



# The Western Section of The Wildlife Society and Wildlife Research Institute

## Western Raptor Symposium February 8-9, 2011 Riverside, California



Symposium  
Sponsors



### February 8 – 11:00-11:20 am Session: Overviews – Diurnal Raptors

#### A Review of Population Status, Available Trends, and Possible Impacts on American Kestrels of the Pacific States

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In the mid 2000s, biologists raised concern for the stability of American Kestrel (*Falco sparverius*) populations particularly in northeastern North America. Evidence for kestrel declines up to 4% annually were found in eastern raptor migration counts (RMC), Breeding Bird Surveys (BBS), Christmas Bird Counts (CBCs), and in nest-box studies. Western kestrel trends have been less conclusive. BBS data for 1984-2007 showed declines in the West to be between 1.0 and 2.0% annually, and significant. I compiled available and published RMC and CBC data for the Pacific region, and found mostly concurrence for declines. The three major RMCs in the Pacific States (Chelan Ridge, WA; Bonney Butte, OR, and Golden Gate, CA) all showed declines in kestrels after the mid-to late 1990s, however the latter site seemed to be showing a minor recovery in 2007-2010. Washington CBCs showed a statewide increase for kestrels from the 1960s to 2004, after which numbers declined. Oregon, Nevada, and British Columbia CBCs each showed a fairly flat kestrel trendline or with slight wavering around a mean. California's CBCs exhibited a long but steady decline of kestrels from 1966, when it peaked at 0.72 kestrels per party-hour (KpPH), to the present. The California decline showed a loss of 0.1 KpPH every 12 years. Except for Nevada, all other western state CBCs showed reduced kestrel counts in 2007-2009, as did the Golden Gate migration site. Causes of recent American Kestrel declines are still only speculative, however they are likely a result of multiple factors given the longevity and geographic breadth of these trends.

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# A Review of Status, Trends, and Potential Impacts on American Kestrel populations of the Pacific States, but mostly California



Allen M. Fish  
Golden Gate Raptor Observatory

GGRO is part of the Golden Gate National Parks Conservancy  
in cooperation with the National Park Service.



GOLDEN GATE  
NATIONAL  
PARKS  
CONSERVANCY

300 volunteers  
& 3 staff  
dedicated to  
long-term  
monitoring of  
California's  
raptors.



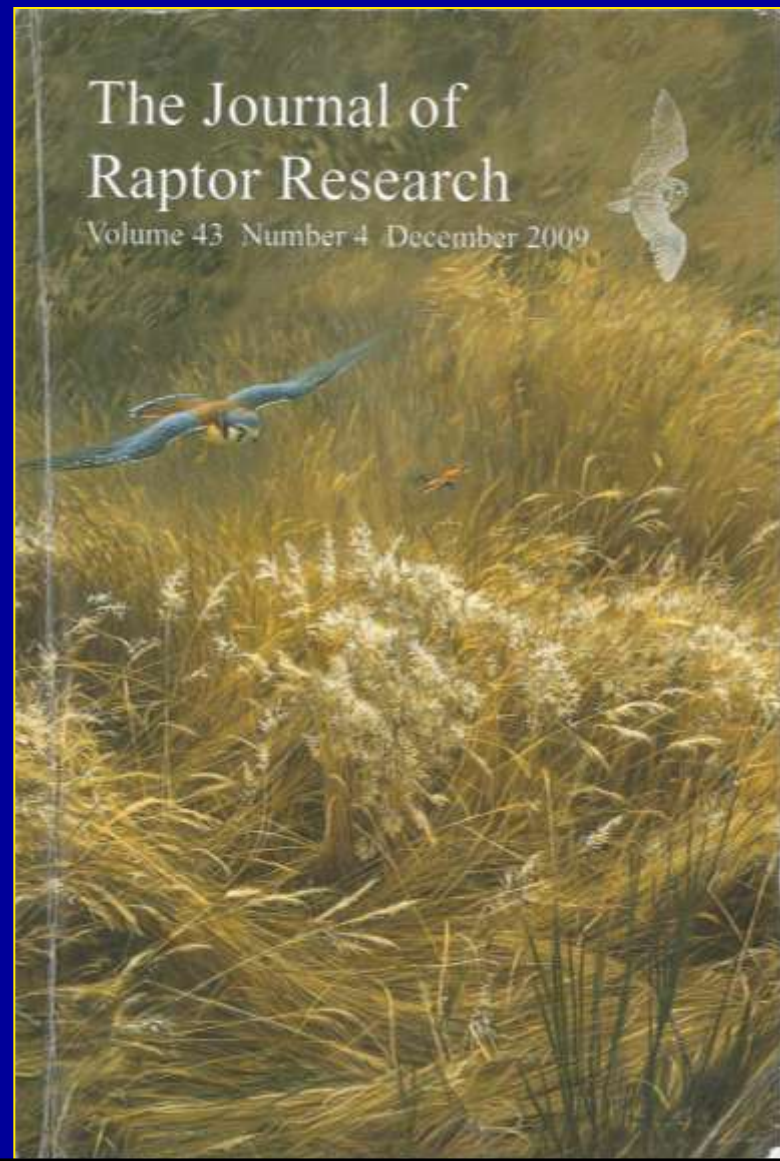






# Background on recent kestrel decline

- 2004 – evidence being consolidated
- 2007 – RRF & HMANA joint symposium at Hawk Mt
- 2009 – Publication of symposium in *Journal of Raptor Research* 43 (4).



# Evidence for Kestrel Decline

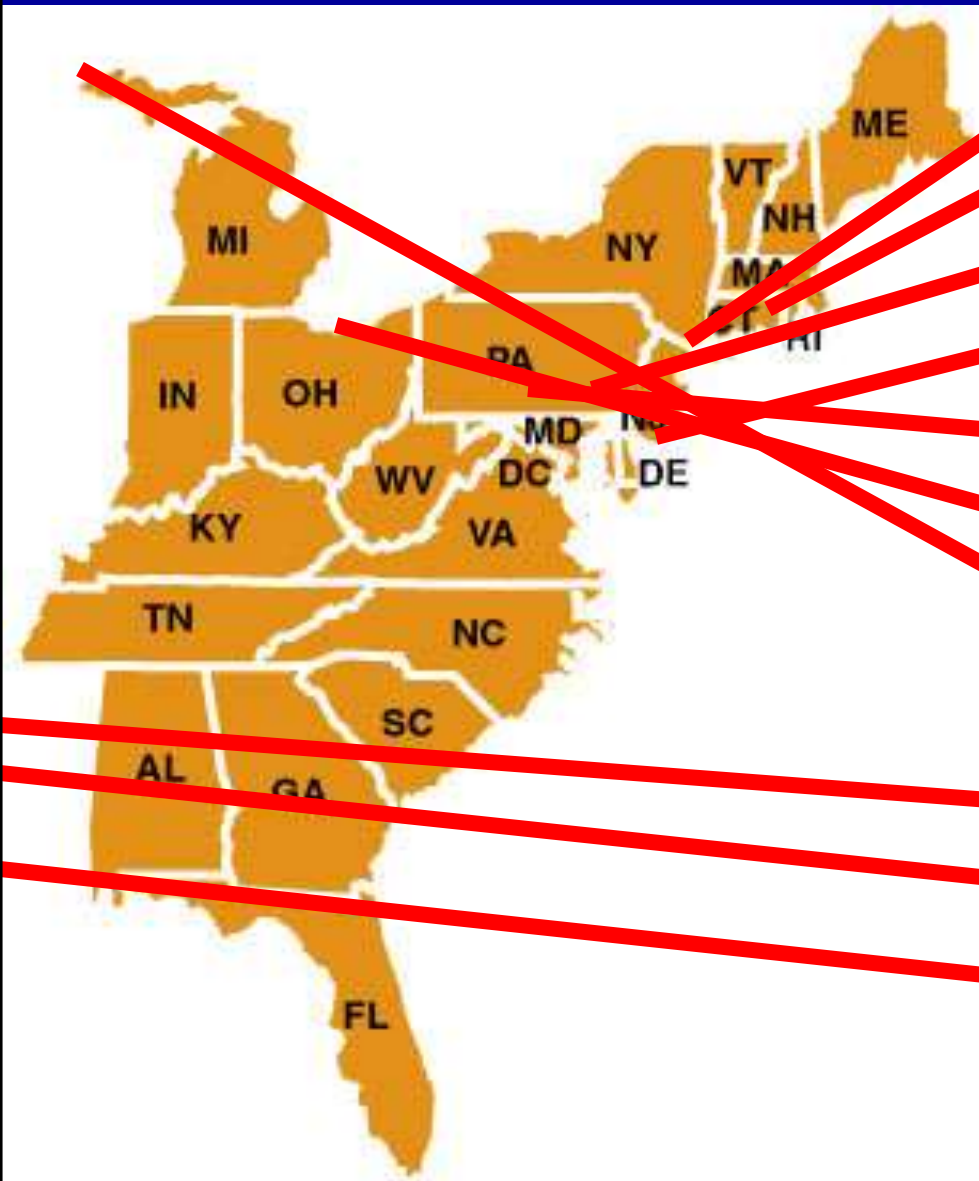
- Raptor Migration Counts (RMC)
- Christmas Bird Counts (CBC)
- Breeding Bird Surveys (BBS)
- Nestbox Studies

Ref. *Journal of Raptor Research* 43 (4). Dec 2009.



