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A time activity budget for American oystercatchers  
(*Haematopus palliatus*) and the effect of laughing gulls  
on parental behavior

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# Introduction

## Biparental care

- Has been shown to increase nest and brood survival
- Permits adults to allocate additional time towards incubation and self maintenance
- Complimentary pairs coordinate roles in defense and nest rearing

## Parental behavior

- Reproductive success is influenced allocation of time and energy into parental behavior
- Incubation bouts are influenced by temperature, food availability, disturbances
- Activity around the nest influences nest survival
- Foraging behavior is highly influenced by reef exposure
- Brood success is positively related to chick provisioning and chick guarding

Nol 1989; Hazlitt 2001; Palmer *et al.* 2001; McGowan and Simons 2006; Thiabault *et al.* 2010; Collins 2012; Spiegel *et al.* 2012

# Research Objectives

1. Quantified parental behavior for the incubation and chick rearing periods during the 2013 and 2014 breeding seasons.
2. Examined whether laughing gulls (*Leucophaeus atricilla*) negatively affected parental behavior.

# Methods

- Conducted time activity budgets (TAB) during the 2013 and 2014 breeding seasons
  - Focal observations of pairs during the nesting and chick rearing periods
    - 20 minute periods and observations every 15 seconds
    - 3 time blocks: 8-10:30, 10:30-13:00, 13:00-15:30
    - Attempted to observe both adults simultaneously
  - Identified likely cause for agonistic behaviors: laughing gulls, American oystercatchers, other bird spp., humans, observer
  - Counted gulls that were present in the nesting and feeding territory during the TABs



# Methods

## Behavioral Categories

1. Self Maintenance
2. Incubation
3. Forage
4. Vigilant
5. Locomotion
6. Agonistic
7. Rest
8. Chick care

Mann-Whitney and Kruskal-Wallis was used to examine differences in frequency of behaviors and several gull variables:

1. Number of gulls
  - Low (0-75, 0-60) and High (76-300, 61-230)
  - Small (0-49, 0)  
Medium (50-99, 1-40)  
Large (100-300, 41-230)
  - Absent (0) or present (< 0)
2. Absence or presence of nesting gulls

