

**The influence of  
changing  
rainfall, parental  
traits,  
and  
nest traits  
on parental care  
in a tropical bird**

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# Parental Care

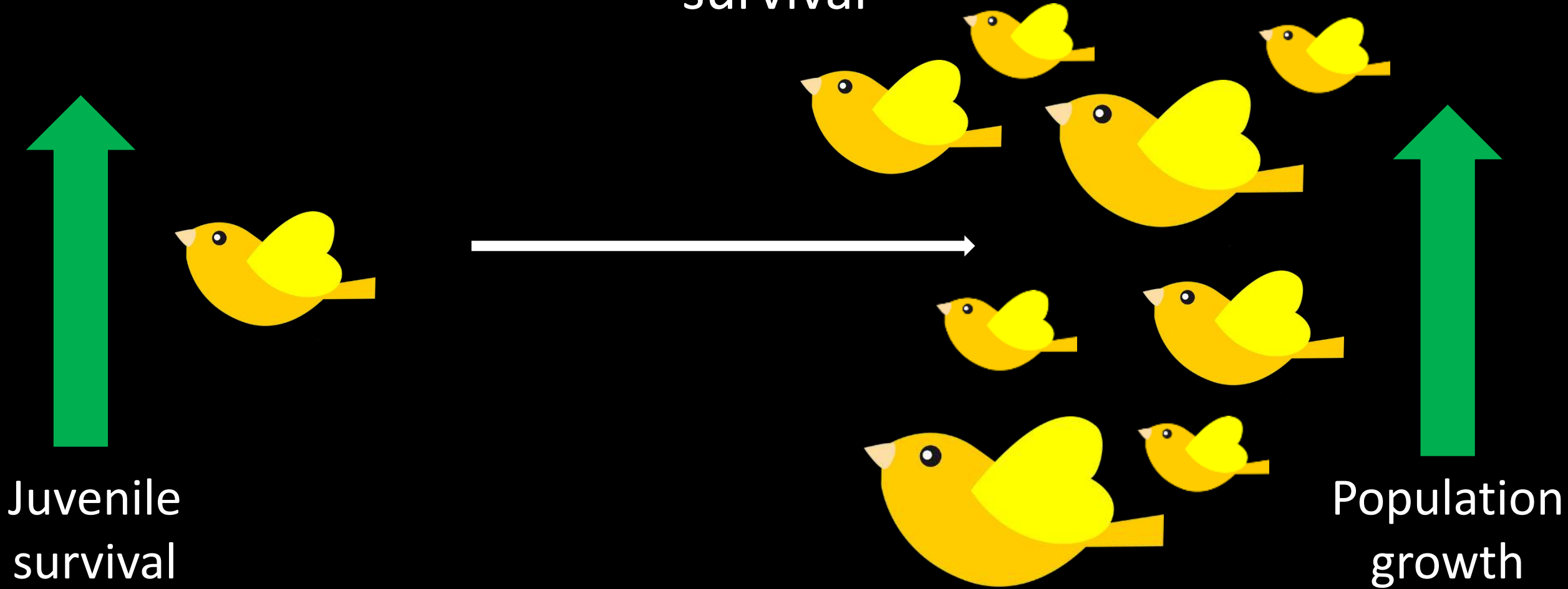
Amount of effort a parent puts into offspring



Trade-off: more time and energy into care, less time and energy for self

# Importance of Parental Care

Amount and length of parental care strongly impacts juvenile survival



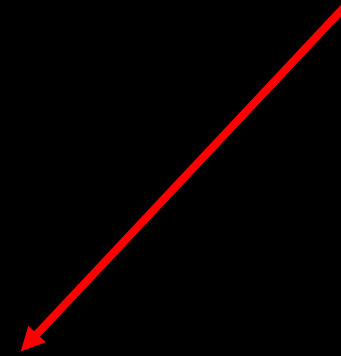
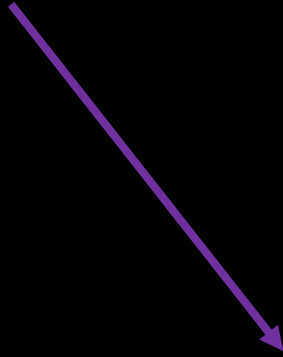
**Traits of Parents**

**Traits of Nest**



**Parental Care**

**Climate**



# Traits of Parents

- Age
  - Reproductive Value (RV): present + future
  - **Predict:** Older parents provide more care
- Sex
  - Biparental care
  - Monogamous
  - **Predict:** Similar levels of care



# Traits of Parents

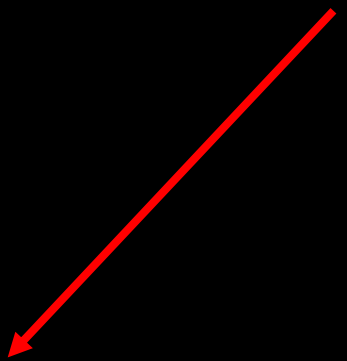
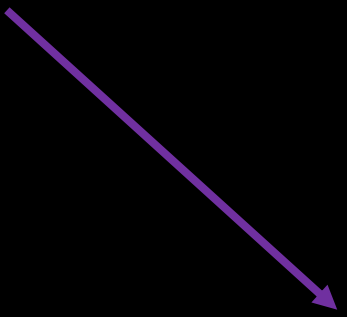
# Traits of Nest

Age

Sex

Parental Care

Climate



# Traits of Nest

- Age of young
  - Older = higher probability of surviving = higher RV
  - **Predict:** Older receive more care
- Time of year
  - Later nest offspring have higher survival = higher RV
  - **Predict:** Later in the year receive more care



## Traits of Parents

## Traits of Nest

Age

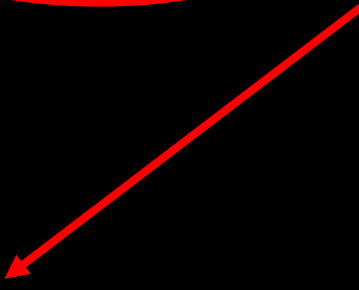
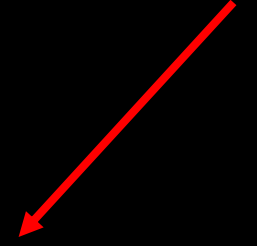
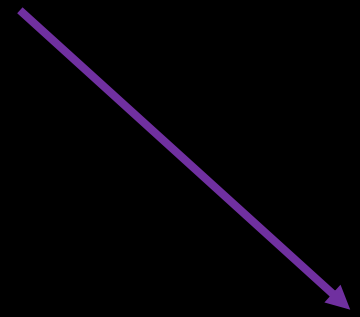
Sex