# Migration Counts

CHANGES in COUNT INDICES from RMC's  
from 1980-84 to 2000 -2004



Montclair, NJ: 66% decline

Lighthouse Pt, CT: 59% decline

Hawk Mt, PA: 19% decline

Cape May, NJ: 90% decline

Waggoner's Gap, PA: 19% increase

Holiday Beach, Ontario: 31% decline

Hawk Ridge, MN: 106% increase

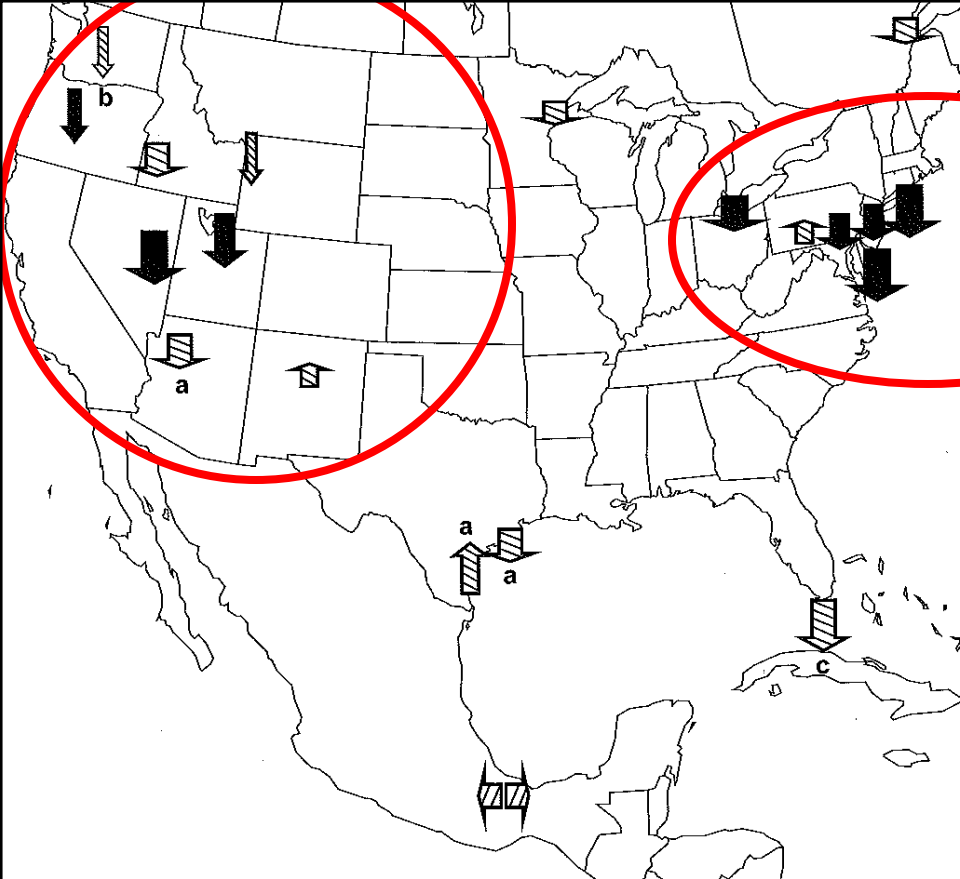
from 1985-89 to 2000 -2004

Wellsville Mts, UT: 35% decline

Goshute Mts, NV: 39% increase

Manzano Mts, NM: 1% increase





RMCs for AMKE decreased 1.6 to 4.5% per year from Atlantic Ocean to Appalachians

Later starts on western counts – results more mixed

Population Trend	Trend Magnitude	Flight Magnitude
<ul style="list-style-type: none"> <li>▲ Significant* Increase</li> <li>▼ Significant Decrease</li> <li>▨ Non-significant Increase</li> <li>▩ Non-significant Decrease</li> </ul>	<ul style="list-style-type: none"> <li>   trend  ≤ 1</li> <li>  1 &lt;  trend  ≤ 5</li> <li>   trend </li> </ul>	<ul style="list-style-type: none"> <li>▲ &lt;100/yr</li> <li>▲ 100-1000/yr</li> <li>▲ &gt;1000/yr</li> </ul>
*P ≤ 0.05		
a 1997-2005	b 1998-2005	c 1999-2005

## BBS *(Sauer et al)*

- 1976 to 2003 – Northeastern NA – 1.4% per year decline
- 1983 to 2005 – Western NA – 1.7% per year decline
- 1995 to 2005 – Western NA – 2.7% per year decline

## CBC *(Natl Audubon)*

- 1976 to 2003 –  
Northeast – 4.6% per year decline  
Southeast – 1.4% /year decline
- 1983 to 2005 – Western NA – 1.5% /year decline
- 1995 to 2005 – Western NA – 2.3% /year decline

# Nestbox Studies 1

- Eight Eastern nestbox studies from Mass to Florida, but also Yukon and Saskatchewan, placed from 863 to 1109 kestrel nestboxes starting 1985 to 1995
- Five of eight peaked in occupancy around 1989-1994 and declined through 2005
- Examples:
  - Virginia-Maryland 88 to 50% occupancy
  - Mass 78 to 28%
  - Sask 58 to 28%
  - Yukon 50 to 4%
- All studies declined 10 to 40% percentage points during 1995 to 2005

*Smallwood et al. 2009. JRR 43 (4).*



# Nestbox Studies 2

- 1986 to 2006 study in SE Idaho
- 34 to 126 boxes each year
- % occupancy increased 20-74% over study period. Aver. 48%
- Dramatic increases in human occupancy in region
- Drought periods may have favored kestrels
- 4-year peaks suggest vole cycles

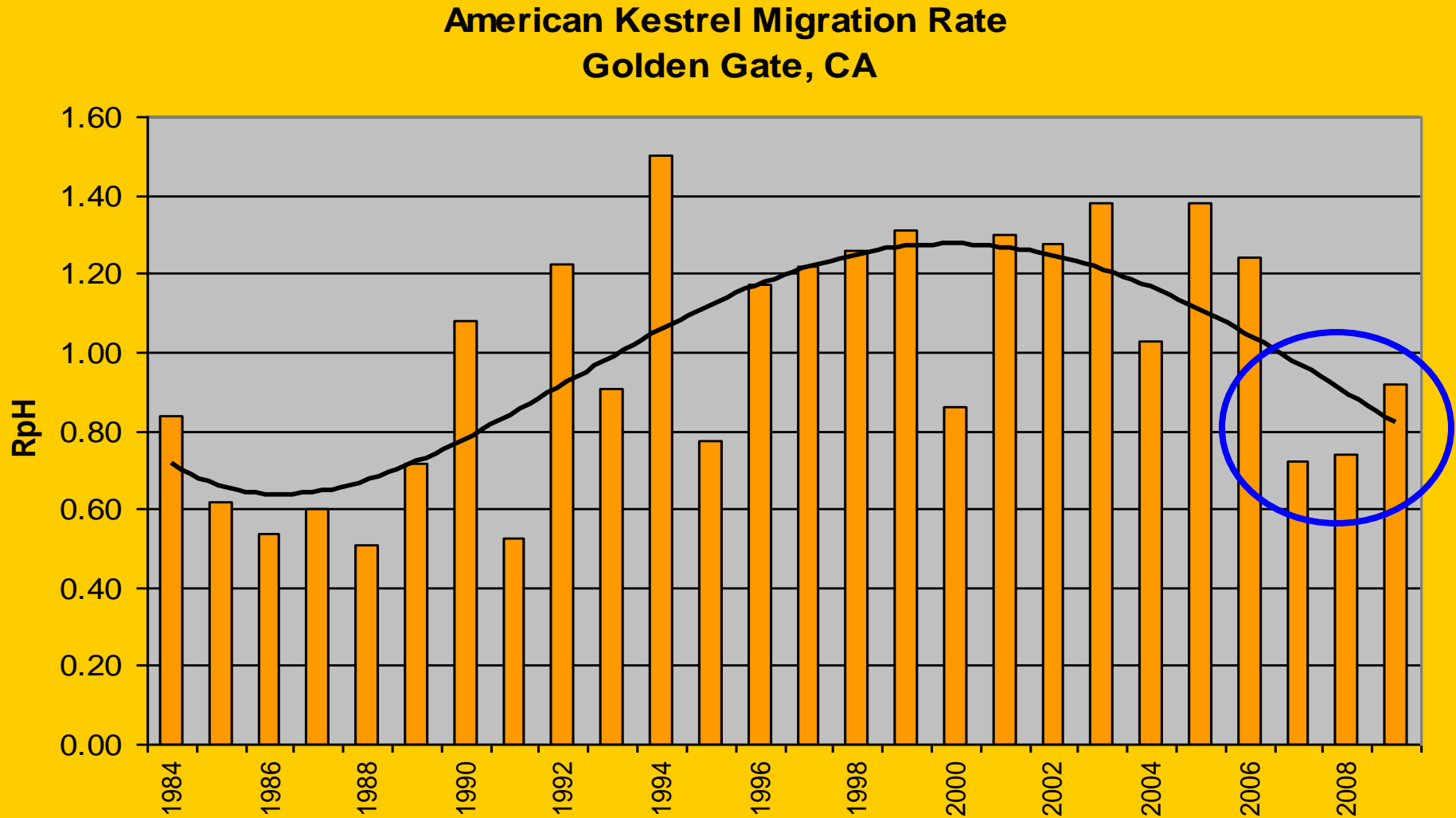
*Steenhof and Peterson. 2009. JRR 43 (4).*

