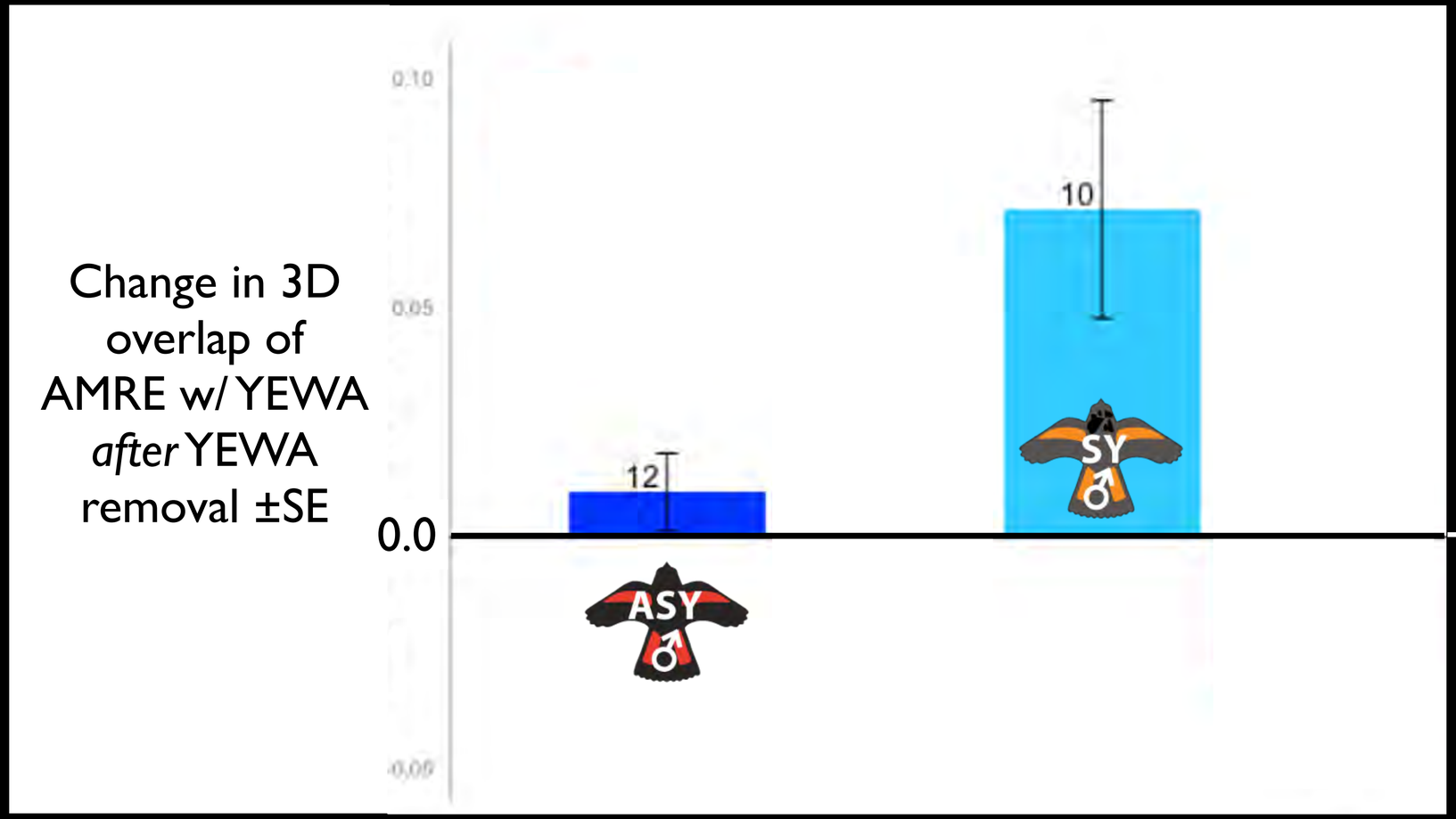



Moved INTO YEWA vacancy

0

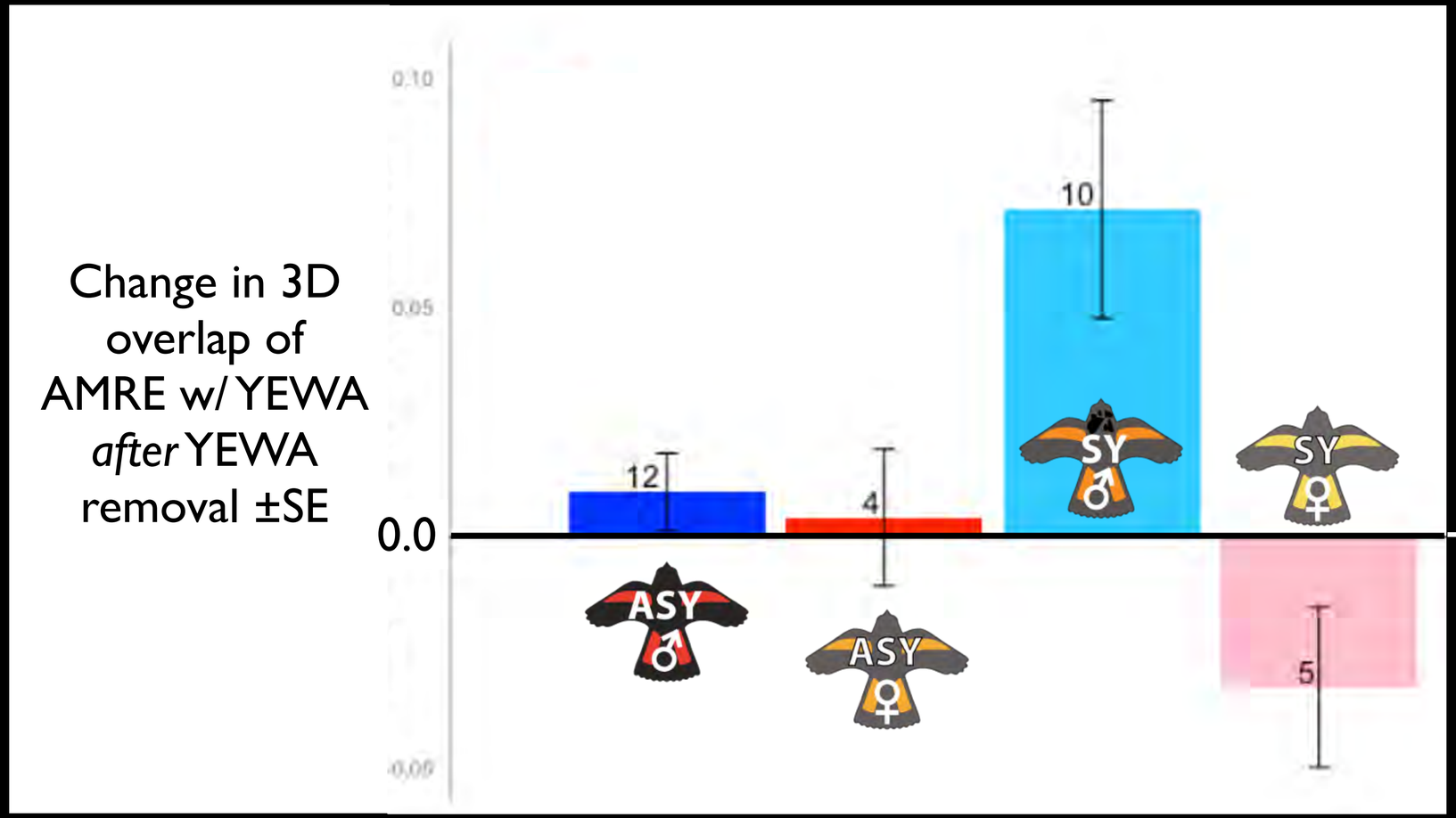
Moved AWAY FROM YEWA vacancy

