

**Patterns and Consequences of Nest-site Selection  
by Ferruginous Pygmy-owls and Application  
to Management Using Nest Boxes**

**Aaron D. Flesch**

*School of Natural Resources*

*University of Arizona*



# *Objectives*

- Resources important in selection
- Resources important to reproductive performance
- Important spatial scales
- Application to nest-box program



# *Design*

- Random and nonrandom surveys
- Paired samples
- Spatial scales nested hierarchically
  - Cavity
  - Substrate
  - Area
    - 15-, 30-, 90-m plots
- Two vegetation communities



# *Environmental Measurements I*

## *Cavity Scale*

- Entrance area
- Height
- Orientation
- Visibility
- Arm or Trunk
- Volume – Stem Bulge

## *Substrate Scale*

- Height
- Diameter at breast height
- Upland or Riparian
- No. Arms
- No. Cavities





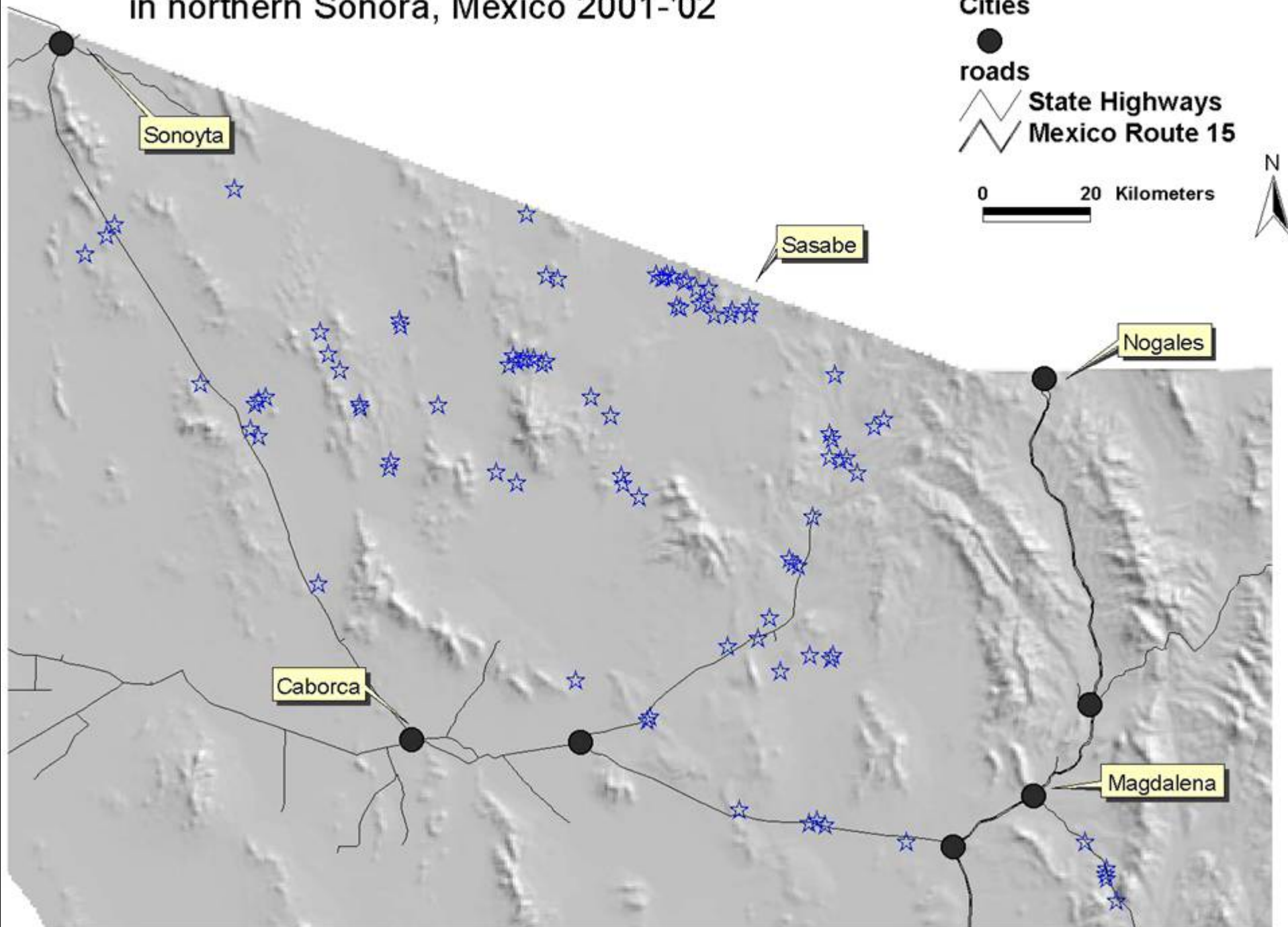
# *Environmental Measurements II*

## *Area Scale*

- Vegetation height, density, and volume
- Species composition
- Formation cover
- Distance to wash and vegetation edge



# Distribution of ferruginous pygmy-owl nest sites in northern Sonora, Mexico 2001-'02



## *Selection - Cavity Scale*

- Factors that explained selection
  - Entrance Area -
  - Cavity Volume +
  - Height +
  - Orientation





# *Selection - Substrate Scale*

- Factors that explained selection
  - No. of Cavities +
  - No. of Arms +
  - Height +





# *Selection - Area Scale in Grasslands*

- Factors that explained selection...