# Pacific Kestrel Data

- RMC data from Marin Headlands
- CBC – State trends
- CBC – Within-California trends

# Recent Pacific region data

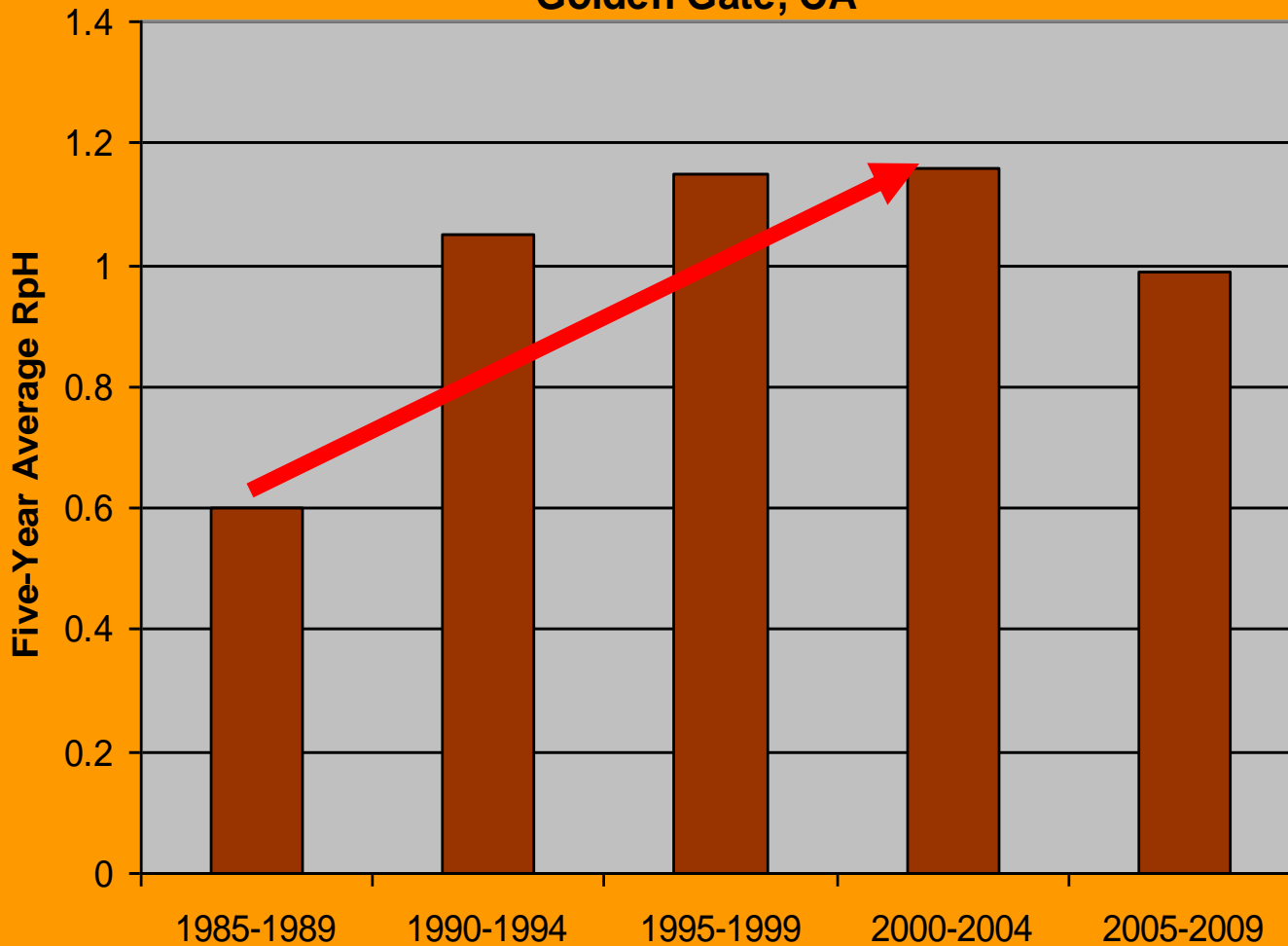
- GGRO migration counts at the Marin Headlands





# GGRO counts

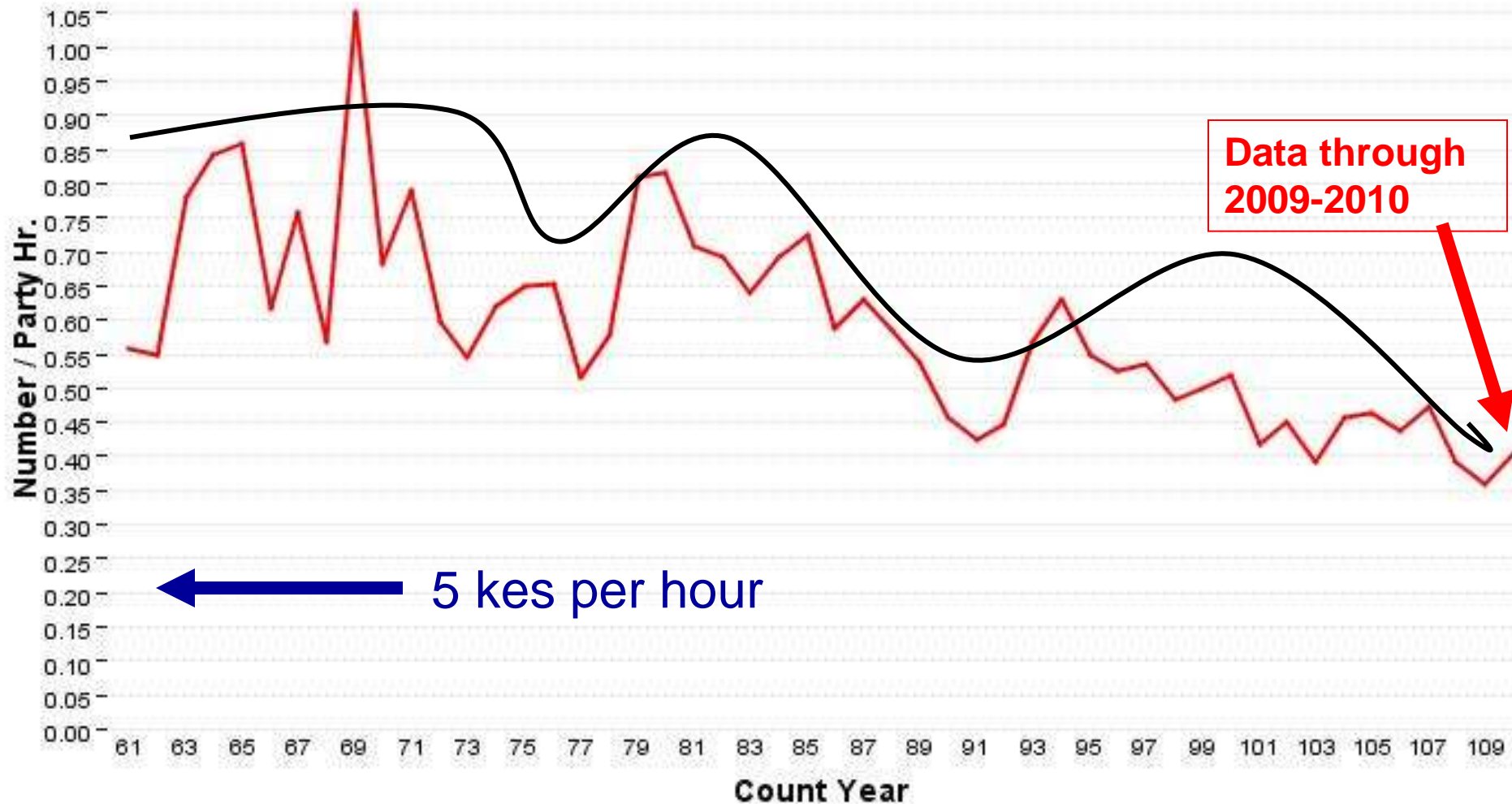
Five-Year Average -- Kestrel Migration Rates  
Golden Gate, CA



