

NEST BOX PROGRAMS FOR AMERICAN KETRELS AN INVALUABLE TOOL FOR RESEARCH AND CONSERVATION

**John A. Smallwood
Montclair State University**



TALK OUTLINE

Behavior and Ecology

Population Decline

Nest Boxes for Research and Conservation

Monitoring Populations

Chick Growth and Development

Operating Nest Box Programs





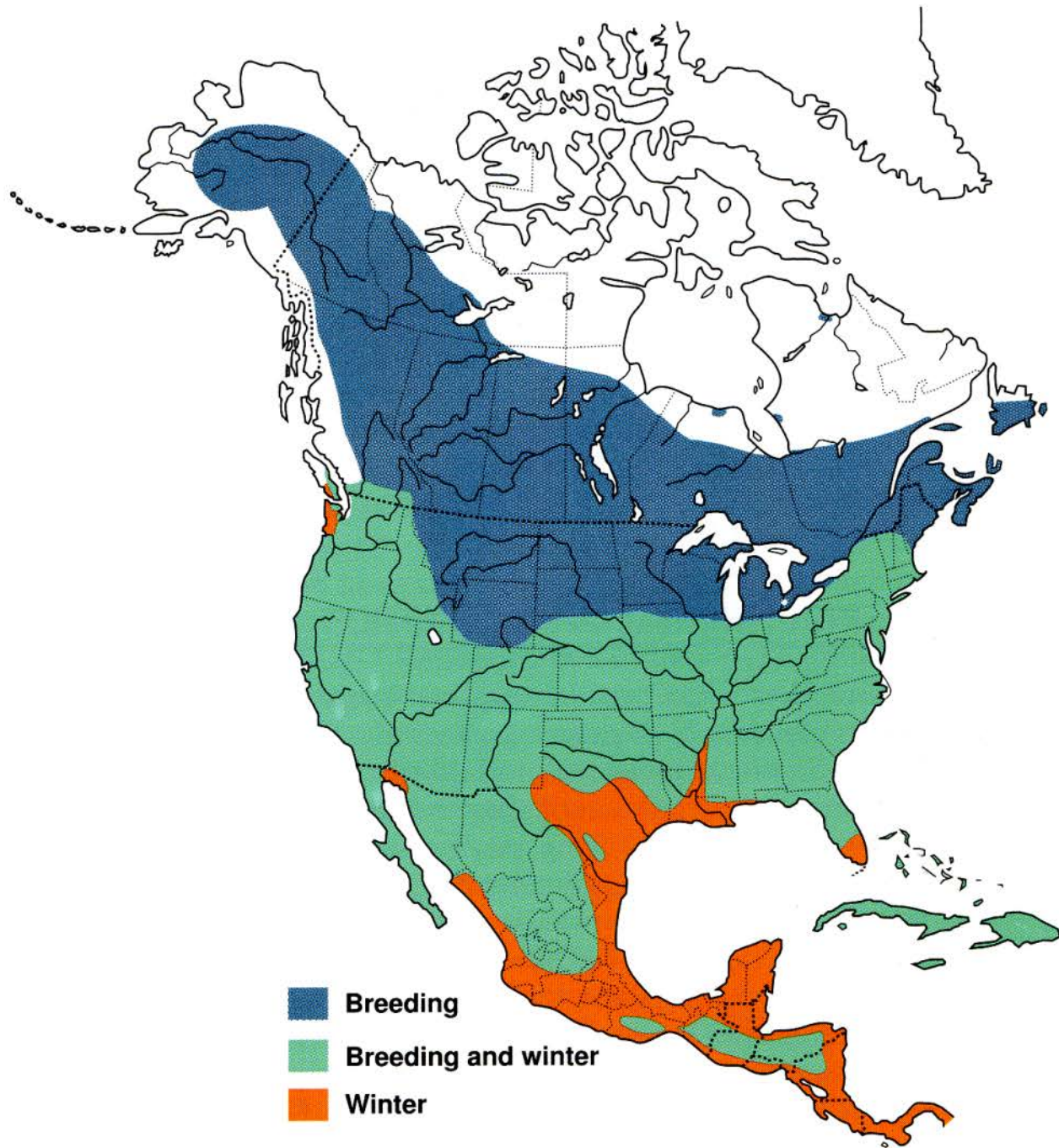














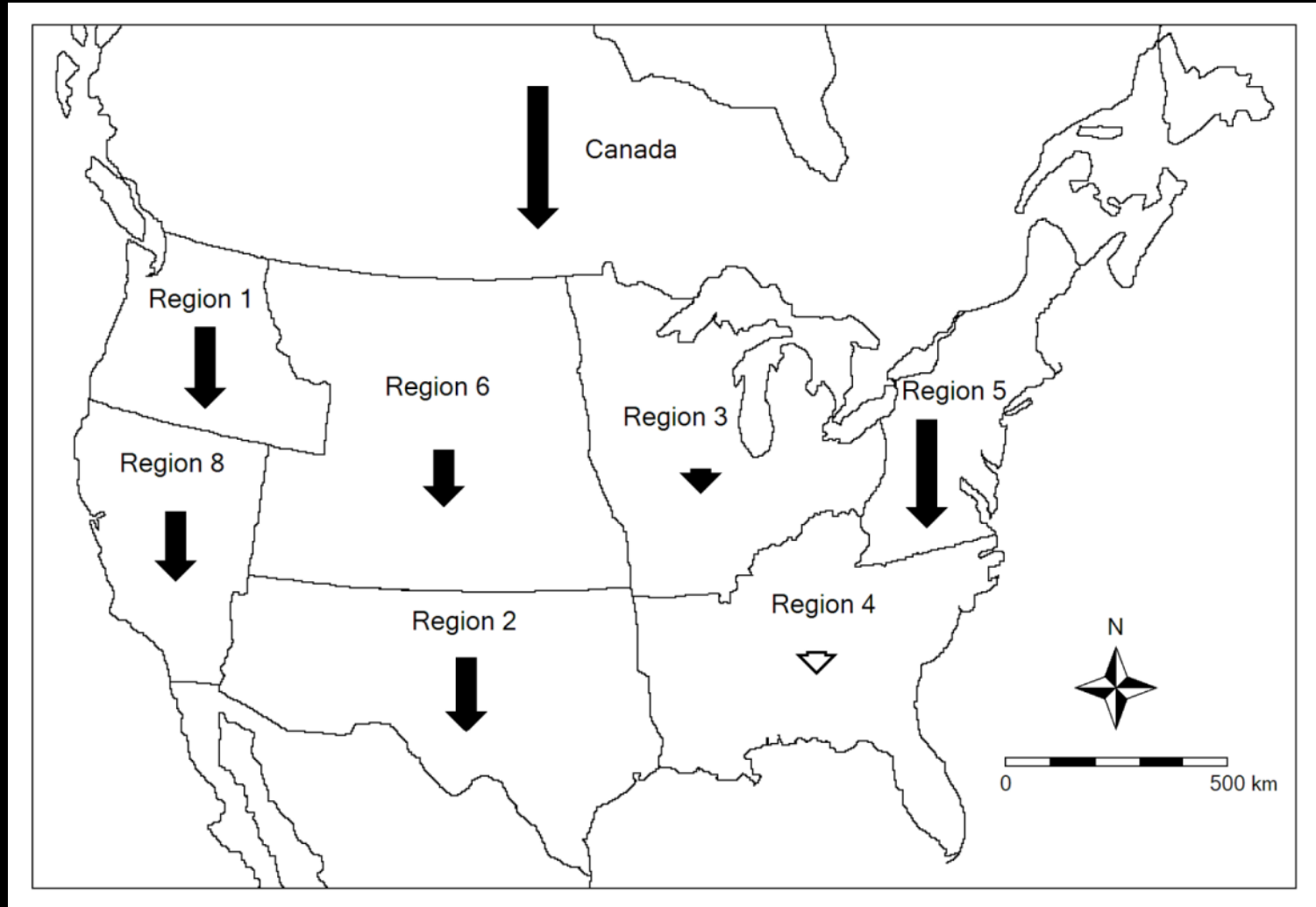
T. Saunders

TALK OUTLINE

Behavior and Ecology

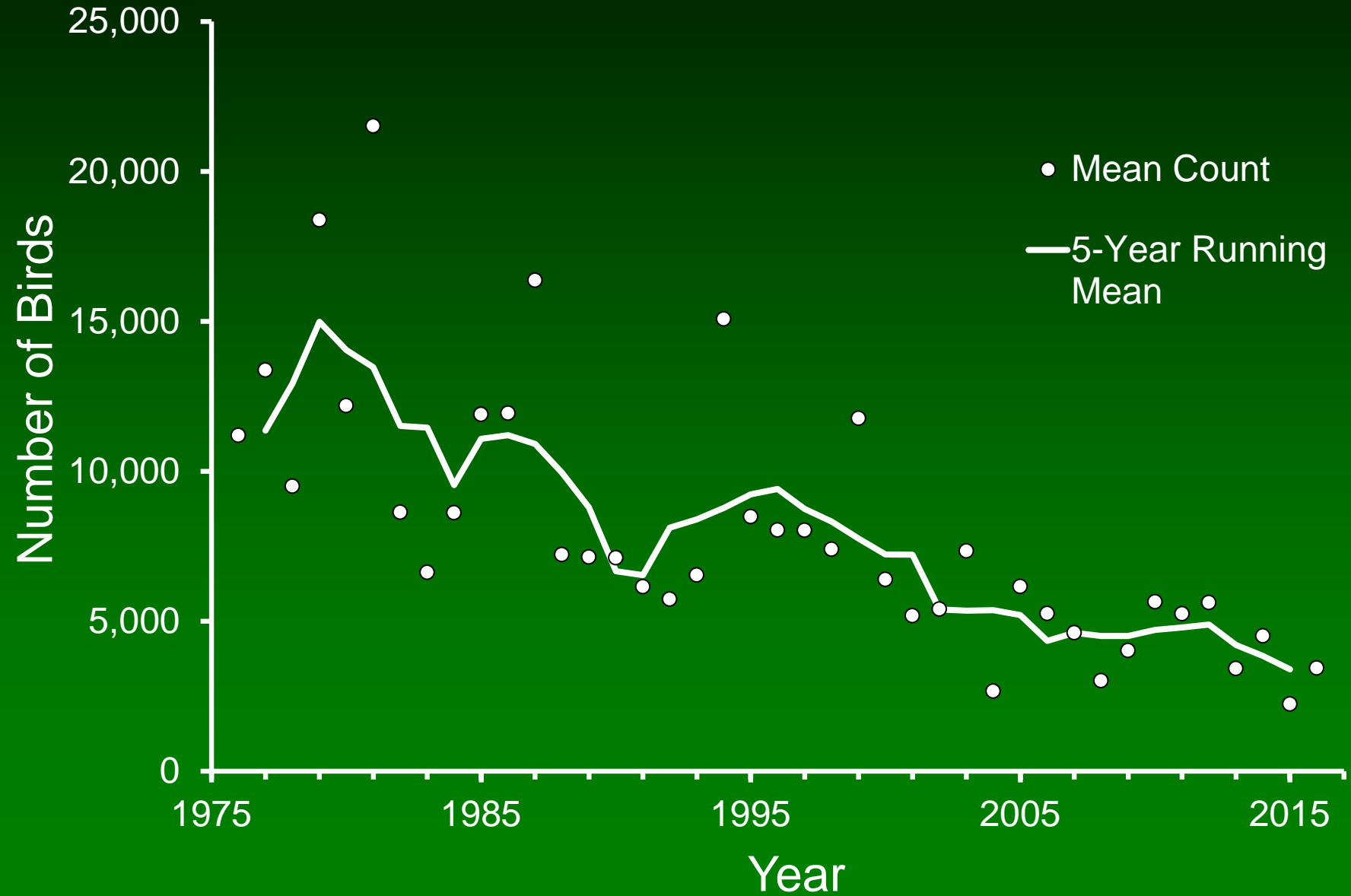
Population Decline

BREEDING BIRD SURVEY: 1966-2013



AUTUMN KESTREL COUNTS

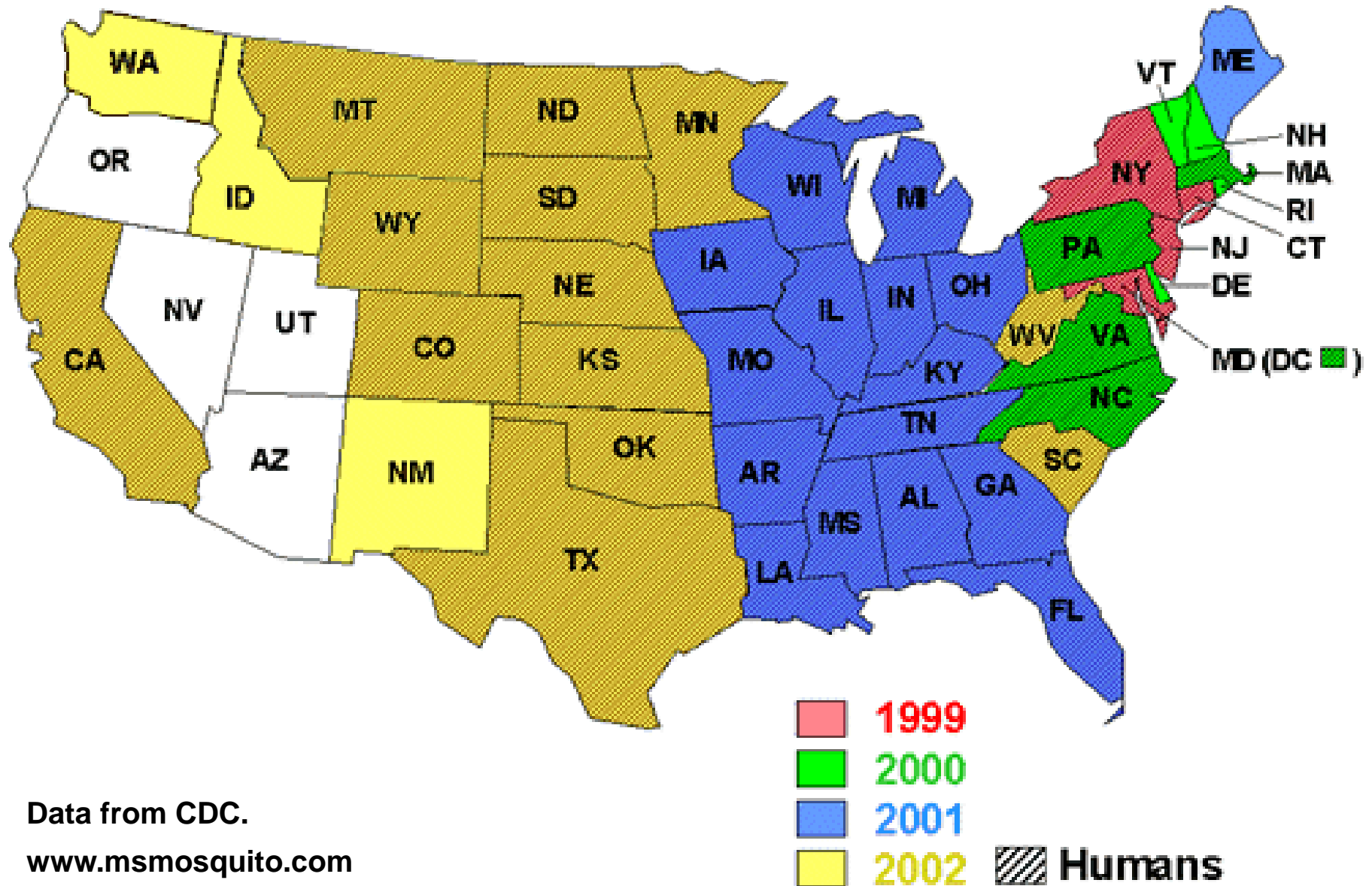
CAPE MAY: 1976-2016



WHY ARE KESTRELS DECLINING IN NORTH AMERICA?

- **West Nile Virus**

West Nile Virus in the United States, 1999 - 2002



Data from CDC.

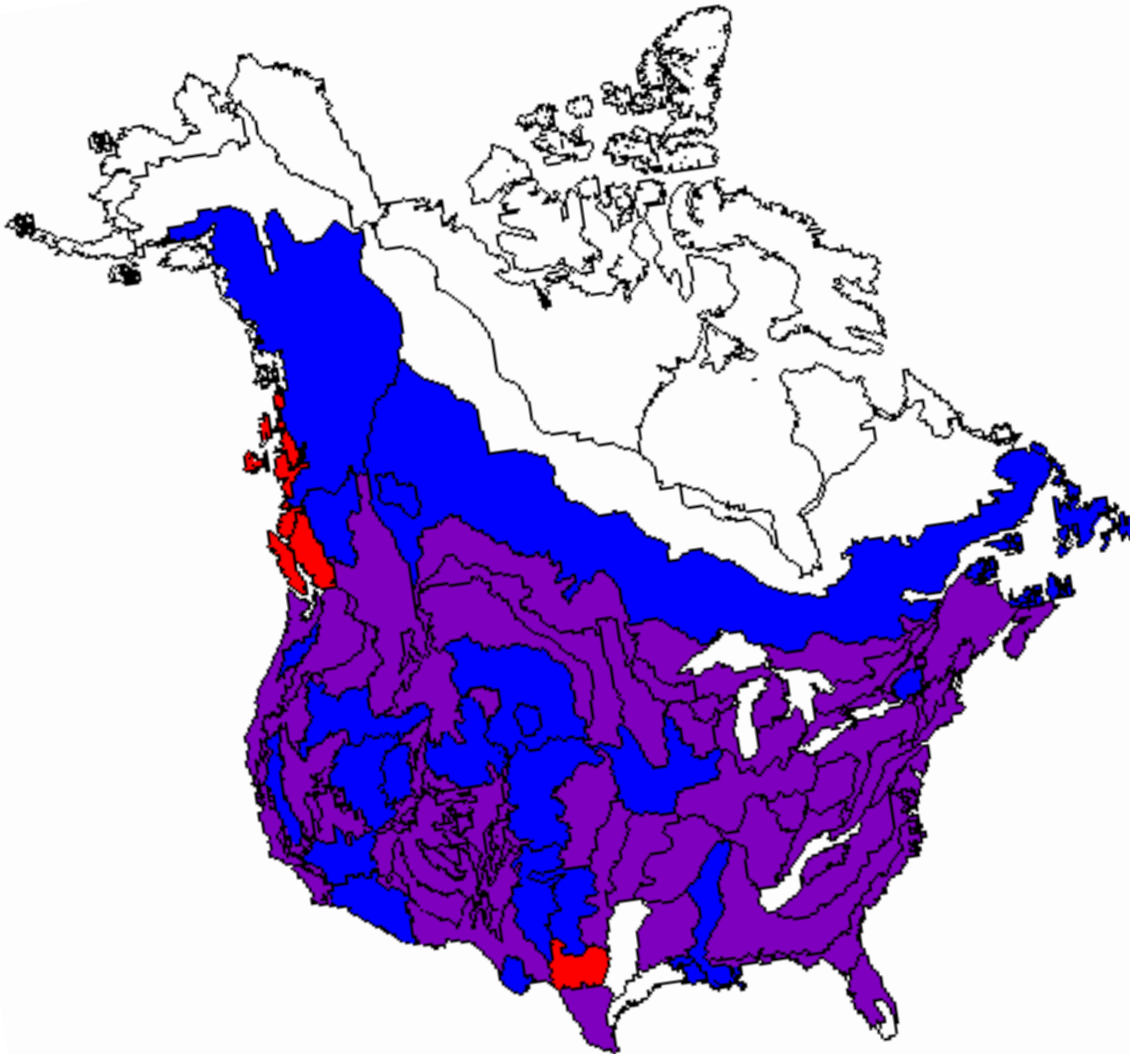
www.ms mosquito.com

WHY ARE KESTRELS DECLINING IN NORTH AMERICA?