# AMRE Response to YEWA removal



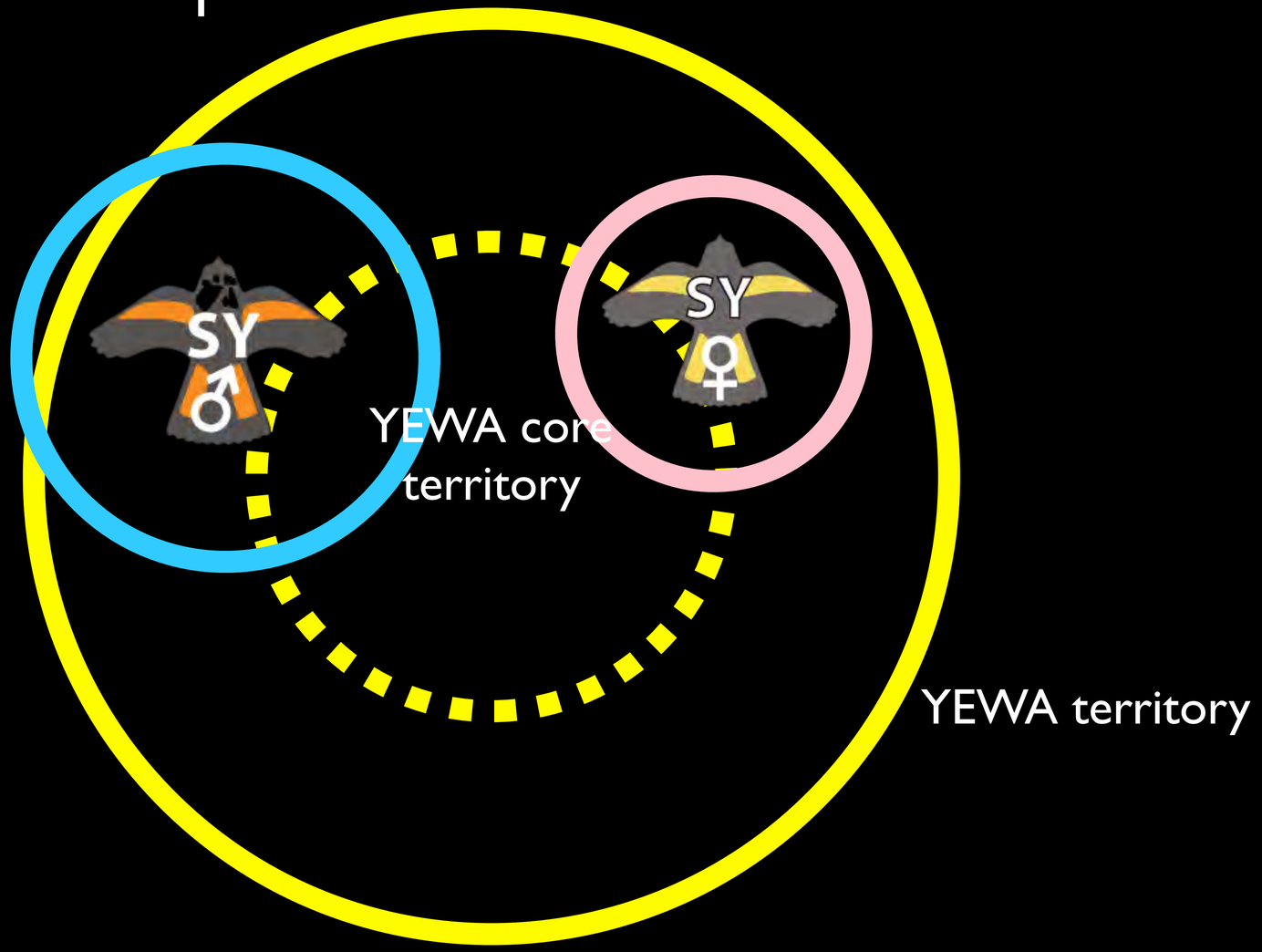

Mixed model: significant Age*Sex effect