Increased  
97% from  
1985-1989  
to 2000-  
2004

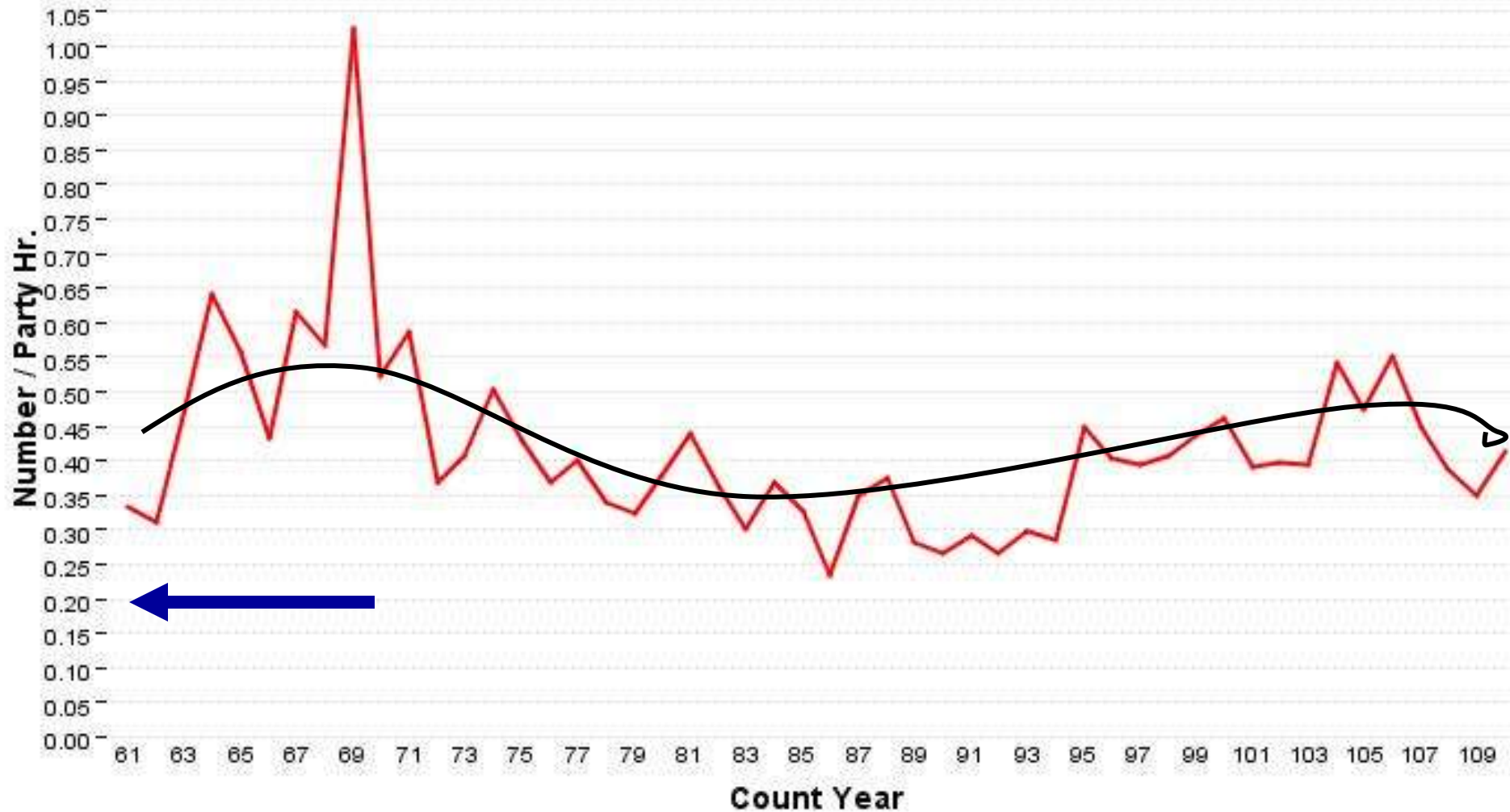
# California CBC for kestrels

American Kestrel, US-CA, From Count 61 to 110



# Oregon Kestrels

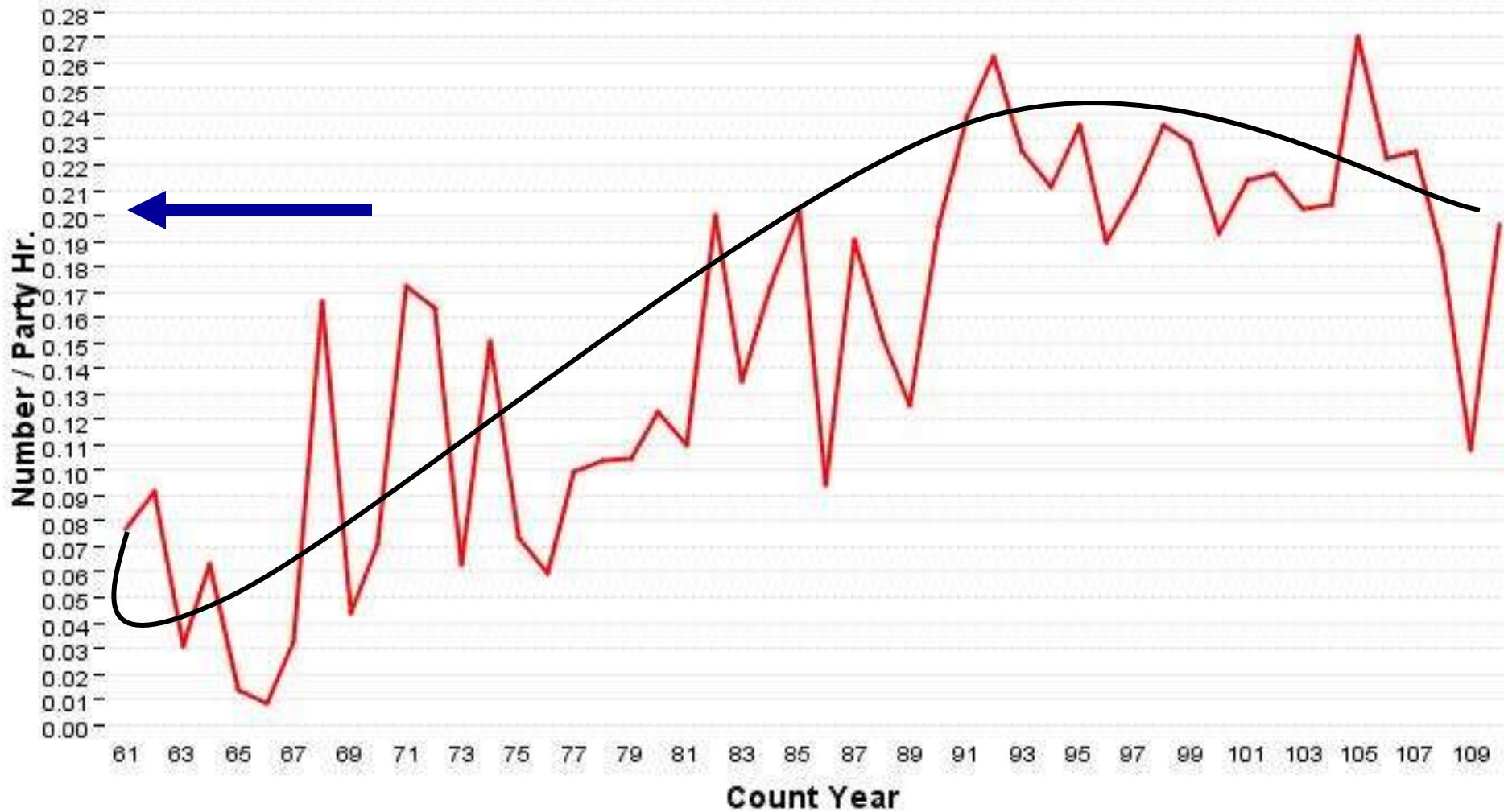
American Kestrel, US-OR, From Count 61 to 110





