



The Power and Peril of Nest Boxes for Managing and Monitoring American Kestrels

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**Nest boxes are
commonly used to
manage and monitor
American Kestrels**



Photo: Rob Palmer

NEST BOXES: AN EFFECTIVE MANAGEMENT TOOL FOR KESTRELS

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SOUTHEASTERN AMERICAN KESTRELS RESPOND TO AN INCREASE IN THE AVAILABILITY OF NEST CAVITIES IN NORTH-CENTRAL FLORIDA

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WHY ARE AMERICAN KESTREL (*FALCO SPARVERIUS*) POPULATIONS DECLINING IN NORTH AMERICA? EVIDENCE FROM NEST-BOX PROGRAMS

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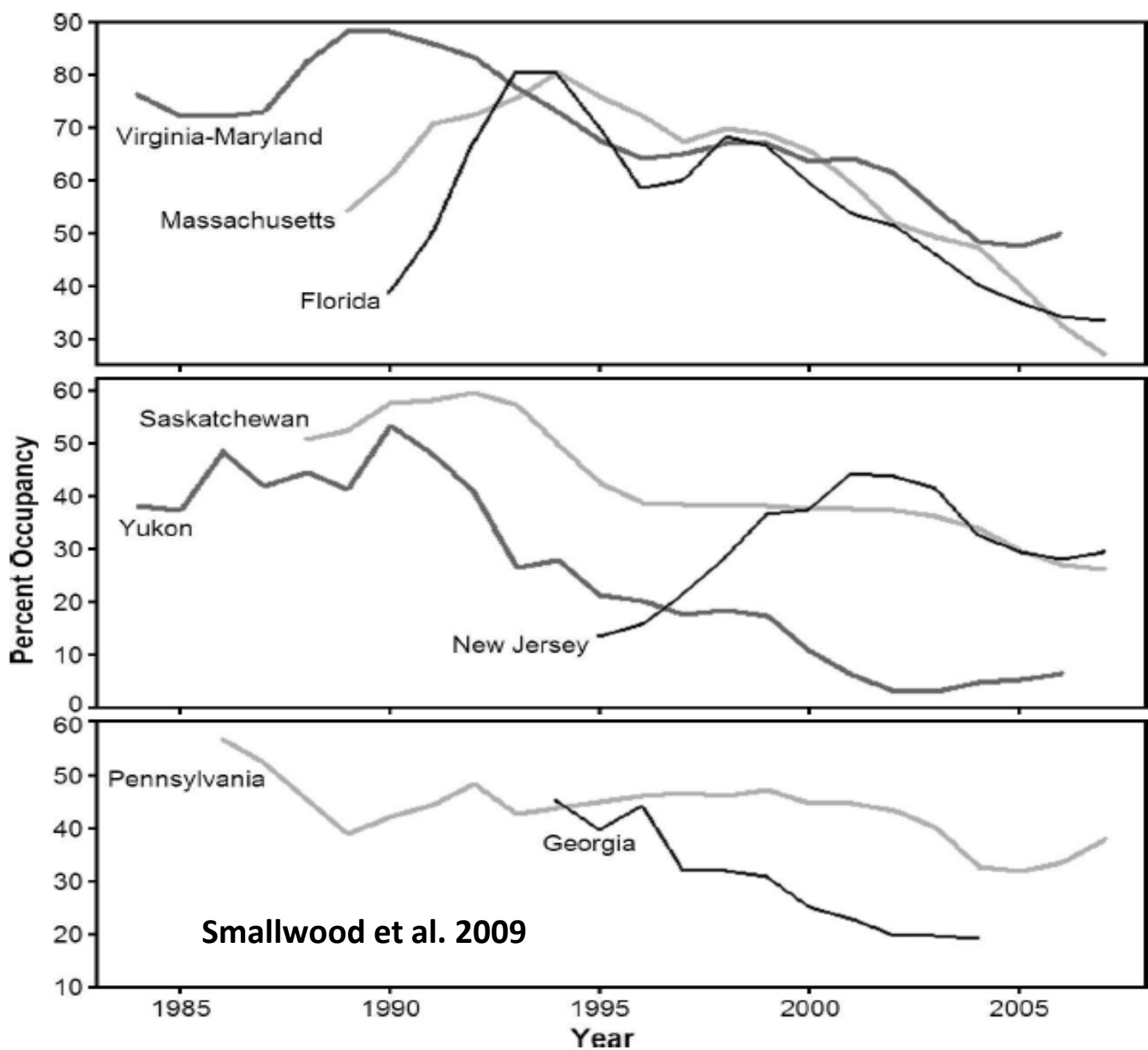
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SITES

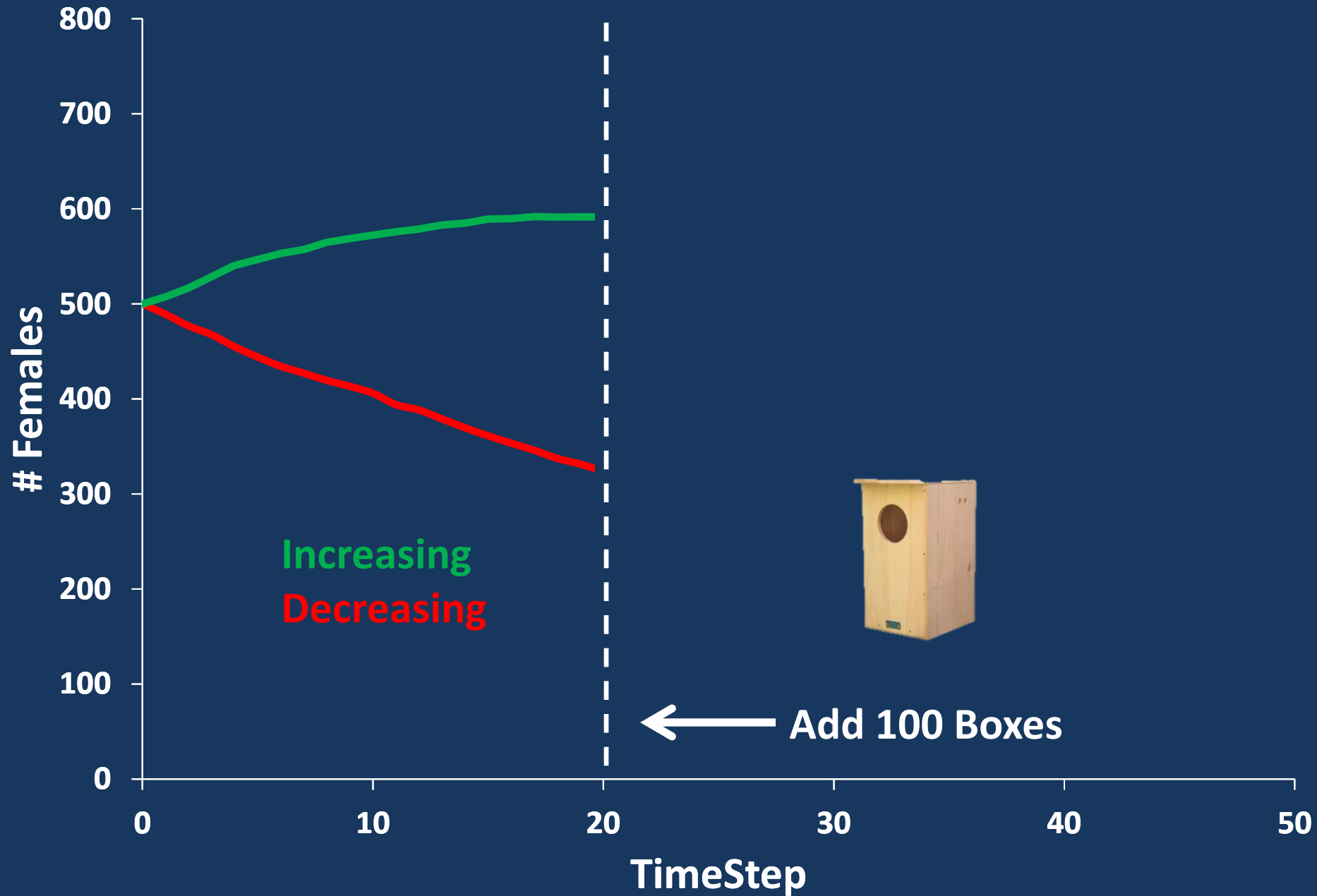
- **Virtual landscape**
 - Breeding sites
 - Females
 - Must find a breeding site to reproduce
- **TimeSteps (years)**
 - Look for site → breed → die → add/remove sites



Why Simulations?