- West Nile Virus
- Cooper's Hawks



USGS BREEDING BIRD SURVEY PHYSIOGRAPHIC STRATA

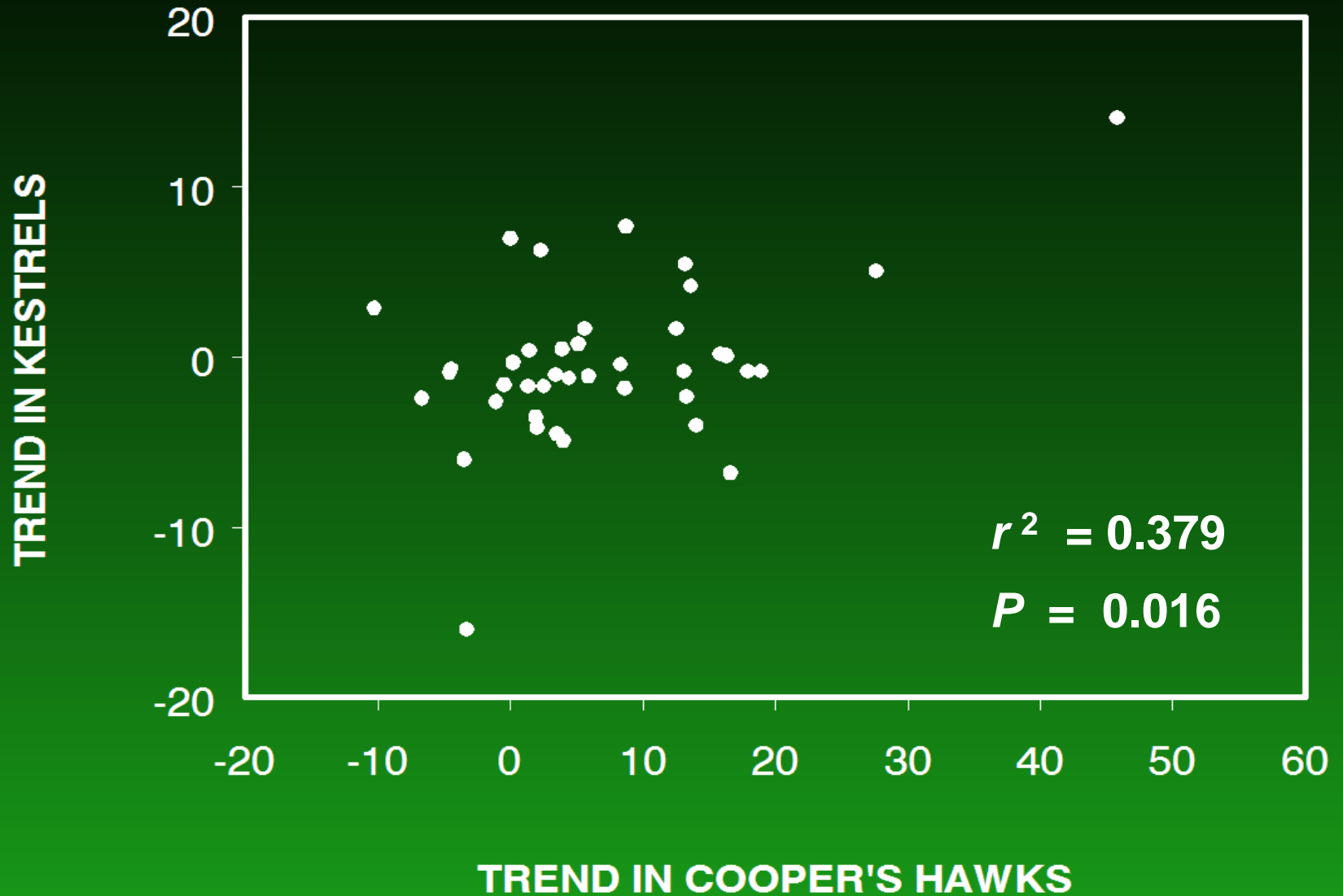


Kestrels

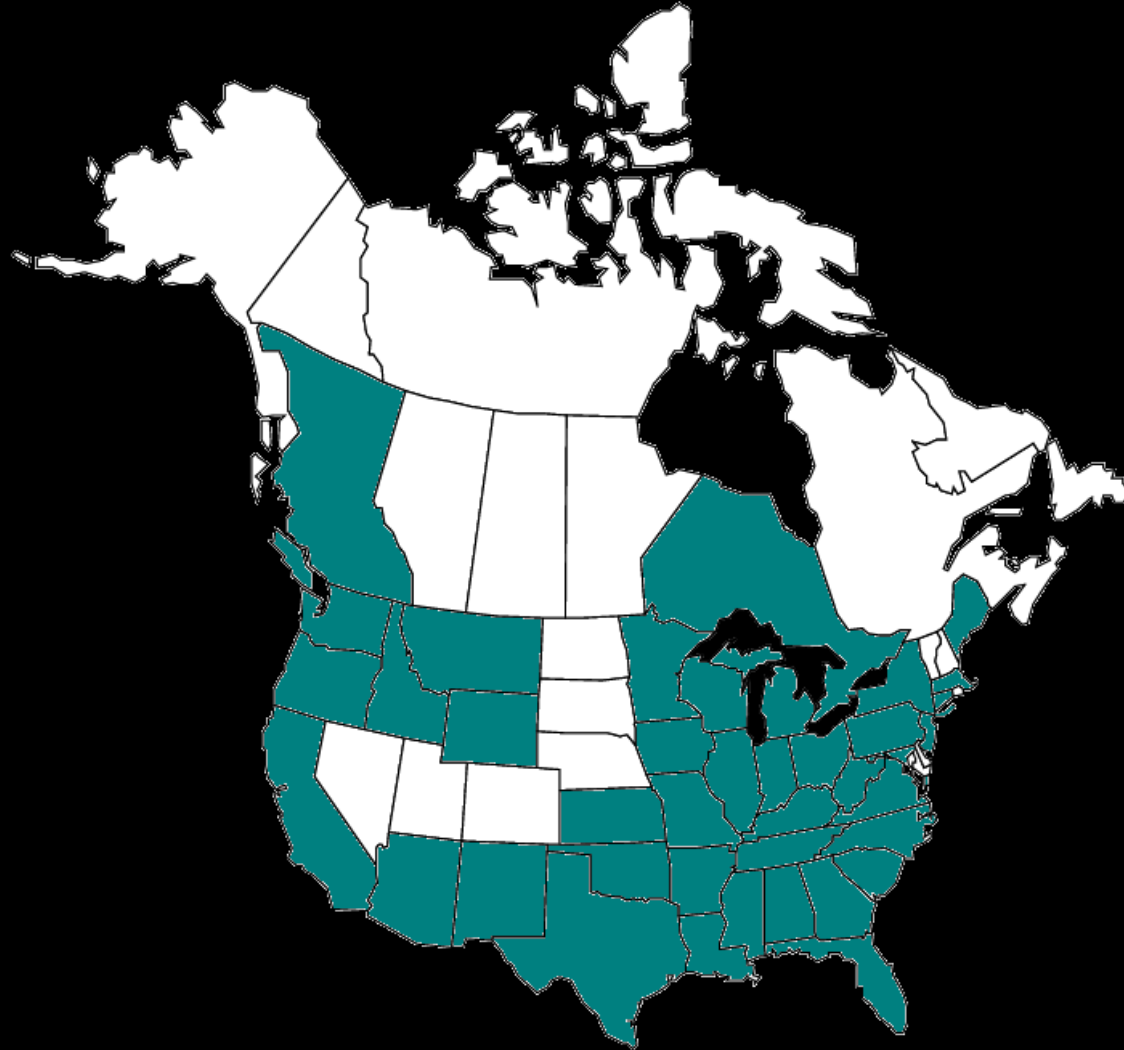


Cooper's Hawks

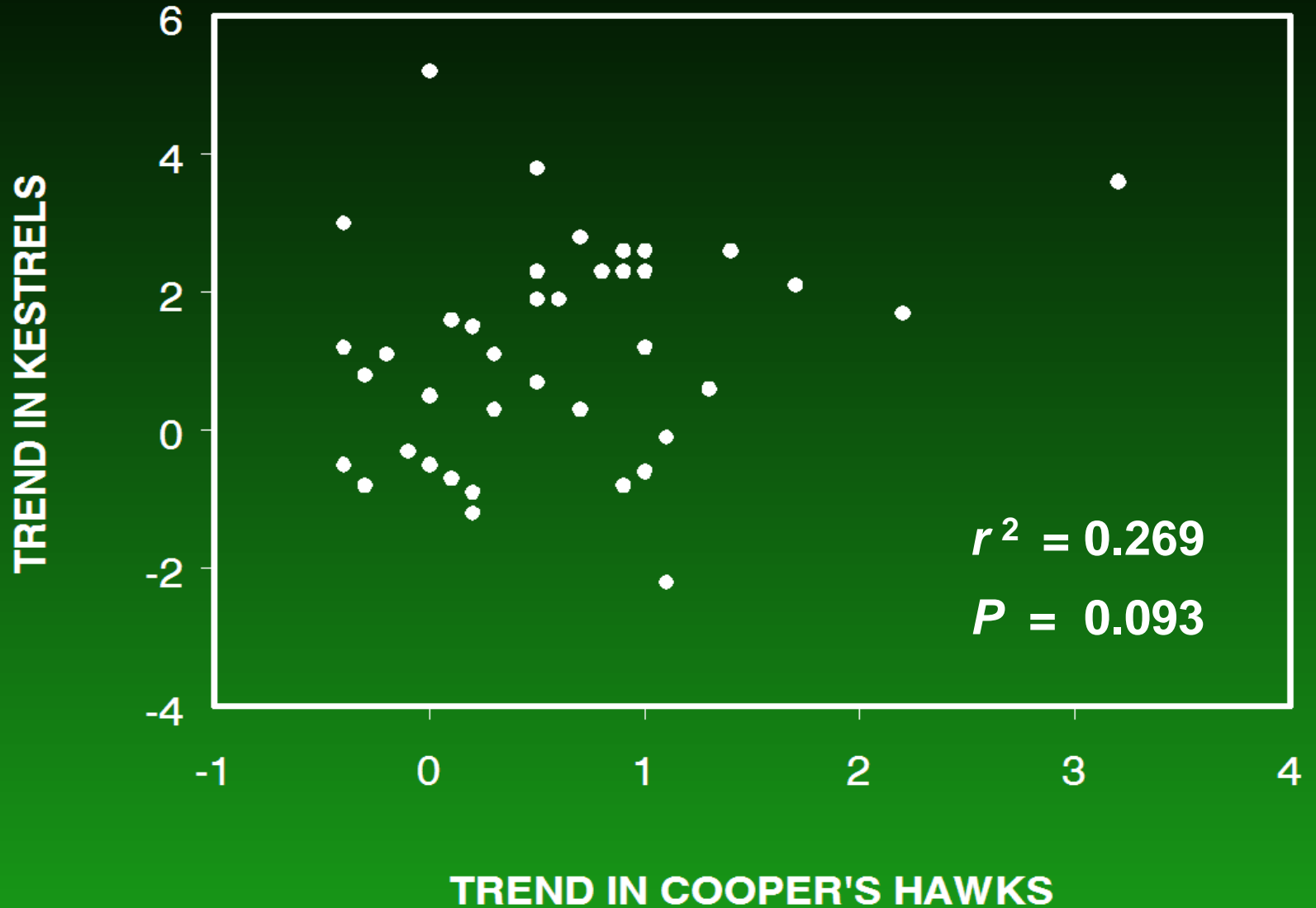
USGS BREEDING BIRD SURVEY, 1966-2005



NAS CHRISTMAS BIRD COUNTS



NAS CHRISTMAS BIRD COUNTS, 1959-1988



WHY ARE KESTRELS DECLINING IN NORTH AMERICA?

- West Nile Virus
- Cooper's Hawks
- **Habitat Loss and Degradation**



WHY ARE KESTRELS DECLINING IN NORTH AMERICA?

- West Nile Virus
- Cooper's Hawks
- Habitat Loss and Degradation
- Pesticides and Pollutants