# Washington Kestrels

American Kestrel, US-WA, From Count 61 to 110

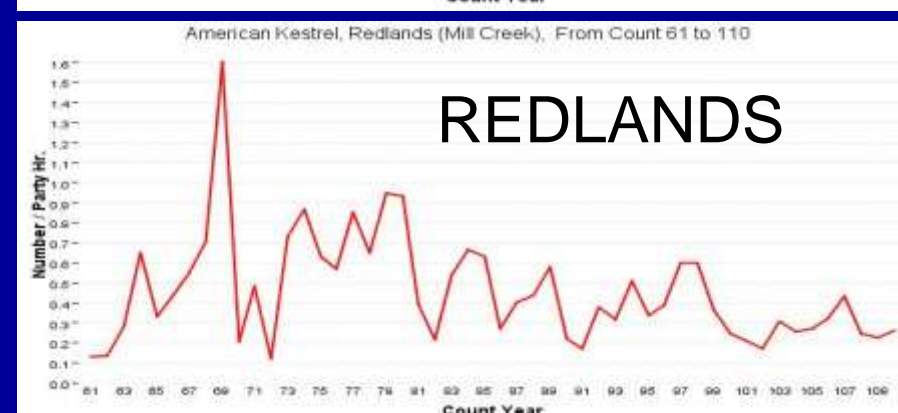
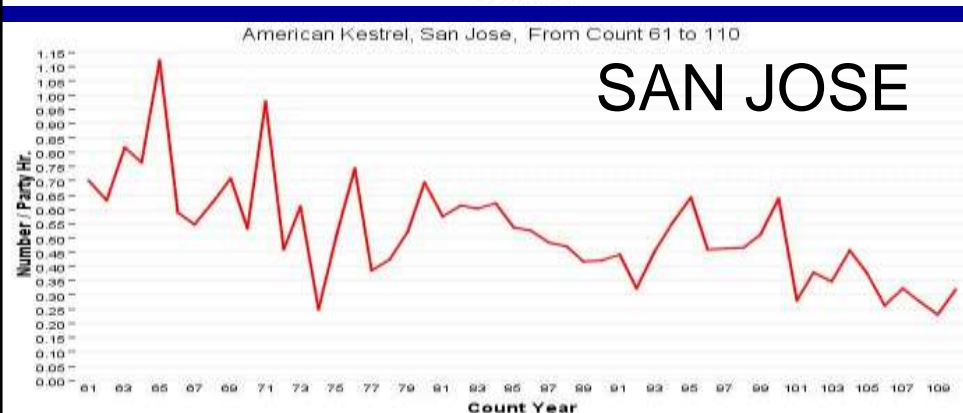
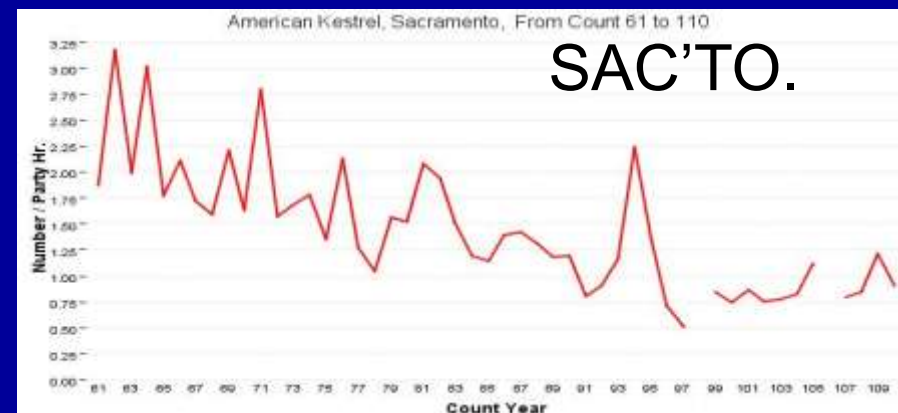
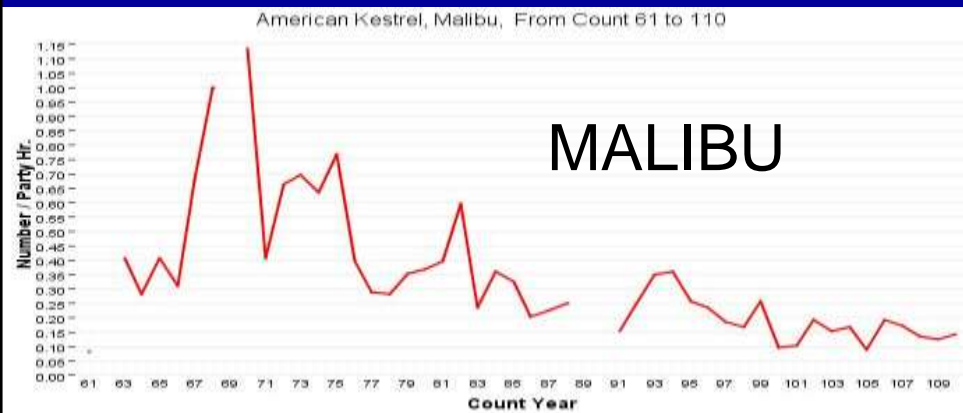


## Within-California CBCs

- Examined 129 California CBC count circles
- Selected continuous or nearly-continuous data for 8 years prior to 2009-2010 – most 20-50 years
- Throw out CBCs with fewer than 8 years data or highly broken up historical records
- Judged each as increasing, decreasing, or no clear trend for American Kestrel counts for 95 California counts

# California CBCs

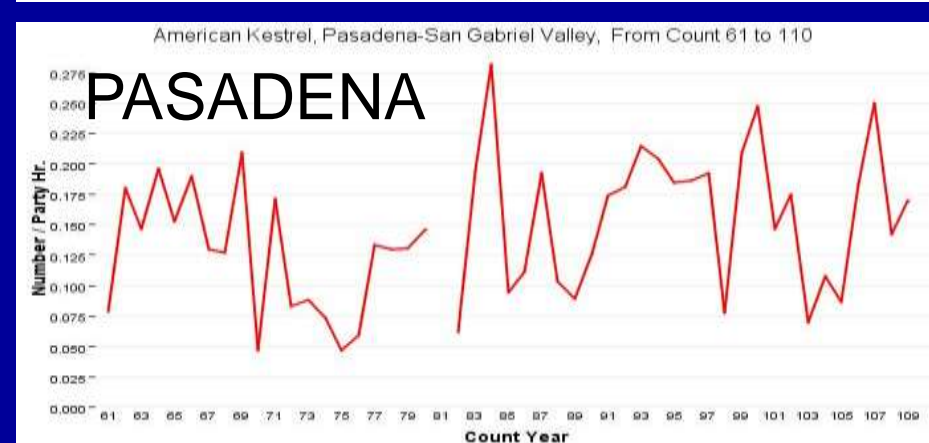
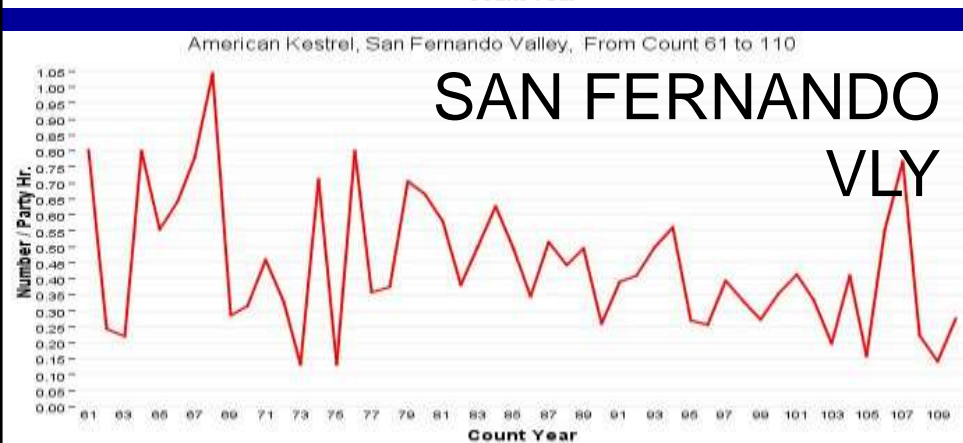
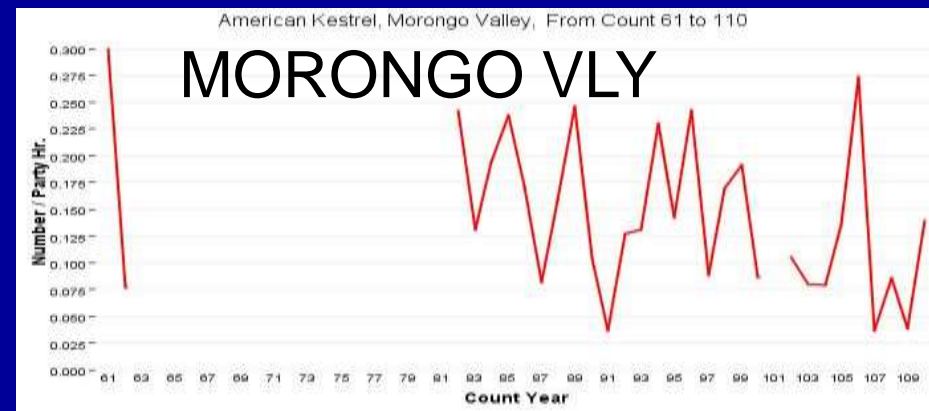
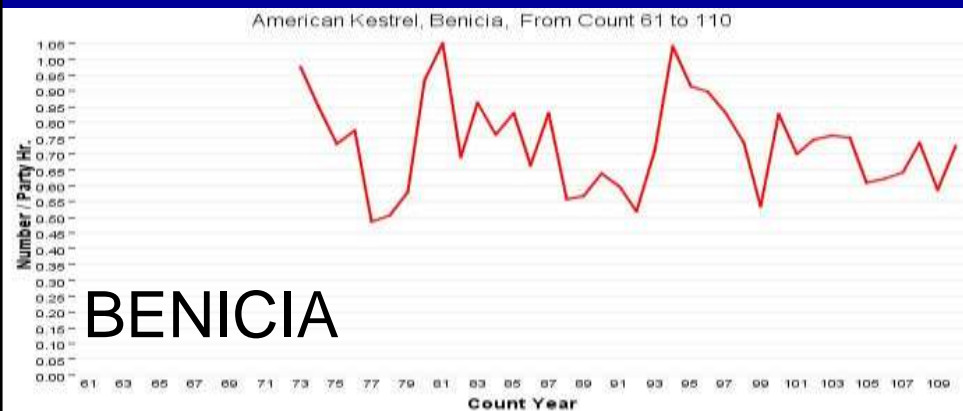
- Of 95 CBCs in California  
55 (57.9%) showed clear decreases