- **15-m Scale**

- Cavity density +
- Max. tree height +
- Saguaro volume +

- **30-m Scale**

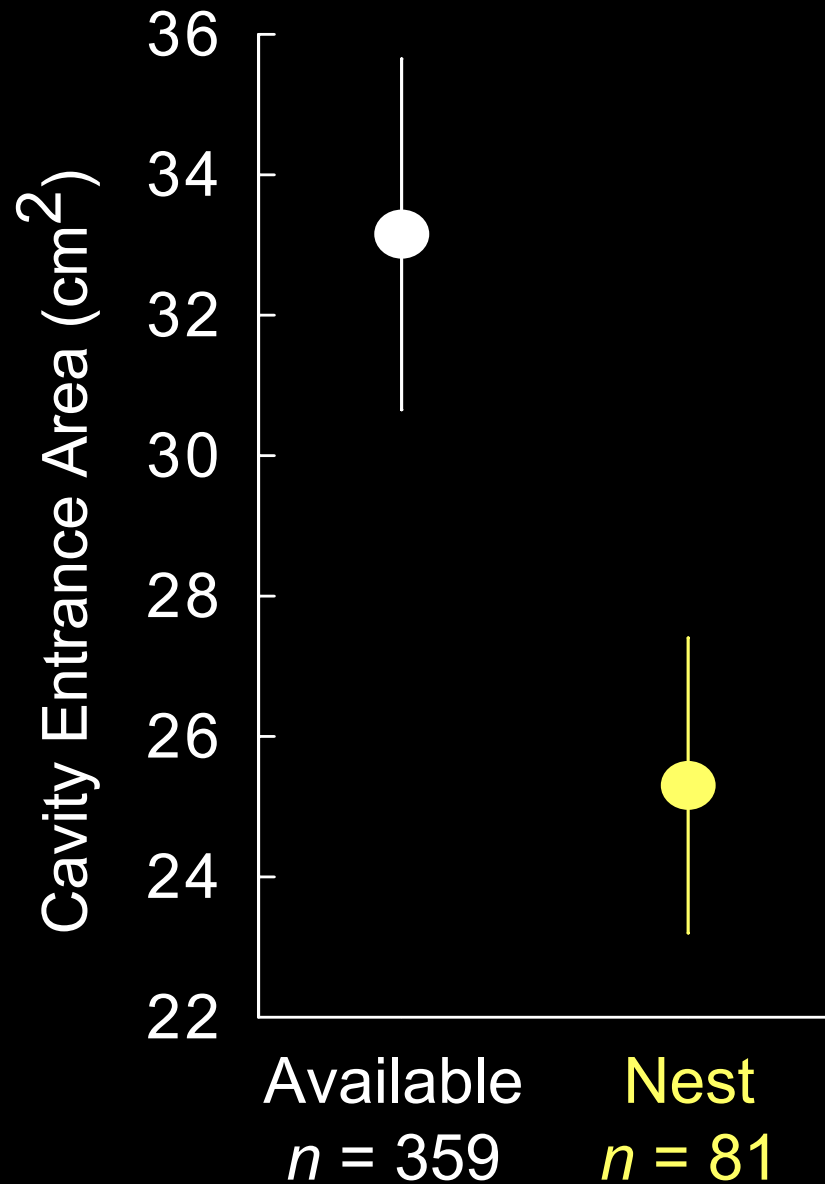
- Woodland cover +
- Saguaro volume +

- **90-m Scale**

- Vegetation volume 3 - 12 m +
- Desert hackberry volume +