TALK OUTLINE

Behavior and Ecology

Population Decline

Nest Boxes for Research and Conservation



TALK OUTLINE

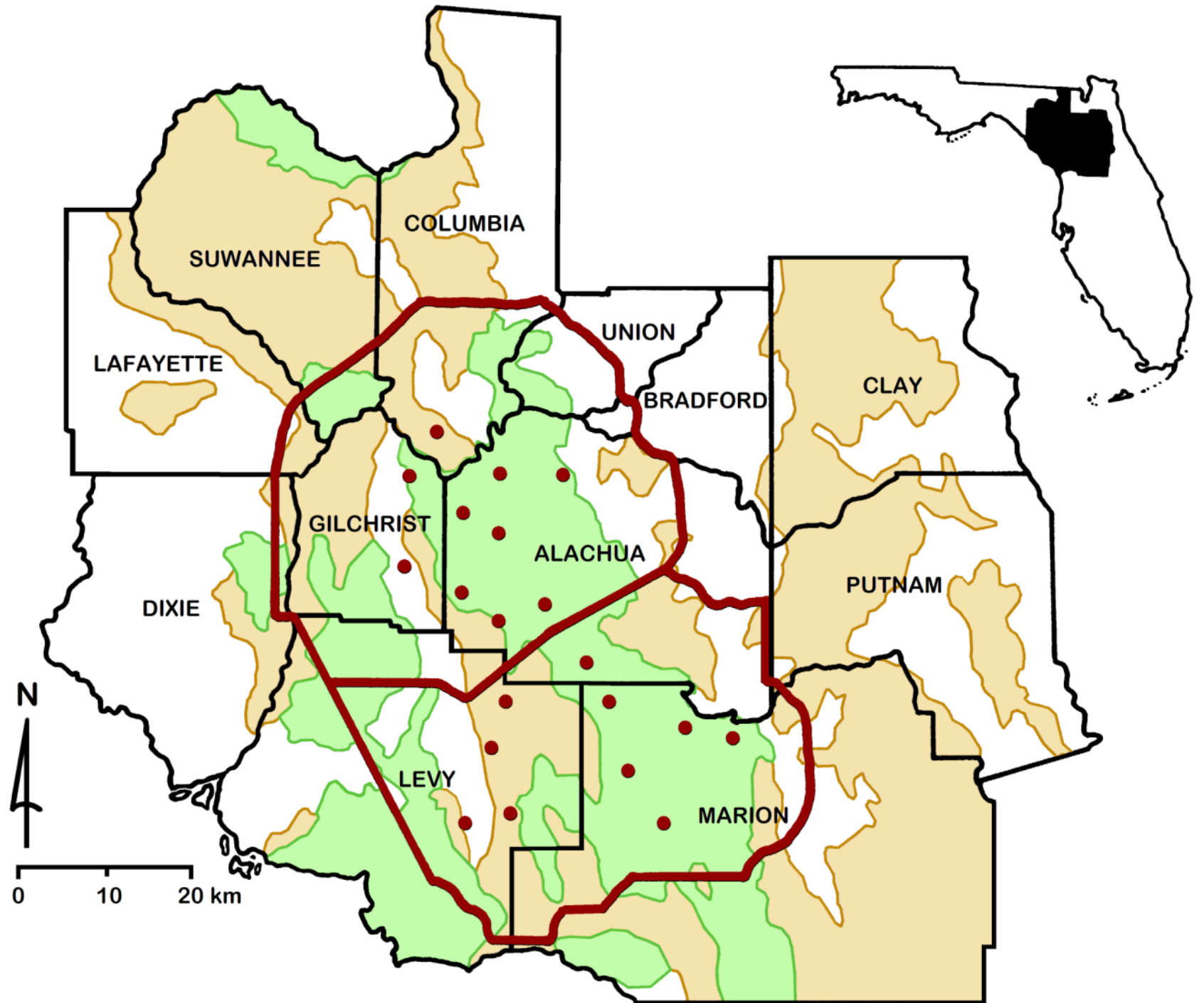
Behavior and Ecology

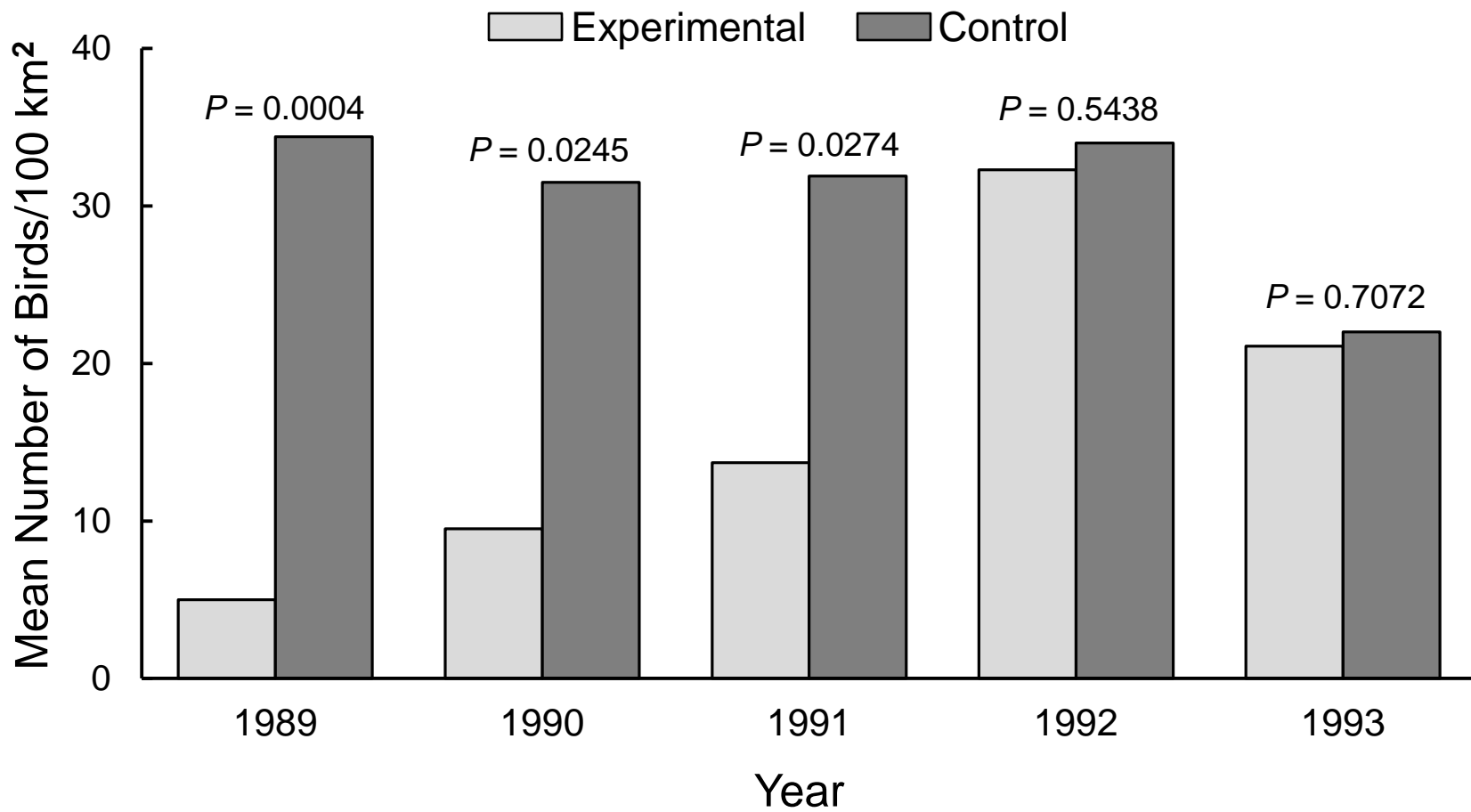
Population Decline

Nest Boxes for Research and Conservation

Monitoring Populations

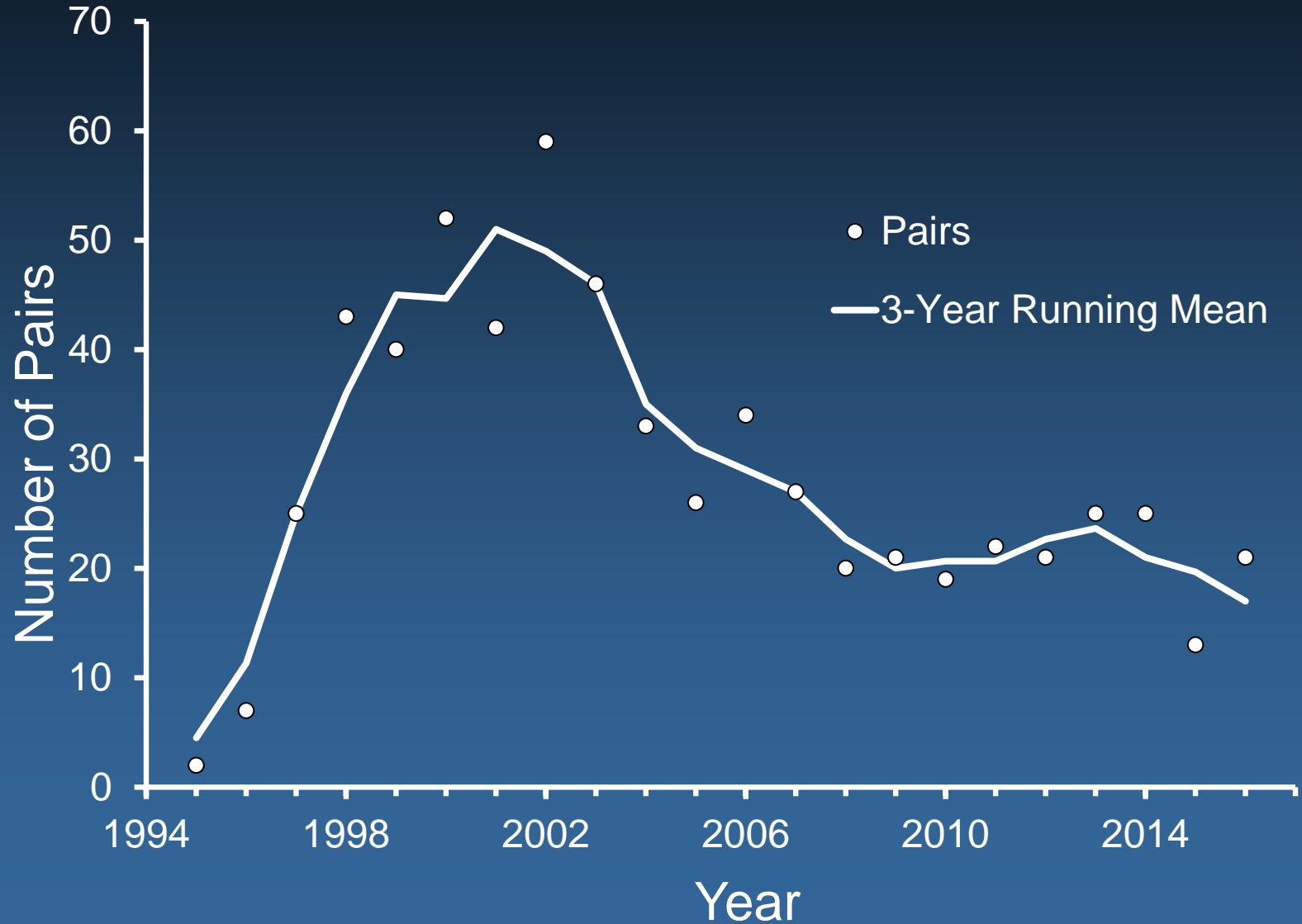




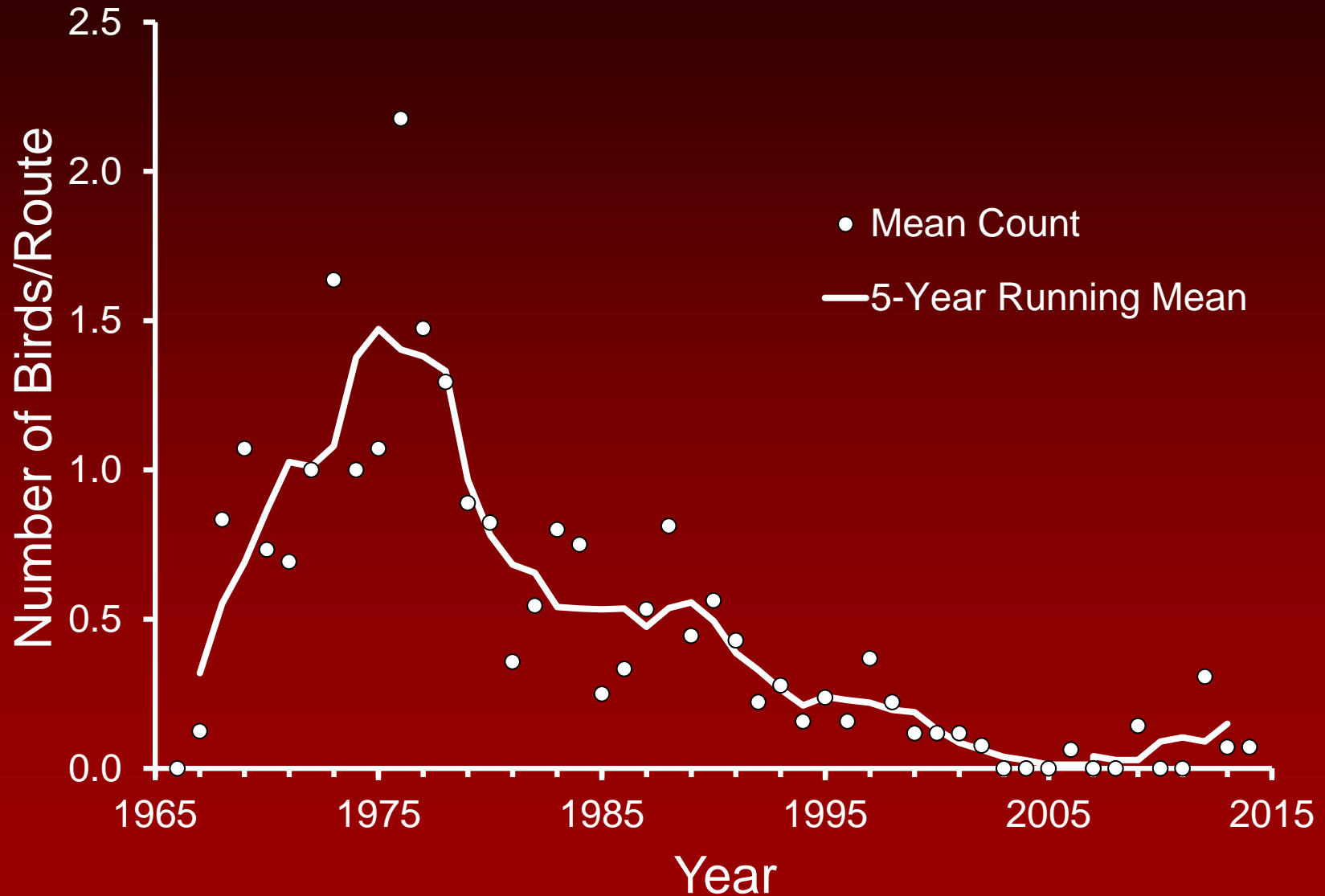




KESTRELS BREEDING IN NEST BOXES IN NORTHWESTERN NEW JERSEY



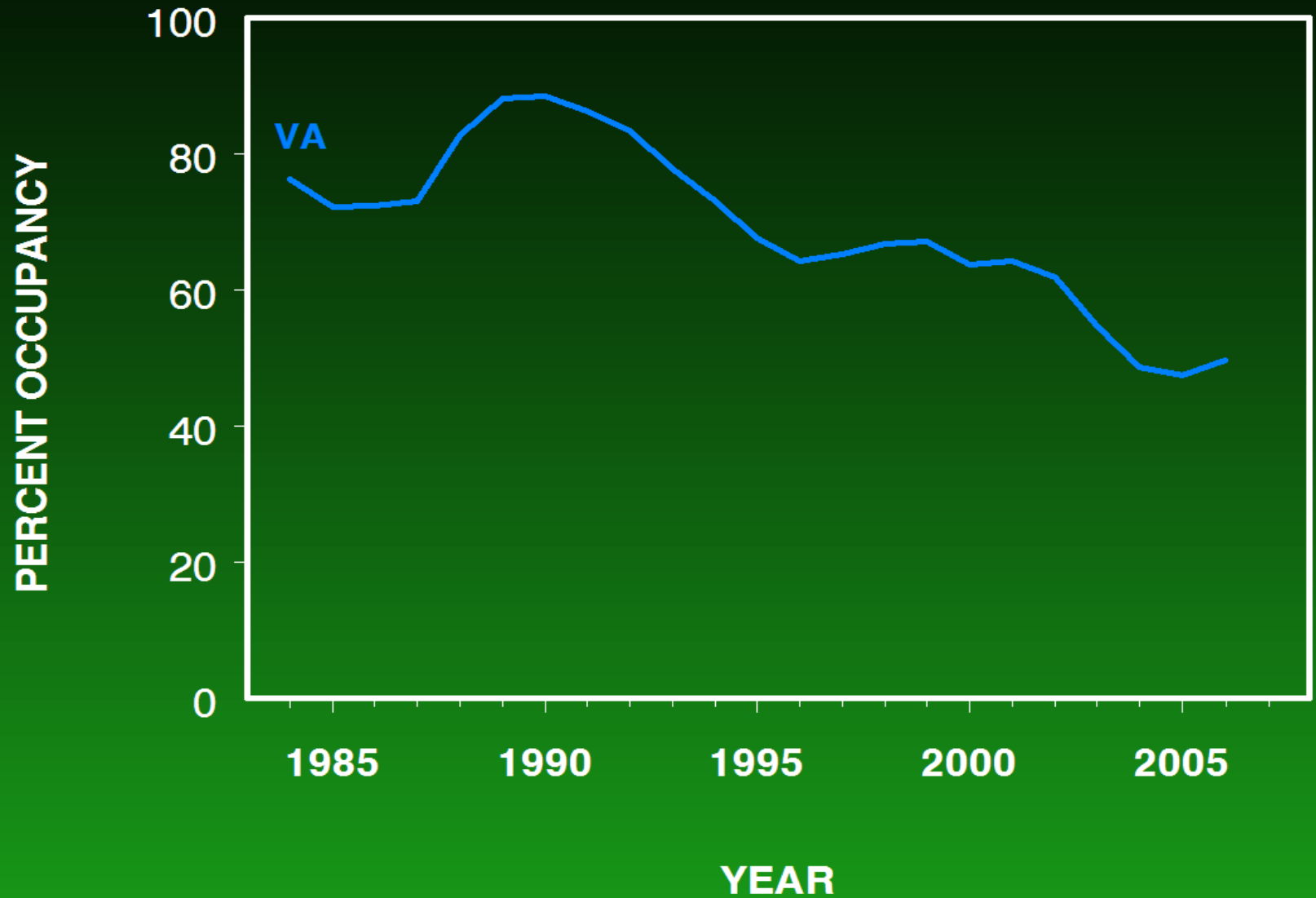
KESTREL COUNTS IN NEW JERSEY BREEDING BIRD SURVEY: 1966-2015



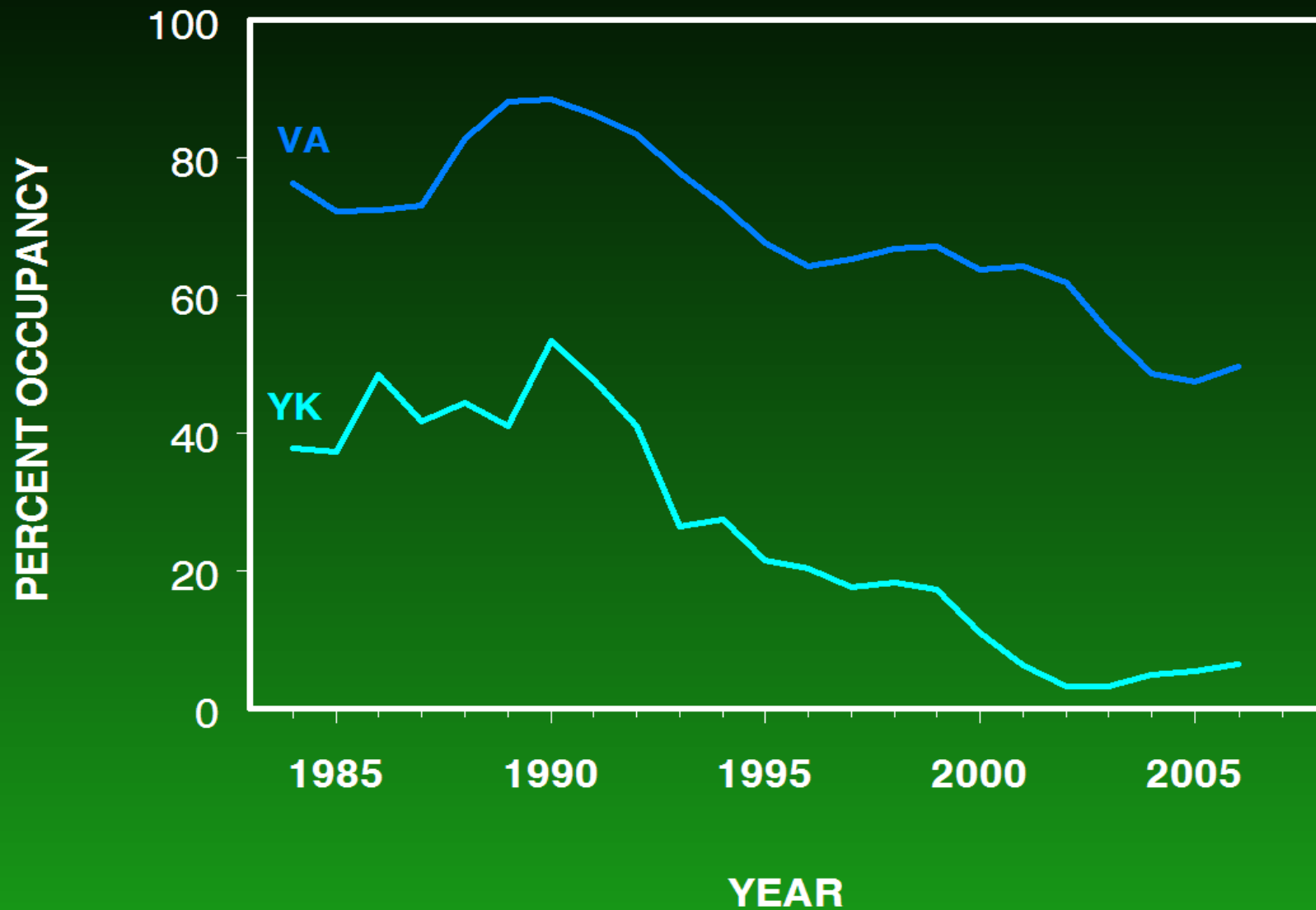
NEST BOX PROGRAMS FOR AMERICAN KESTRELS



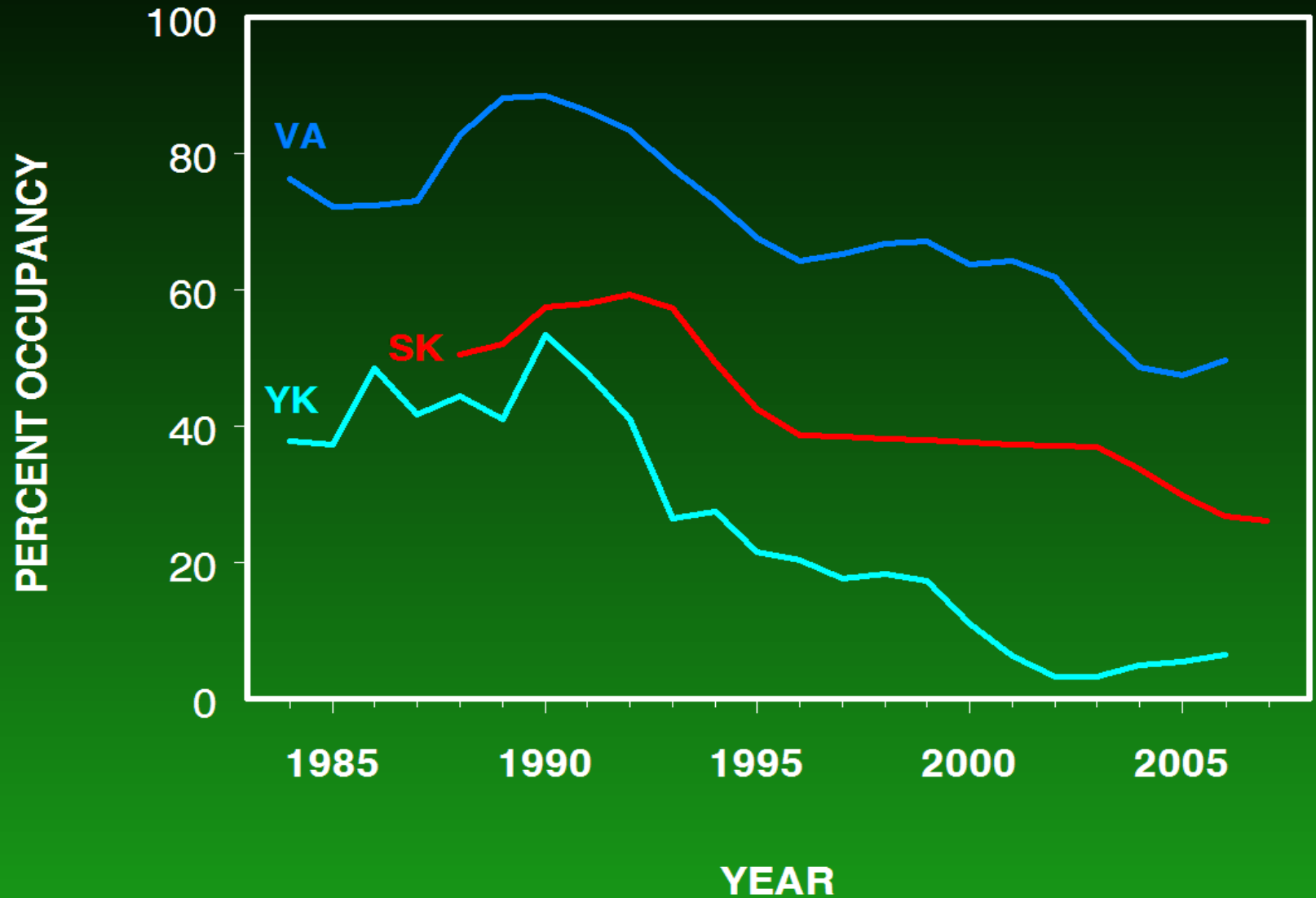
NEST BOX USE BY KESTRELS IN NORTH AMERICA



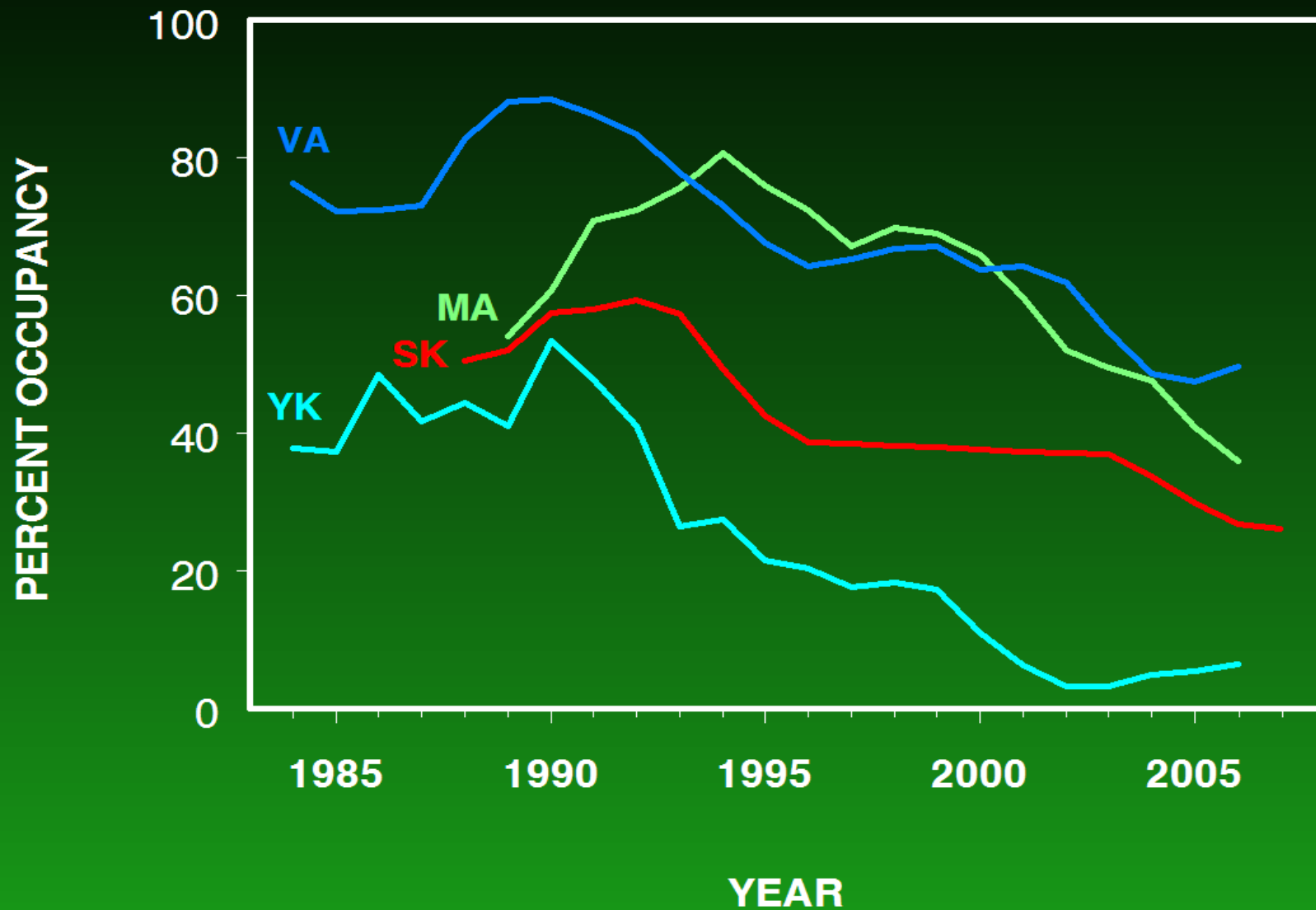
NEST BOX USE BY KESTRELS IN NORTH AMERICA



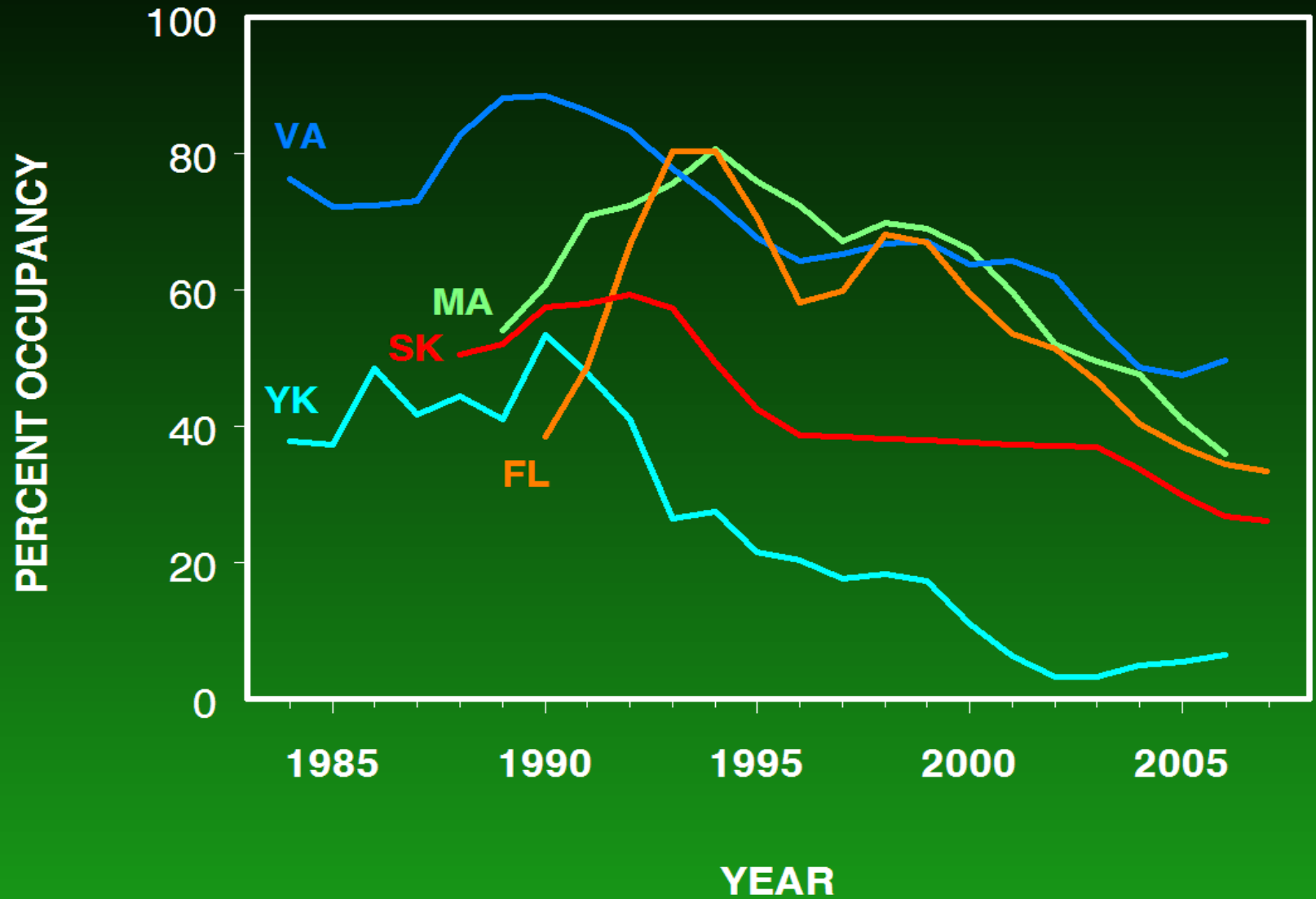
NEST BOX USE BY KESTRELS IN NORTH AMERICA