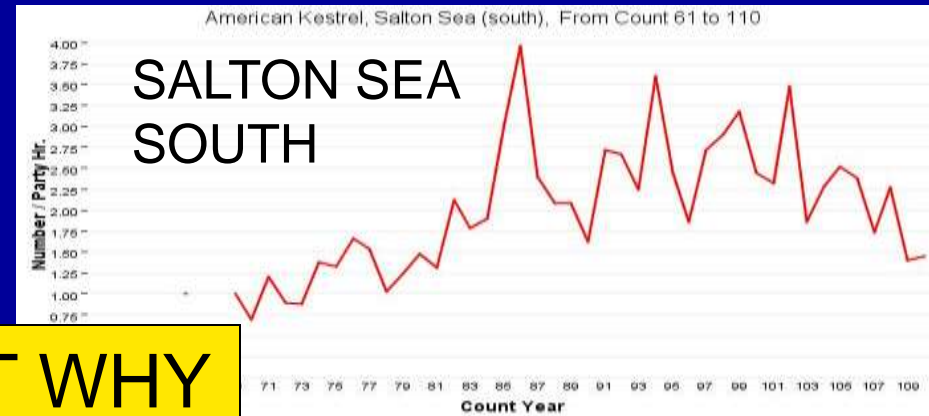
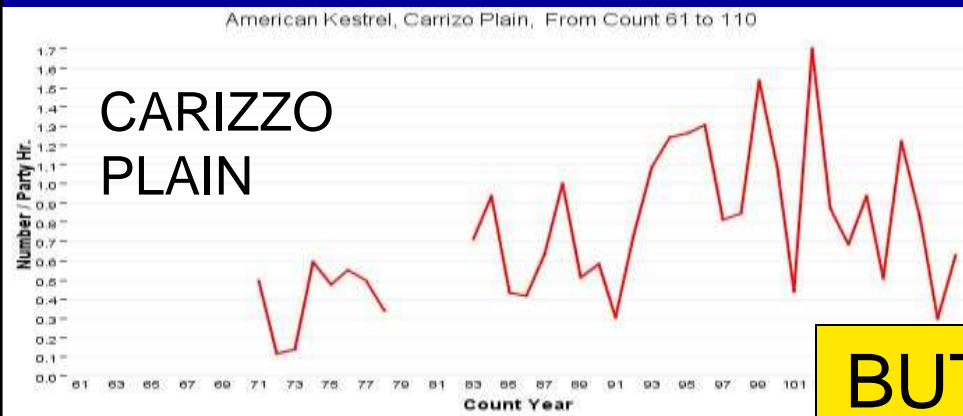
# California CBCs

- Of 95 CBCs in California  
35 (36.8%) showed no clear trend

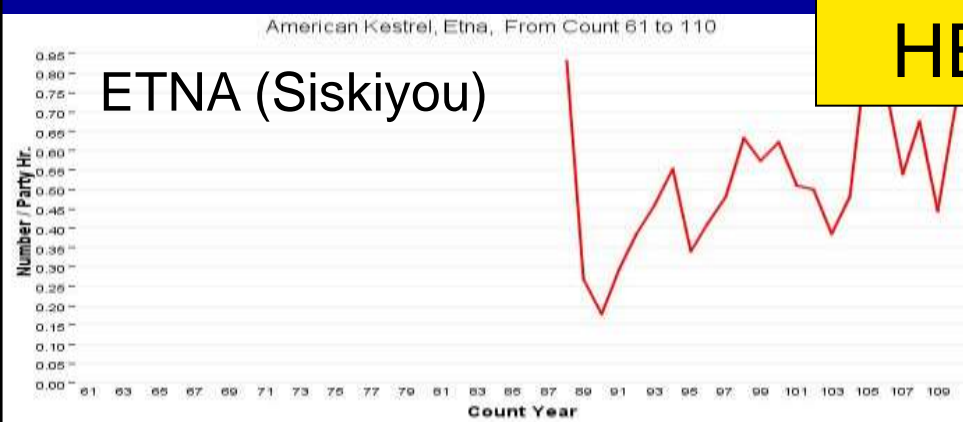


# California CBCs

- Of 95 CBCs in California  
5 (36.8%) showed increases



**BUT WHY  
HERE?**



# Possible Causes - Habitat

- Habitat loss - grassland succession
- Habitat loss - agricultural conversion

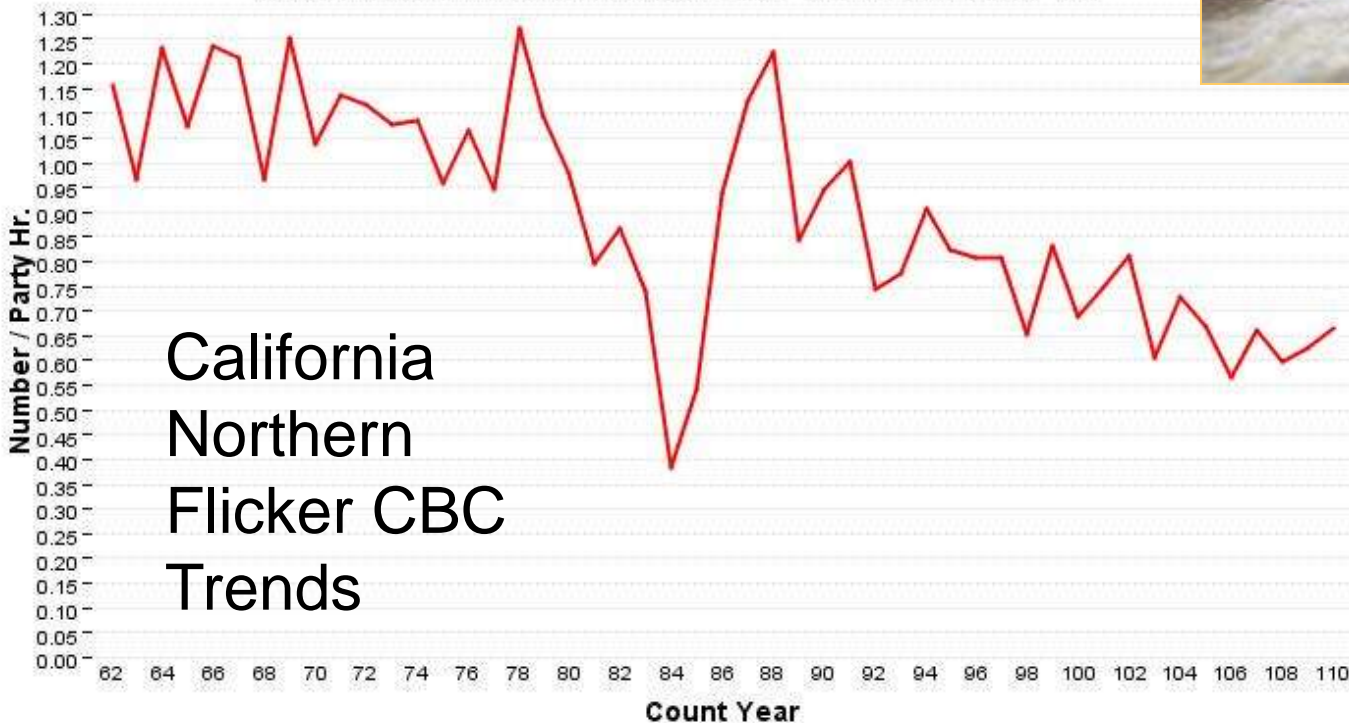


# Possible Causes - Habitat

- Loss of cavity-trees (flicker trends?) but nest-boxes? Are they a perfect cavity analog?



Northern (Red-shafted) Flicker, US-CA, From Count 62 to 110



California  
Northern  
Flicker CBC  
Trends



# Possible Causes - Habitat

- NYC kestrels – why so many? safe from predators?
- Urban habitat structure



# Possible Causes - Prey

- Decline/control of large insects – Orthopta
- Can we connect kestrel numbers or breeding success with Orthopteran outbreaks?