$P \leq 0.05$  was considered significant

# Results

## Incubation

Nests(n)= 60

TAB(n)= 249

18,540 behavioral observations



## Chick Rearing

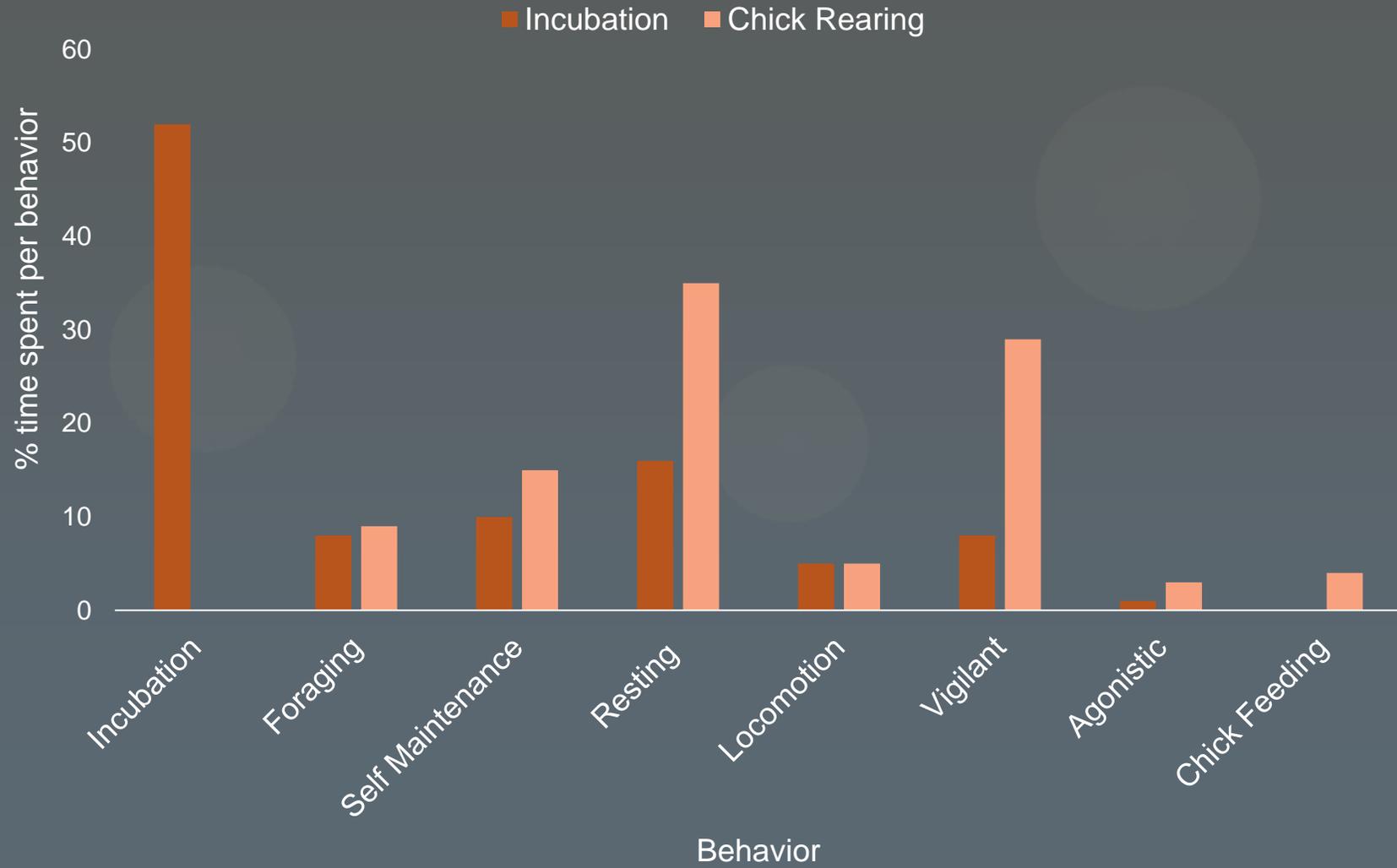
Broods(n)= 38

TAB(n)= 187

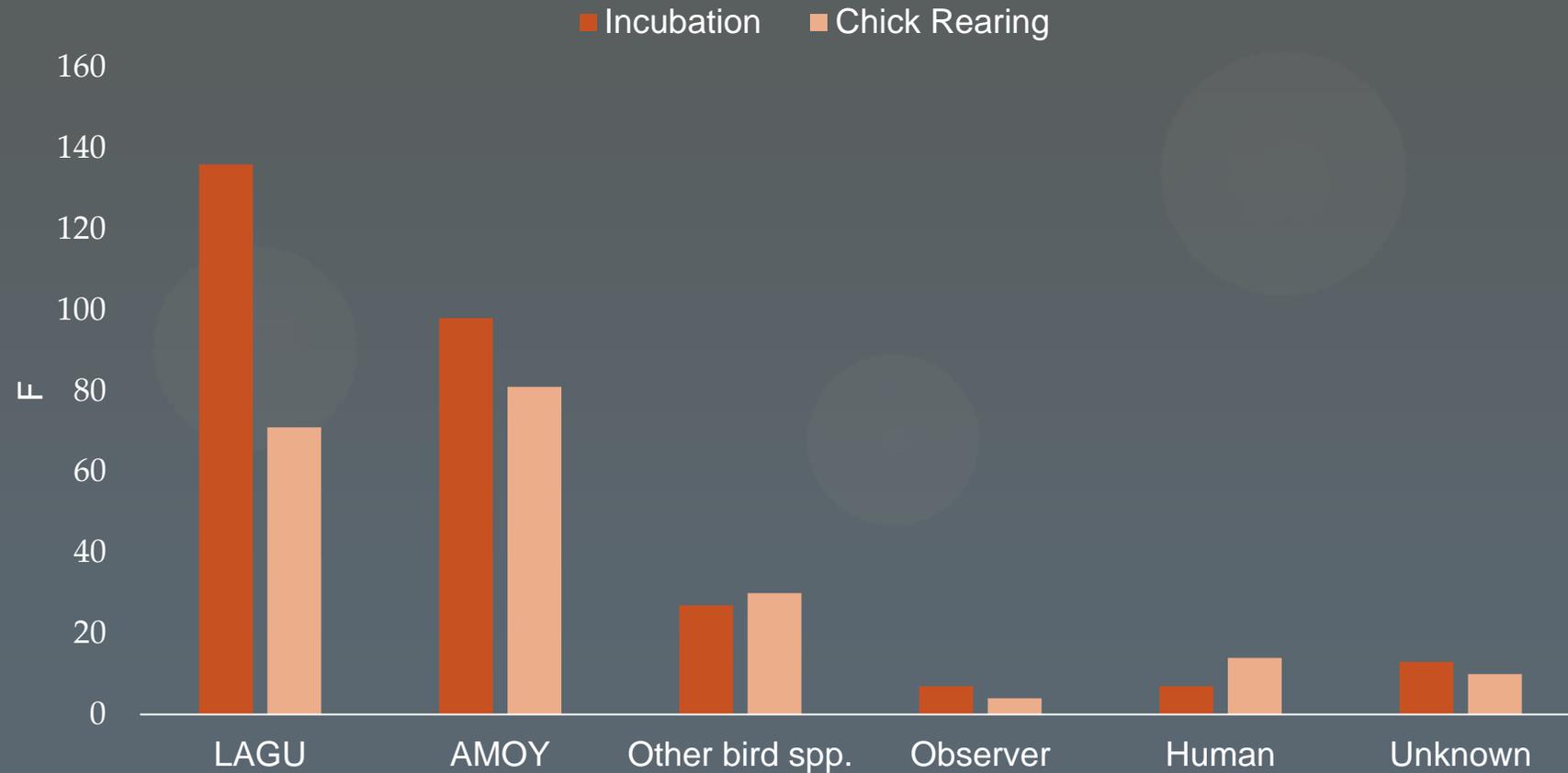
13,976 behavioral observations



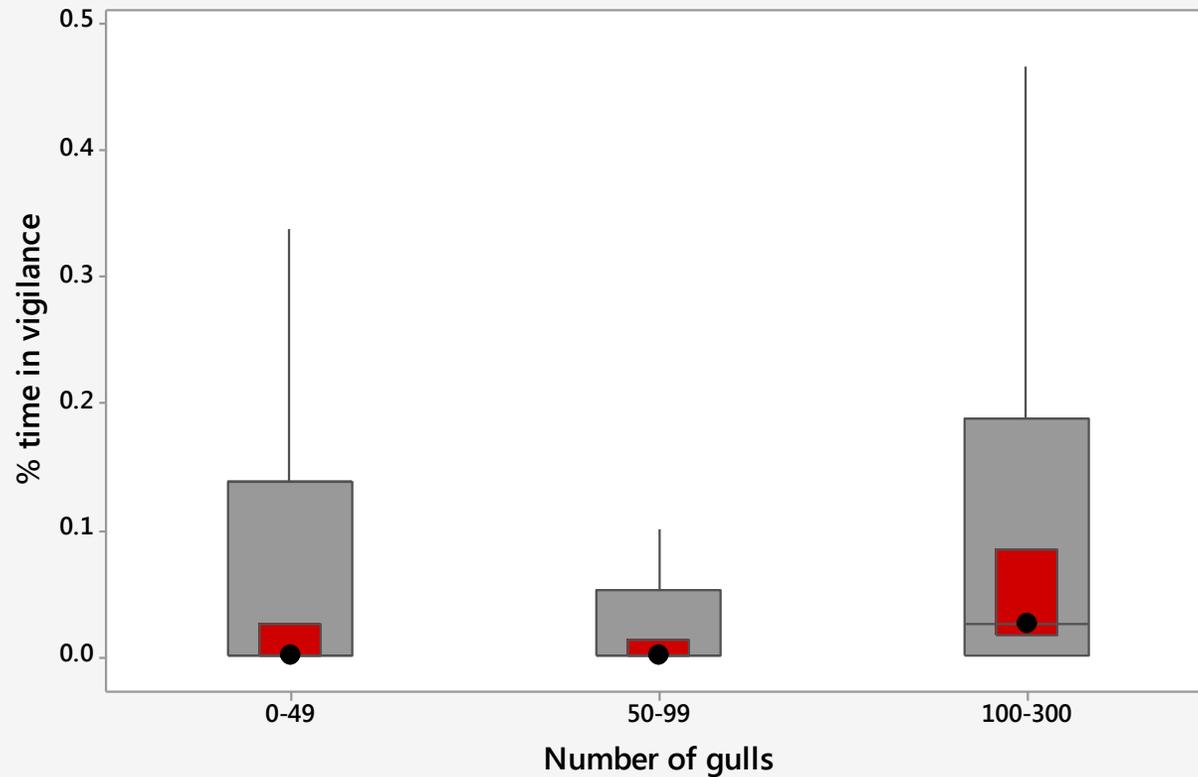