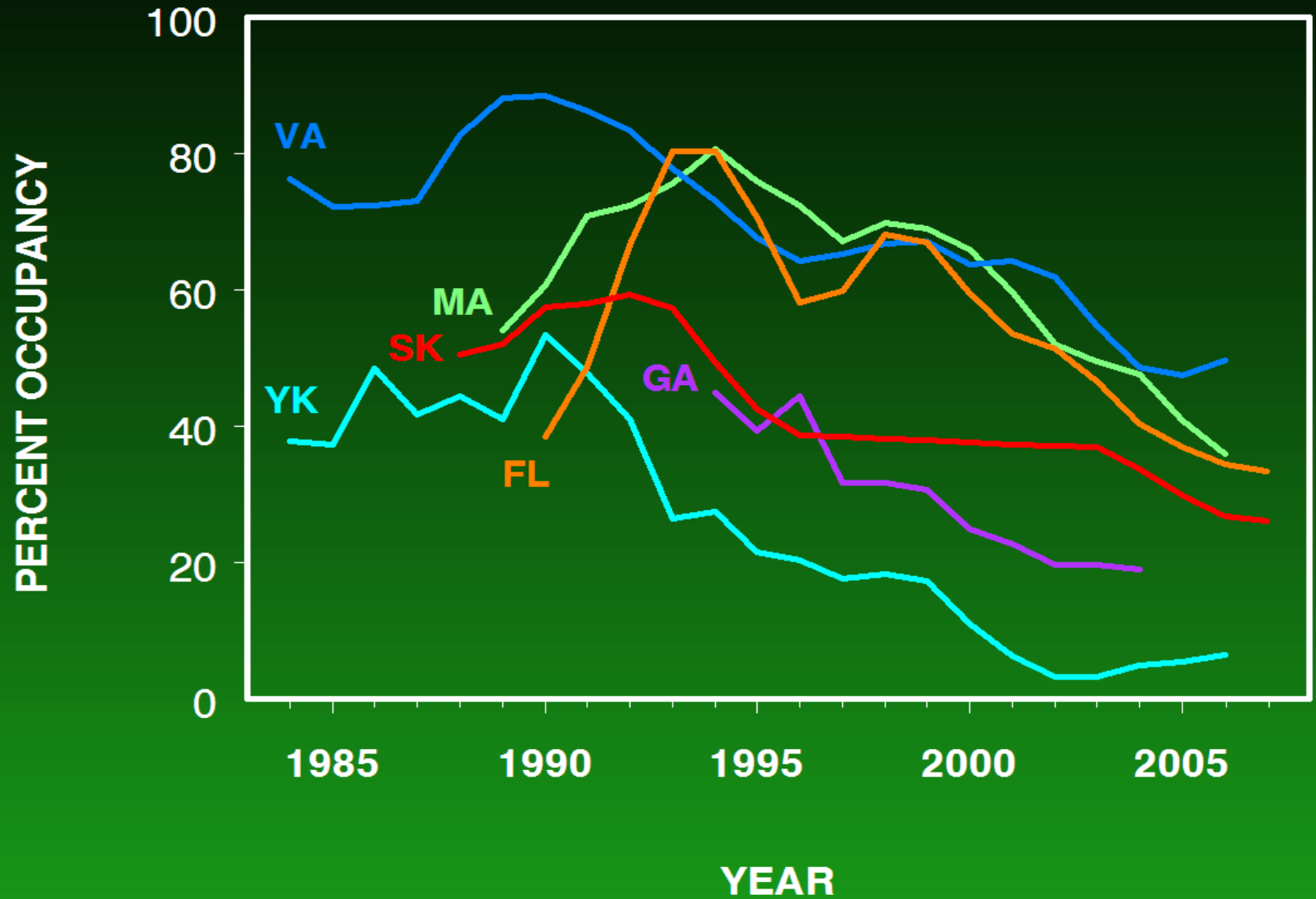
NEST BOX USE BY KESTRELS IN NORTH AMERICA



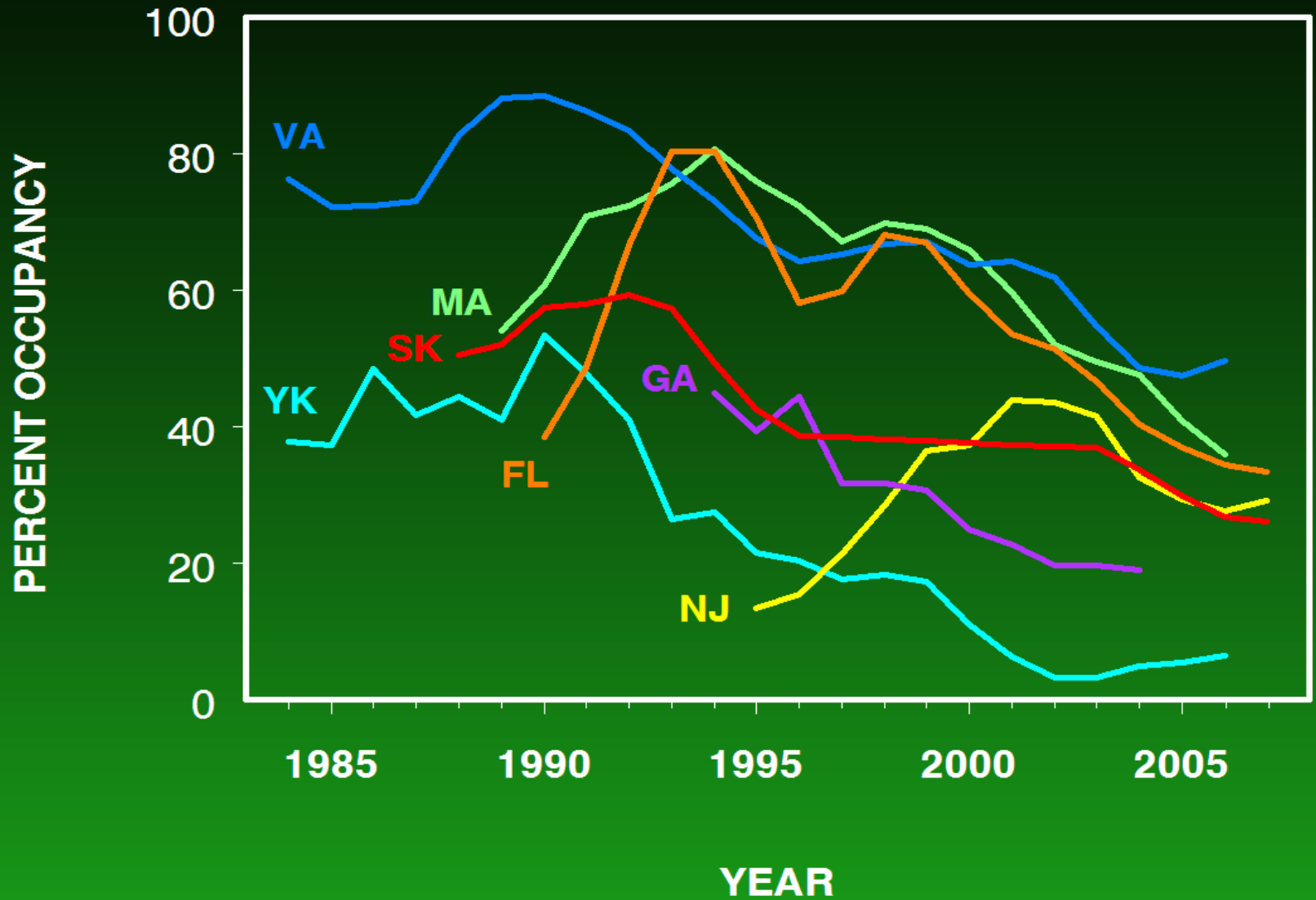
NEST BOX USE BY KESTRELS IN NORTH AMERICA



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NEST BOX USE BY KESTRELS IN NORTH AMERICA



TALK OUTLINE

Behavior and Ecology

Population Decline

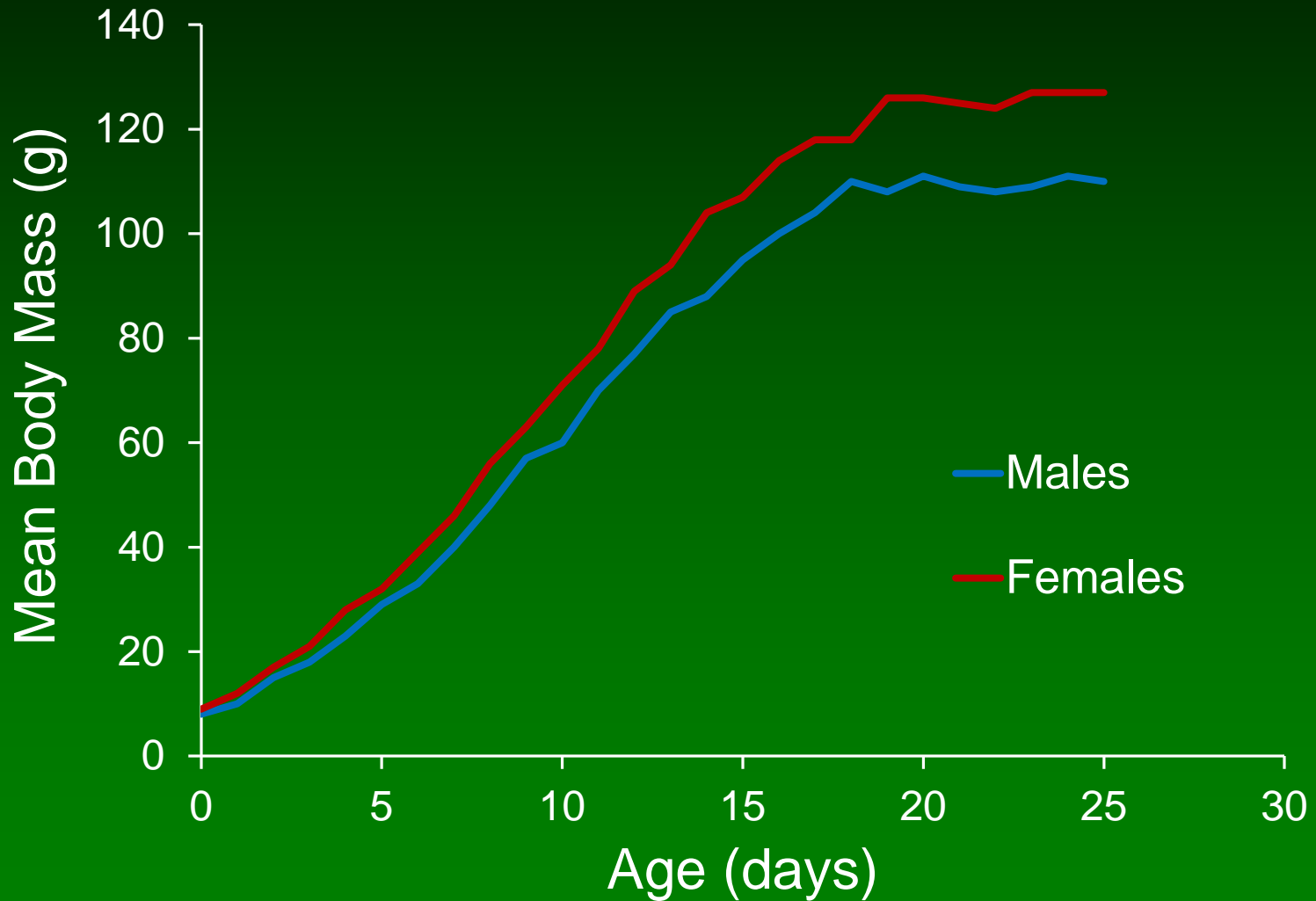
Nest Boxes for Research and Conservation