- **Control everything**
 - **Survival**
 - **Reproduction**
 - **Dispersal**
 - **# Boxes and Cavities**
- **Know everything**
 - **Population levels vs Occupancy**
 - **Effects of adding removing boxes**
- **Growing vs declining populations**

Management



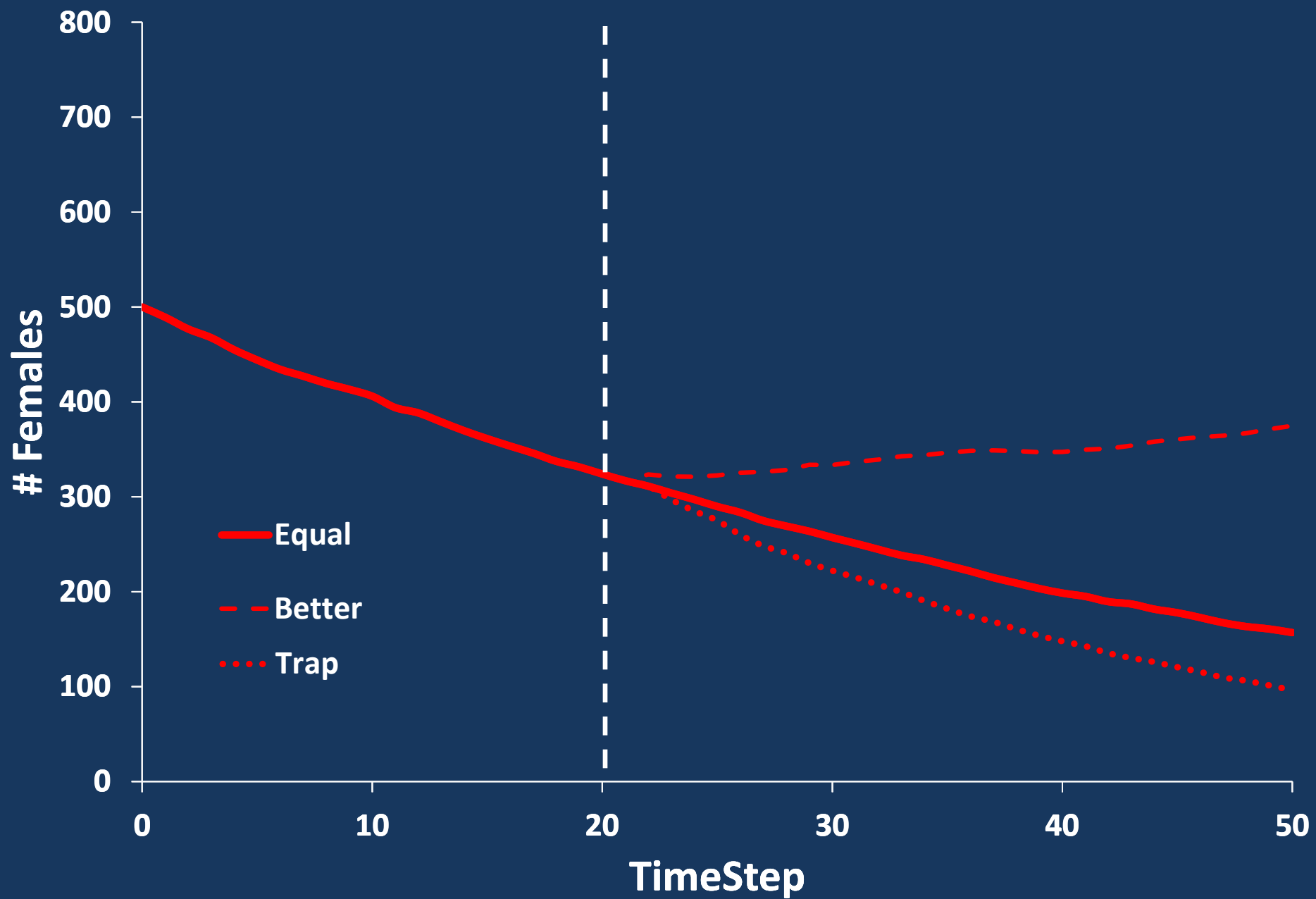
High-quality Boxes

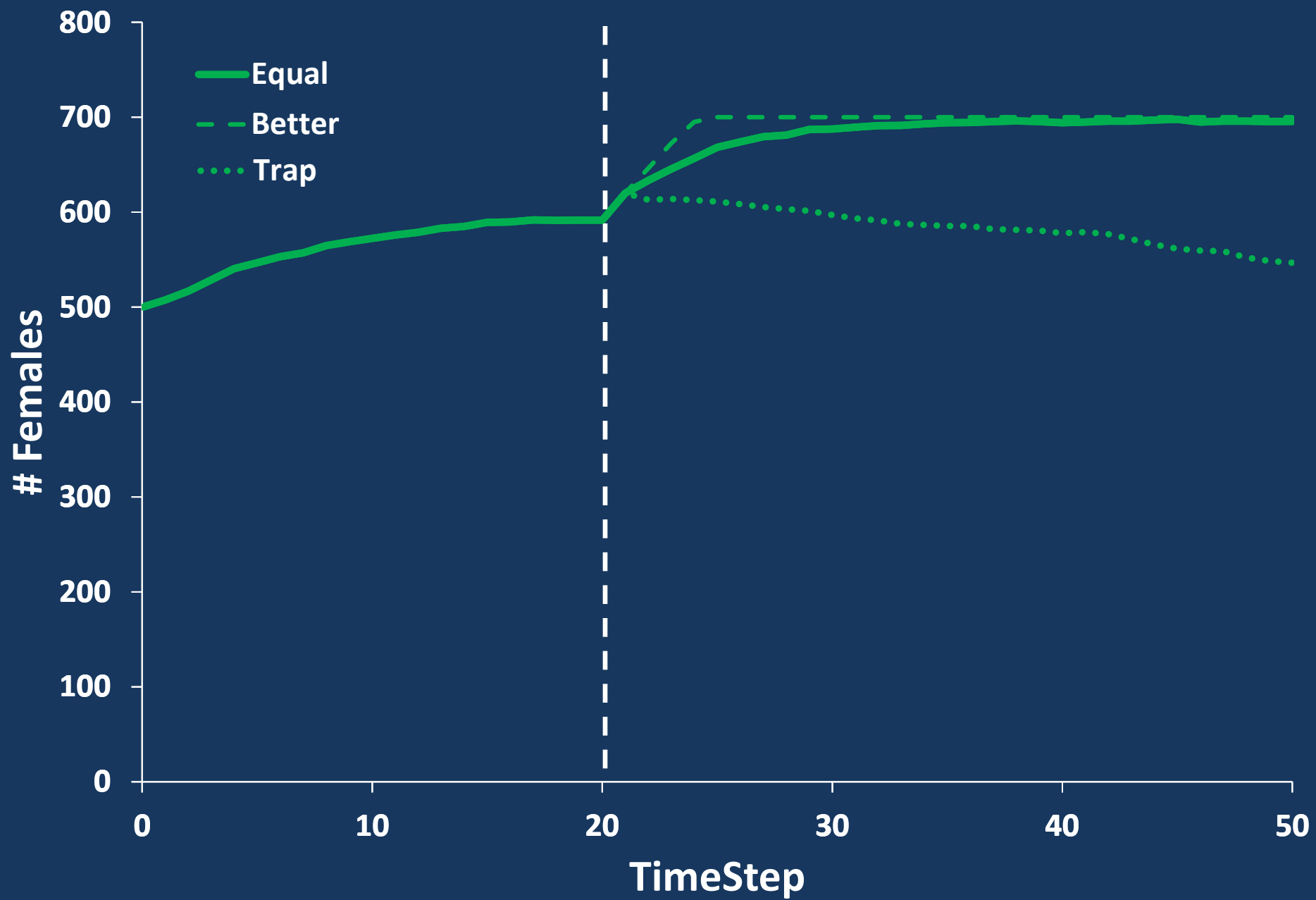
- **Boxes placed in good habitat**
(Rohrbaugh & Yahner 1997, Greenwood & Dawson 2011).
- **Enhancements**
 - **Predator guards**
 - **Starling control**