# AMRE Response to YEWA removal




Mixed model: significant Age*Sex effect

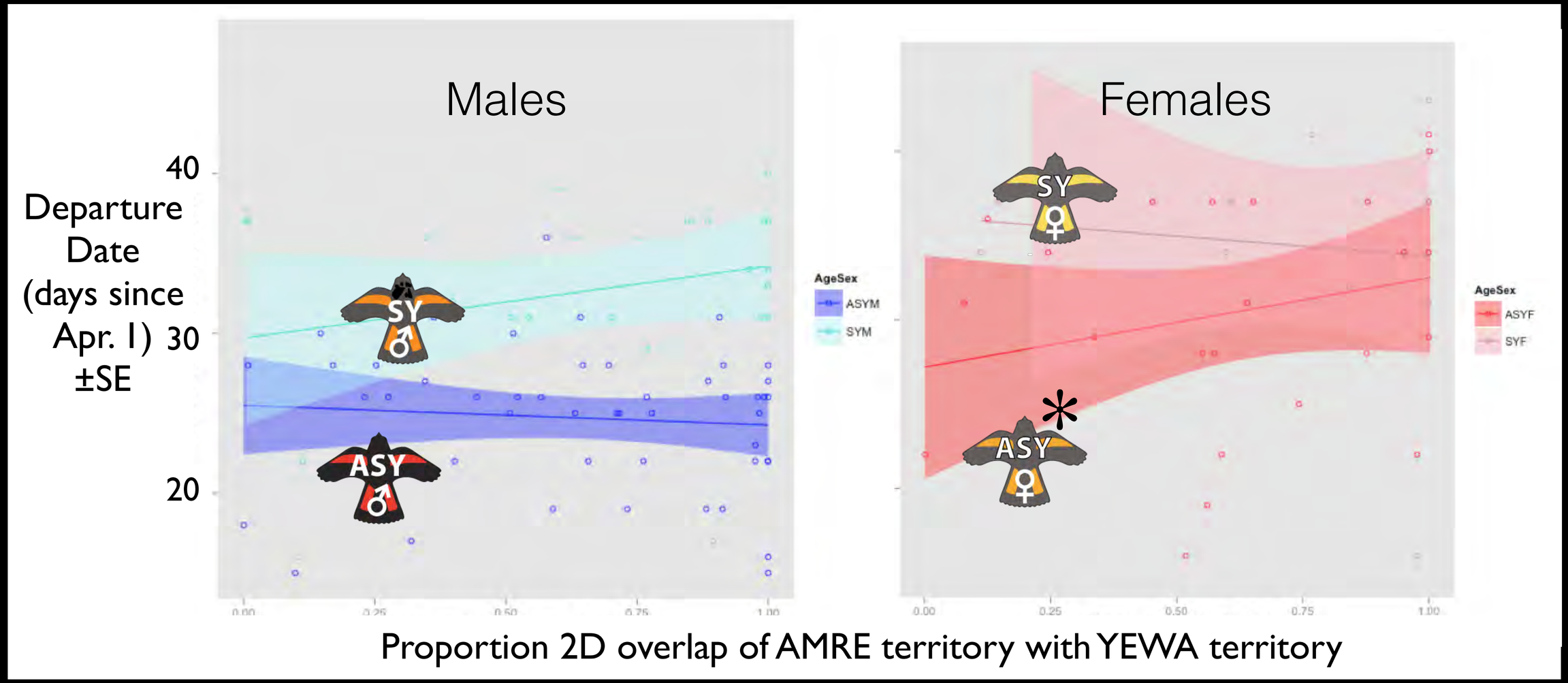
# AMRE Response to YEWA removal