Monitoring Populations

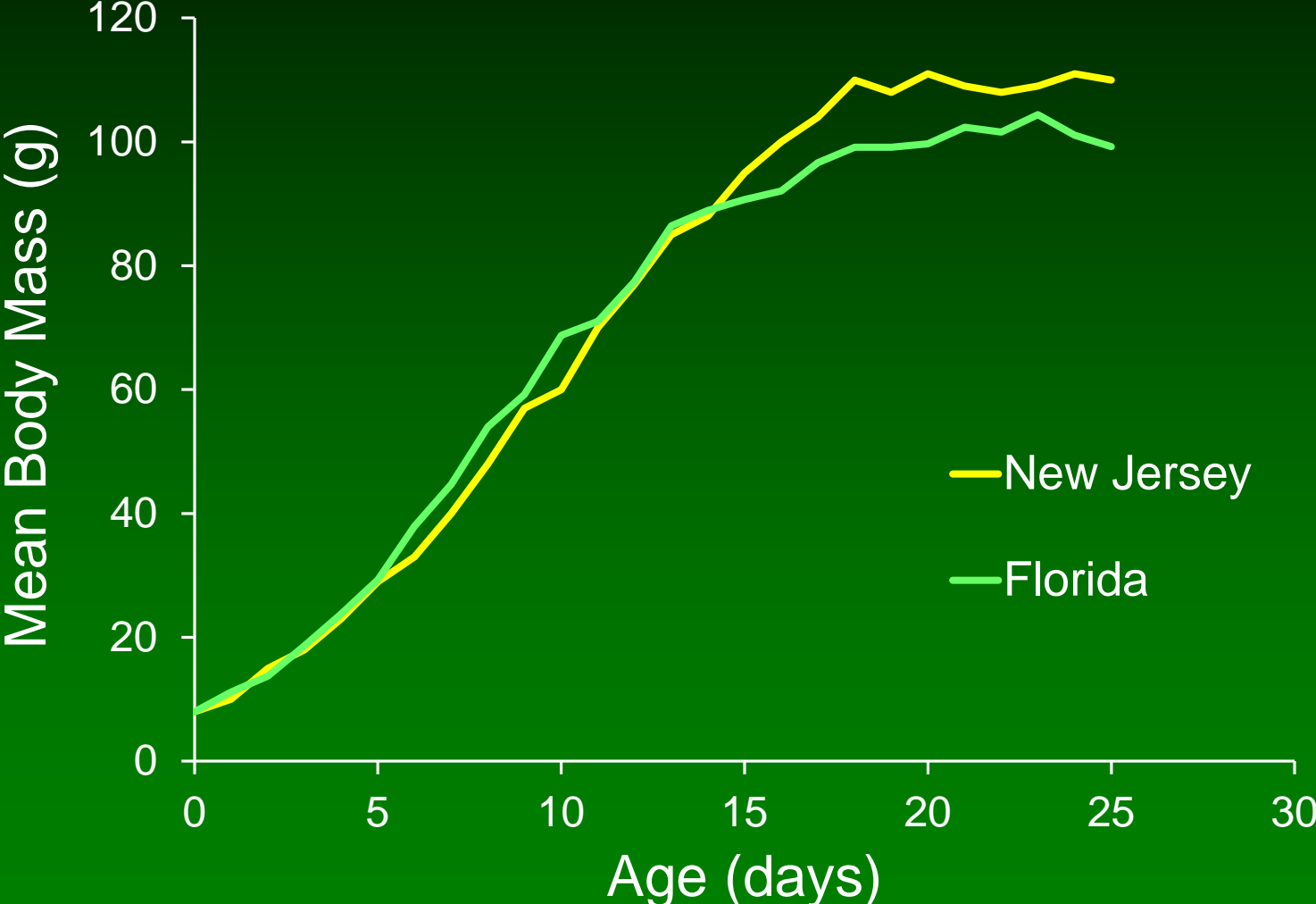
Chick Growth and Development



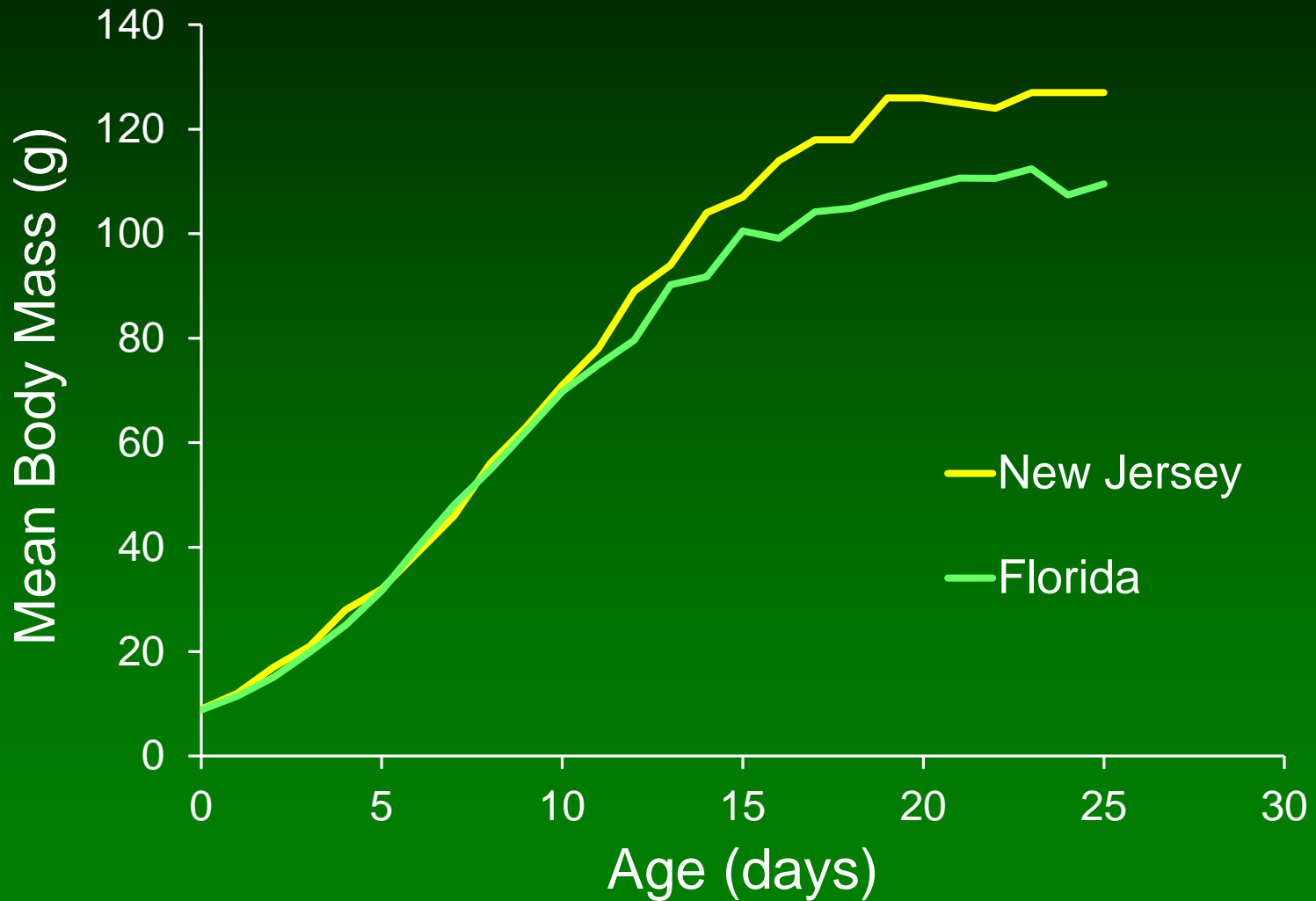
GROWTH OF KESTREL CHICKS IN NEW JERSEY



GROWTH OF MALE KESTREL CHICKS



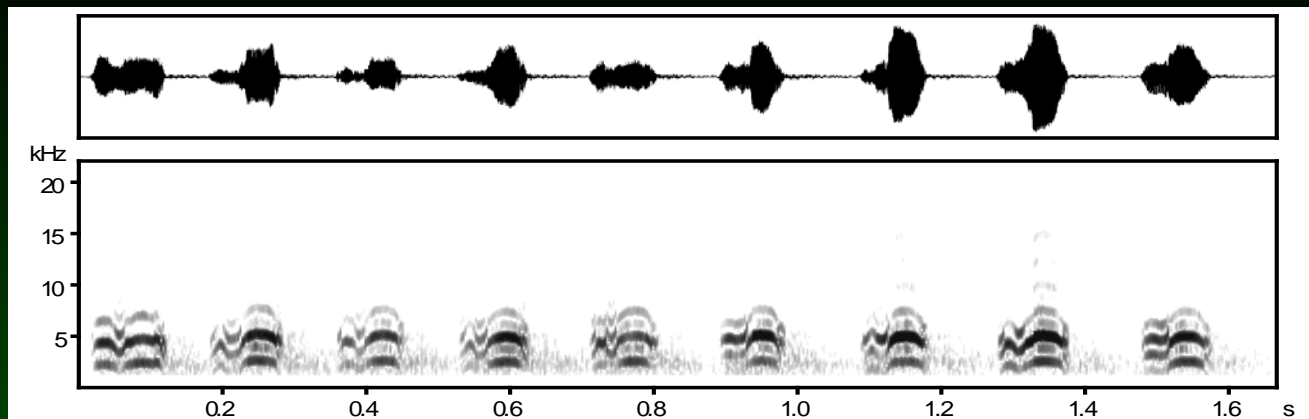
GROWTH OF FEMALE KESTREL CHICKS



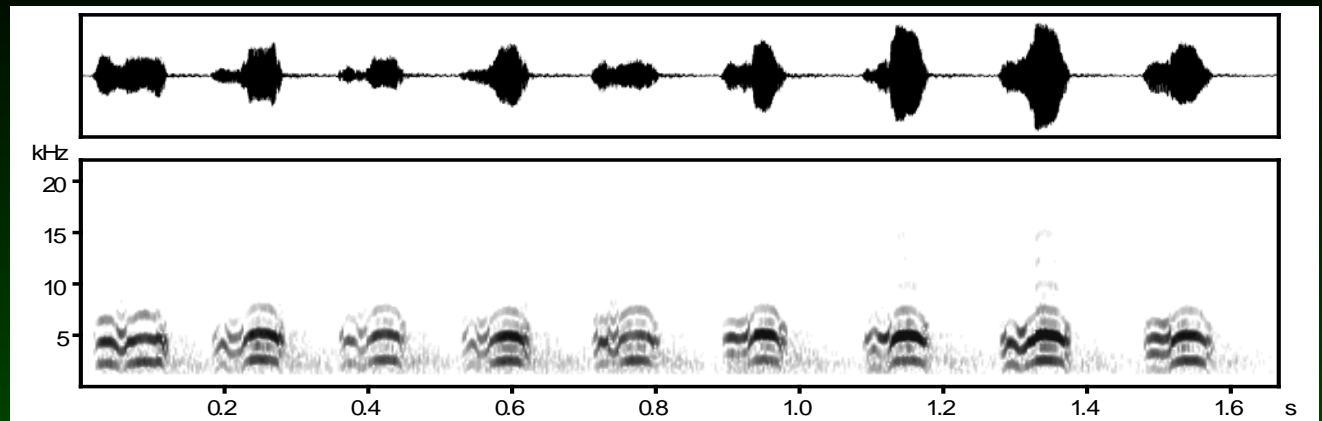




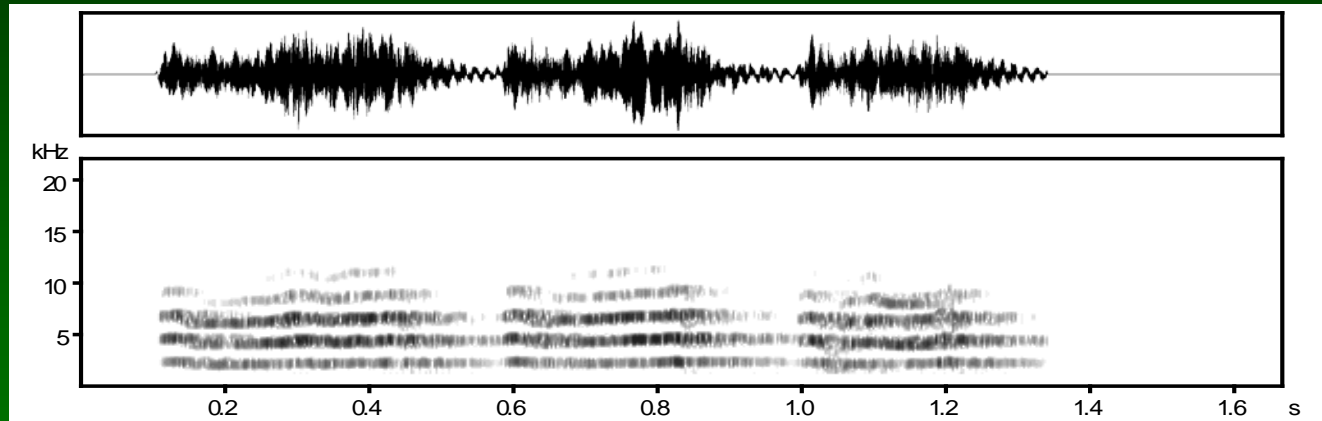
KLEE



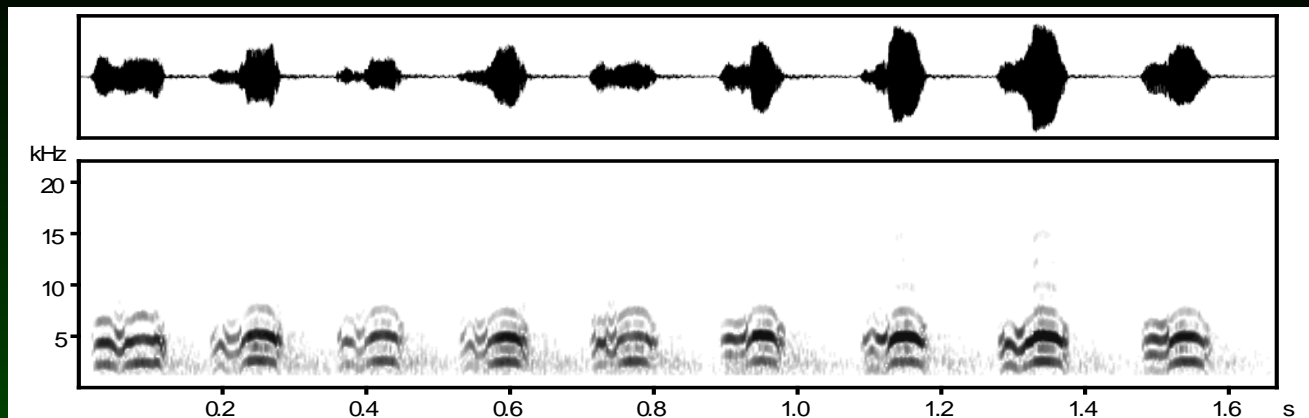
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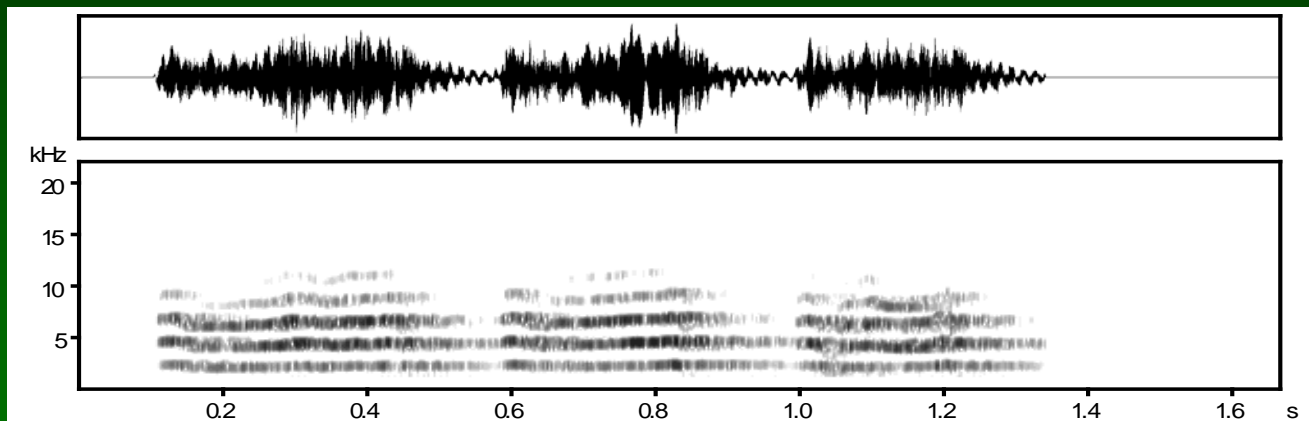
 **WHINE**



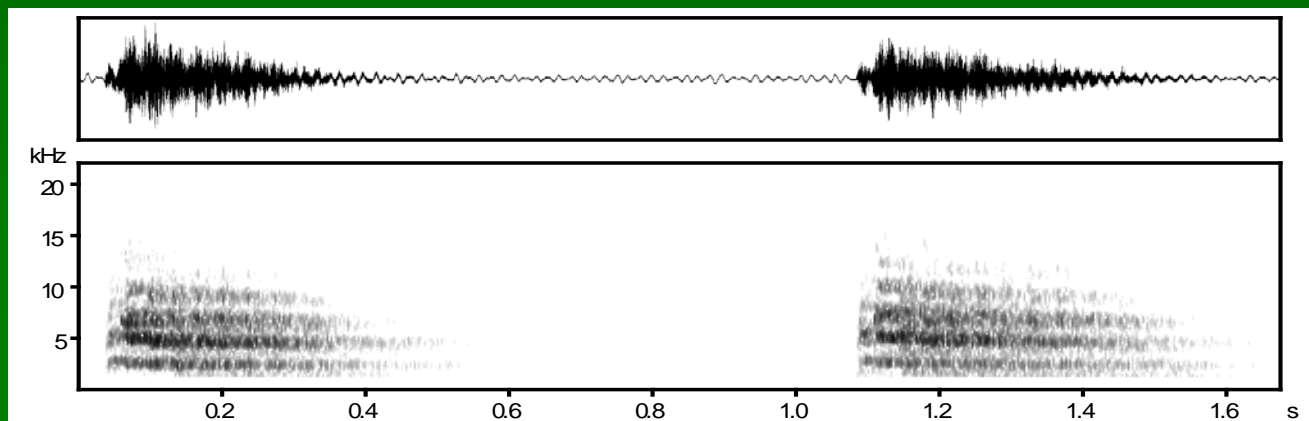
 **KLEE**



 **WHINE**



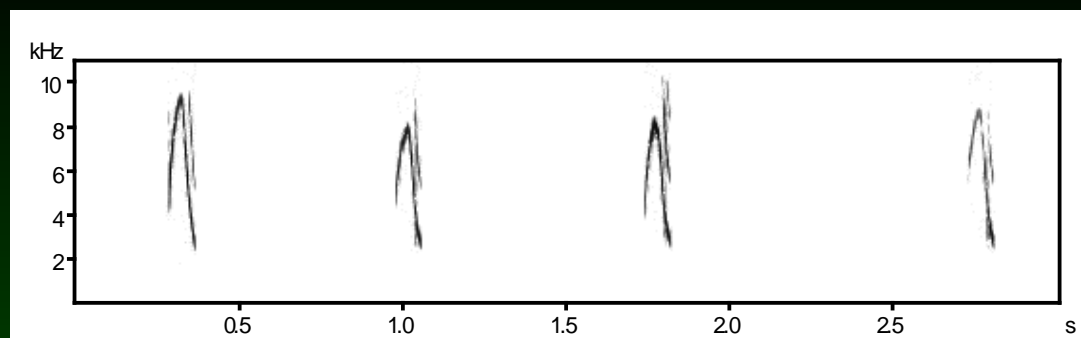
 **CHITTER**





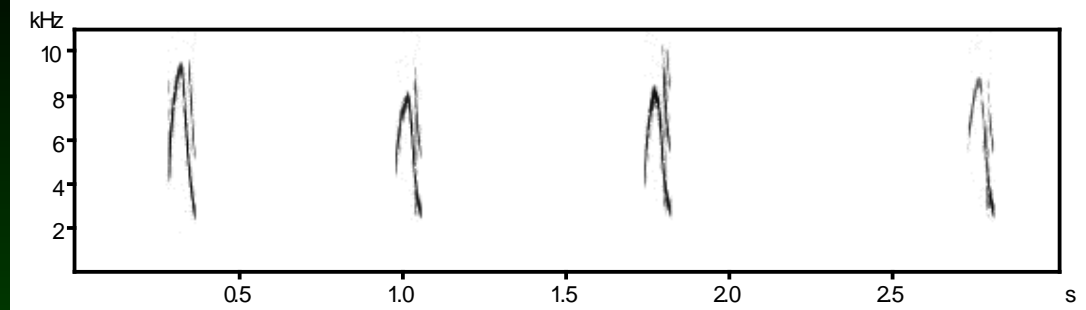


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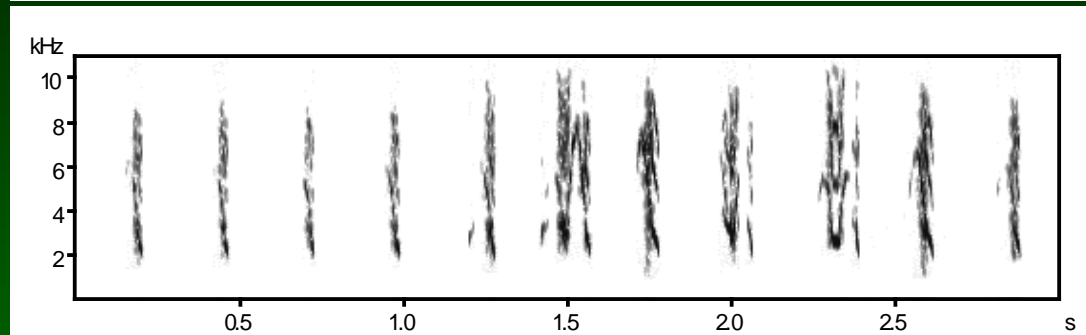