## *Cavity Selection - Entrance Area*

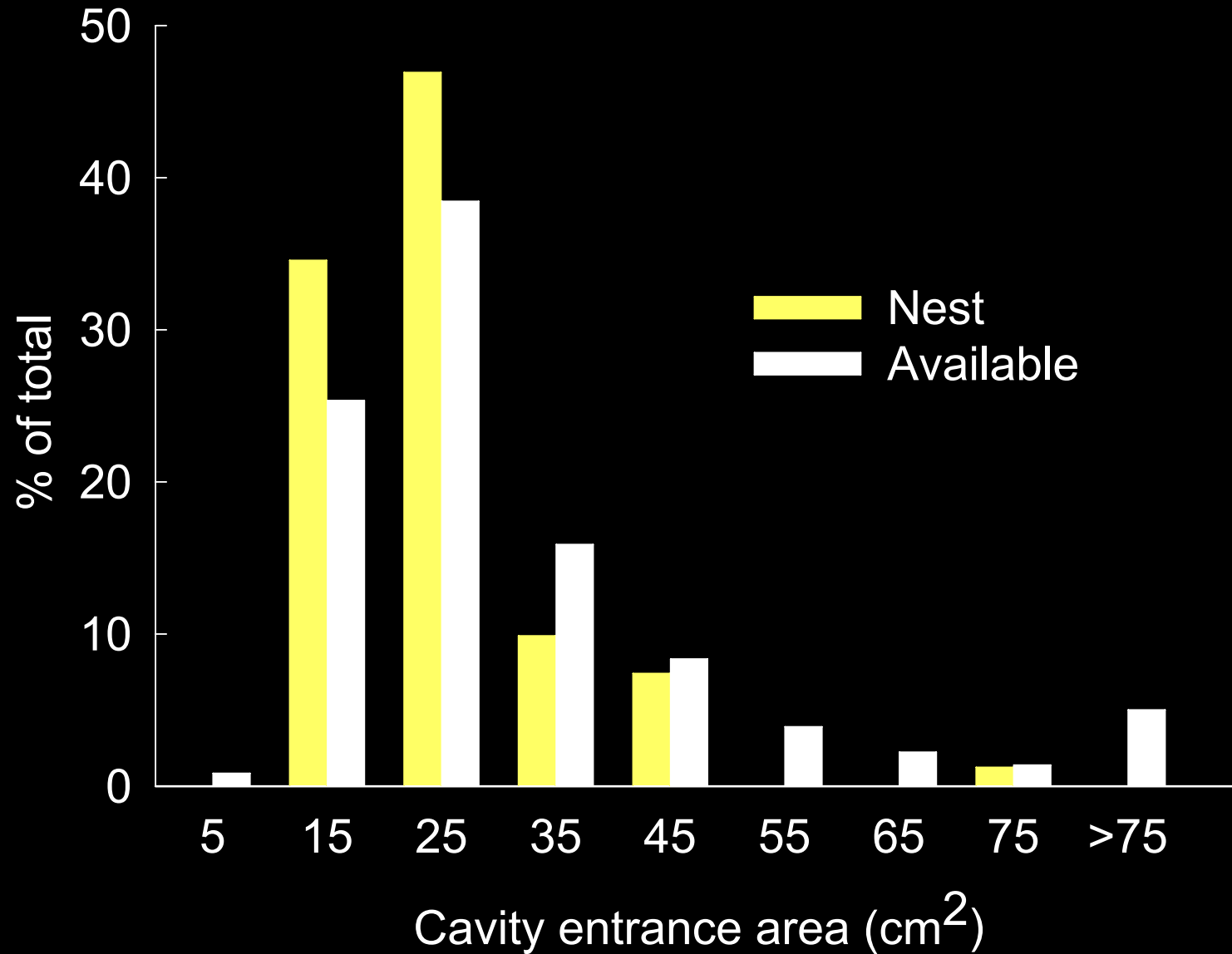


Odds = 0.94  $P = 0.0086$

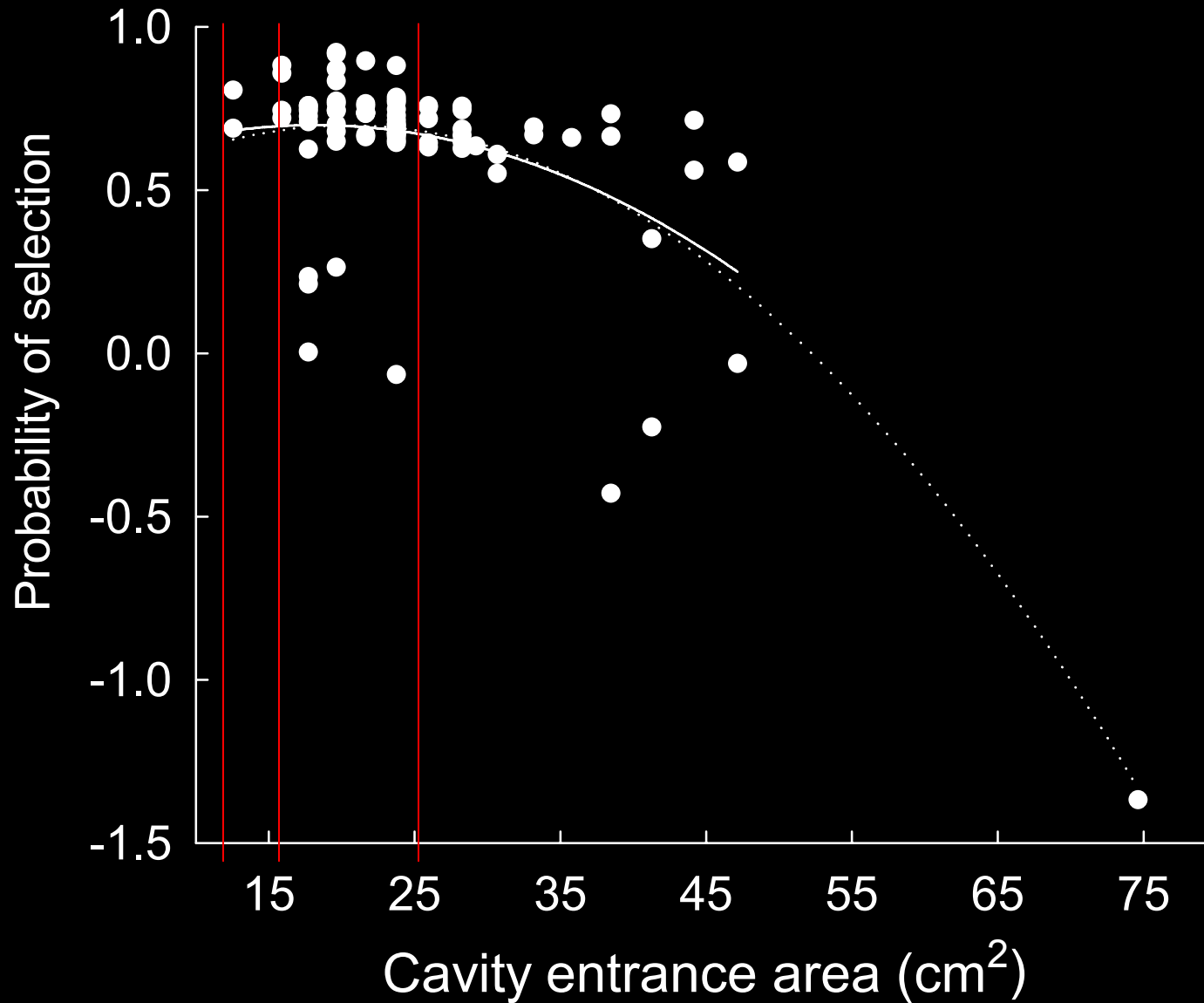
Mean (range) diameter

- vertical 5.5 cm (3.5-8.5)
- horizontal 5.8 cm (3.7-12.0)