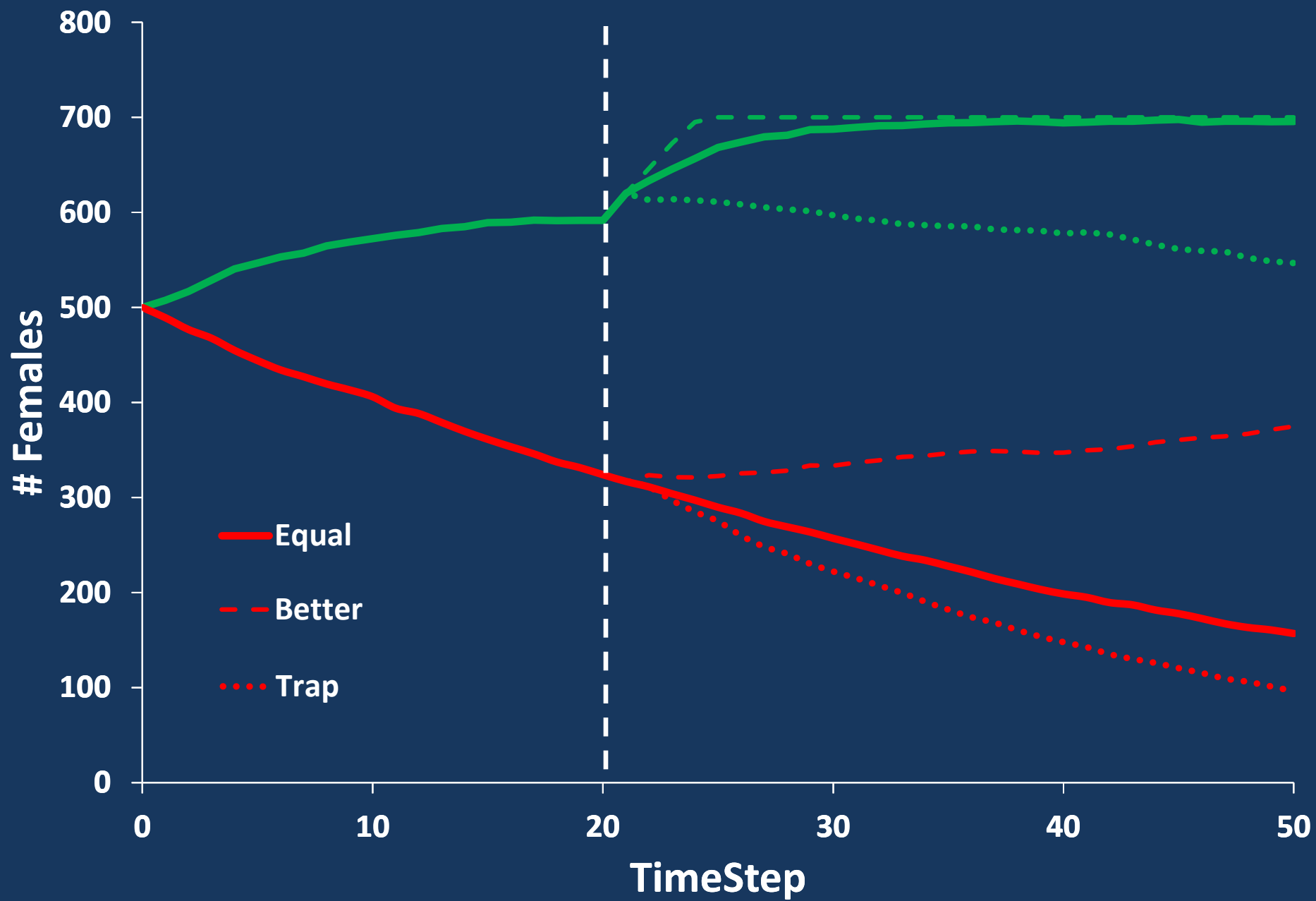
Ecological Traps

Poor-quality Boxes

- **Boxes placed at a high density can lead to lower reproductive success**
(Pöysä and Pöysä 2002, Mänd et al. 2005).
- **Can attract birds to poor habitat.**
 - **e.g., roadsides (Strasser & Heath 2013)**