Age of Young

Time of Year

Parental Care

Climate





# Climate



Scale	Factor	Justification	Prediction
Daily	Temperature	Development of young	Colder temp, more care
	Rain	Ectoparasites and time needed to forage	More rain, more care
Monthly	Rain	Distribution/Abundance of Resources	More rain, more care
Annually	Rain	Distribution/Abundance of Resources	More rain, more care

# Traits of Parents

# Traits of Nest

Age

Sex

Age of Young

Time of Year

**Parental Care:**

Daily Temp

Daily Rain

**Climate**

Monthly Rain

Yearly



50 min



20 min



40 min



10 min



60 min

## Parental Care

Attentiveness

On-bouts

Off-bouts

Total time on nest

Average time off nest

Average time on nest

Total food brought over hour

Number of visits per hour

Average size of prey

Total Food

Provisioning Rate

Prey Load

## Parental Care

Attentiveness

On-bouts

Off-bouts



Prey load:  $0.5 \text{ length} \times 1 \text{ width} = 0.5 \text{ relative to beak}$

# Study Species – *Thamnophilus atrinucha* (antshrike)

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- Biparental care
- Parental care alters juvenile survival
- Forest understory insectivores – sensitive to environmental changes





# Methods

- Nest Videos
  - Incubation (699 hours) and nestling periods (222 hours)
  - Sample Size
    - Egg-days:  $N = 56$
    - Nestling-days:  $N = 18$
- Vocal Recordings to age adults
  - $N = 50$
  - Range: 1 – 13 years