DAY 0

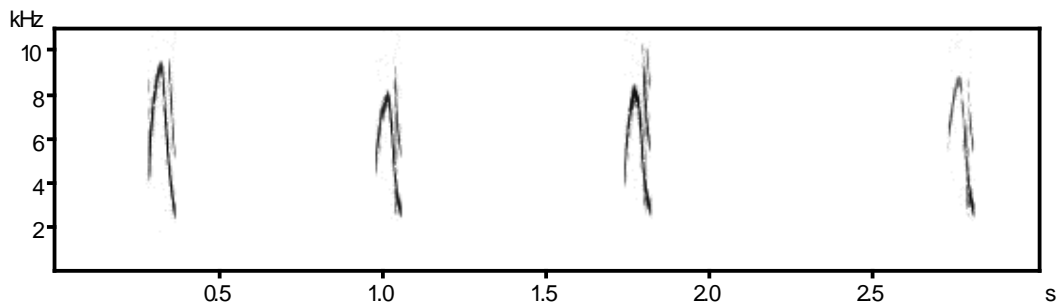


DAY 6

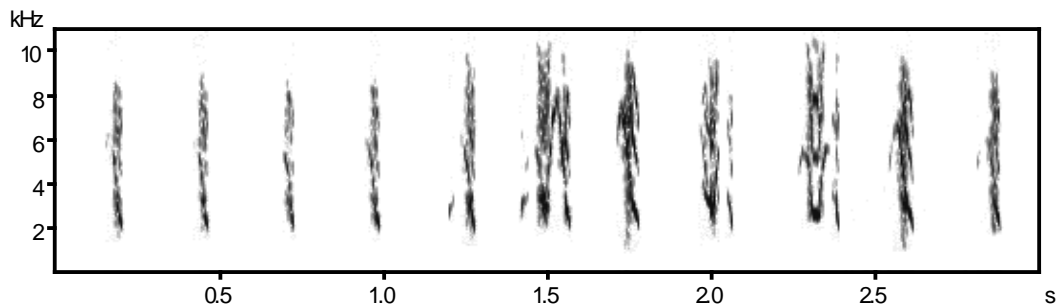




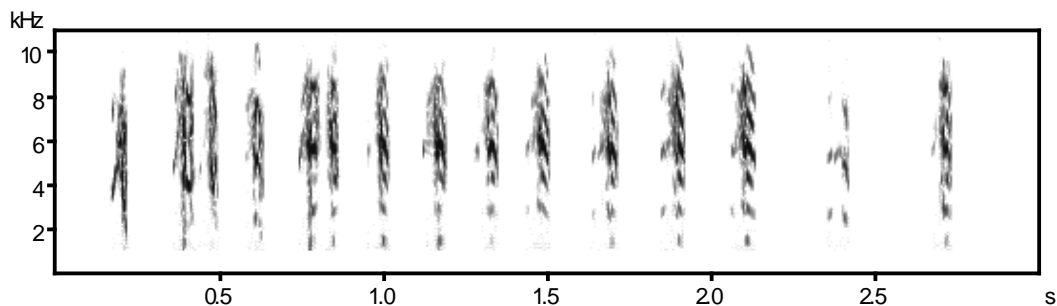
DAY 0



DAY 6

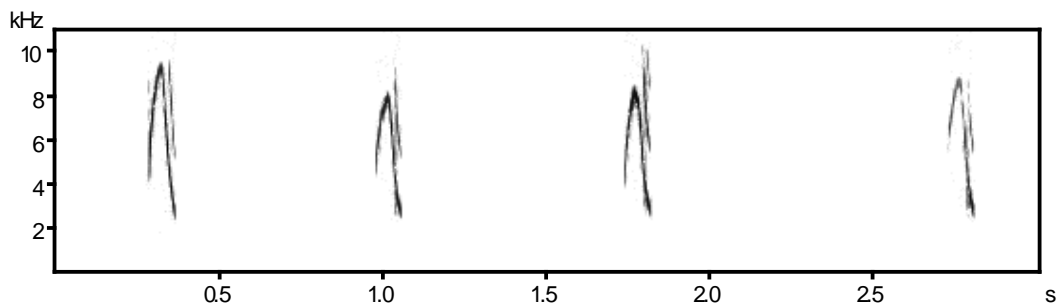


DAY 12

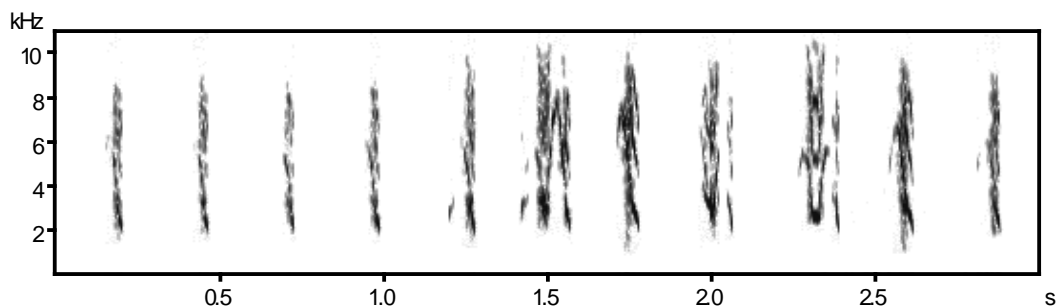




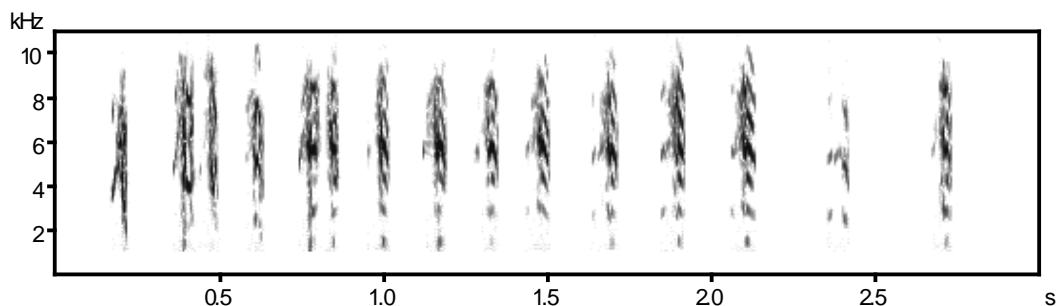
DAY 0



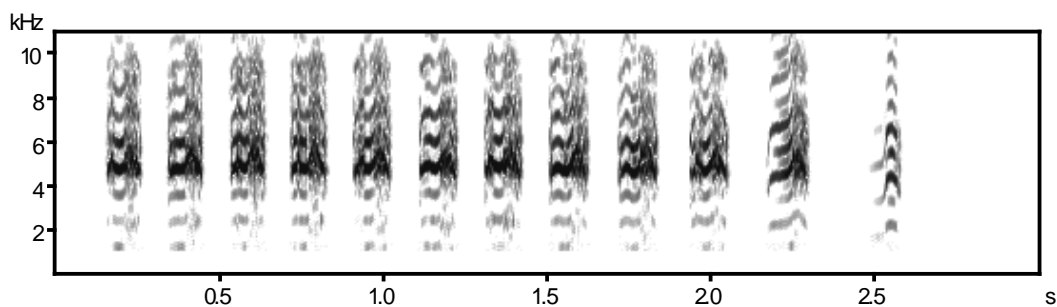
DAY 6



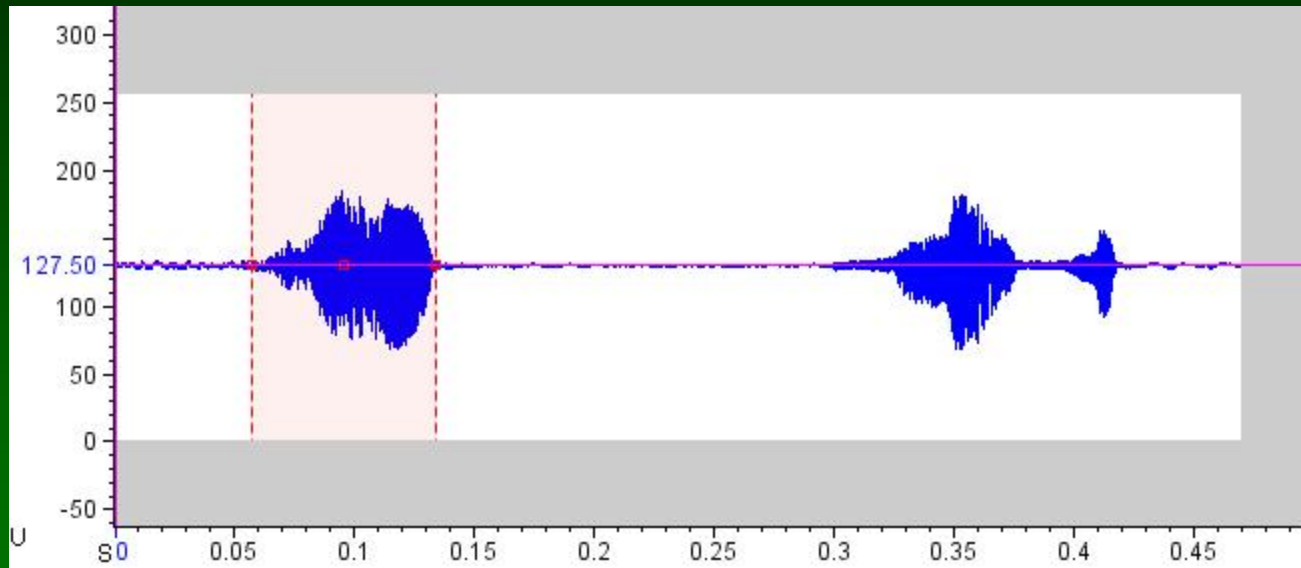
DAY 12



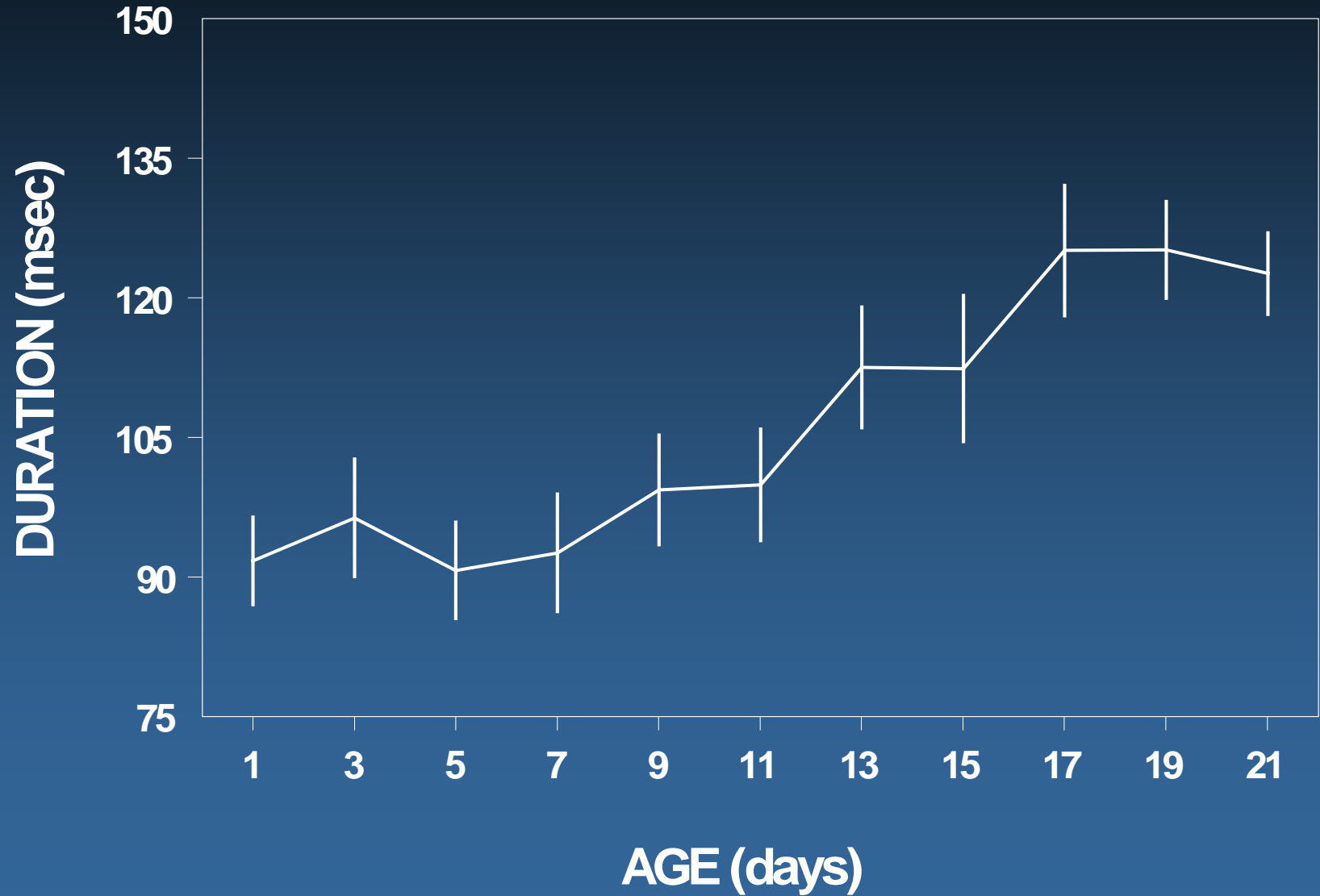
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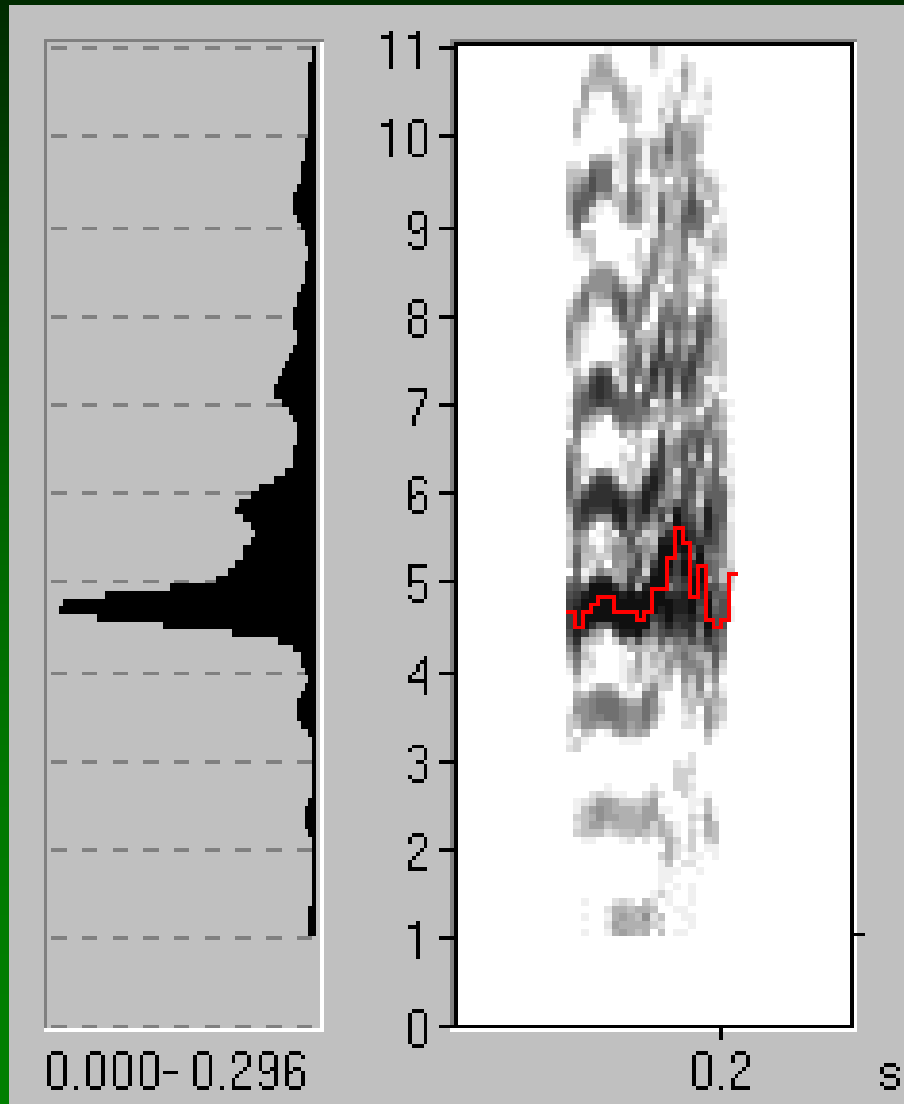
NOTE LENGTH