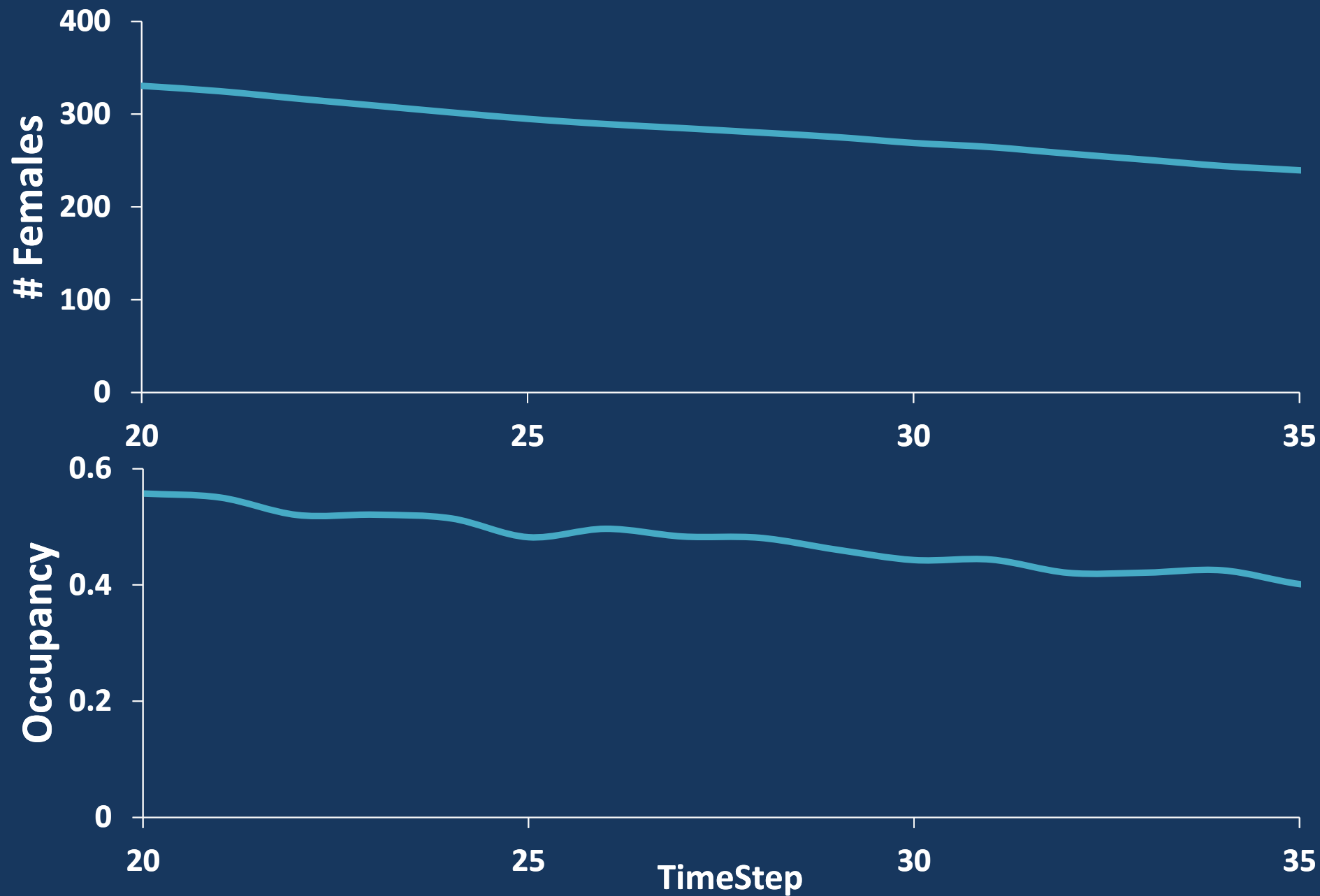
Monitoring

- **Are there situations where occupancy does not reveal population trends?**

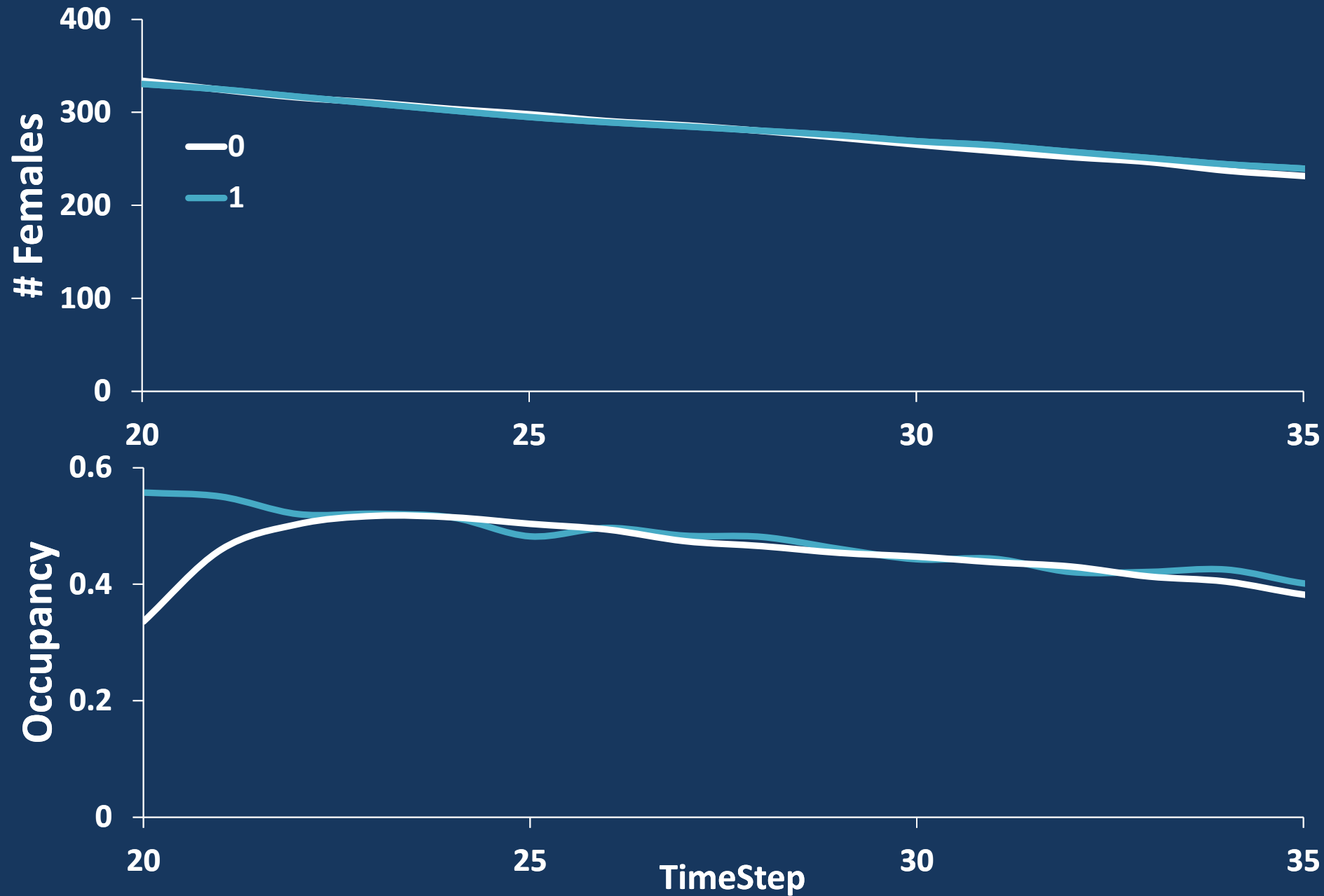
Occupancy Lag

- **Occupancy often rises shortly after installation**
(Jackson and Tate 1974, Gauthier and Smith 1987, Newton 1998, Lindenmayer et al. 2009, Smallwood et al. 2009a, 2009b, Brown et al. 2014).
- **Site fidelity**
 - **Propensity to use same site year after year**