# Traits of Parents

# Traits of Nest

Age

Sex

Age of Young

Time of Year

**Parental Care:**

Daily Temp

Daily Rain

**Climate**

Monthly Rain

Yearly

# Traits of Parents

# Traits of Nest

Age

Sex

Age of Young

Time of Year

**Parental Care:  
Attentiveness**

Daily Temp

Daily Rain

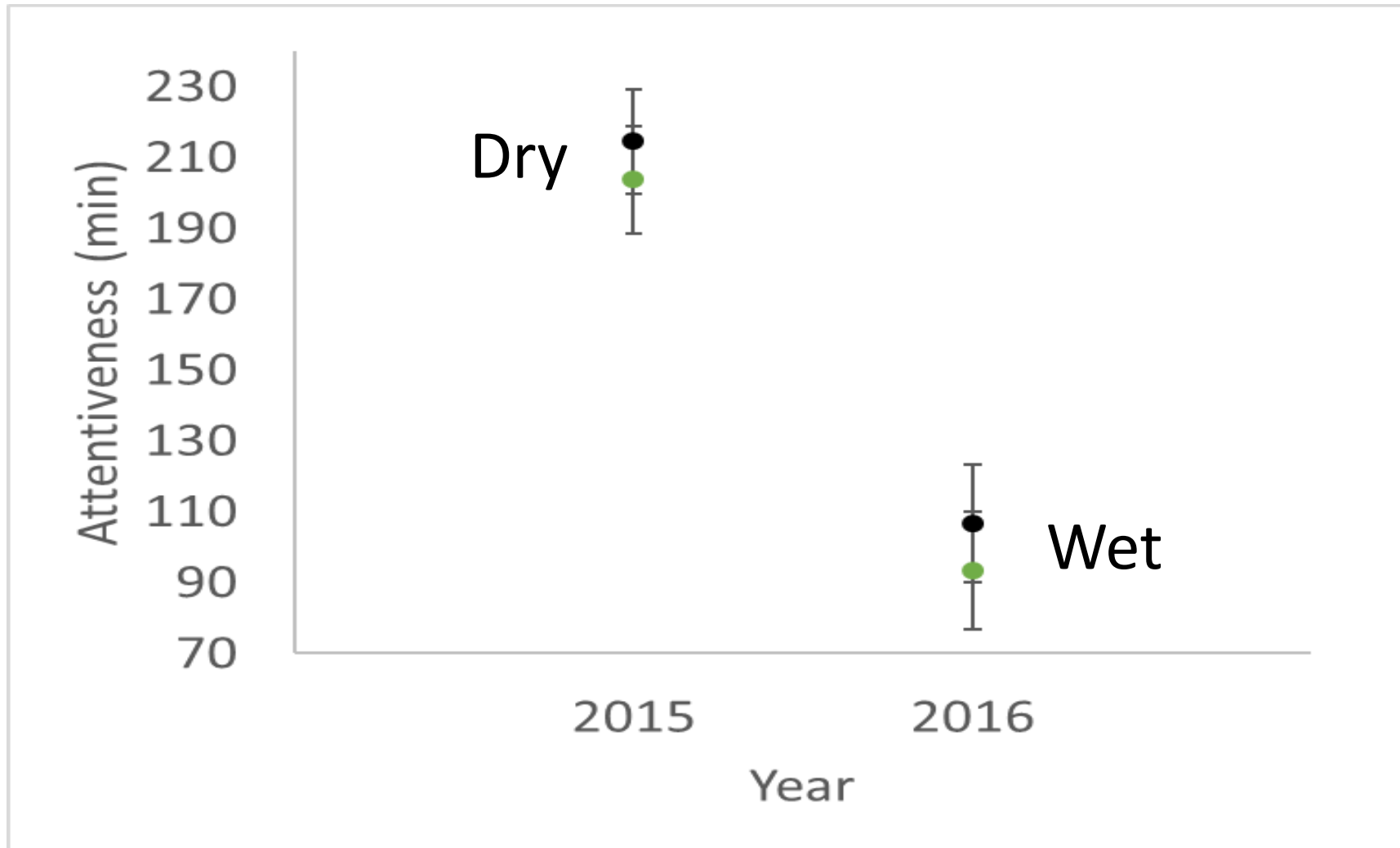
**Climate**

Monthly Rain

Yearly

# Attentiveness was greater in 2015

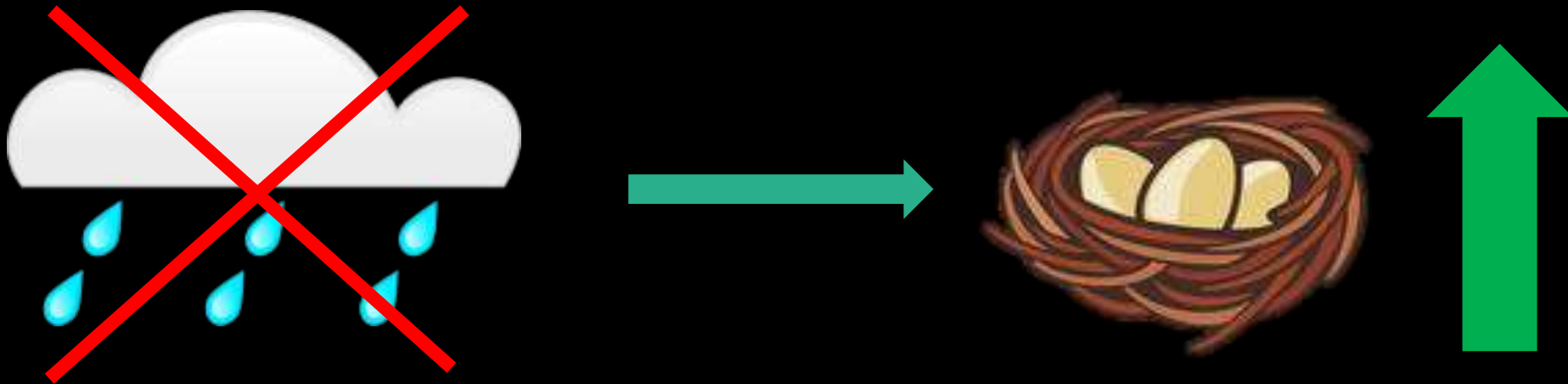
● = Male ● = Female



# Attentiveness Conclusions

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- Fewer breeding attempts in drier year, increased attentiveness to nests