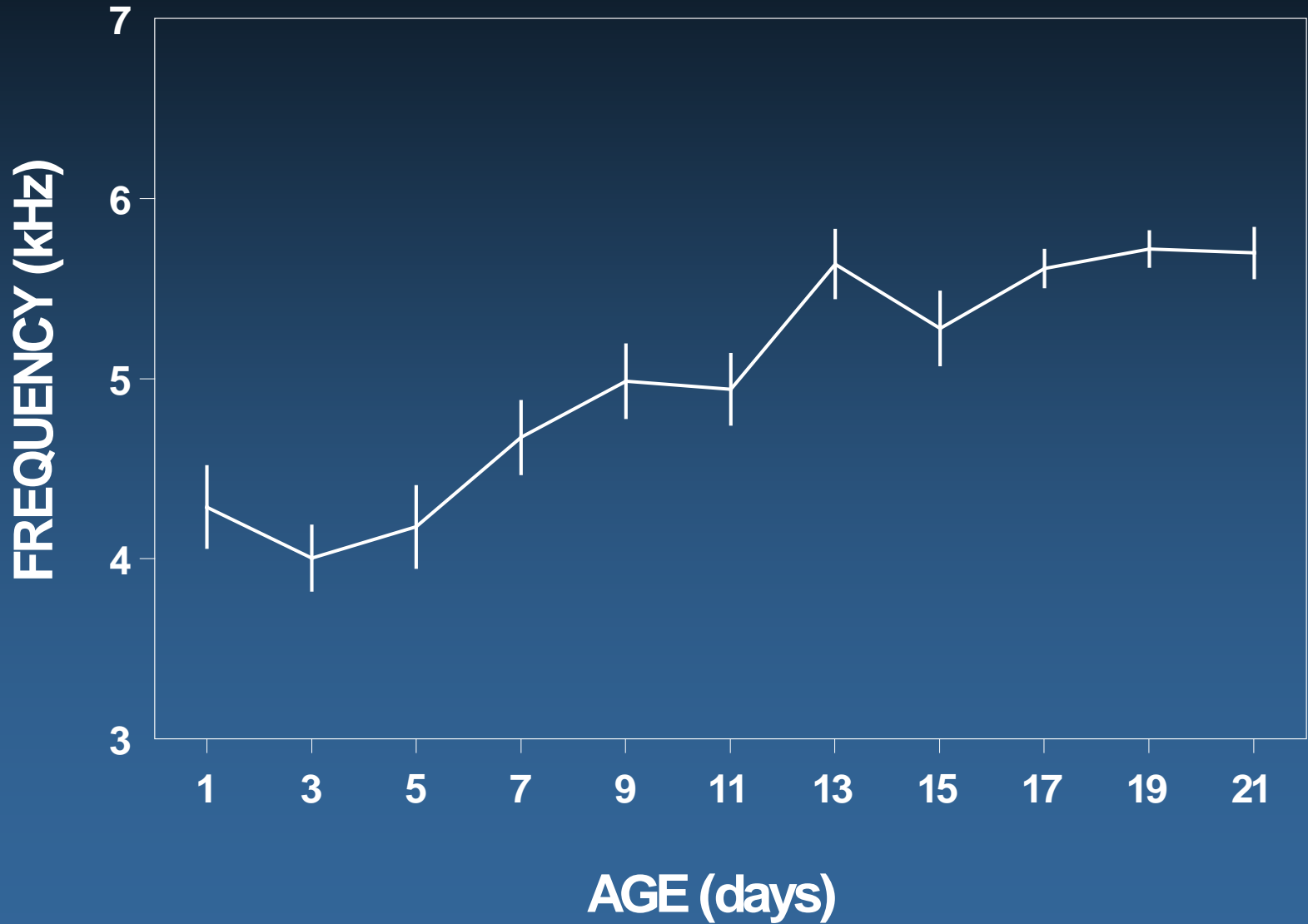
NOTE LENGTH



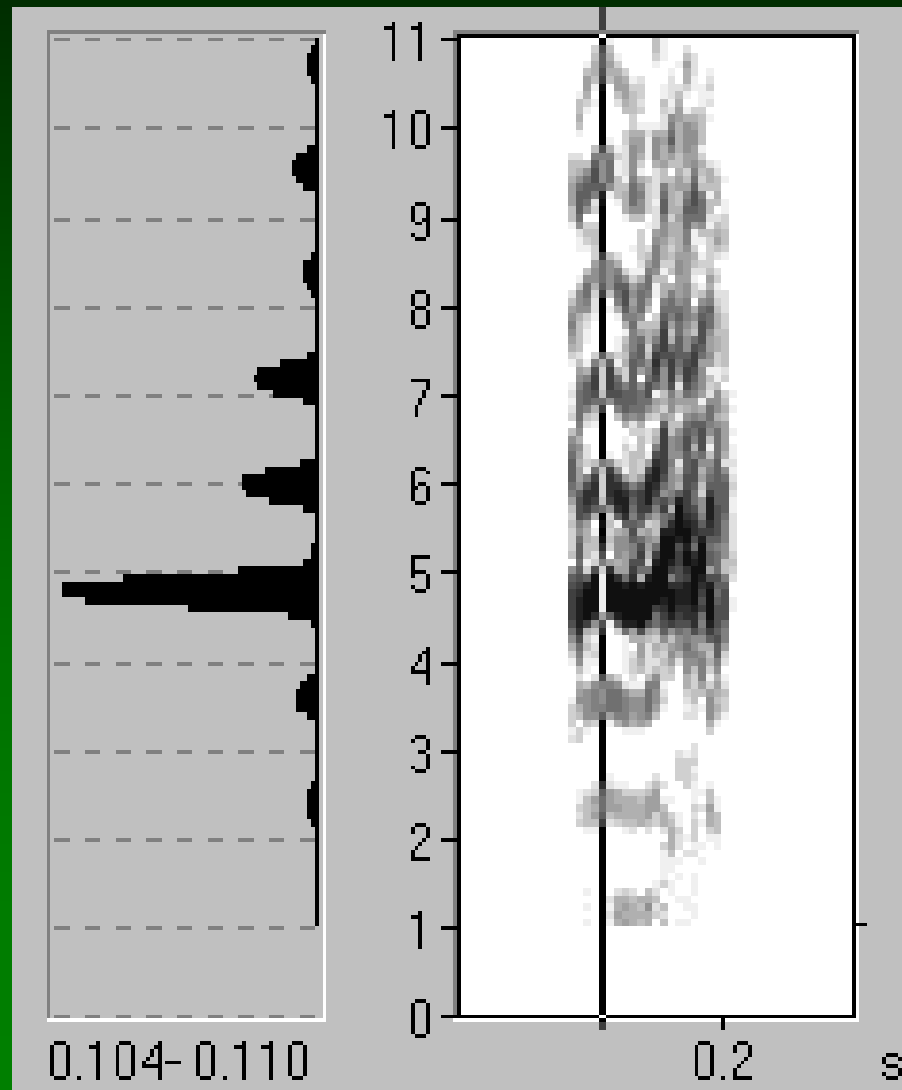
FREQUENCY OF MAXIMUM AMPLITUDE



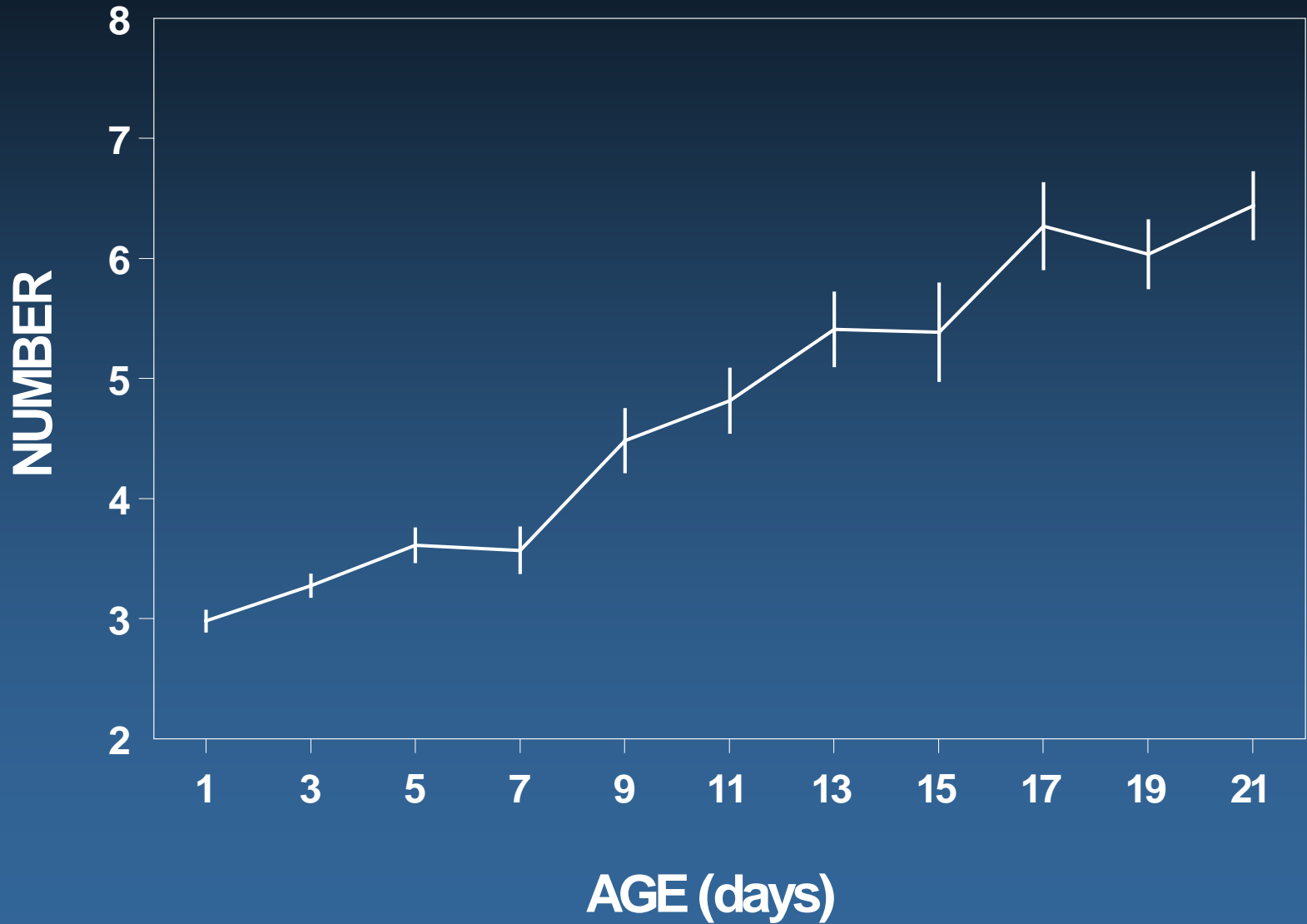
FREQUENCY OF MAXIMUM AMPLITUDE



HARMONIC FREQUENCIES



NUMBER OF HARMONICS PER NOTE









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WR03

WR05

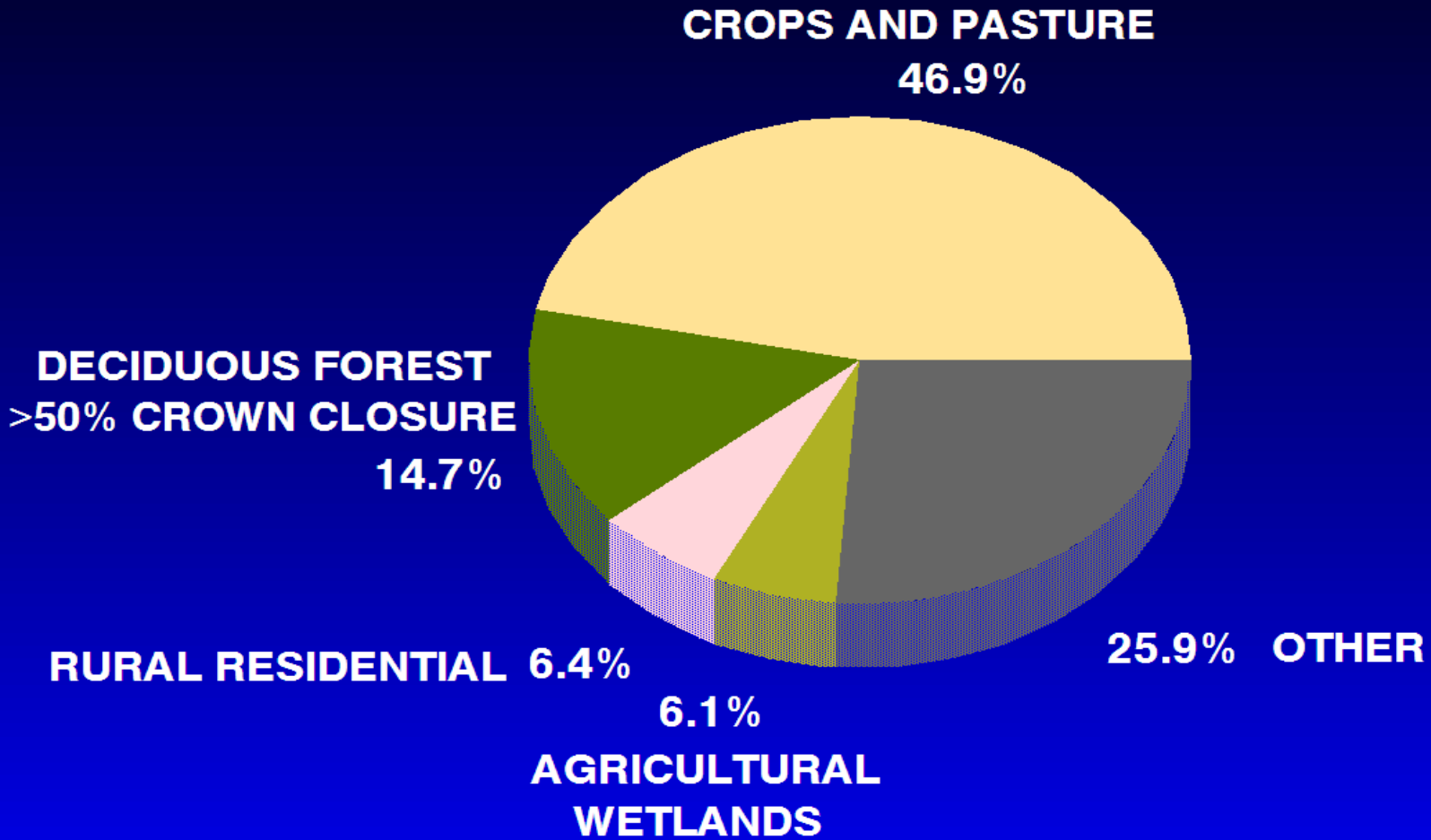
WR06

WR01

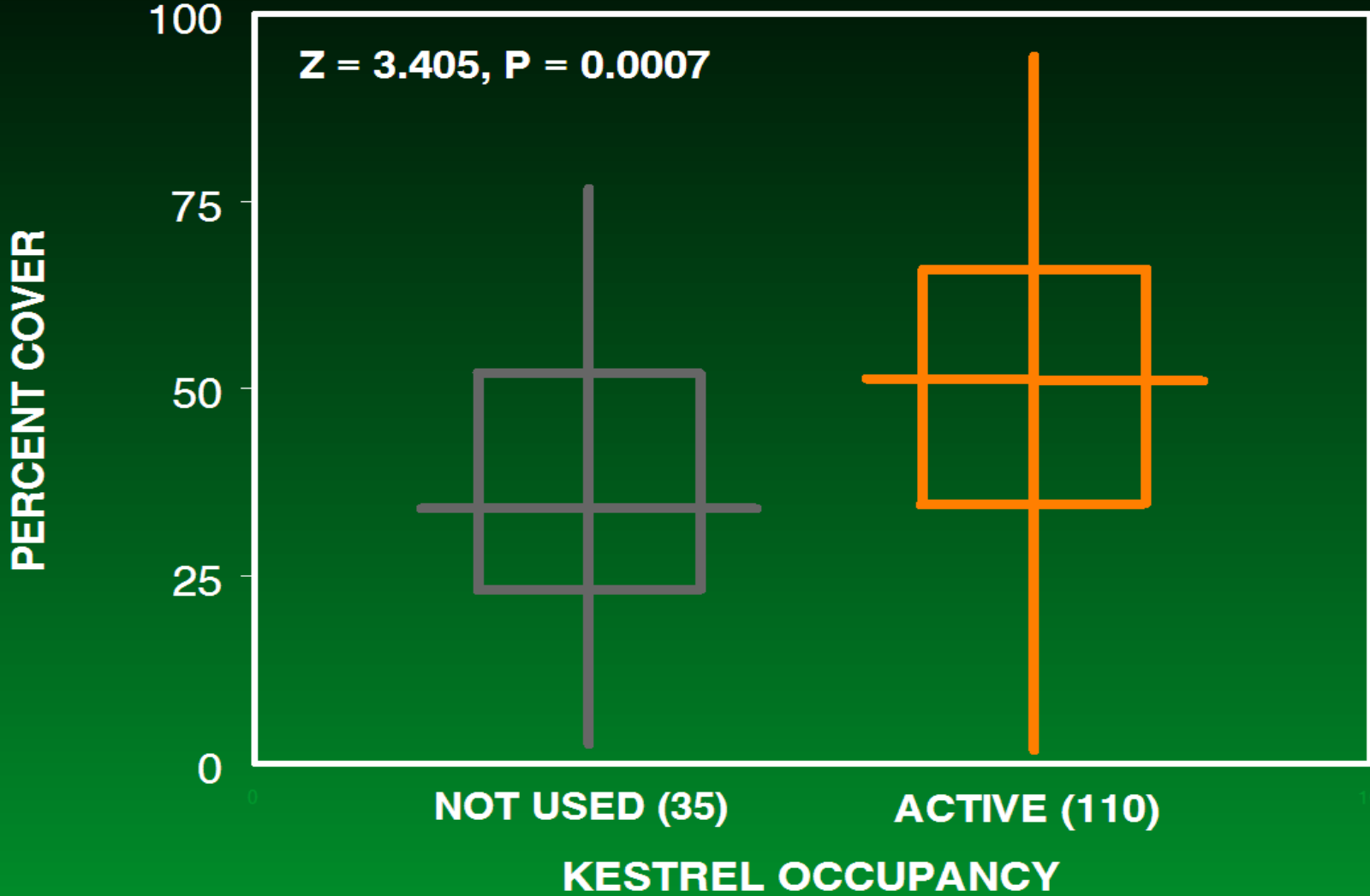
Image © 2006 State of New Jersey



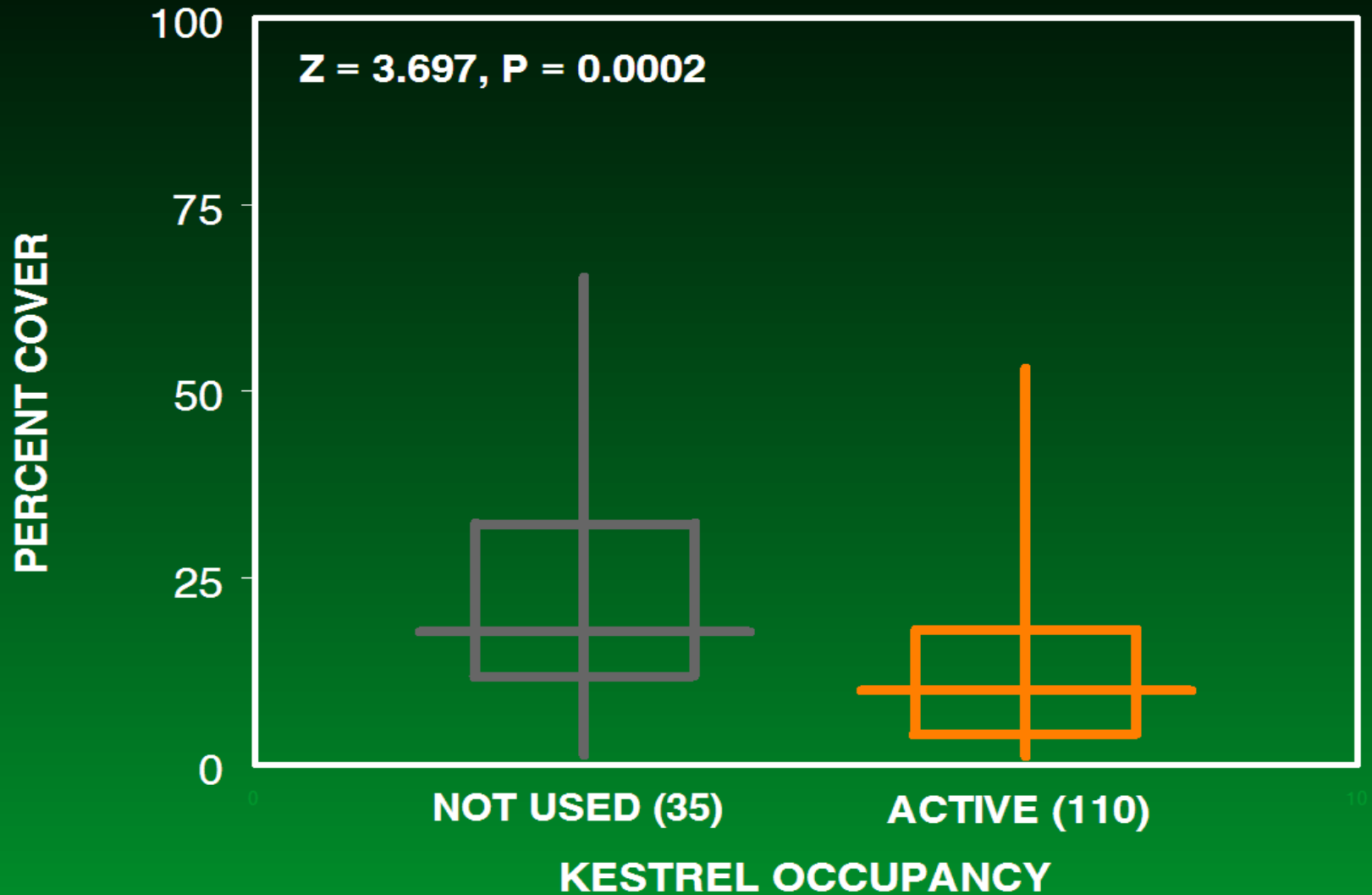
LAND USE/COVER TYPES AT NEST BOX SITES



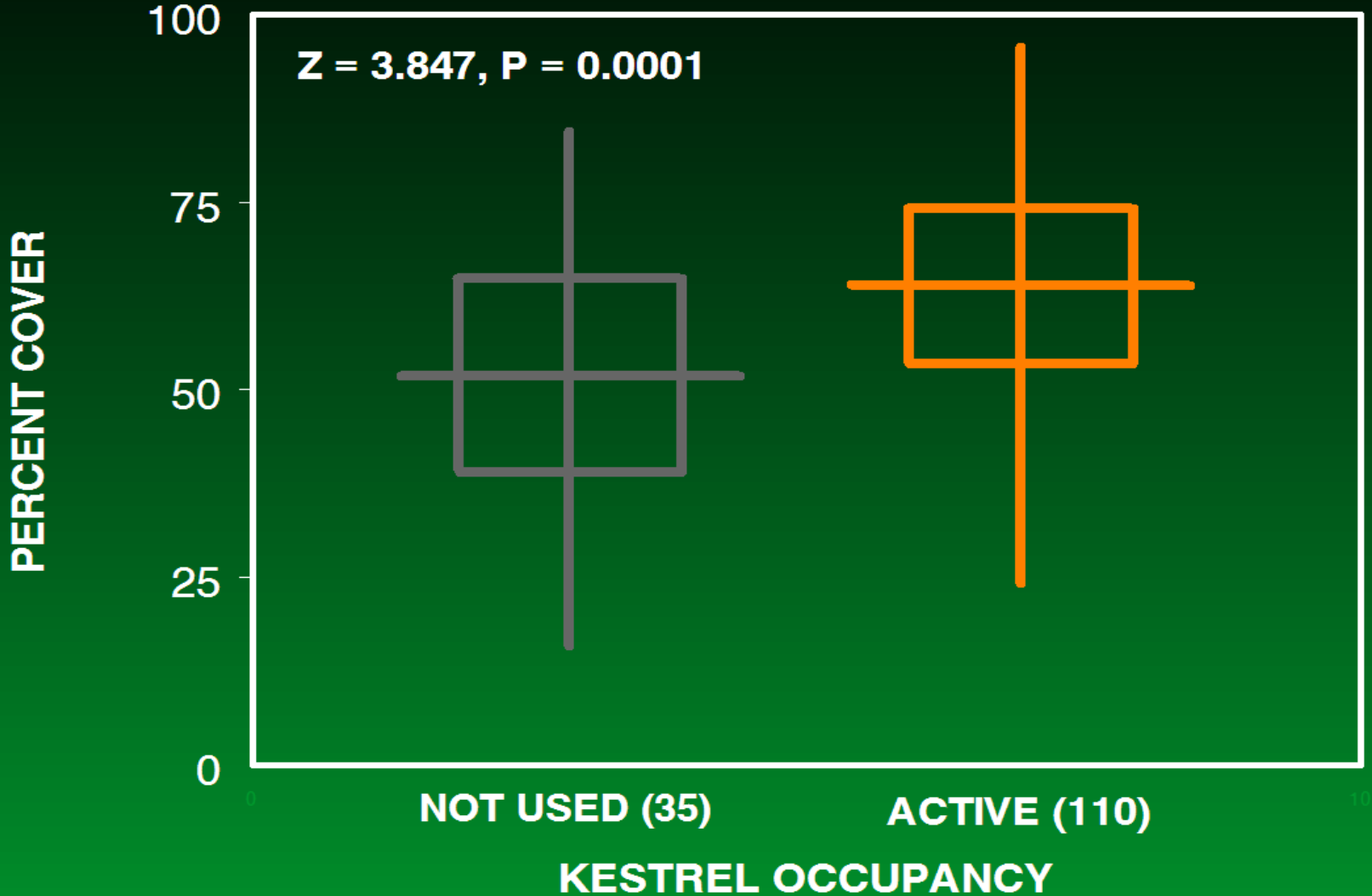
CROPS AND PASTURE

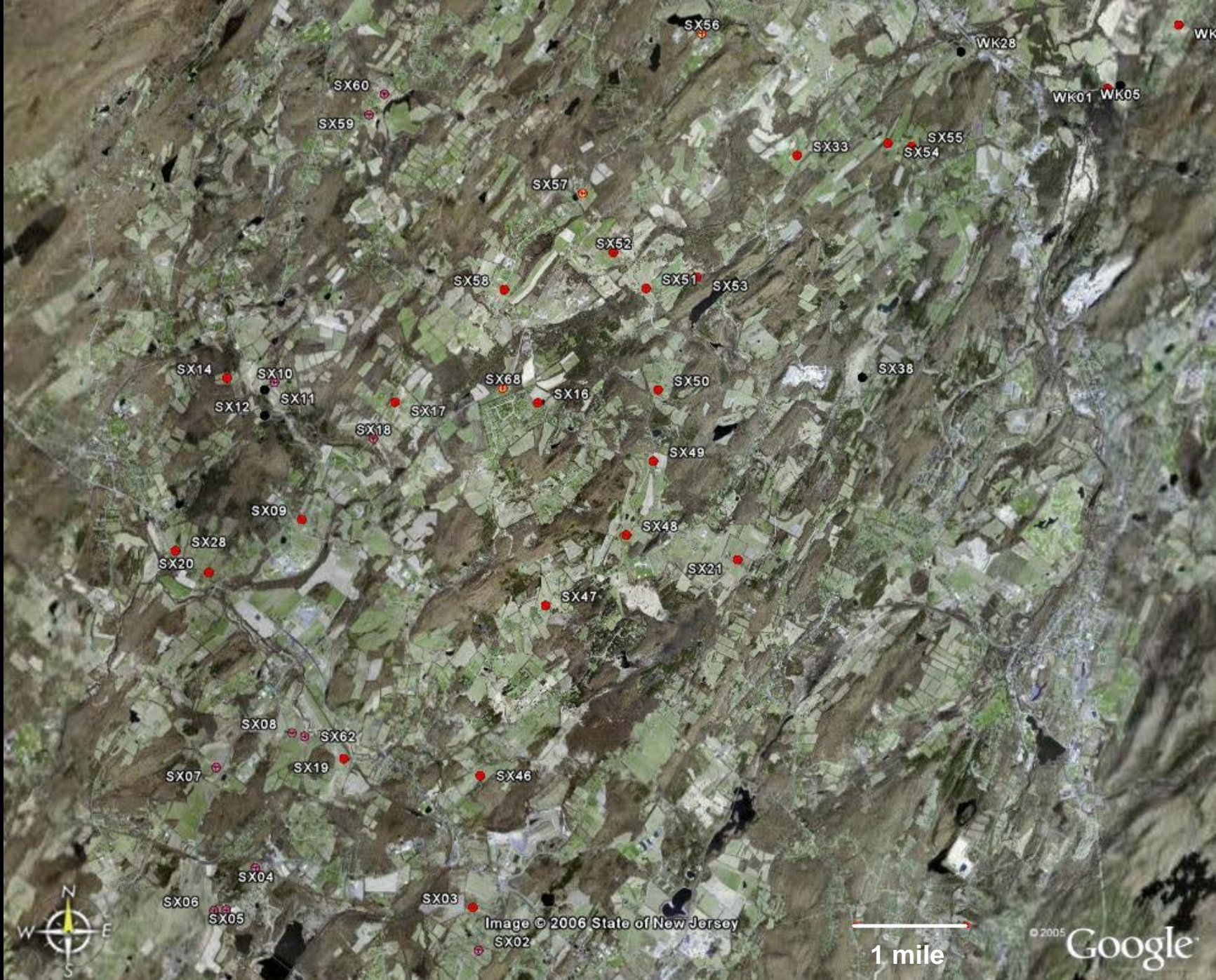


DECIDUOUS FOREST, >50% CROWN CLOSURE



OPEN HABITATS WITH LOW VEGETATION





Pointer 41°08'21.92" N 74°39'37.65" W

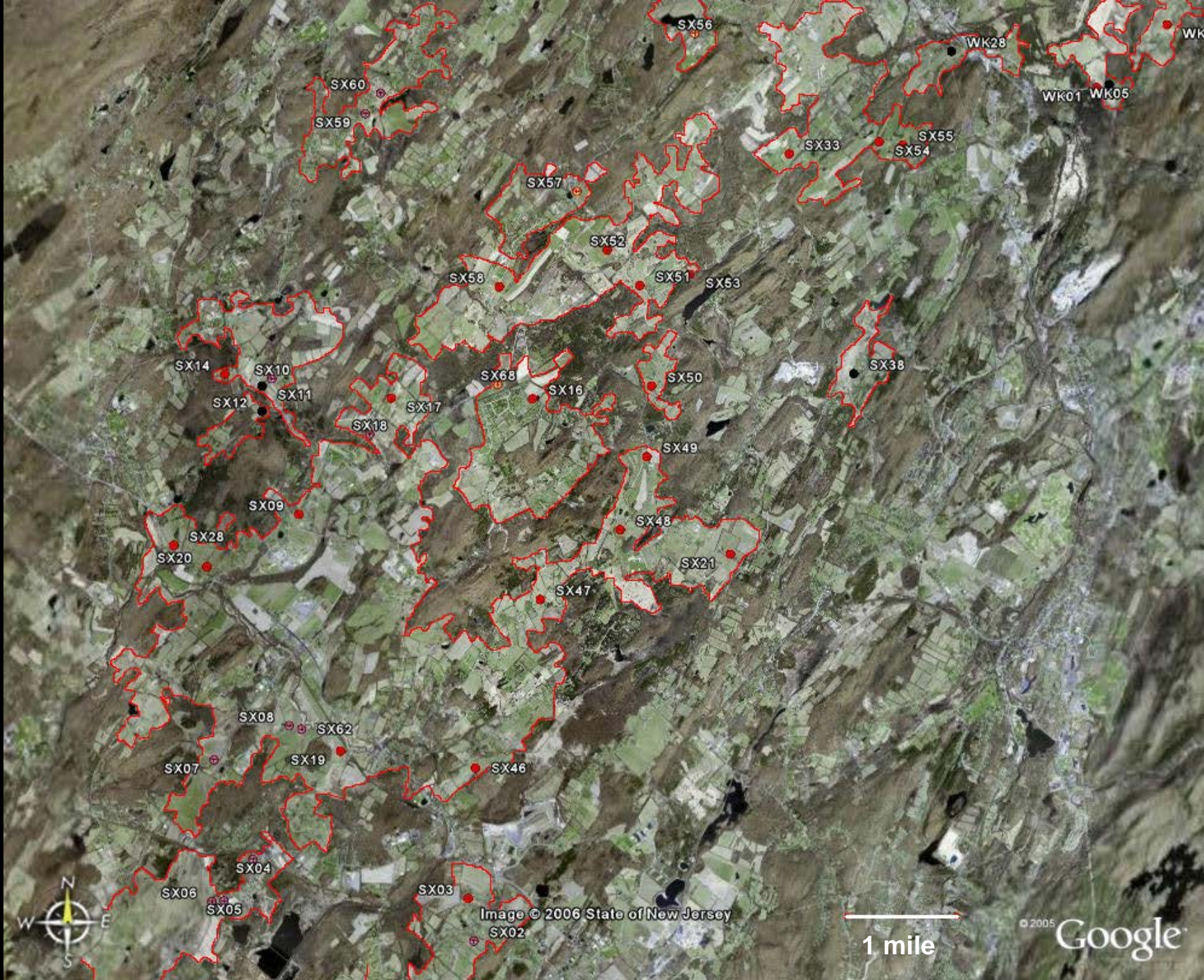
Image © 2006 State of New Jersey
SX02

1 mile

© 2005 Google

Streaming ||||| 100%

Eye alt 50053 ft

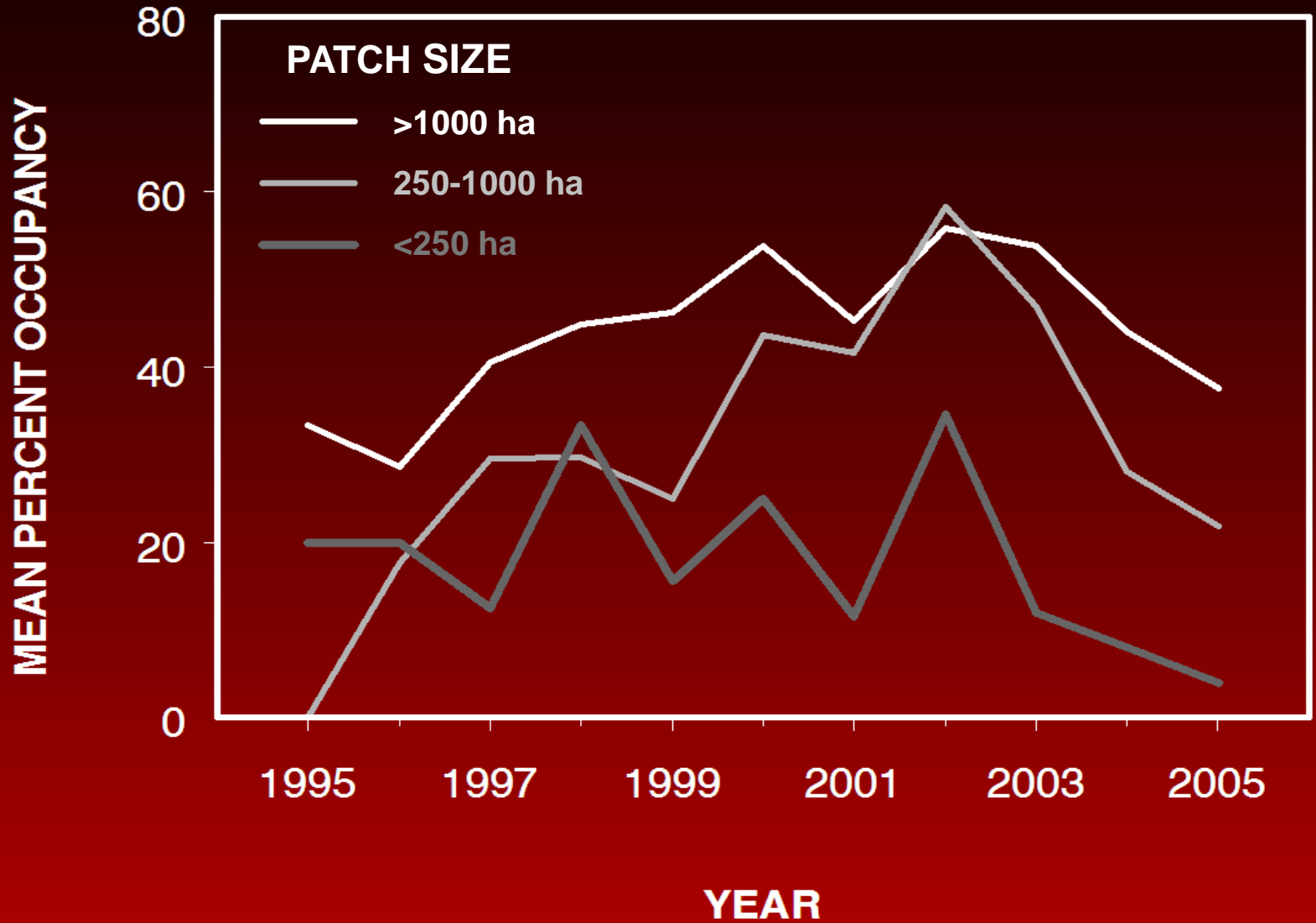


Pointer 41°08'21.92" N 74°39'37.65" W

Streaming ||||| 100%

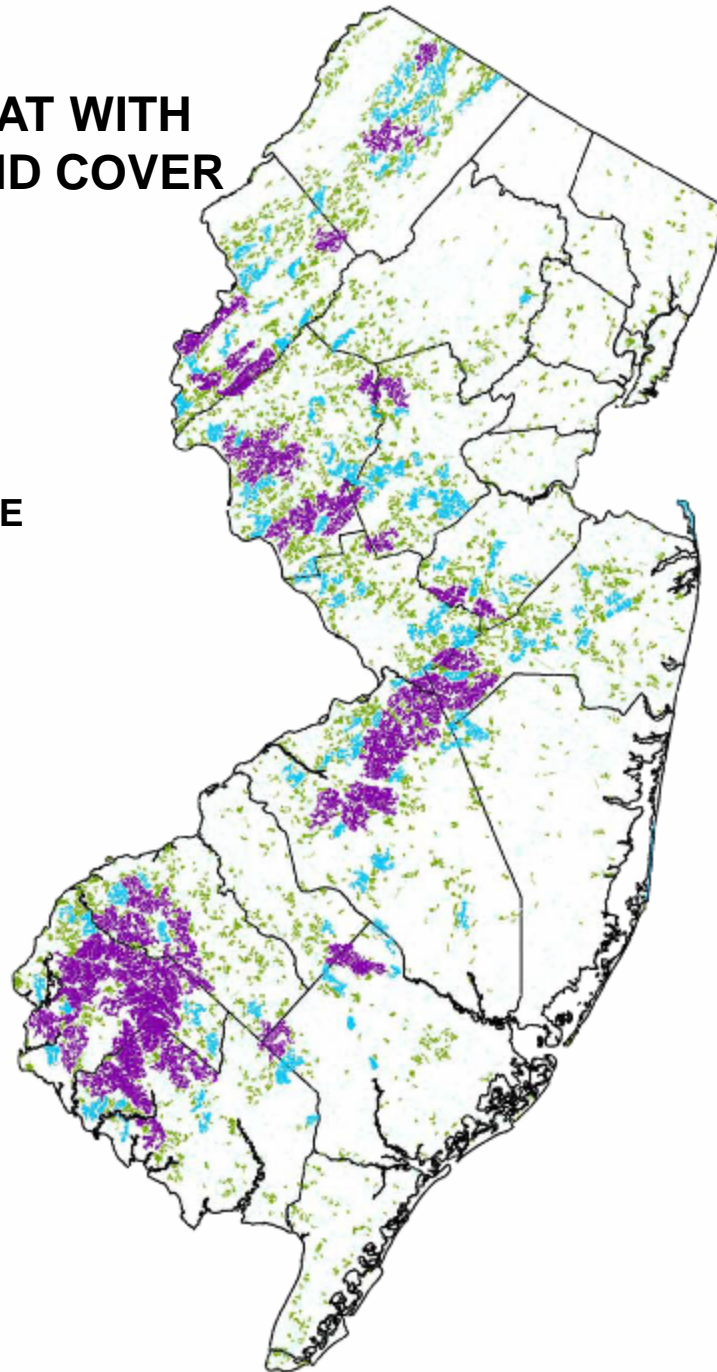
Eye alt 50053 ft

NEST BOX USE BY KESTRELS IN NEW JERSEY



OPEN HABITAT WITH LOW GROUND COVER

PATCH SIZE (acres)