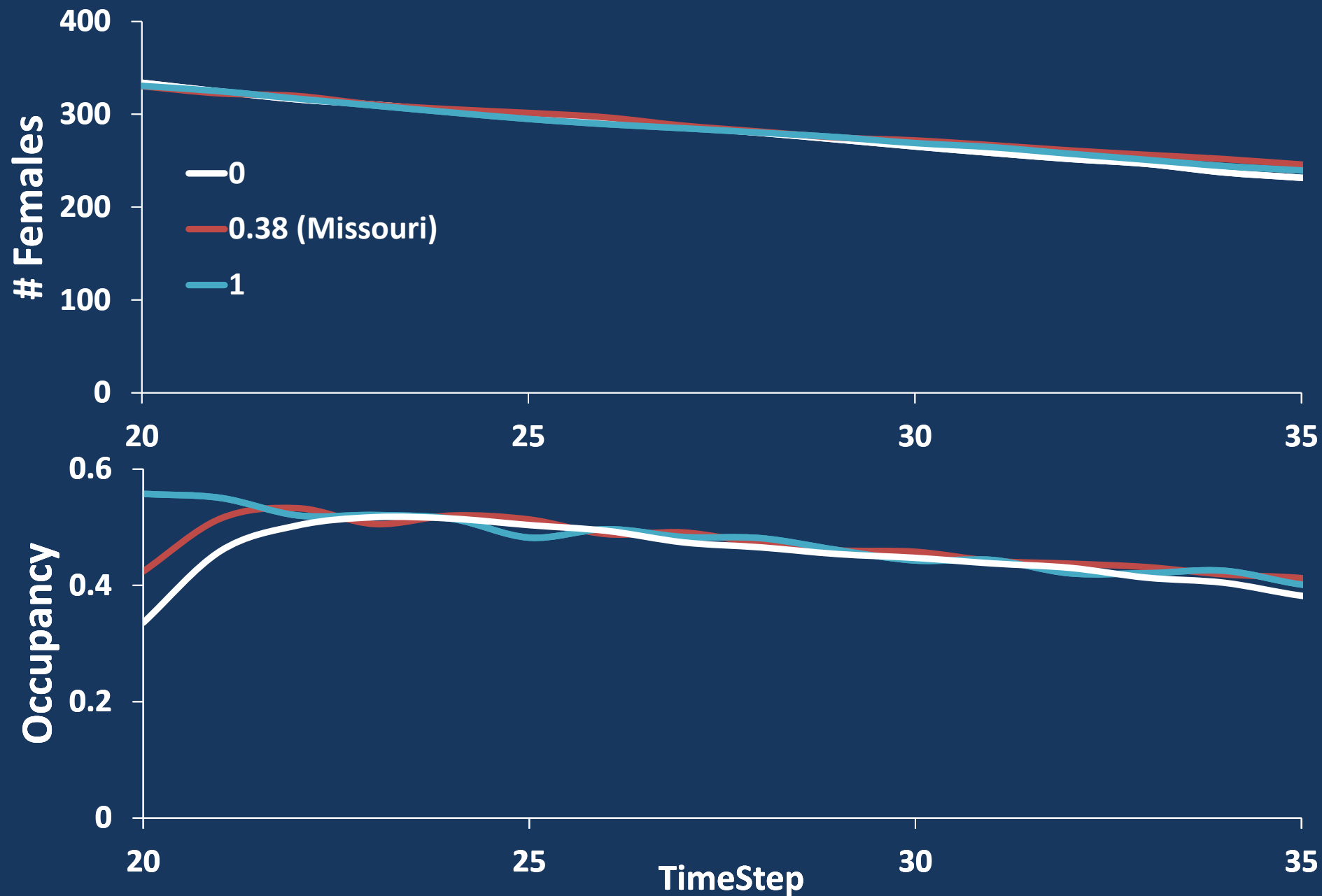
Occupancy Lag



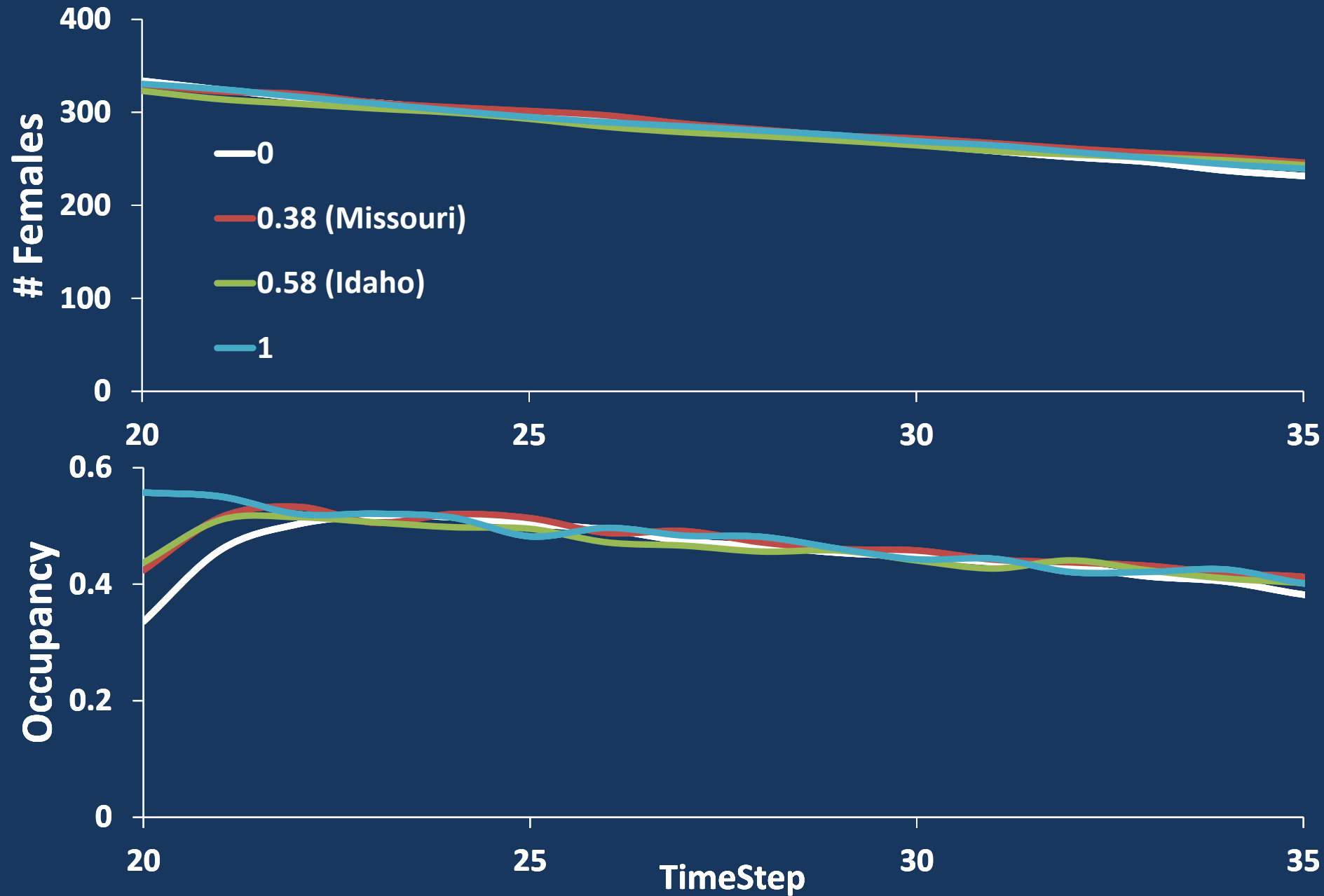
Occupancy Lag



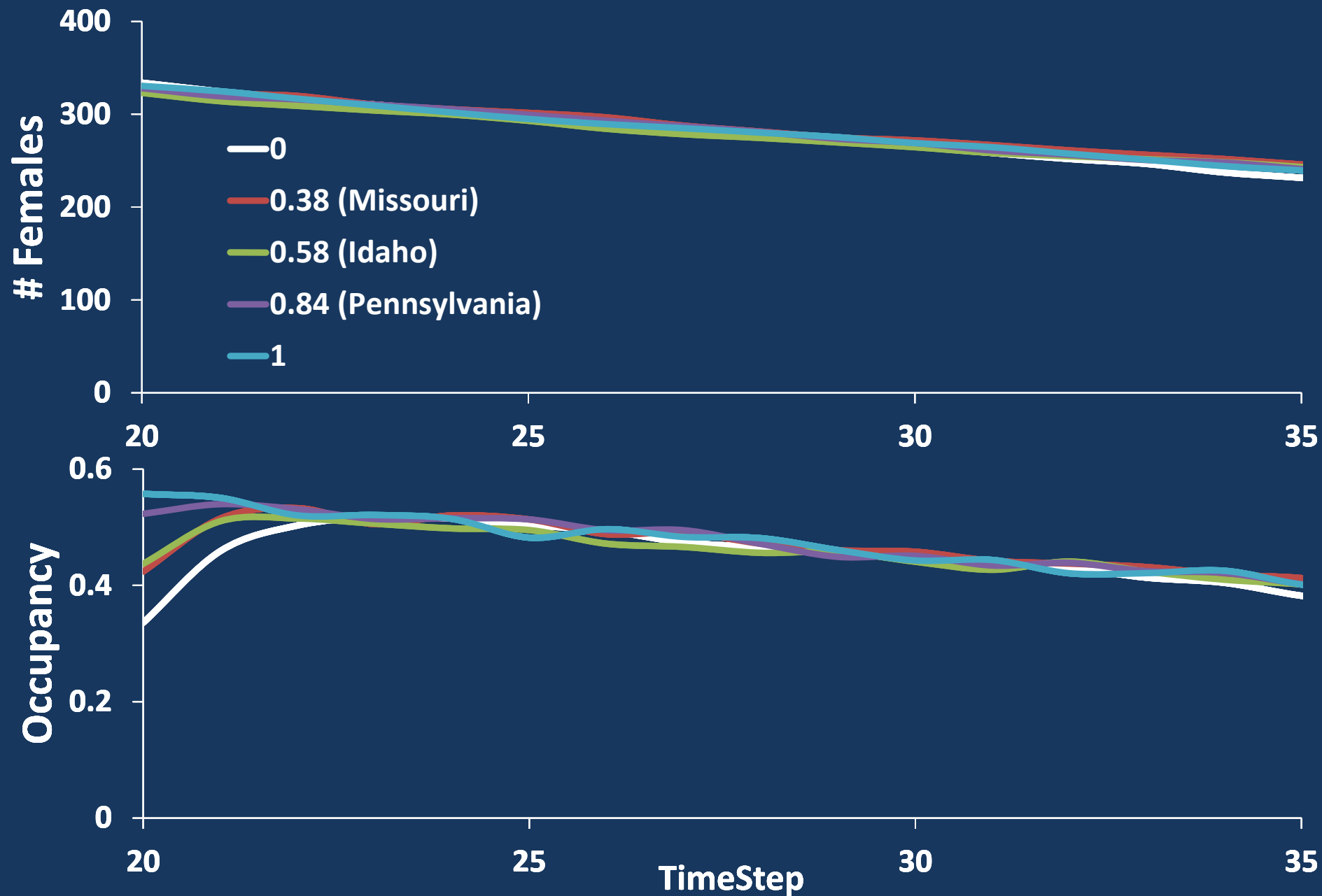
Occupancy Lag



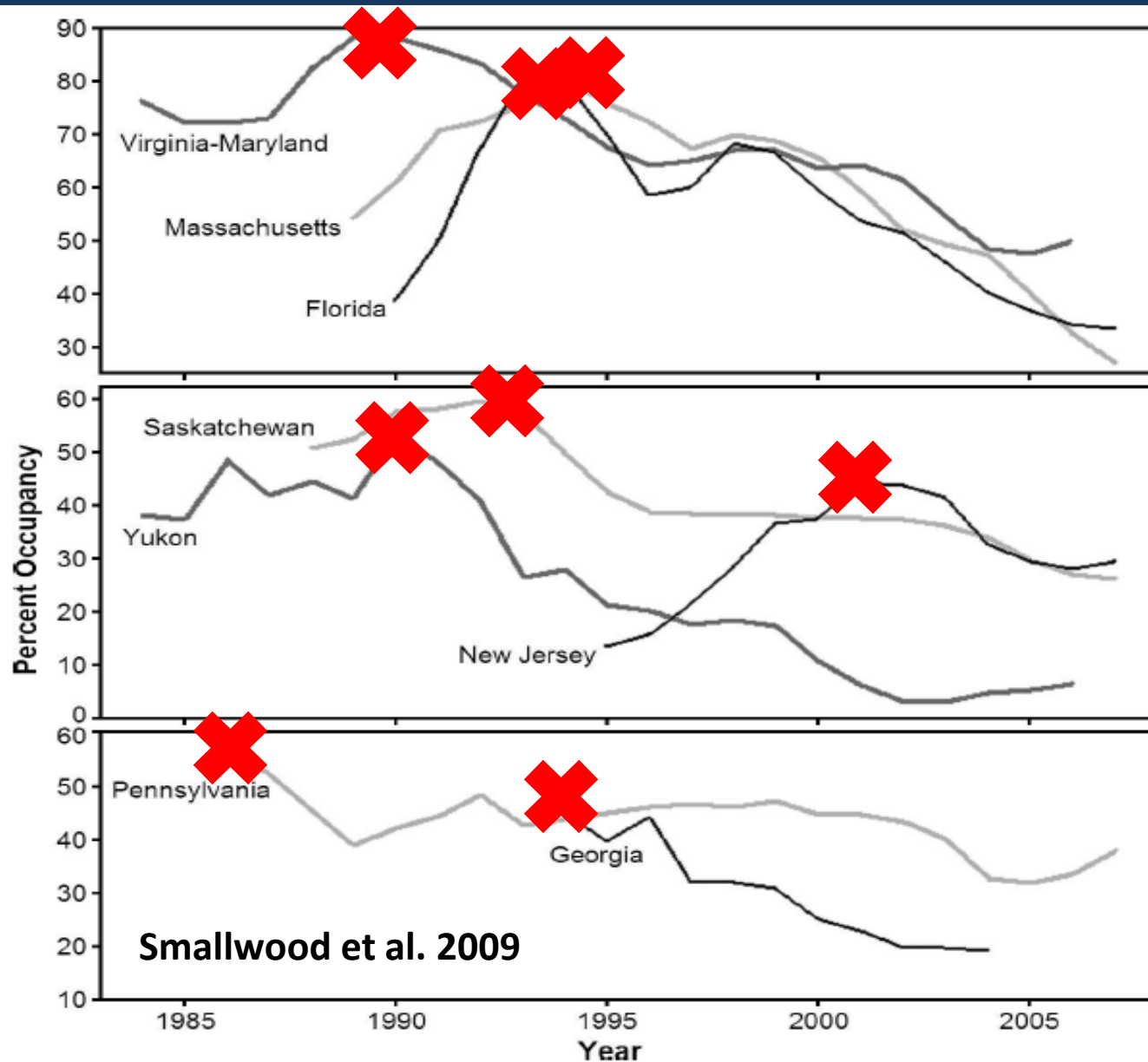
Occupancy Lag