## *Cavity Selection - Entrance Area II*

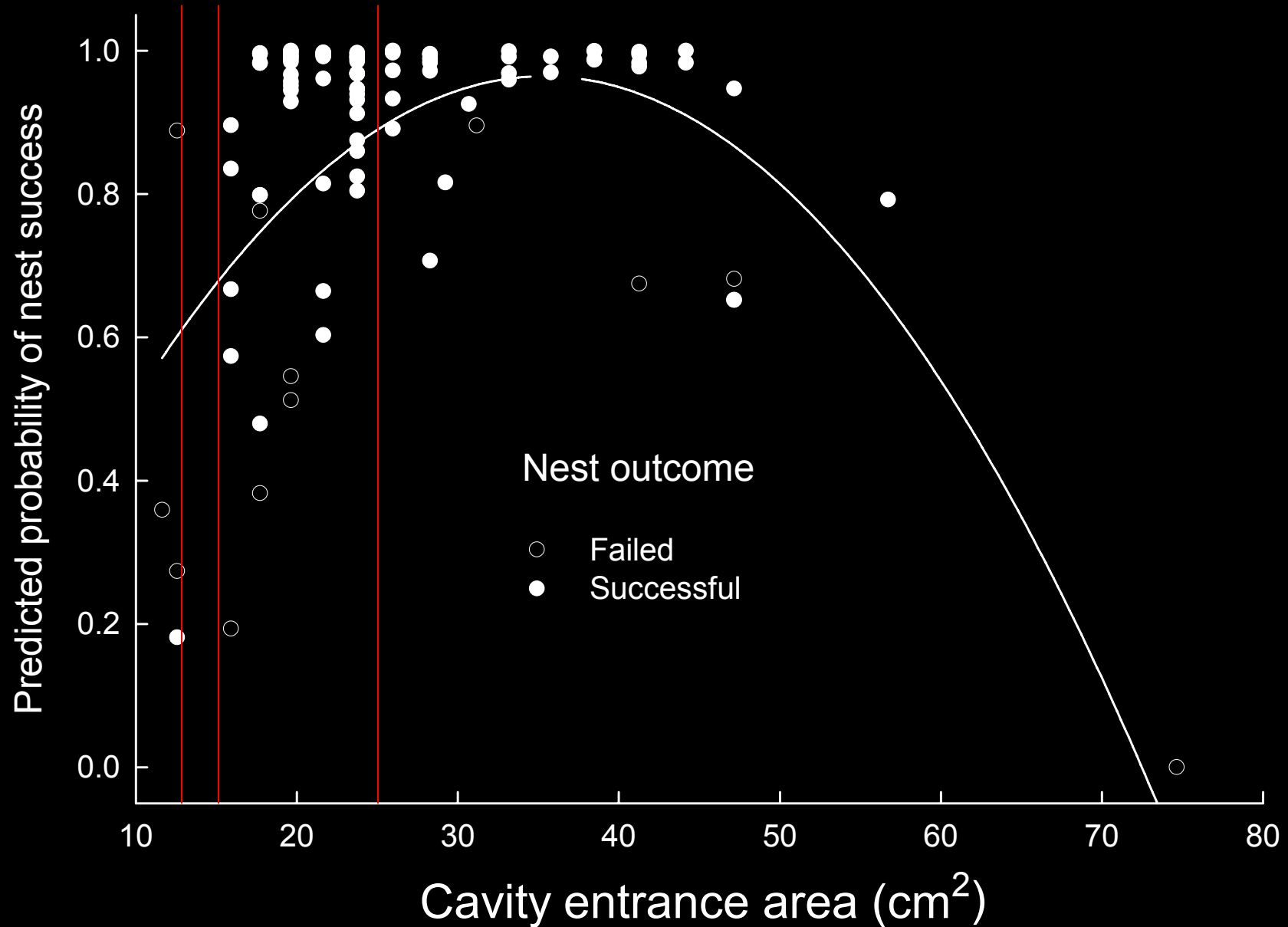


# *Cavity Selection - Entrance Area III*

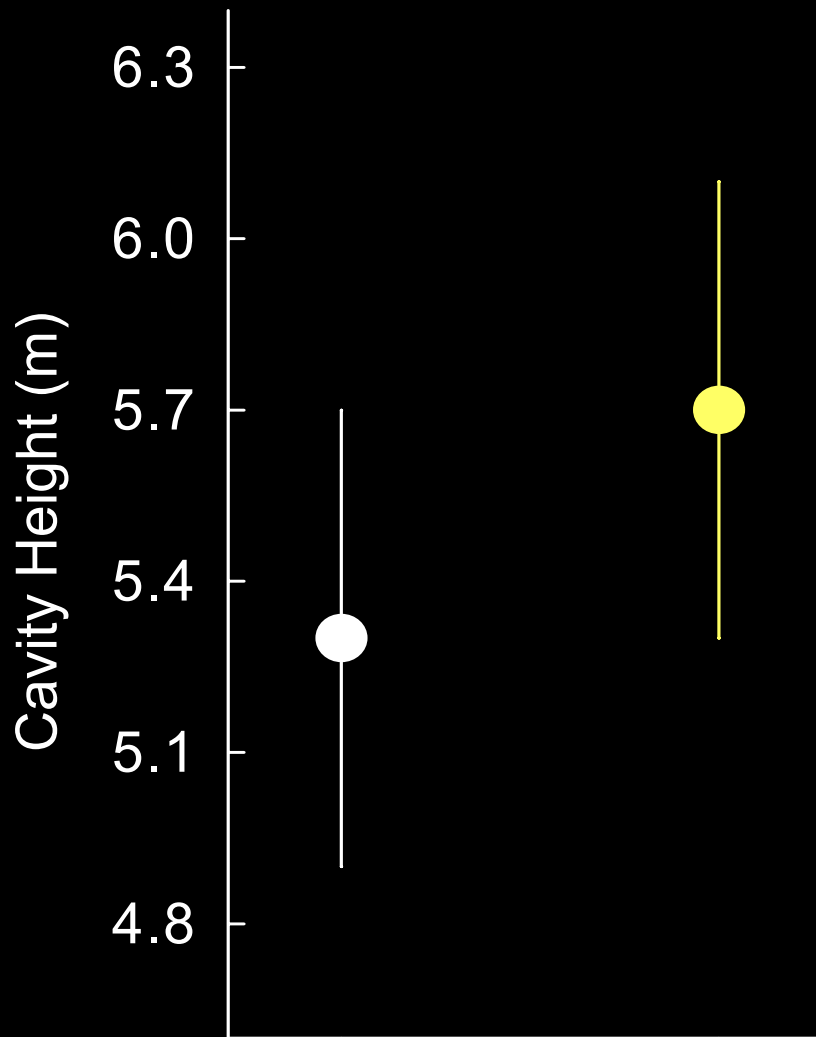