# Consequences of interspecific coexistence for AMRE

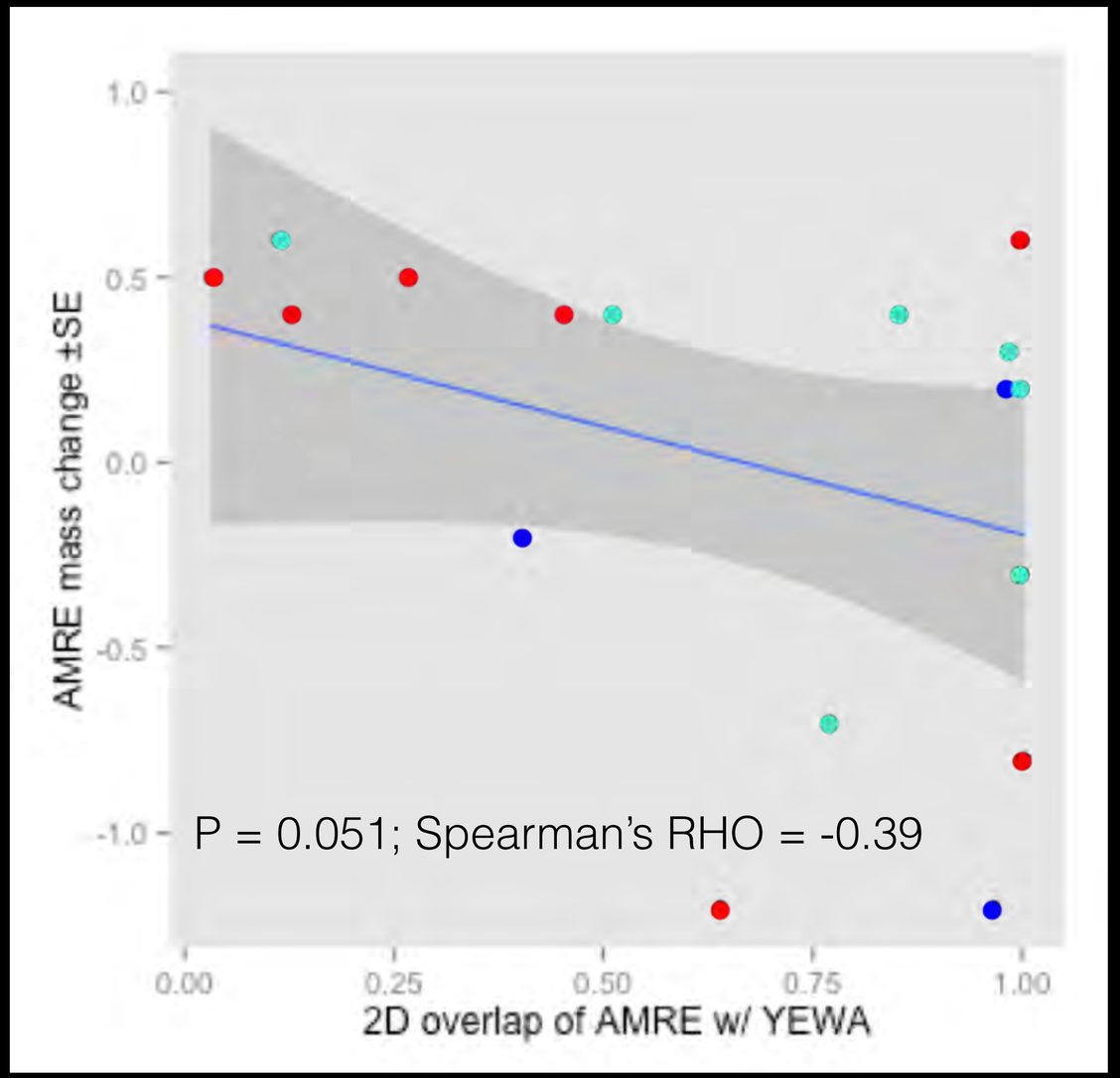
How does 2D overlap w/ YEWA affect AMRE indices of fitness?

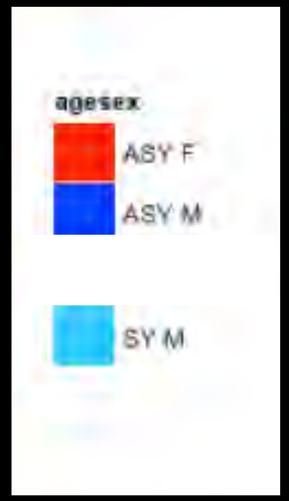
# 2D overlap v. departure date




Only ASYF significant (Spearman's RHO = 0.33)