Occupancy Lag

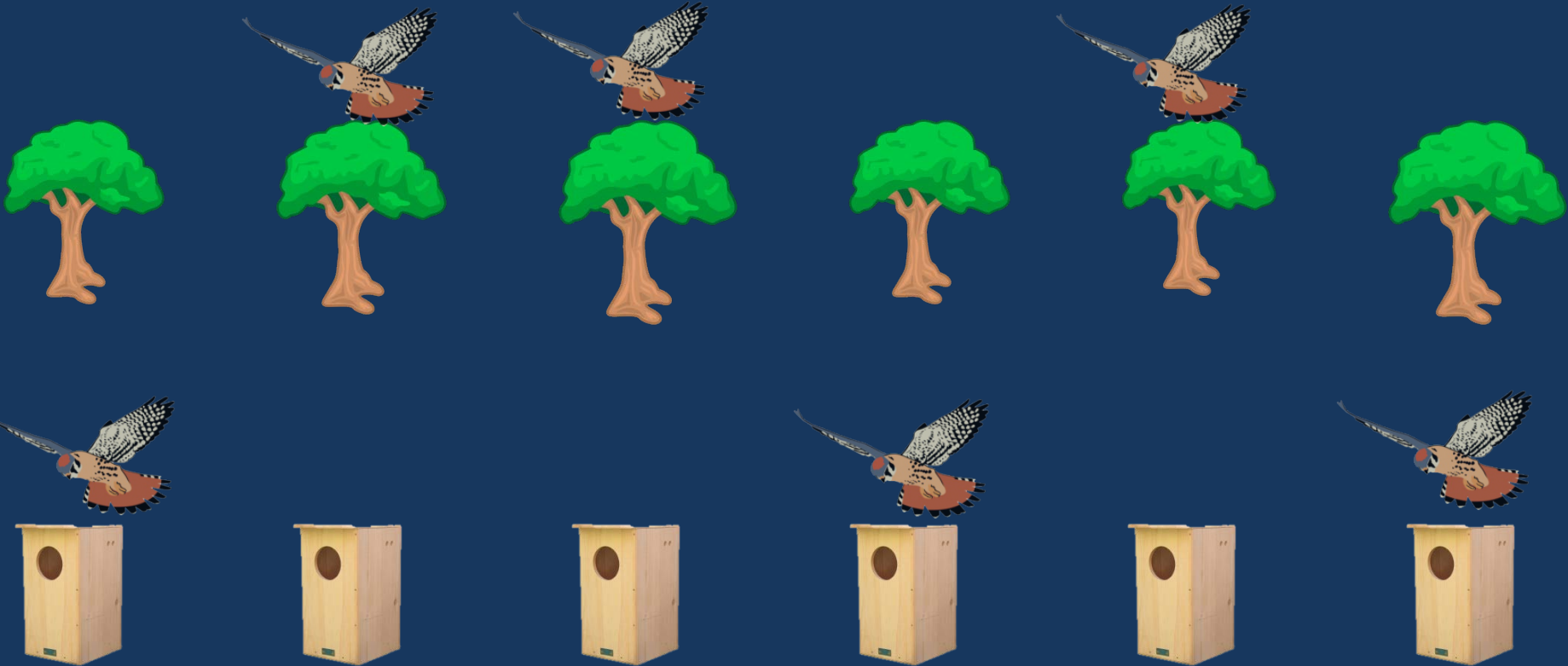


Occupancy Lag



Unmonitored Nests

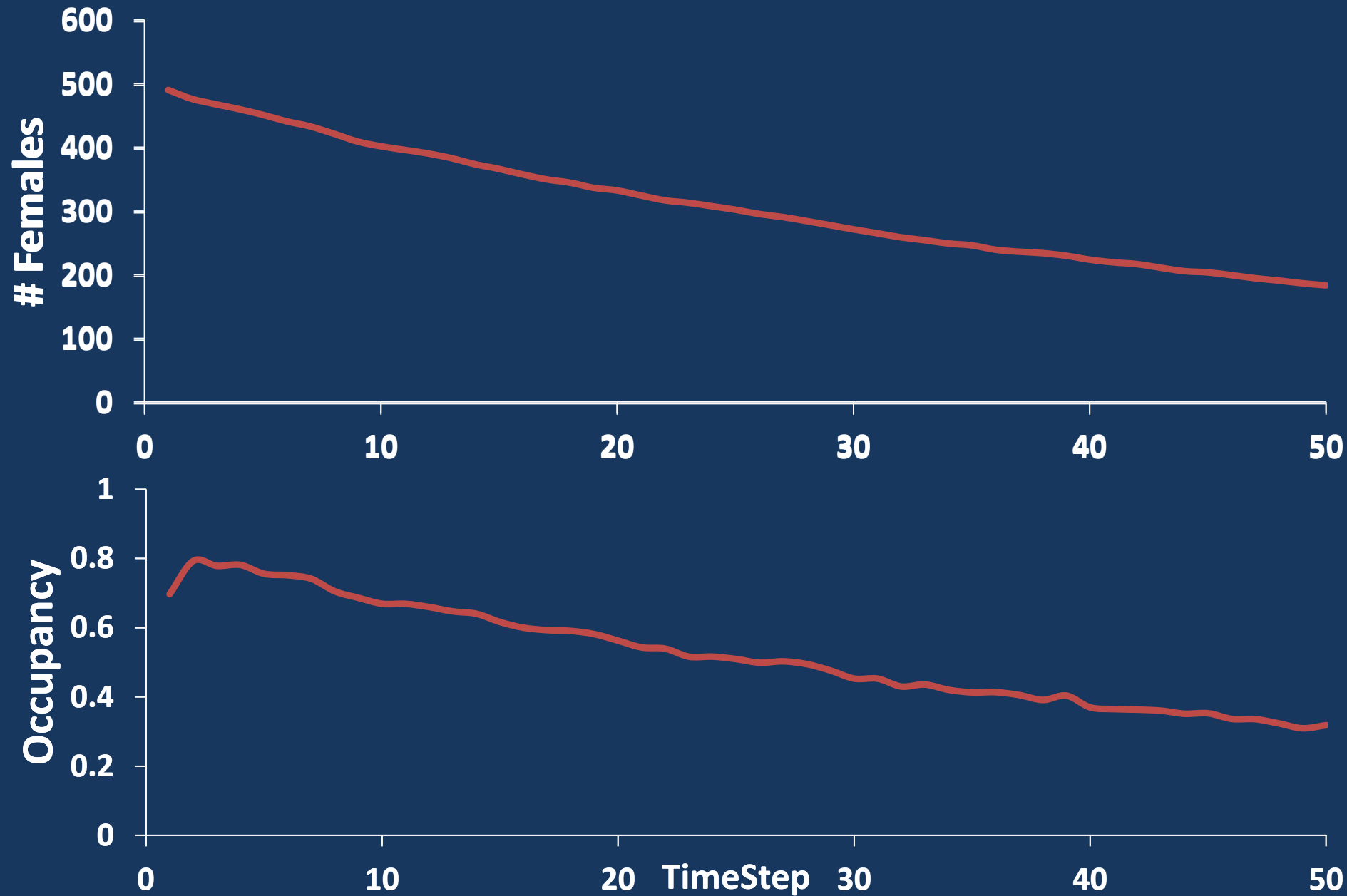
- Changes in availability of **unmonitored** nest sites may induce false trends