# Traits of Parents

Age

Sex

# Traits of Nest

Age of Young

Time of Year

**Parental Care:  
On-bouts**

Daily Temp

Daily Rain

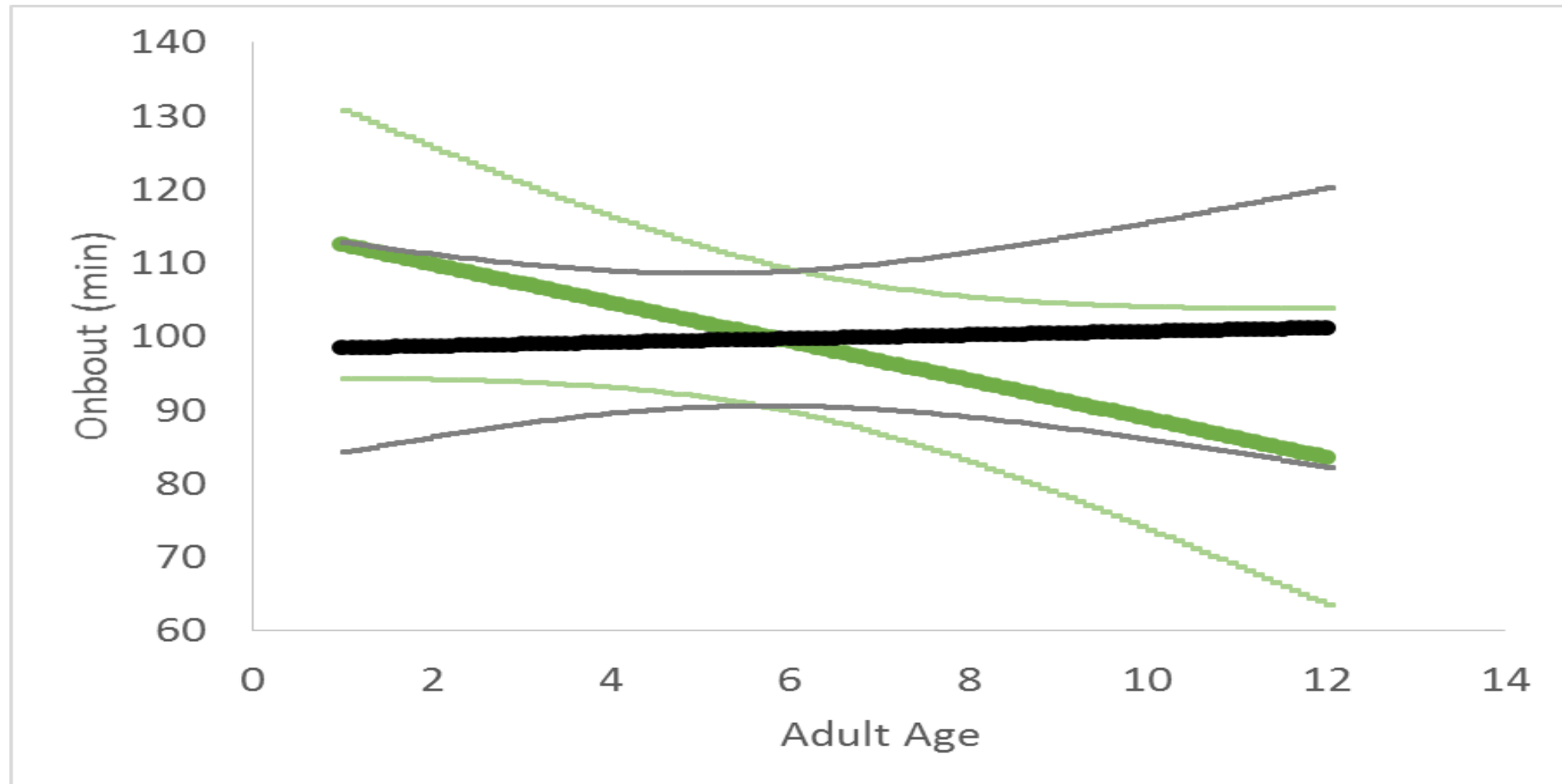
**Climate**

Monthly Rain

Yearly

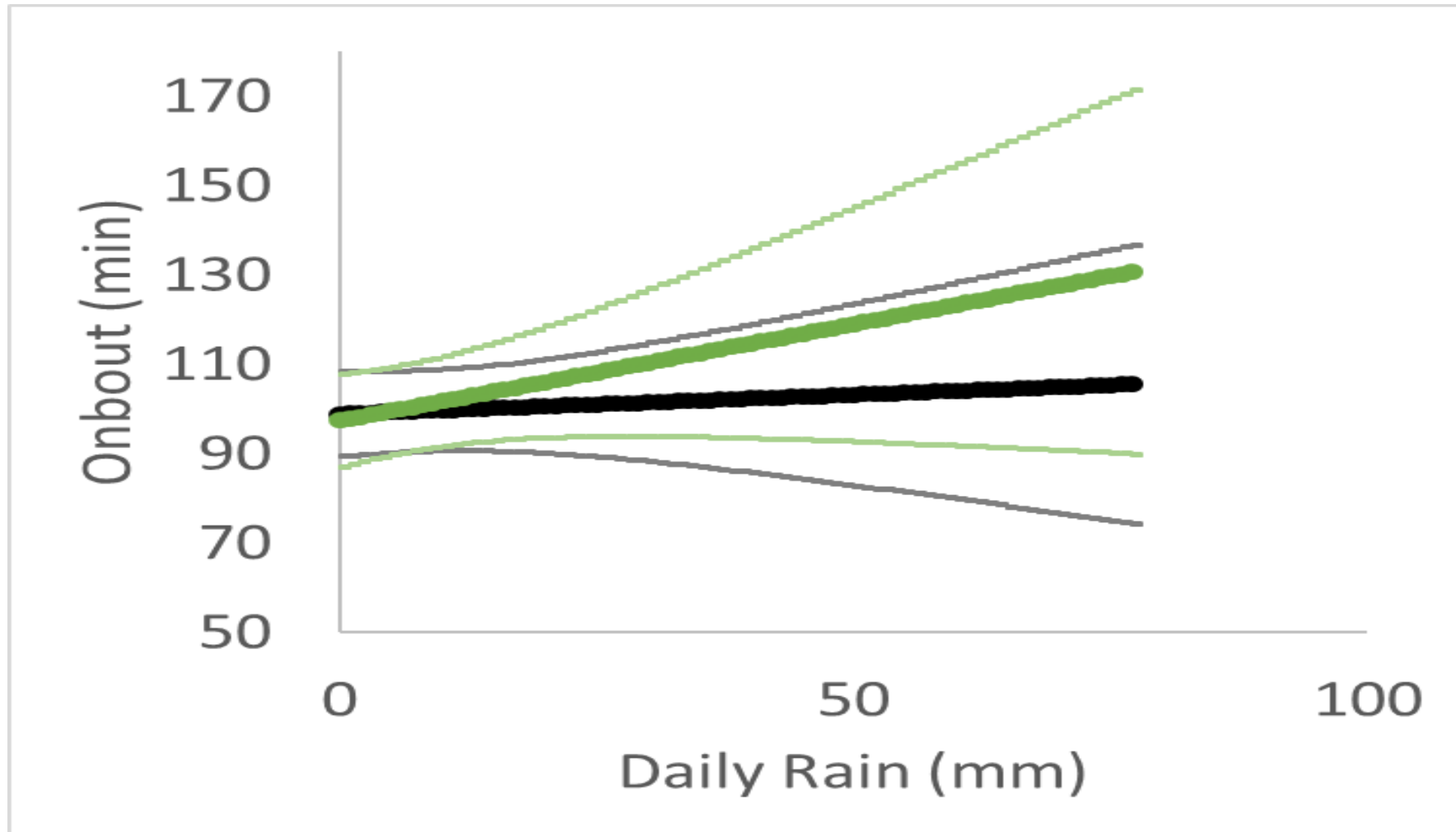
# Older Females Had Shorter On-bouts

● = Male ● = Female



# Females Had Longer On-bouts with Higher Daily Rain

● = Male ● = Female



# On-bout Conclusions

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- Decreased condition of older females
- Females more responsive than males to immediate weather