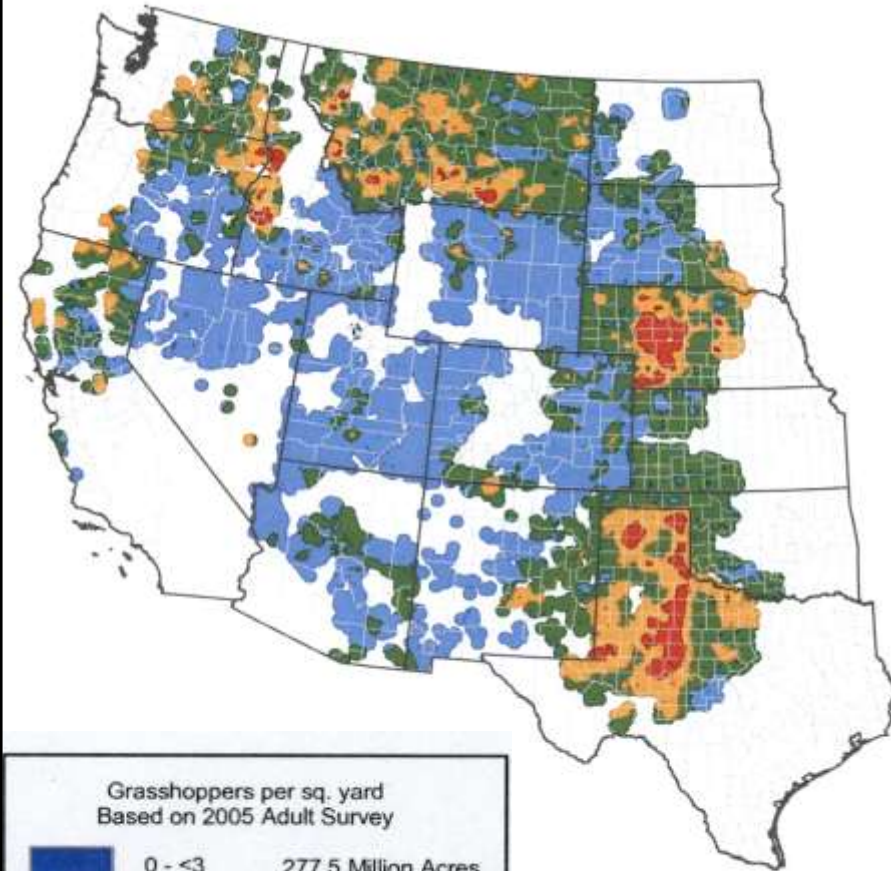


# What to Expect in 2007?

## Rangeland Grasshopper Hazard Map

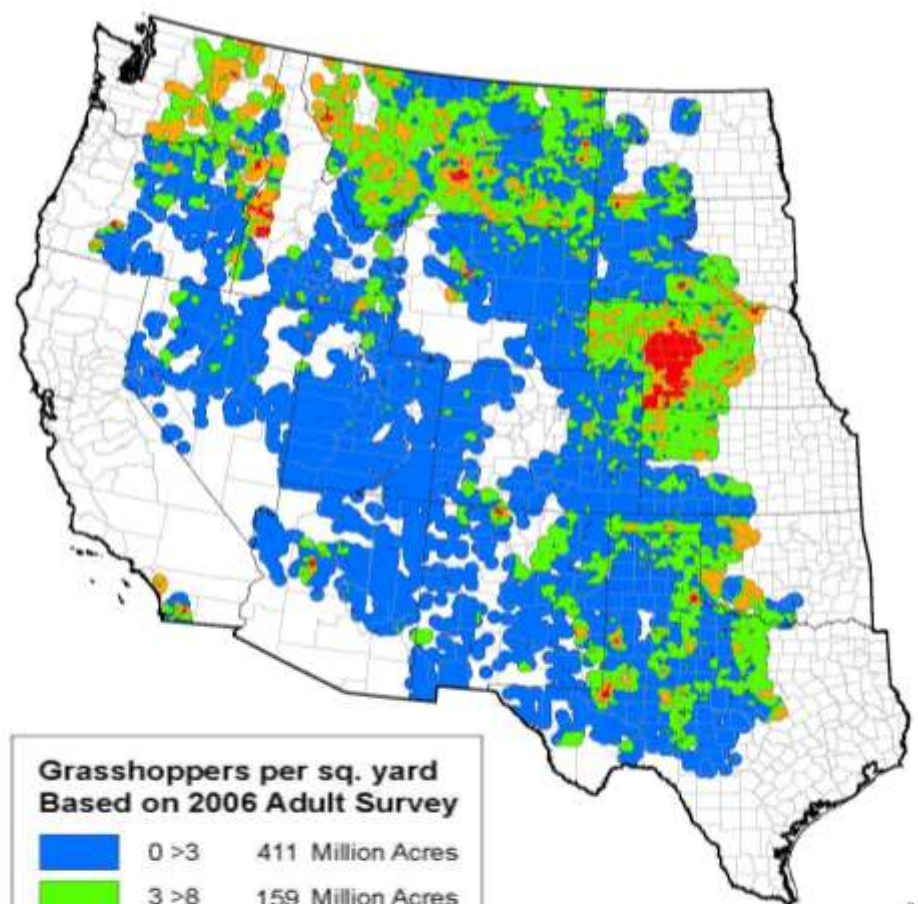
2006

2007



Grasshoppers per sq. yard  
Based on 2005 Adult Survey

Blue	0 - <3	277.5 Million Acres
Green	3 - <8	229.8 Million Acres
Orange	8 - <15	83.9 Million Acres
Red	15+	16.2 Million Acres



Grasshoppers per sq. yard  
Based on 2006 Adult Survey

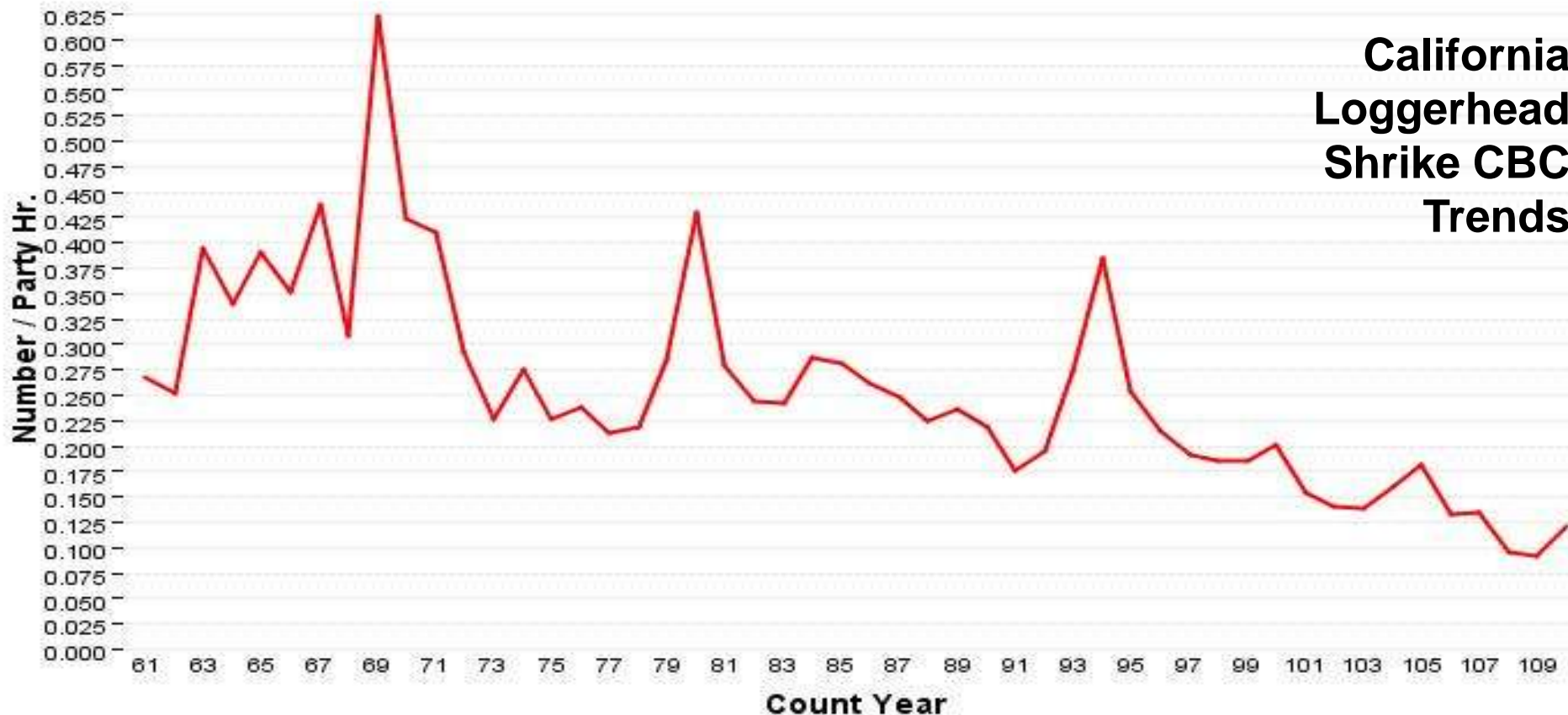
Blue	0 >3	411 Million Acres
Green	3 >8	159 Million Acres
Orange	8 >14	45 Million Acres
Red	15 +	8 Million Acres