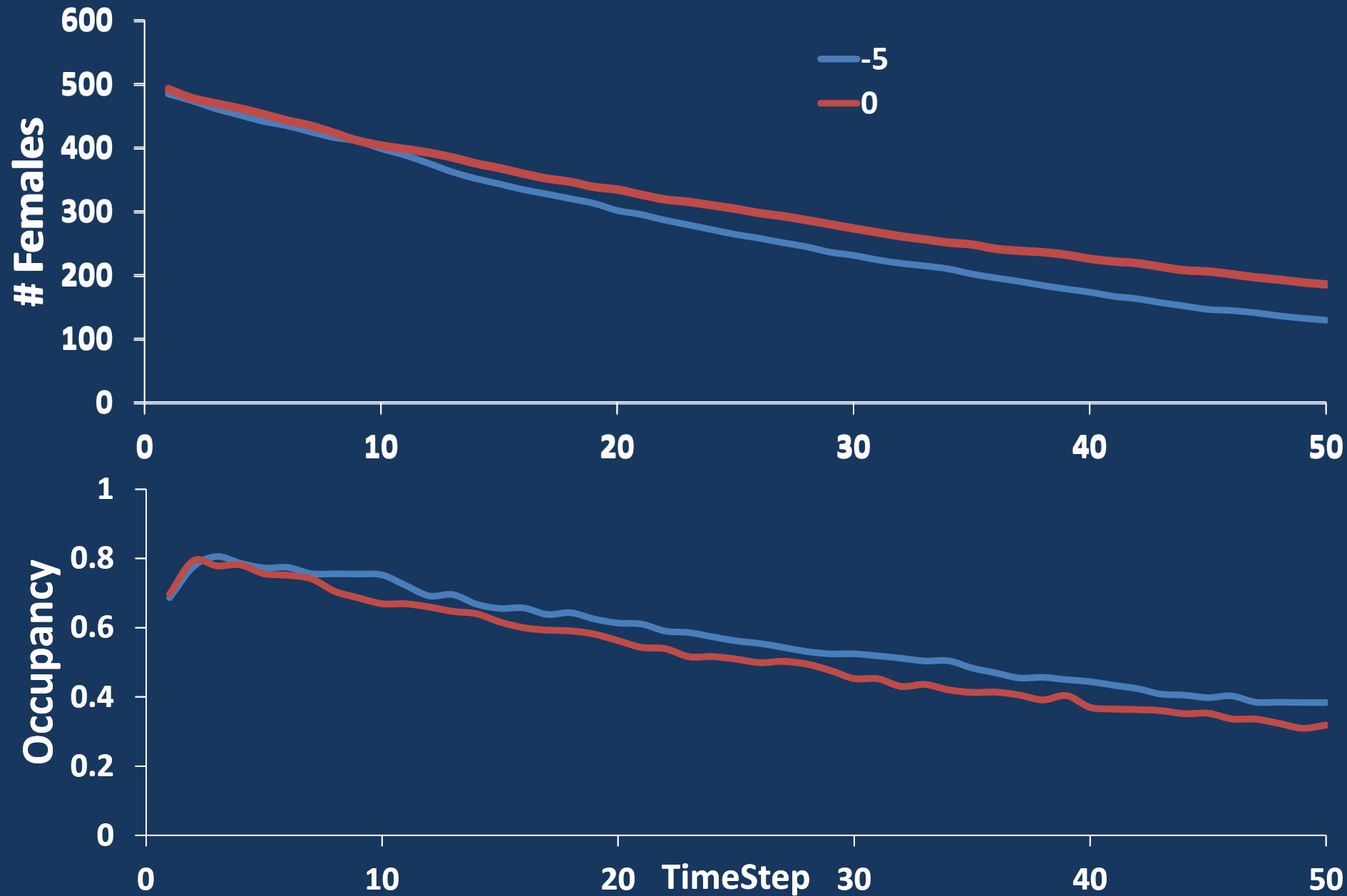
Unmonitored Nests

- **Boxes for Eastern Screech Owls might not detect a population decline caused by loss of cavities**
(VanCamp and Henny 1975).
- **Occupancy of boxes for Boreal Owls might actually increase because of cavity loss** (Hayward et al. 1992).