# Traits of Parents

Age

Sex

# Traits of Nest

Age of Young

Time of Year

**Parental Care:  
Off-bouts**

Daily Temp

Daily Rain

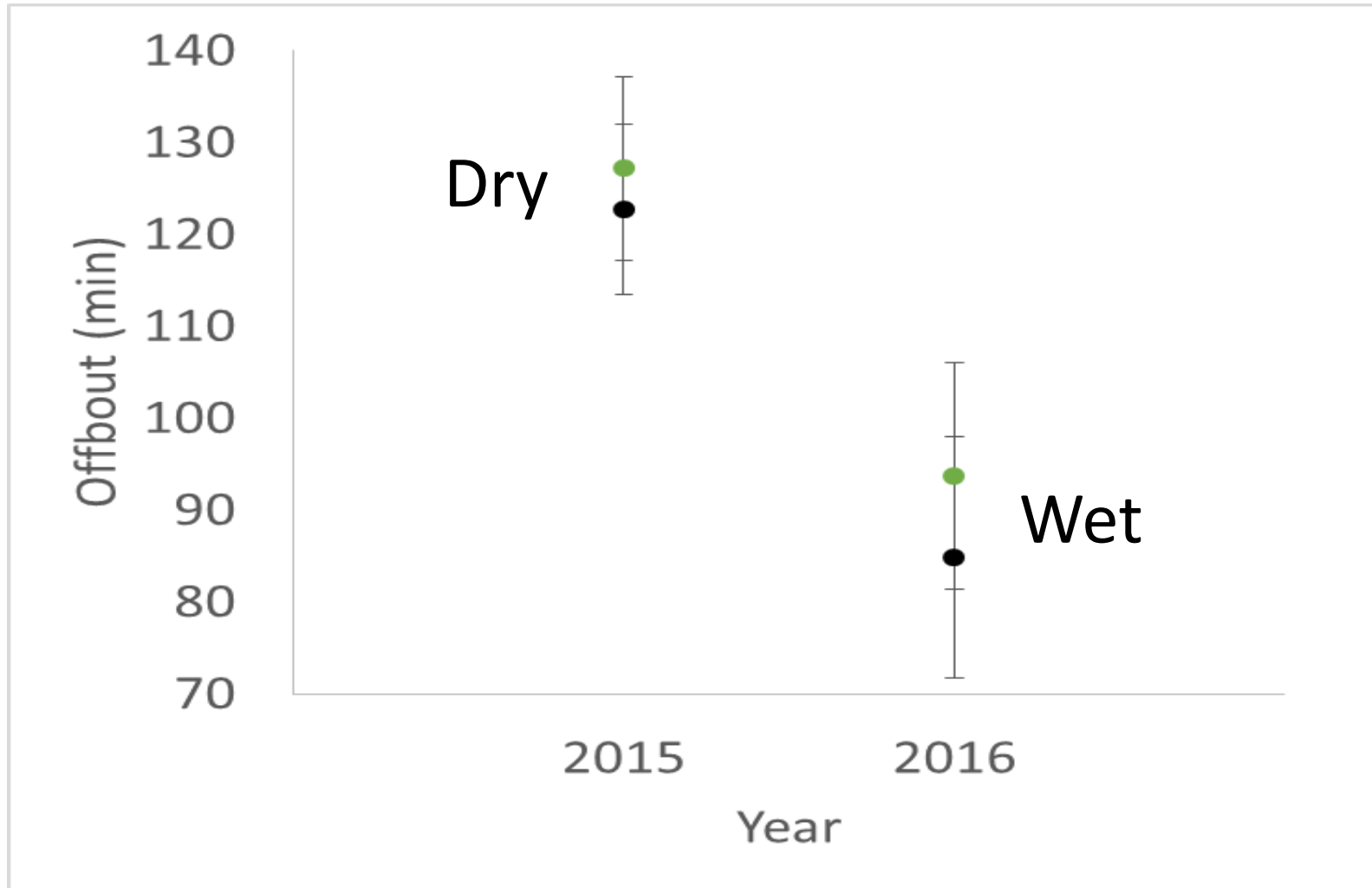
**Climate**

Monthly Rain

Yearly

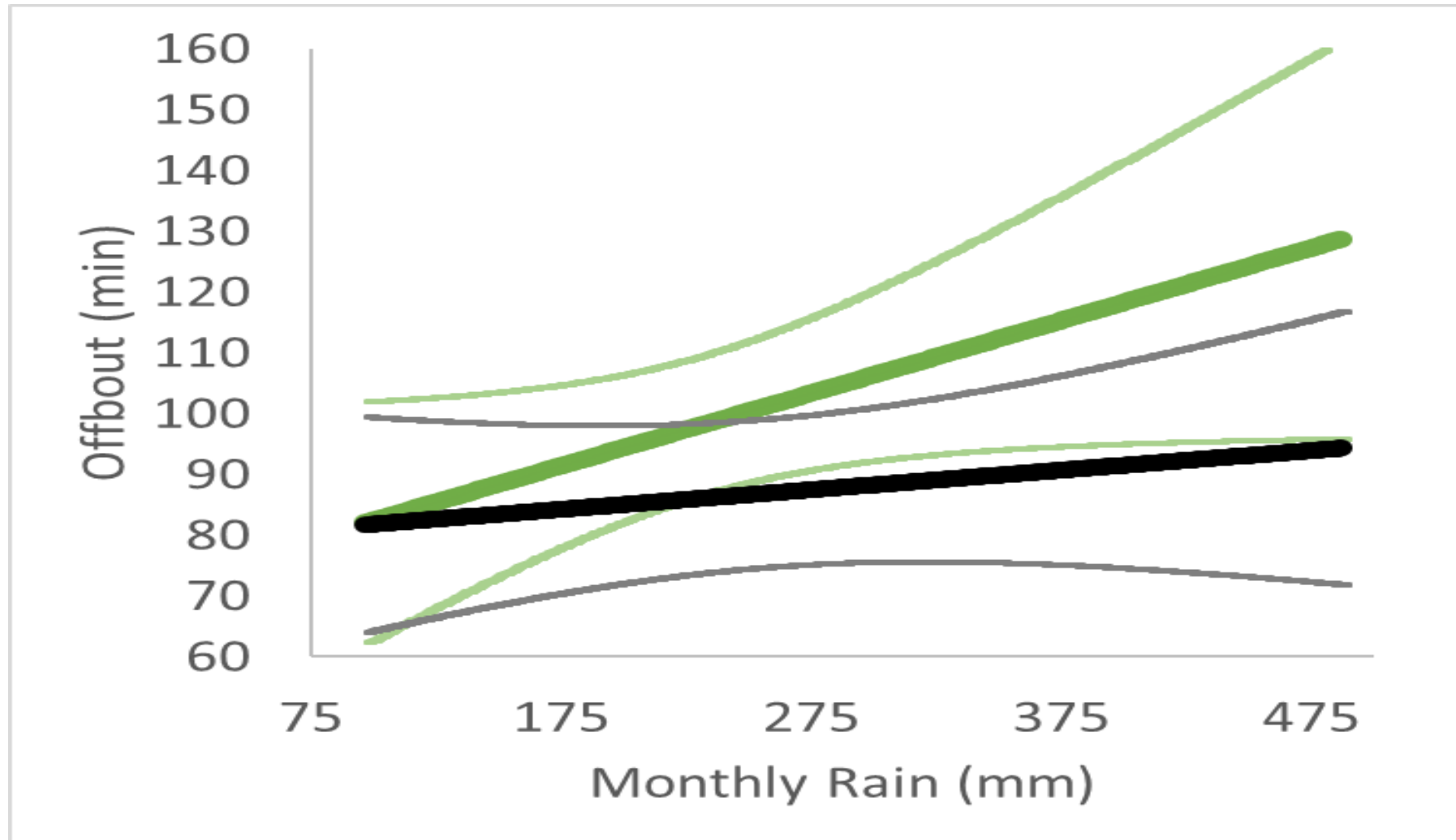
# Longer Off-bouts in 2015

● = Male ● = Female



# Off-bouts Longer with More Monthly Rain

● = Male ● = Female



# Off-bout Conclusions

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- Drier year and too much monthly rain may require more time off nest for maintenance and defense