# Possible Causes - Prey

- Reduction of large flocks of winter sparrows & finches

Loggerhead Shrike, US-CA, From Count 61 to 110

**California  
Loggerhead  
Shrike CBC  
Trends**



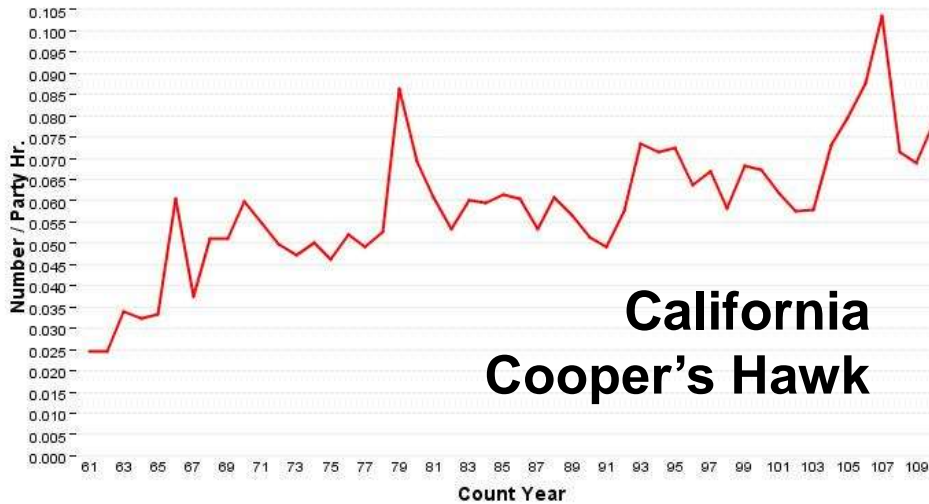


# Others 1

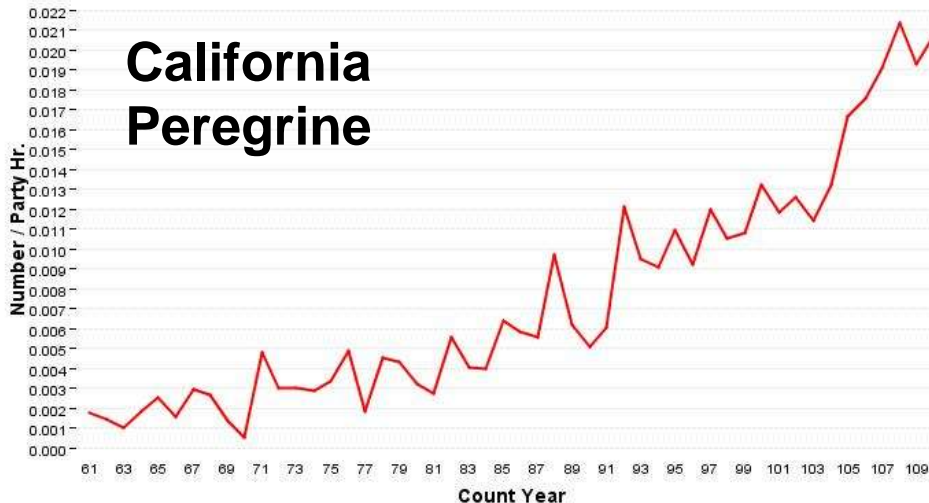
- Predation/displacement/competition from increased Cooper's Hawks, Peregrine Falcons, Merlins
- Especially in urban zones
- Habitat specializations relax in winter
- “Poorly placed kestrel nest boxes may be nothing more than lunch boxes to increasing numbers of Cooper's Hawks.”
  - *Brian Sullivan & Christopher Wood*

# Predation, Displacement

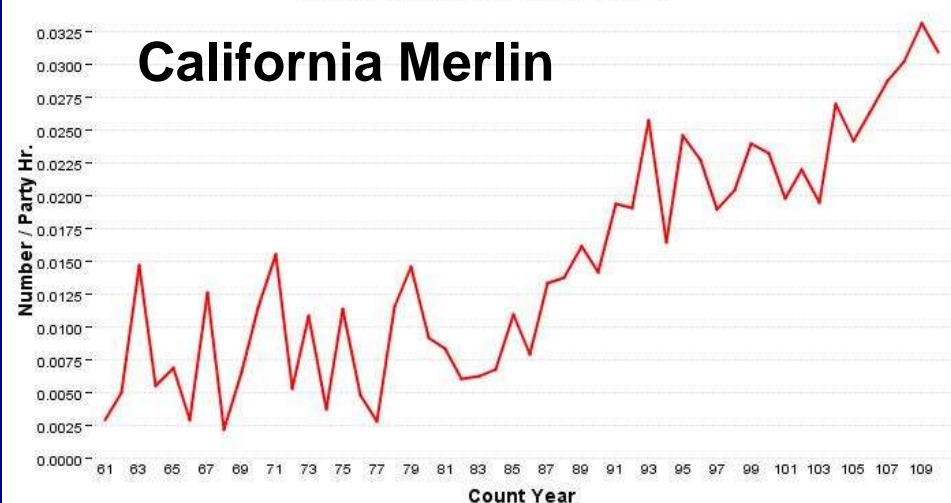
Cooper's Hawk, US-CA, From Count 61 to 110

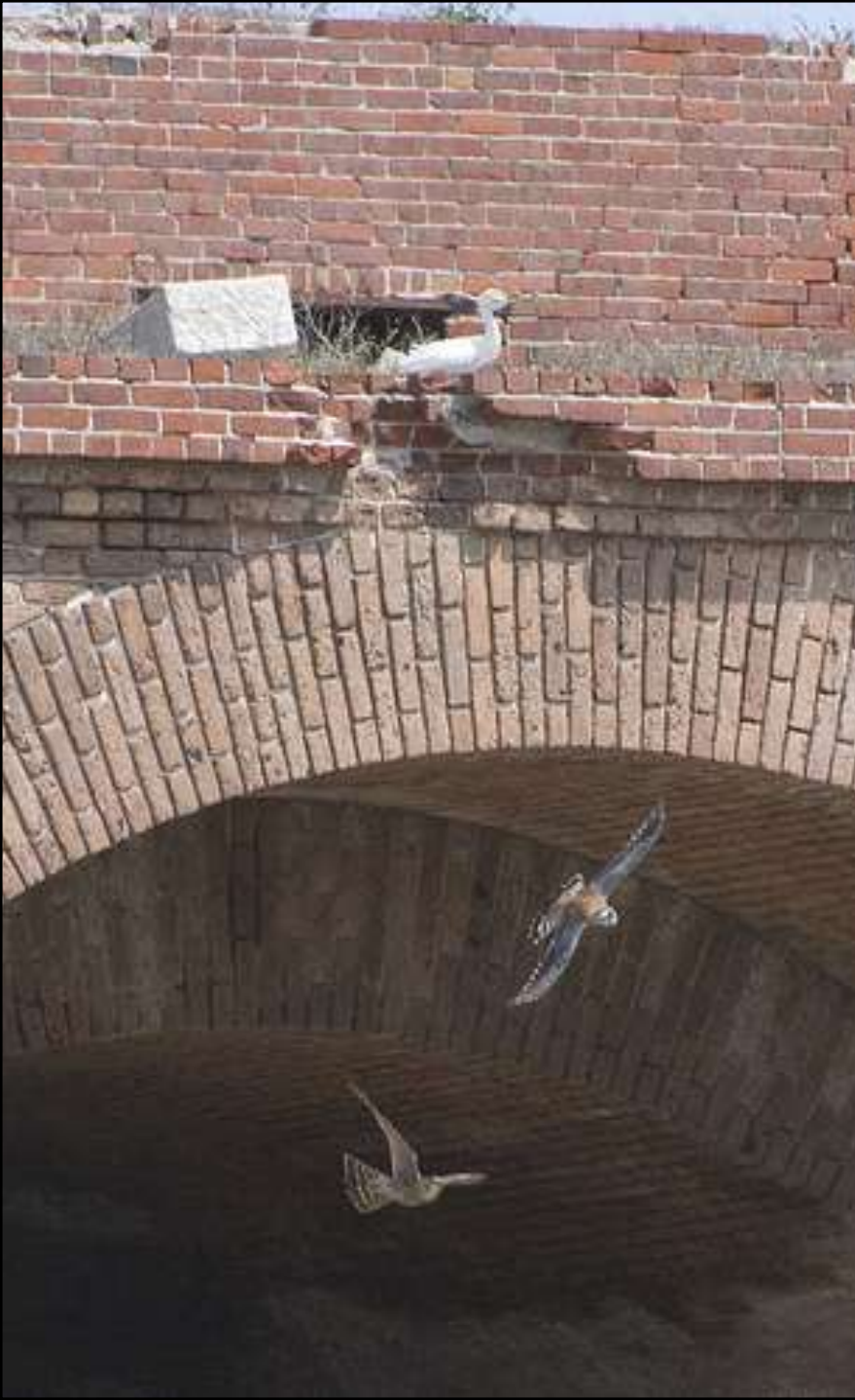


Peregrine Falcon, US-CA, From Count 61 to 110



Merlin, US-CA, From Count 61 to 110





## Others 2

- West Nile Virus – timing was not quite right, a wide impact not recorded
- Contaminations? Poisonings?
- Migratory Short-stopping?
- A Perfect Storm for Kestrels?

# Conclusions



- American Kestrels have declined greatly in the Eastern US
- Midwestern and Intermountain West trends lean toward declines but are not as clear
- California CBCs suggest a state decline since about 1970, though some counts decline from 1960 forward
- Causes are likely multiple and so far undiagnosed



# Acknowledgements



- Chris Farmer, Jeff Smith, Ernesto Inzunza Ruelas, Brian Sullivan, Chris Wood, Keith Bildstein for publications and reference materials
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