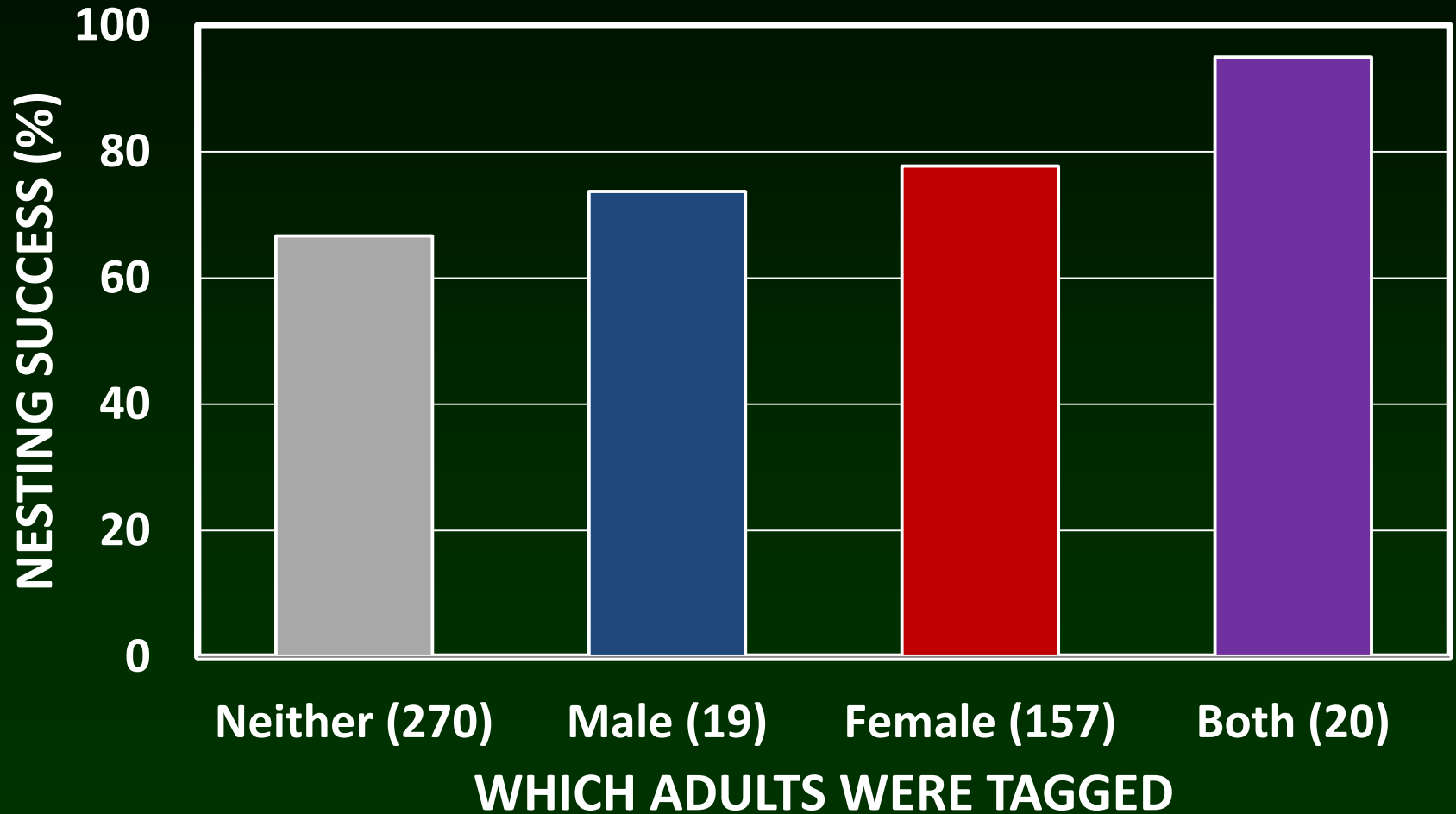








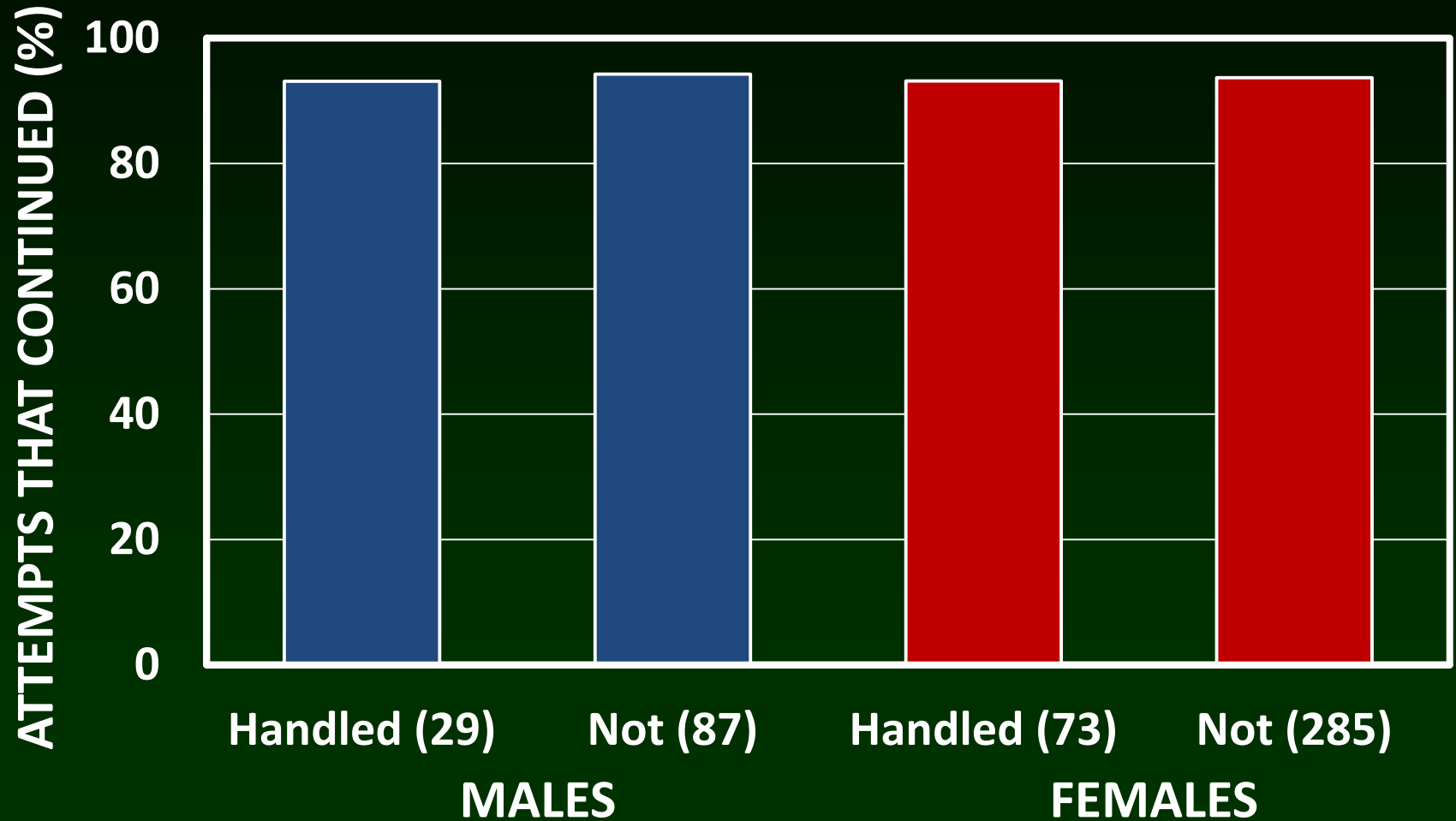
DOES WING TAGGING EFFECT NESTING SUCCESS IN KESTRELS?



$\chi^2 = 11.6, df = 3, P = 0.009$



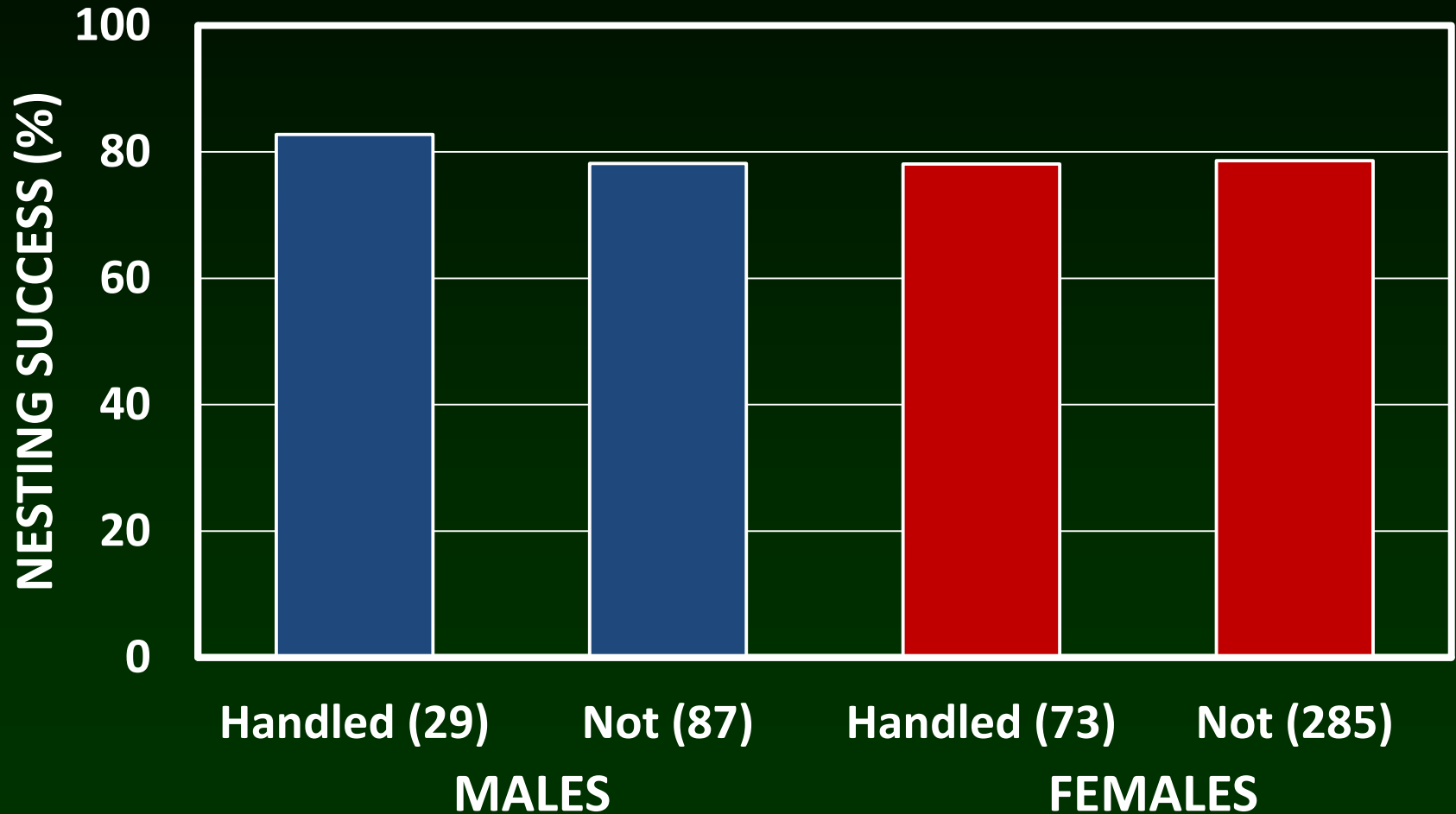
DOES HANDLING ADULTS CAUSE ABANDONMENT IN KESTRELS?



Fisher's Exact Test: $P = 0.56$

$P = 0.52$

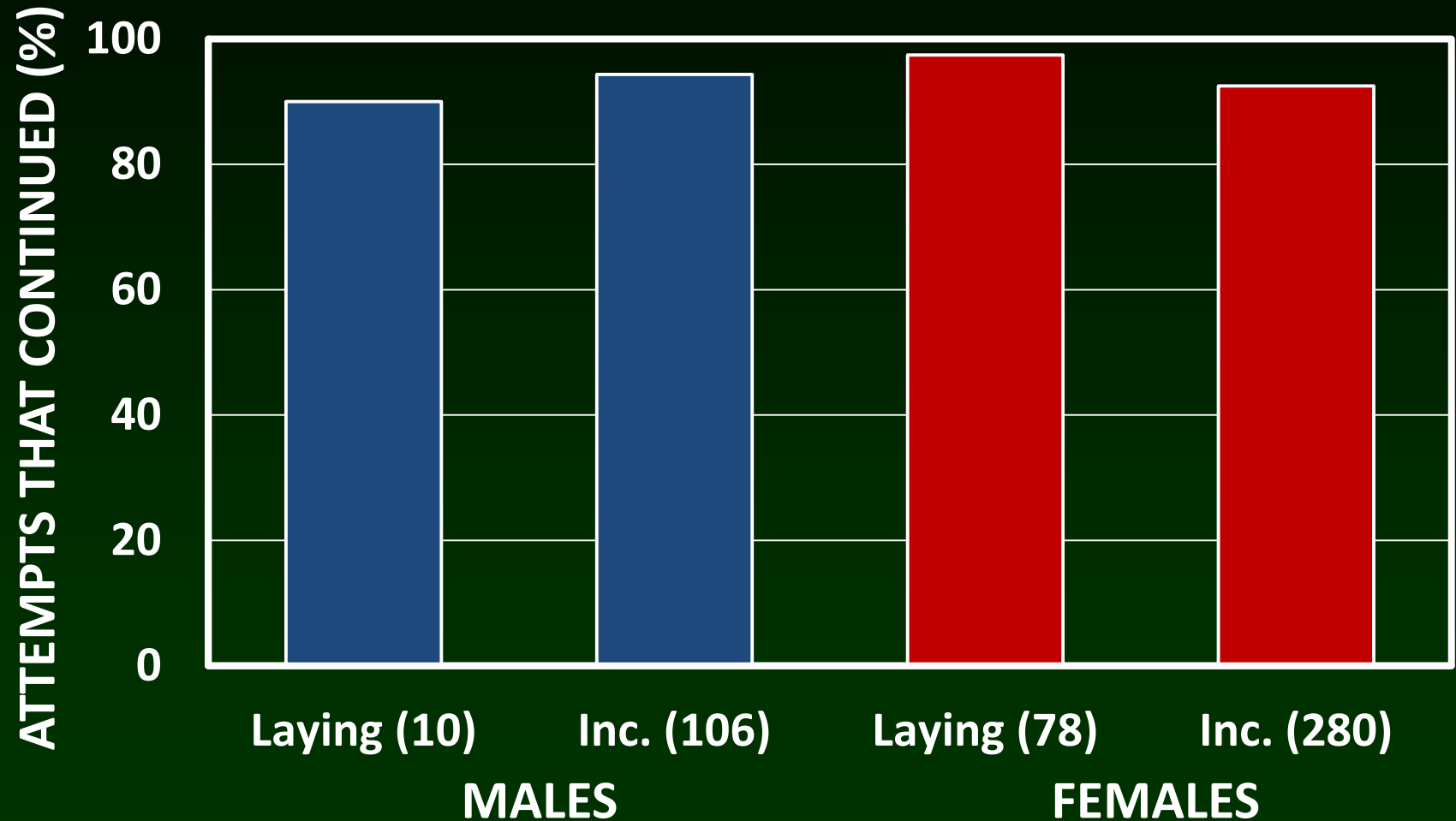
DOES HANDLING ADULTS EFFECT NESTING SUCCESS IN KESTRELS?



$\chi^2 = 0.28, df = 1, P = 0.60$

$\chi^2 = 0.01, df = 1, P = 0.92$

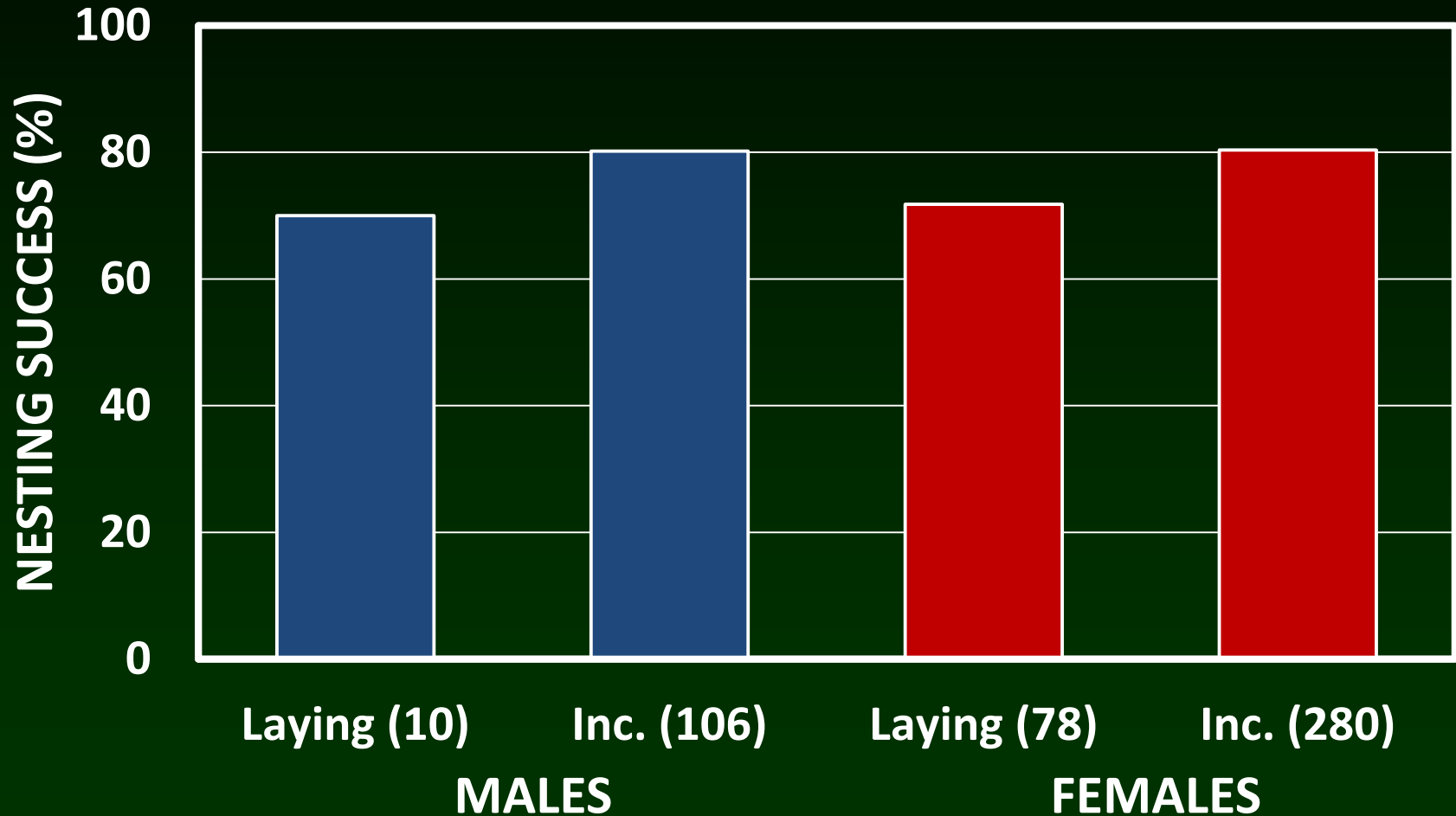
IS THE TIMING OF HANDLING ADULTS RELATED TO ABANDONMENT IN KESTRELS?



χ^2 (NA)

$\chi^2 = 2.47, df = 1, P = 0.12$

IS THE TIMING OF HANDLING ADULTS RELATED TO NEST SUCCESS IN KESTRELS?



χ^2 (NA)

$\chi^2 = 2.65, df = 1, P = 0.10$





FUNDING

**The Ohio State University
Archbold Biological Station
University of Florida
Florida Game and Freshwater Fish
Commission
Montclair State University**

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