# *Reproductive Performance - Entrance Area*



# *Cavity Selection – Height*



Range = 2.9 - 9.6 m

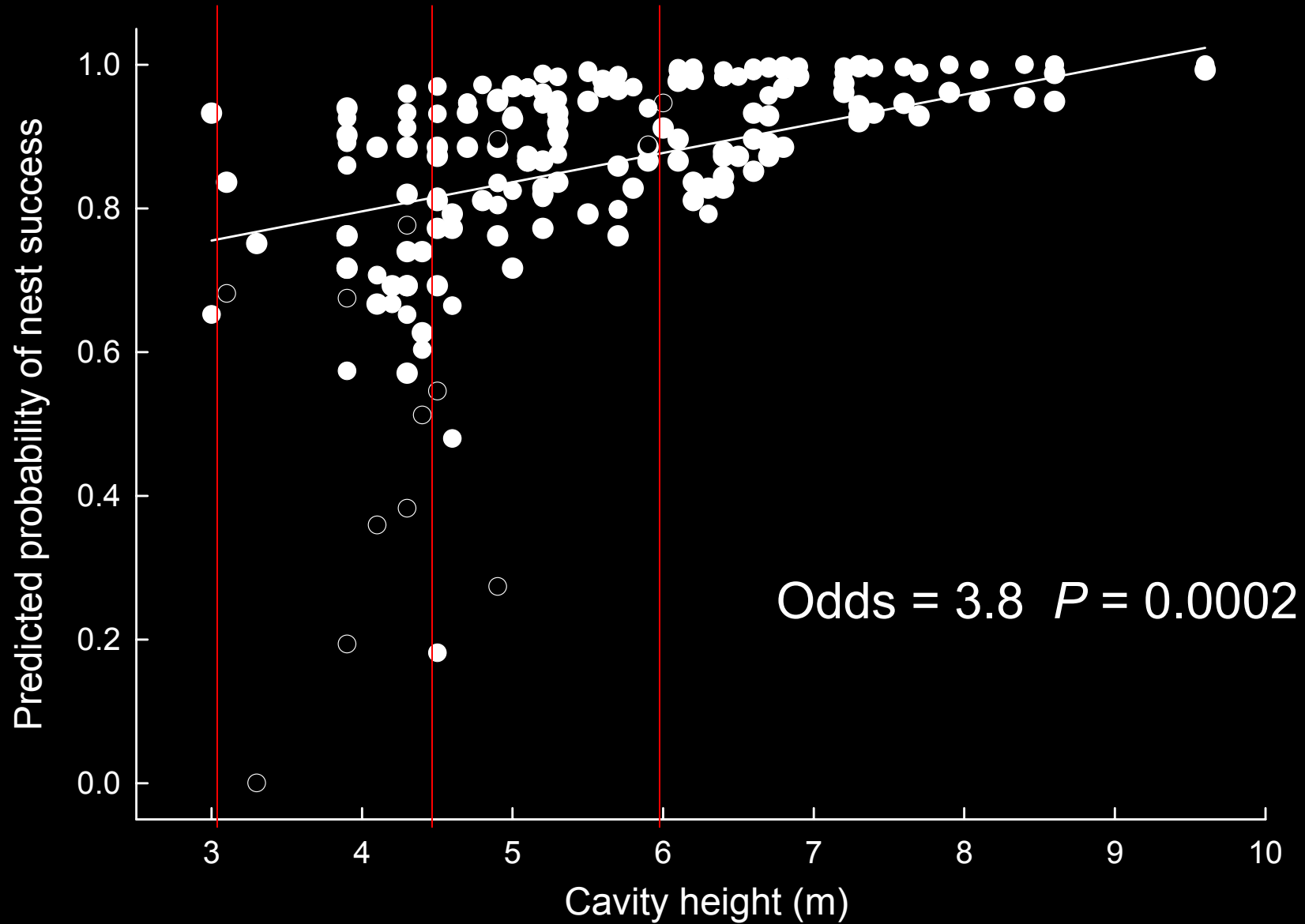
Odds = 1.4

$P = 0.046$

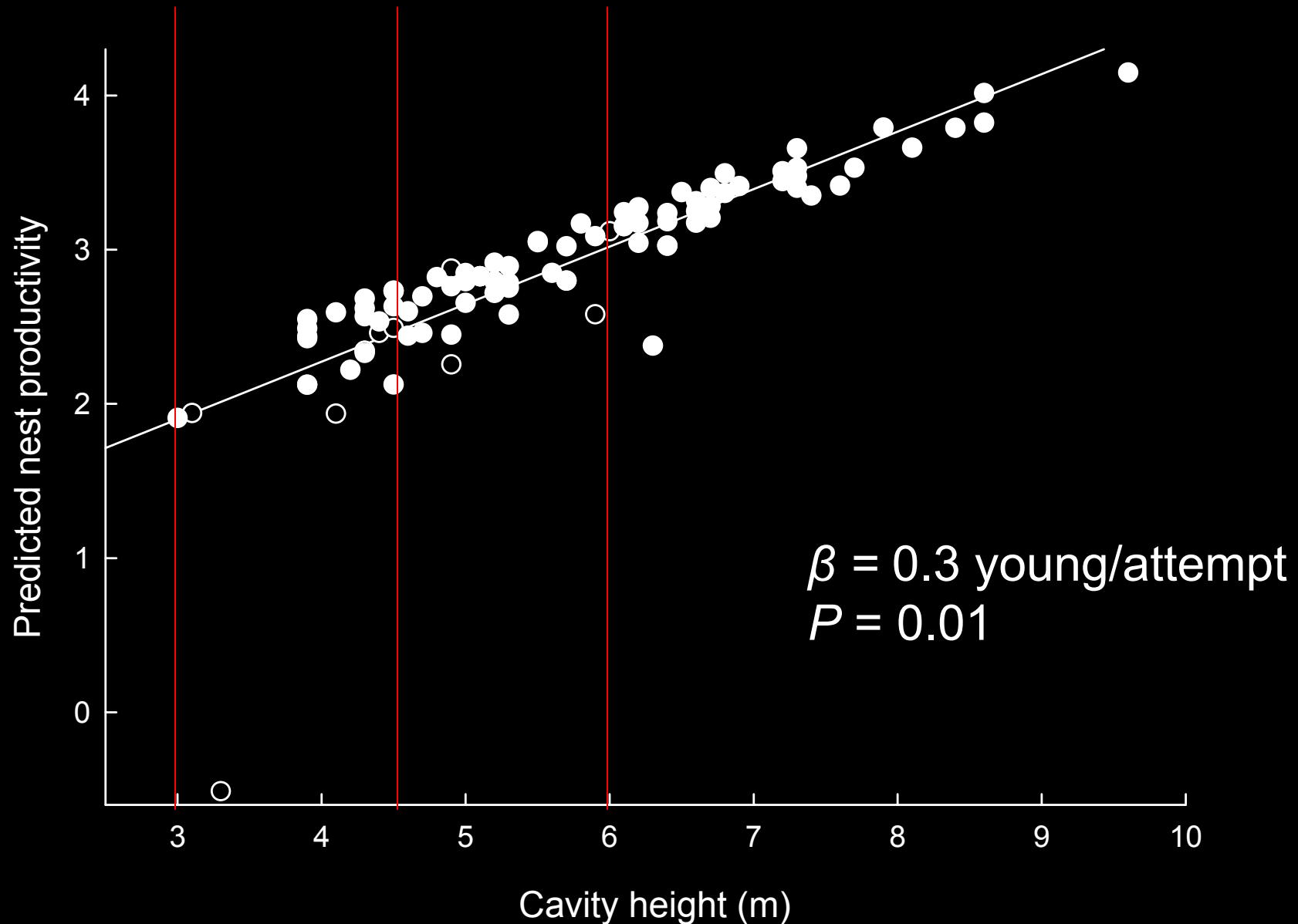