# Traits of Parents

# Traits of Nest

Age

Sex

Age of Young

Time of Year

**Parental Care:  
Total Food**

Daily Temp

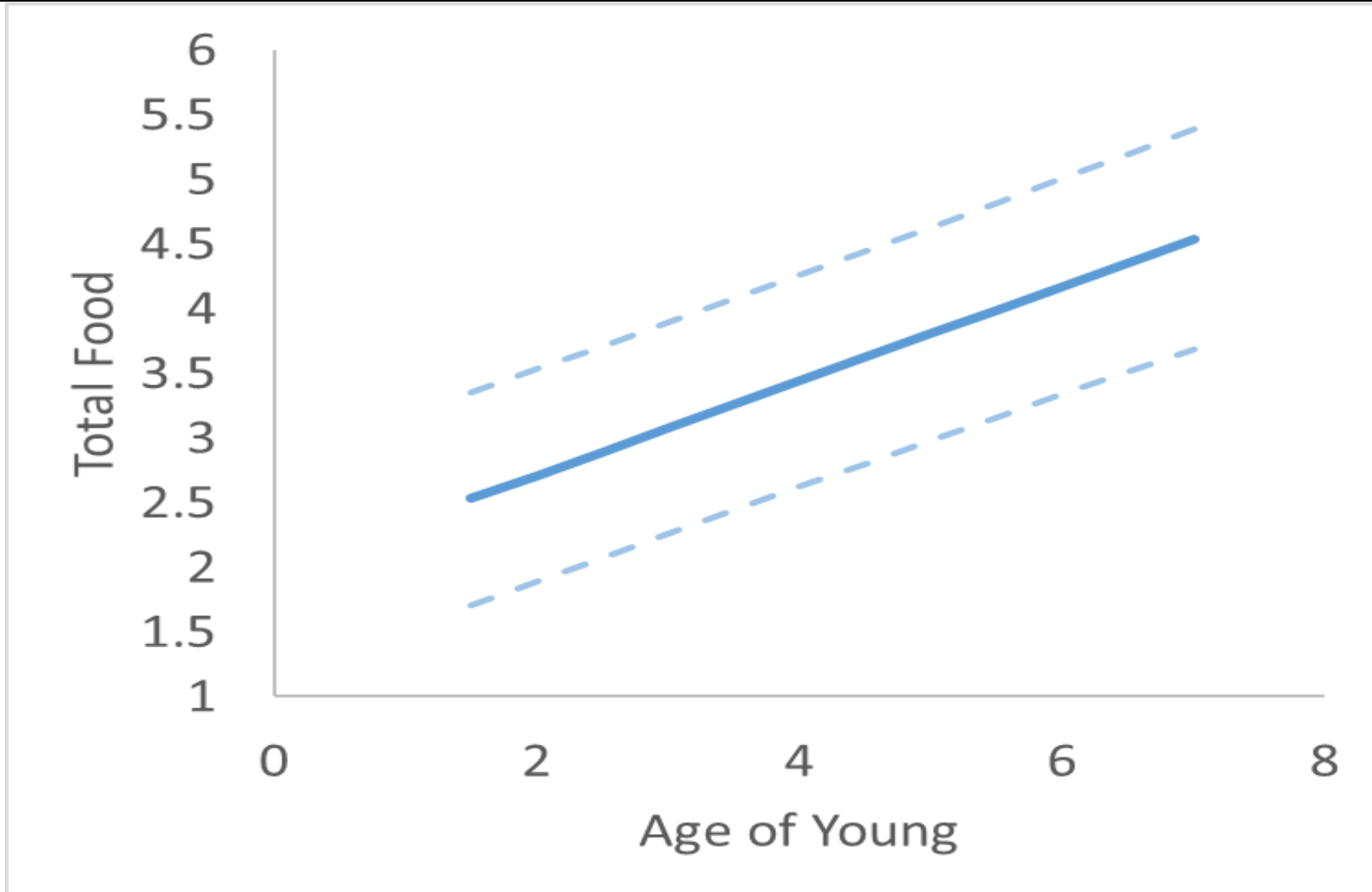
Daily Rain

**Climate**

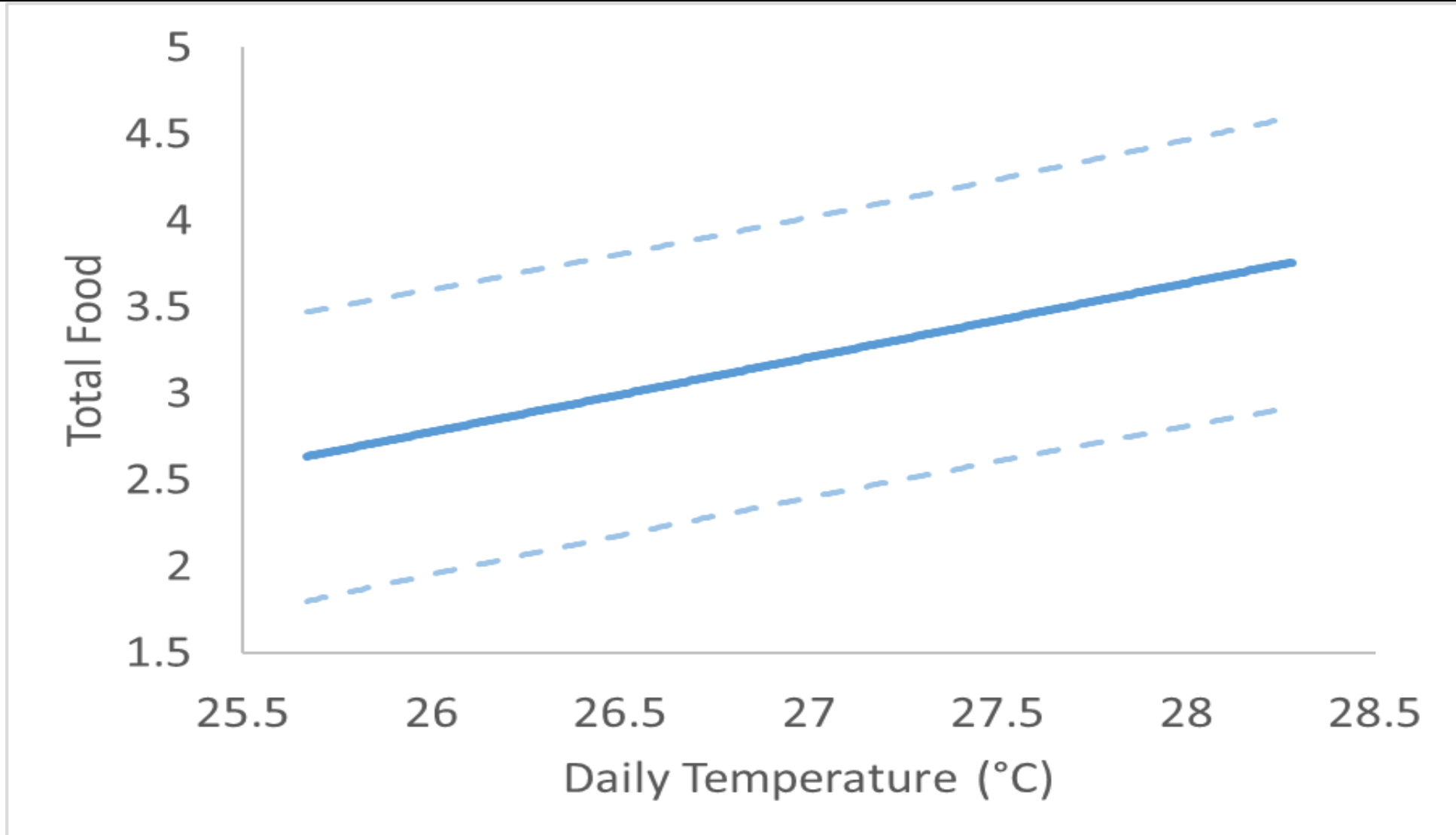
Monthly Rain

Yearly

# Total Food Increased with Age of Young

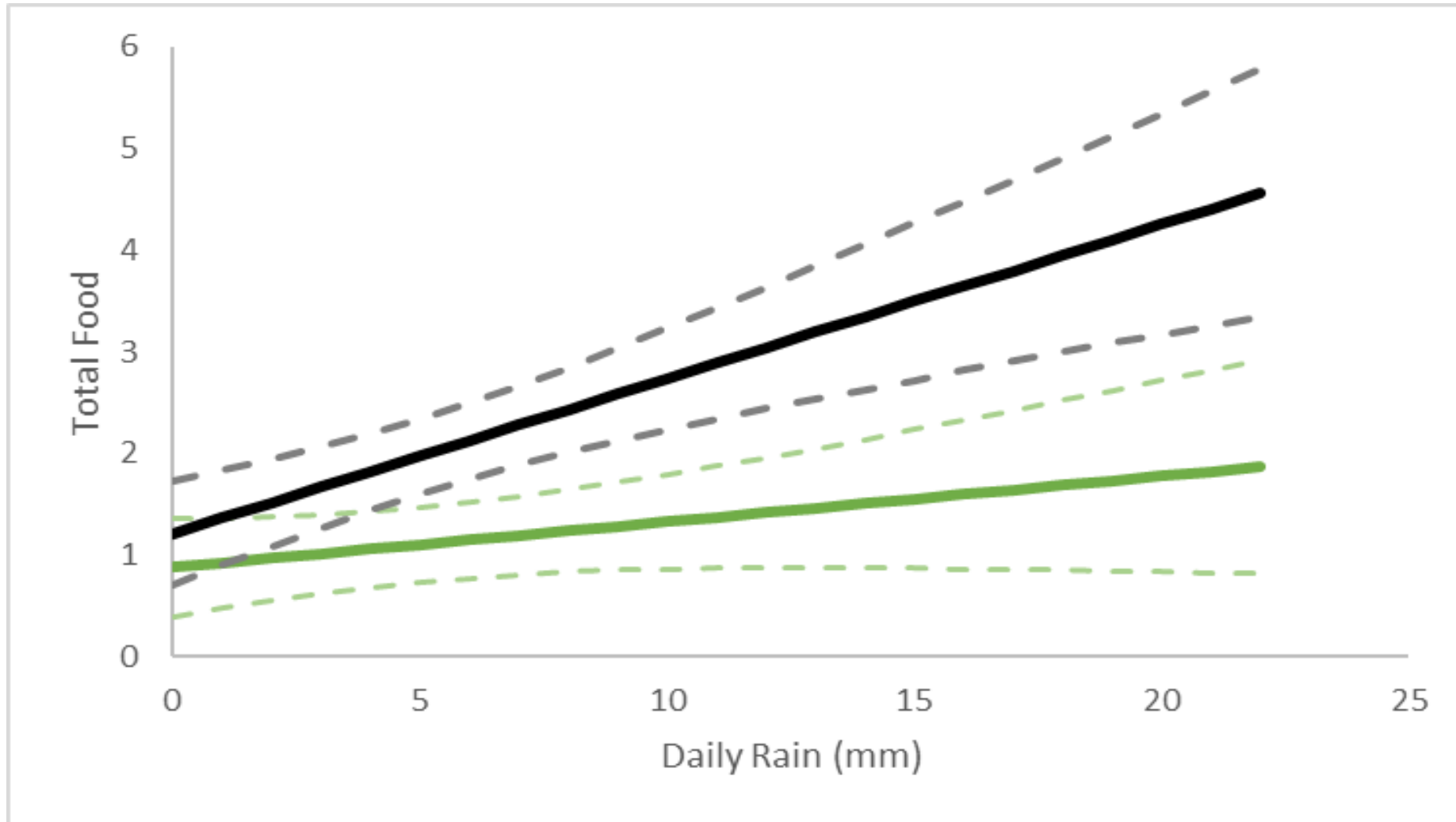


# Total Food Increased with Daily Temperature



# Males Increased Total Food with More Daily Rain

● = Male ● = Female



# Total Food Conclusions

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- Higher RV for older young
- Higher daily temperature later in the year when nest of higher RV
- Males more responsive than females to immediate weather