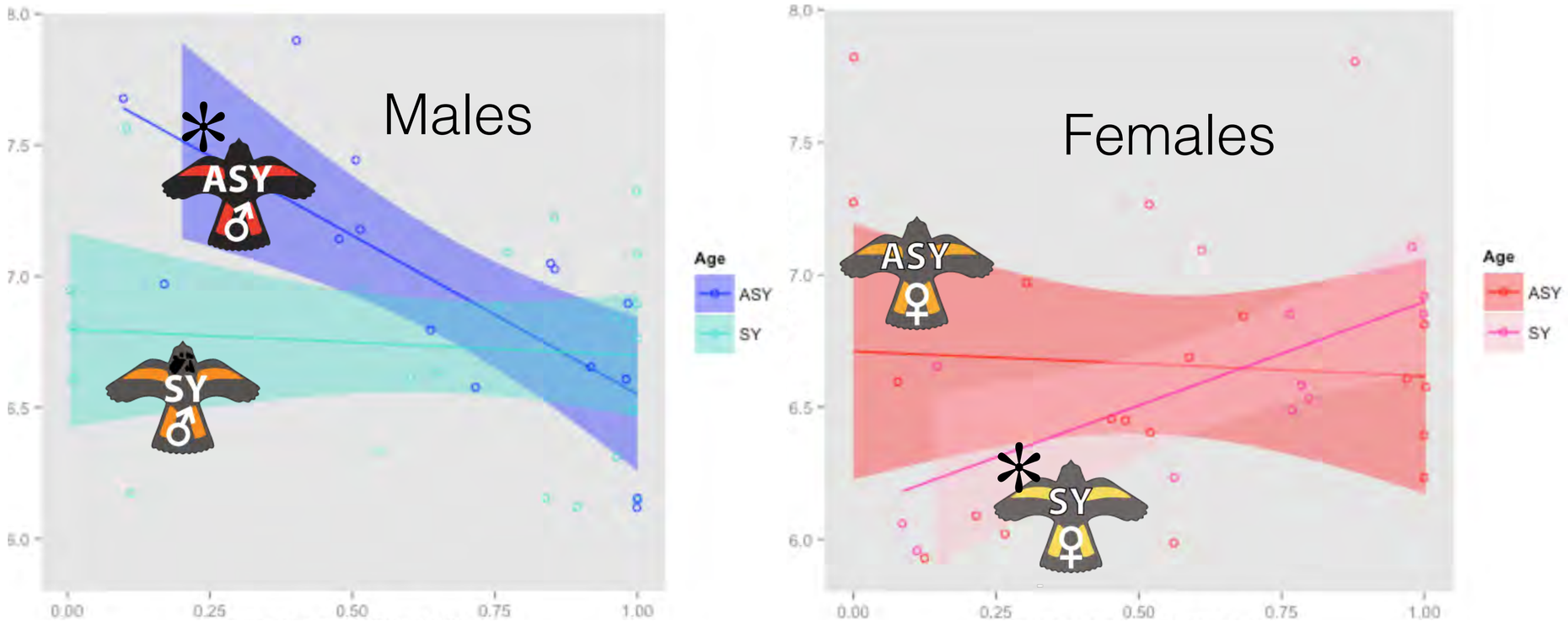
# 2D overlap v. mass change



# 2D overlap v Body Condition

AMRE body condition ±SE




2D overlap of AMRE territory with YEWA territory

Pearson correlation tests: ASYM & SYF significant at P<0.01

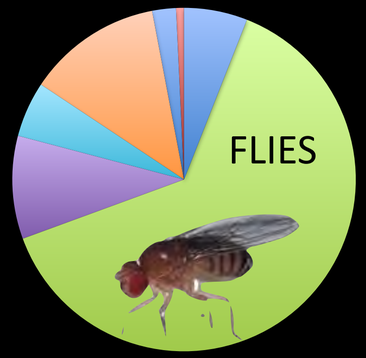
# Summary (Evidence for competition)

- (most) AMRE shift space use to avoid YEWA
  - natural experiment, 2D overlap & 3D removal experiment
- AMRE fitness (indices) affected by overlap YEWA
  - departure date, mass change, body condition
- SYF AMRE overlaps most
  - did not gain space w/ YEWA removal
  - increased body condition w/ YEWA overlap
  - YEWA create niche for YEWA?


# Competition for food?

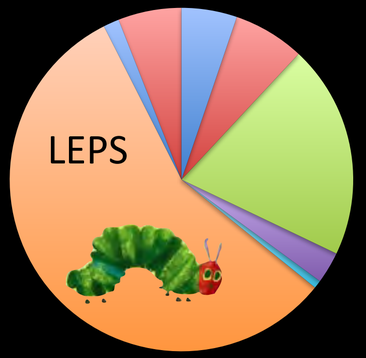
**w/ Andreanna Welch. 4pm today!**

**RS**




- Araneae
- Coleoptera
- Diptera
- Hemiptera
- Hymenoptera
- Lepidoptera
- Neuroptera
- Orthoptera

**YW**




# Thank You!

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photo: Beth Kinsey