Available  
 $n = 359$

Nest  
 $n = 81$

# *Selection Consequences – Cavity Height I*



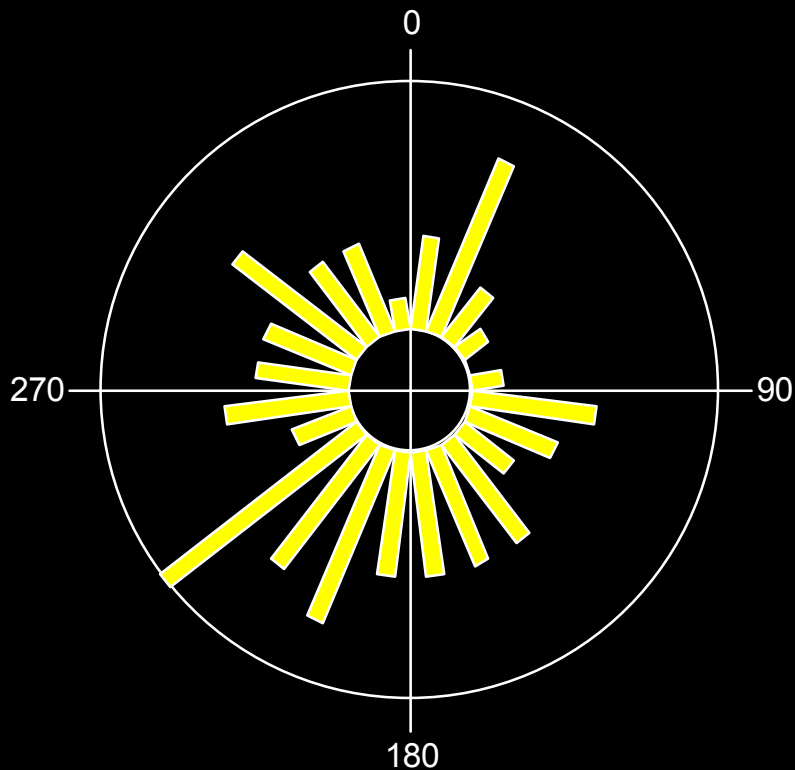
# *Reproductive Performance – Cavity Height II*