# Traits of Parents

Age

Sex

# Traits of Nest

Age of Young

Time of Year

**Parental Care:  
Provisioning Rate**

Daily Temp

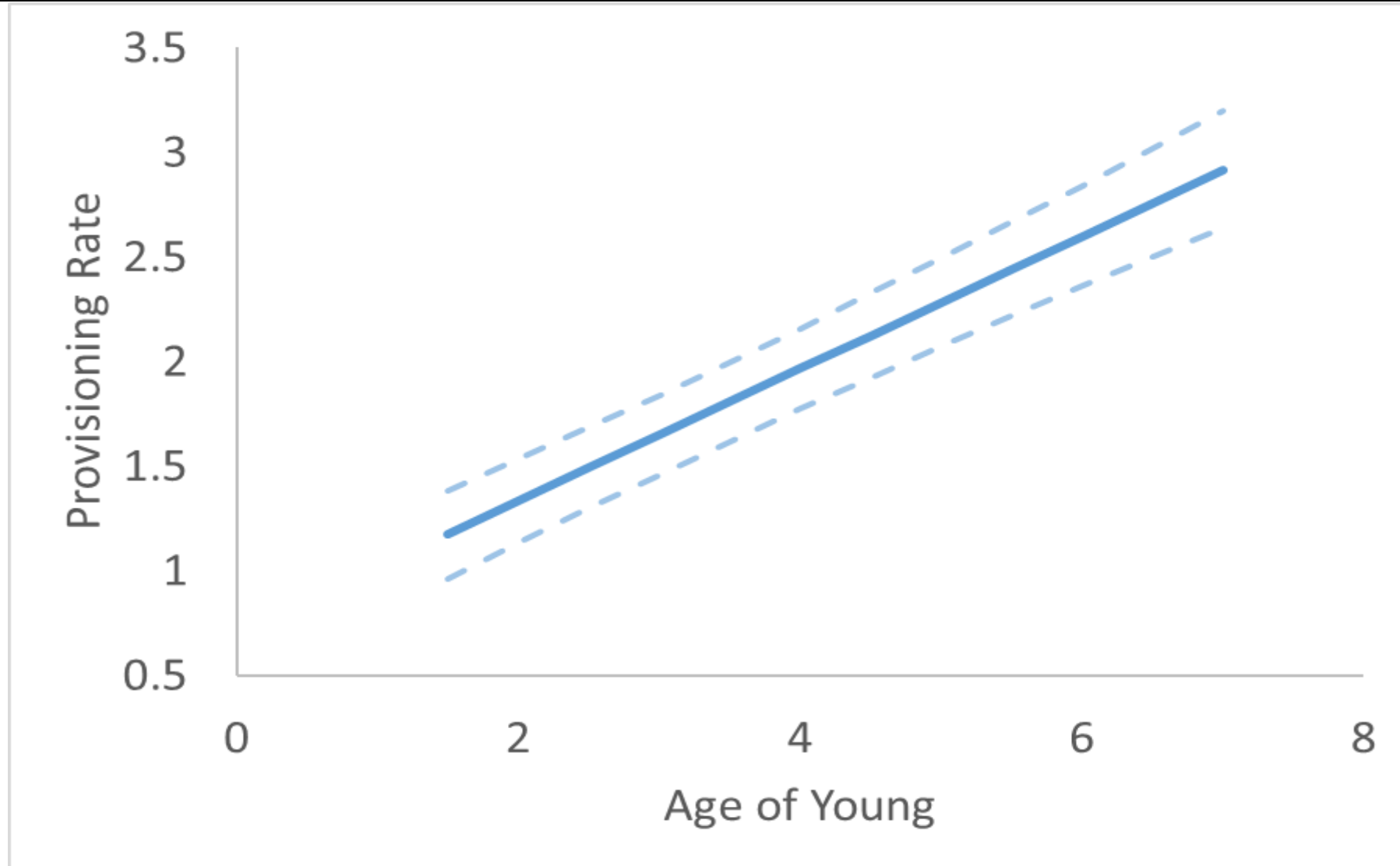
Daily Rain

**Climate**

Monthly Rain

Yearly

# Provisioning Rate Increased with Age of Young



# Provisioning Rate Conclusions

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- Reproductive value increases with age



# Traits of Parents

# Traits of Nest

Age

Sex

Age of Young

Time of Year

**Parental Care:  
Prey Load**

Daily Temp

Daily Rain

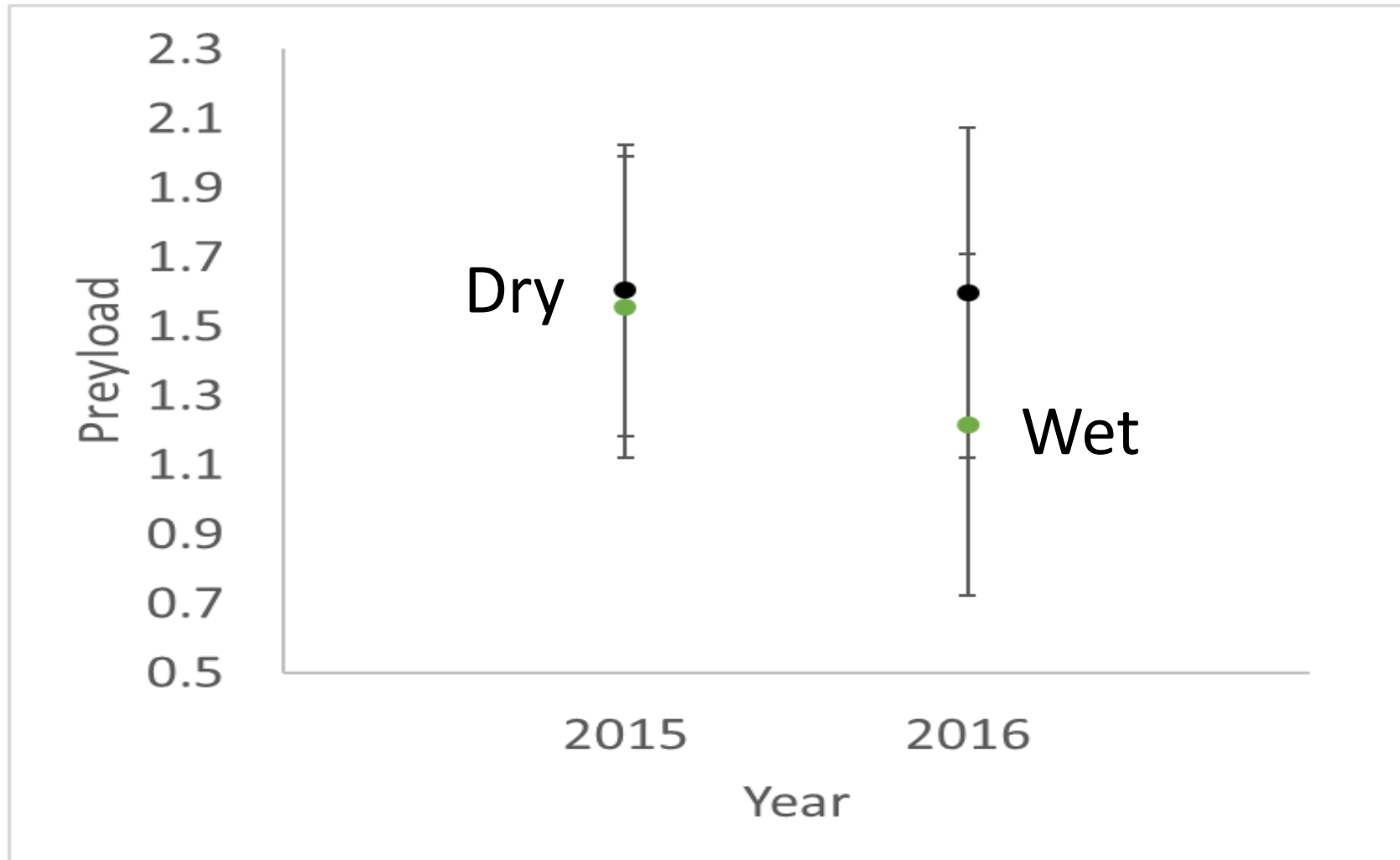
**Climate**

Monthly Rain

Yearly

# Females had Smaller Prey Loads in 2016

● = Male ● = Female



# Prey Load Conclusions

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- Female: Smaller food owing to changed food resources and/or reduced adult condition



# Overall Results

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Age of adult, year, and rain  
Female responsive to daily rain



Age of young, temperature, year, and rain  
Male responsive to daily rain

# Parental Care Comparisons

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Response Variable	Average	Temperate Region
Attentiveness	81.50 %	Higher
On-bouts	91.53 min	Lower
Off-bouts	21.33 min	Higher
Total food per nestling	2.67 / hour	Lower
Provisioning rate per nestling	1.75 / hour	Higher
Prey load per nestling	1.37 / hour	Lower

# Overall Conclusions

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- Increased provisioning with age of young supports other studies
- Temperate studies find stronger impacts from temperature
- Rainfall strongly influences parental care in tropics

## Temperate Regions



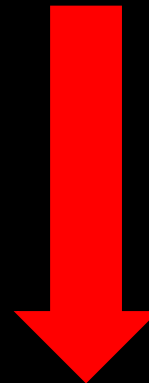
## Tropical Regions



# Why it matters

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- Predicted drying trends for Panama with climate change
  - Decreased juvenile recruitment and decreased population growth
- Results:
  - Had an **increase** in parental care in drier year



# Acknowledgements

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