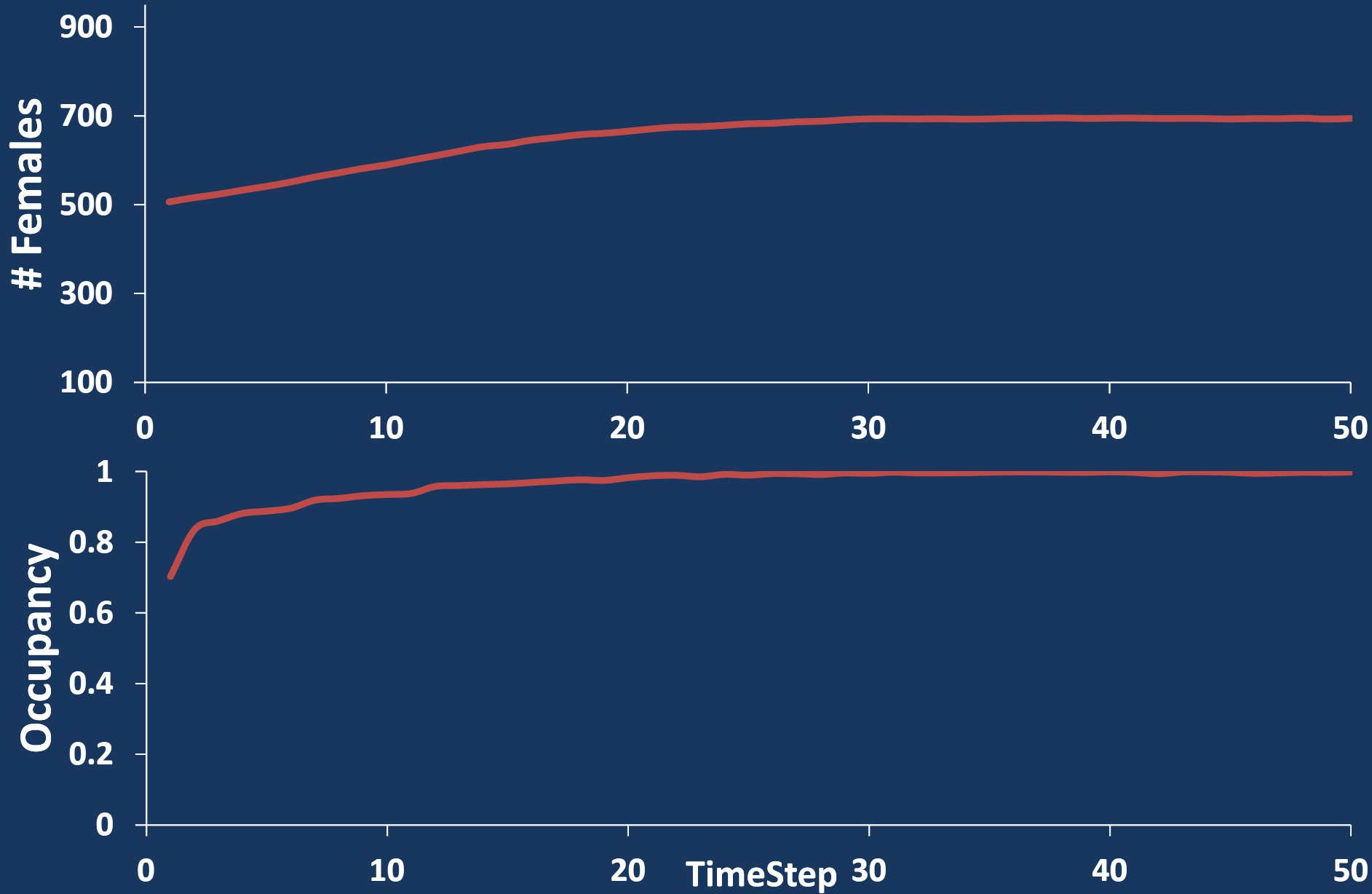
Unmonitored Nests



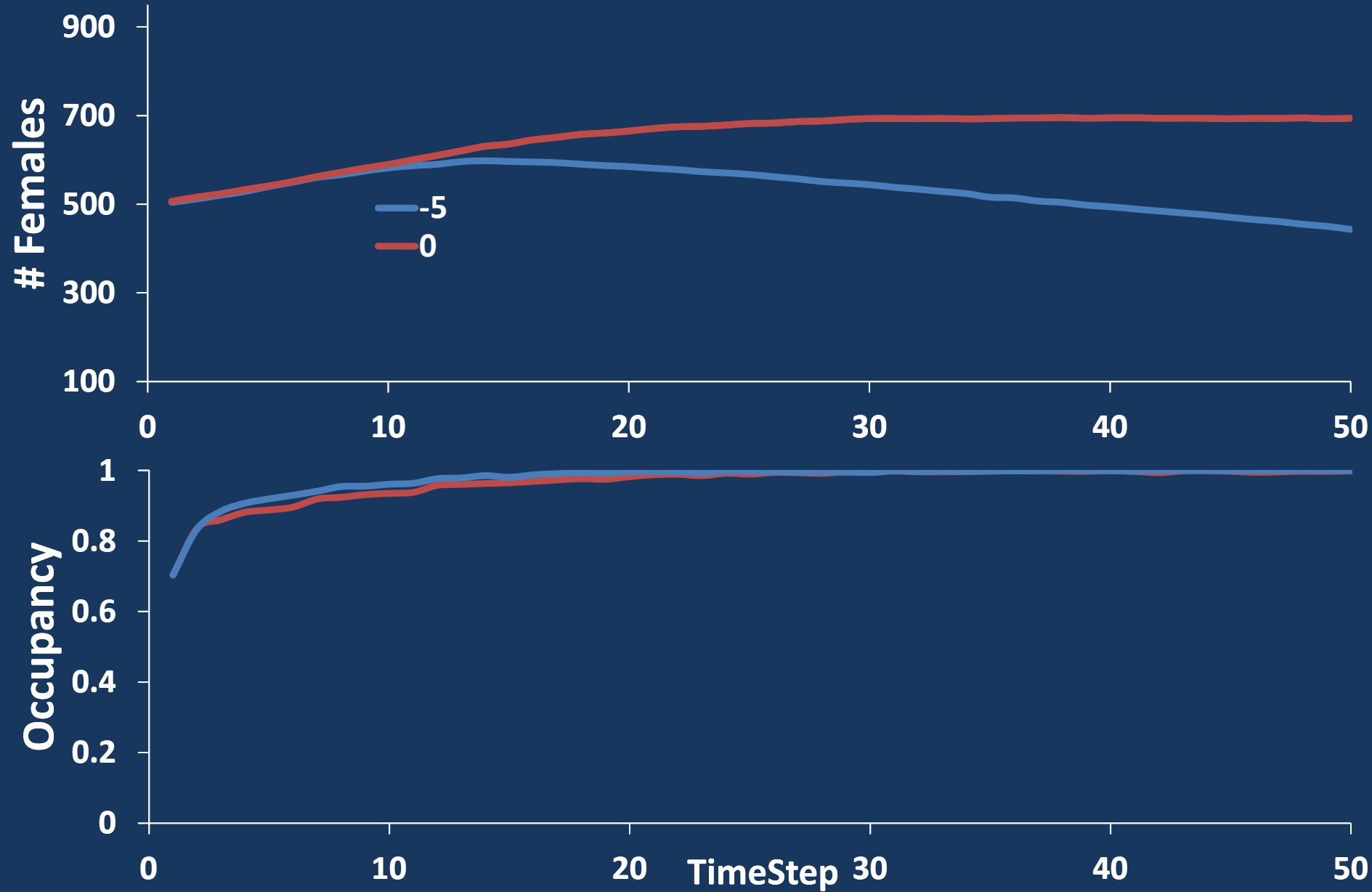
Unmonitored Nests



Unmonitored Nests



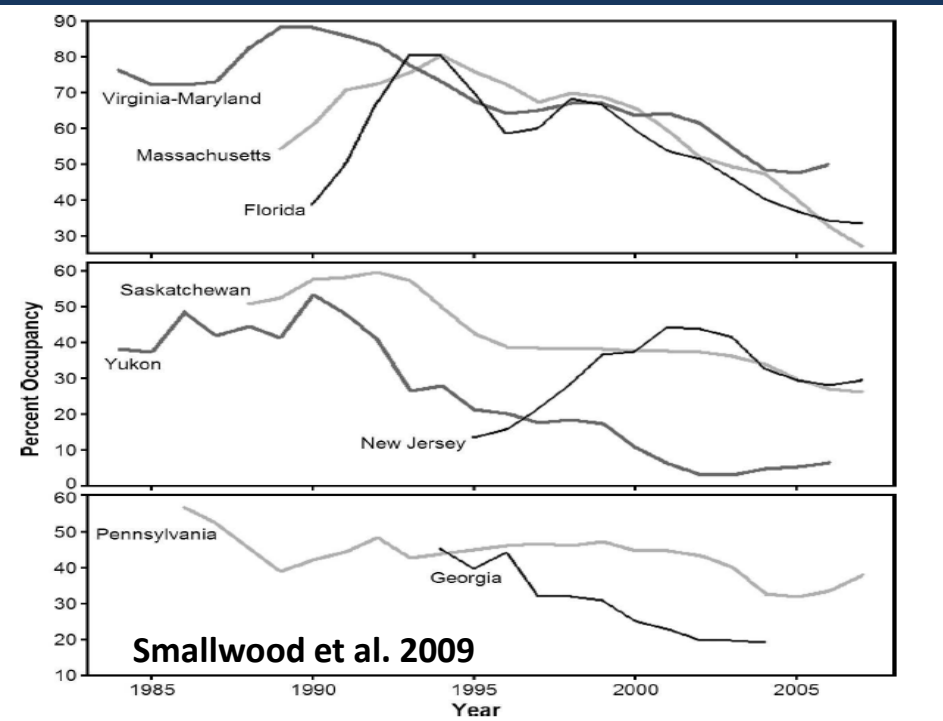
Unmonitored Nests



Cavity Loss

- **Boxes for Eastern Screech Owls might not detect a decline caused by loss of cavities (VanCamp and Henny 1975).**
- **Occupancy of boxes for Boreal Owls might actually increase because of cavities loss (Hayward et al. 1992).**

Conclusions



- Not cavity loss
- Can be detrimental
- Occupancy lag
- Important programs

Other Considerations

- Adding unmonitored cavities
- r vs K selected species
- Affinity for nest boxes
- Spatial arrangement
- Differences between sites
- Density dependence

Acknowledgements



- Jack and Lynn Loacker
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