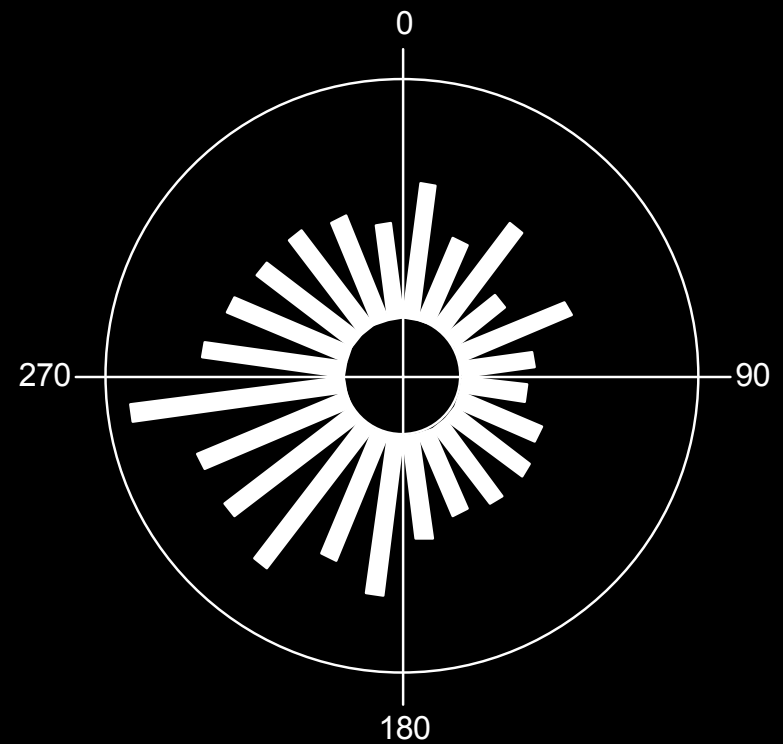
# *Cavity Selection – Orientation I*

Nest



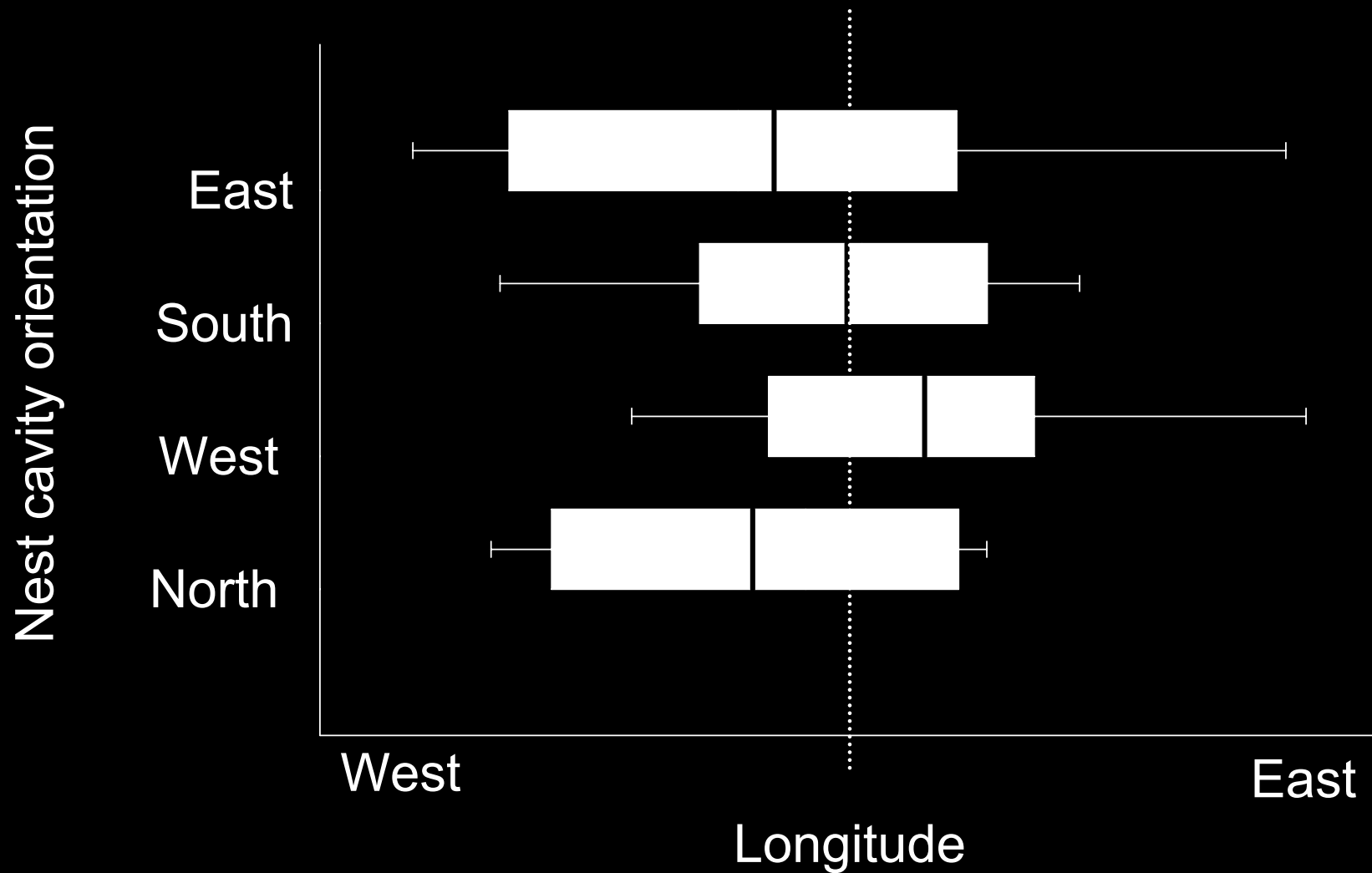
Mean = 224°

Available

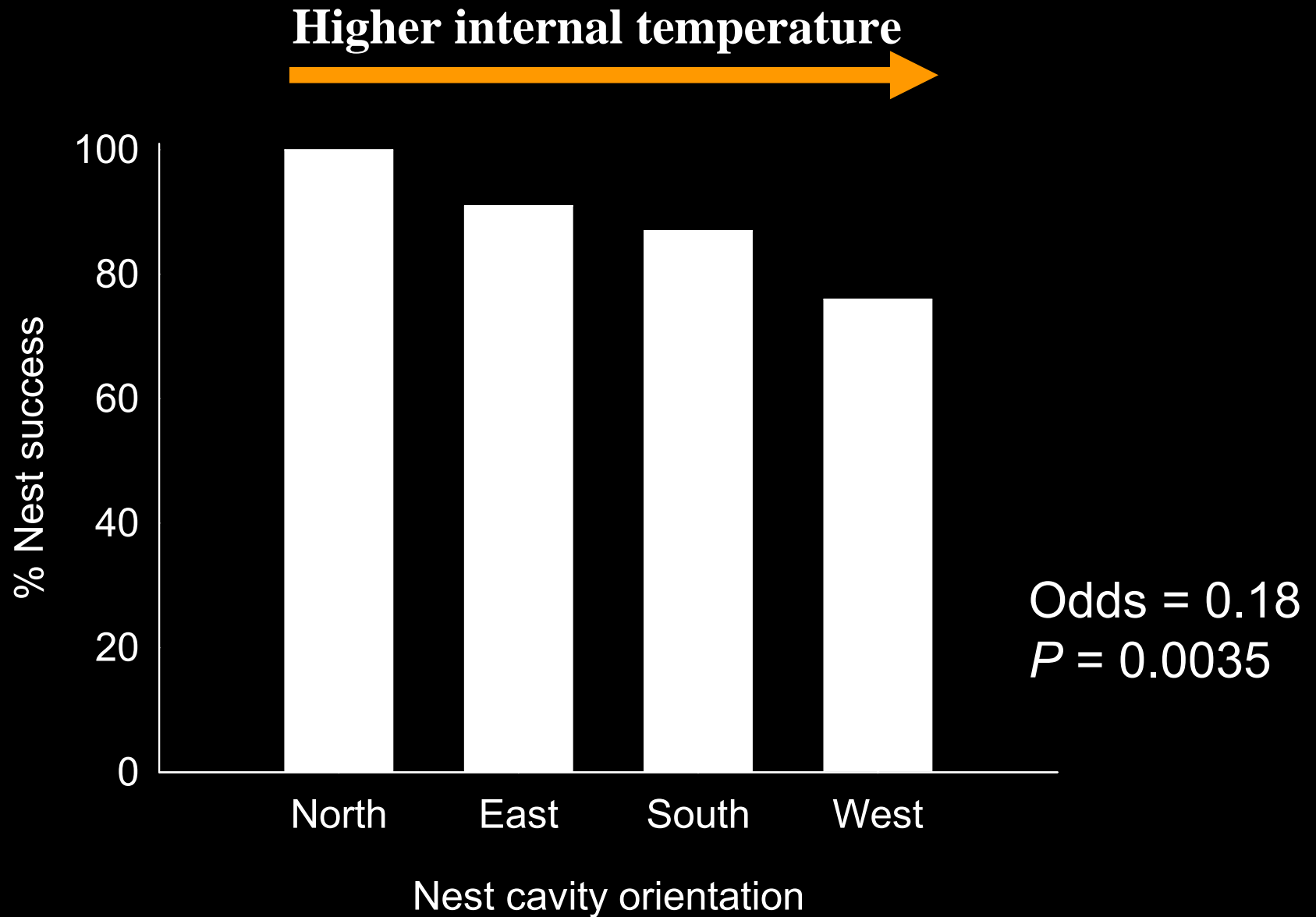


Mean = 253°

# *Cavity Selection – Orientation II*



# *Reproductive Performance - Orientation*



# *Reproductive Performance - Substrate Scale*

- Factors that explained nest success and productivity
  - Height +





# *Nest Success - Area Scales*

- Factors that explained nest success

## **Desertscrub**

- **15 m**

- Max. tree height +

- **30 m**

- Max. tree height +

- **90 m**

- Woodland cover +

## **Grasslands**

No Factors  $P < 0.25$

# *Nest Productivity - Area Scales*

- Factors that explained Productivity

## **Desertscrub**

- **15 m**

- Mean tree height +

- **30 m**

- Mean tree height +
- Total Veg. Volume  $\cap$

- **90 m**

- Desertscrub cover -
- Total Veg. Volume  $\cap$

## **Grasslands**

- **15 m**

- Mesquite density +

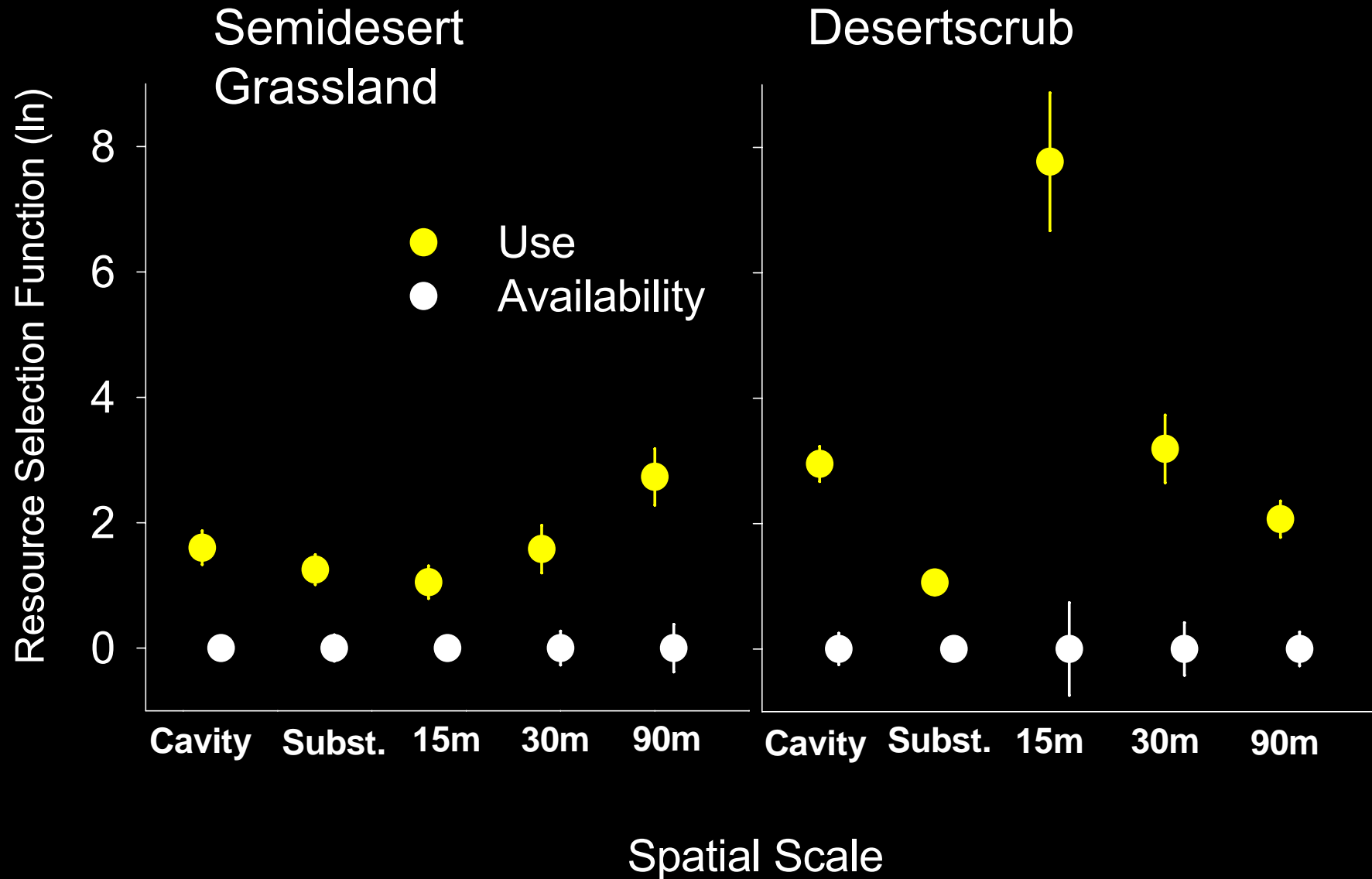
- **30 m**

- Veg. volume 1-3 m +

- **90 m**

- Veg. volume 3-6 m +

# *Magnitude of Selection*



# *Conclusions*

- Many resources important
- Resources important in selection also important to reproduction
- No efficient substitute for quantifying prescription
- Uncertainty - approach management as an experiment





# *Nest Boxes*

- Spatial scales where owls most selective
- Focus on factors at cavity and large-area scales in grasslands
  - Orientation?
  - Shading and thermal issues
- Other issues
  - Distance, timing, fire, vandals



G. Proudfoot

*Thanks for your time*