# Time Activity Budget



# Causes of agonistic behaviors during the incubation and chick rearing periods



# Nesting period and number of gulls



- Vigilance increased significantly when there was 100-300 gulls

$$H_2 = 11.11, P = 0.004$$

# Nesting period and gulls

- Besides vigilance, gulls did not significantly affect other nest rearing behaviors
- Although not significant, there is evidence of behaviors changing in response to gulls

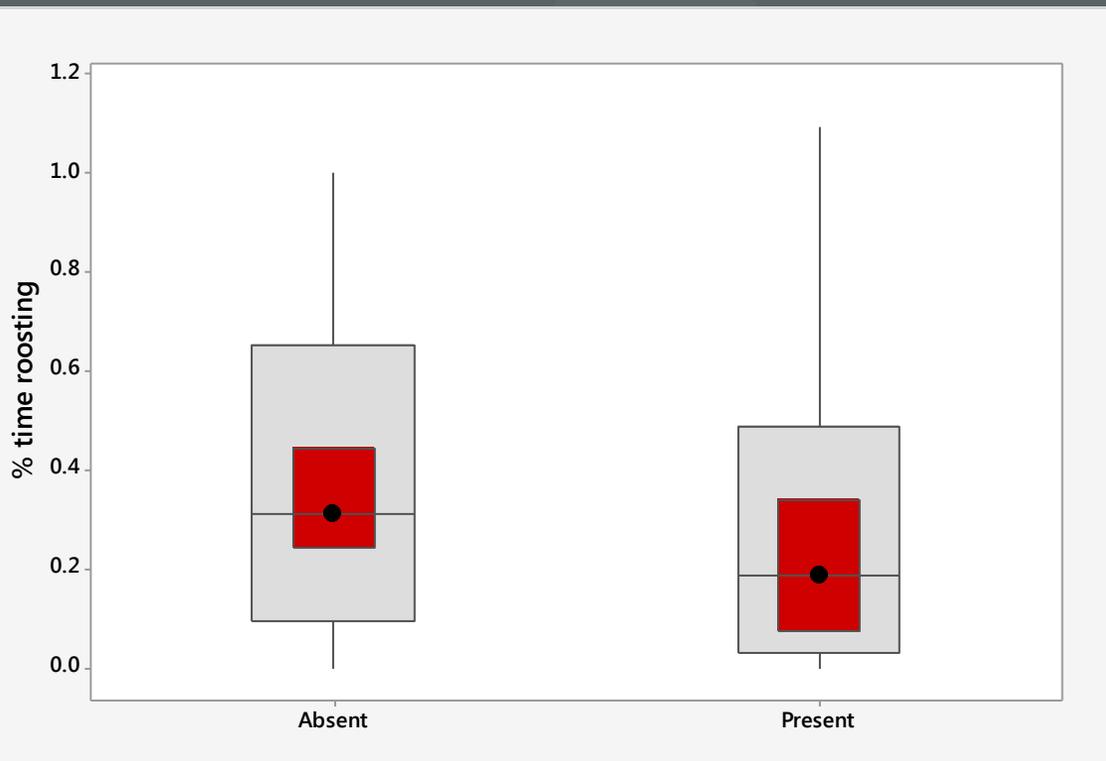
	Gulls A or P		# of gulls		Gulls nesting	
	No	Yes	Low (0-75)	High (76-300)	No	Yes
Incubation	93.7	95	95.6	92.5	96.8	90
Self Maintenance	10.6	11.7	12.5	10	11.7	10
Roosting	11.8	19.4	15	17.5	17.7	17.5

\* Values are median % time spent per behavior

# Chick rearing and nesting gulls

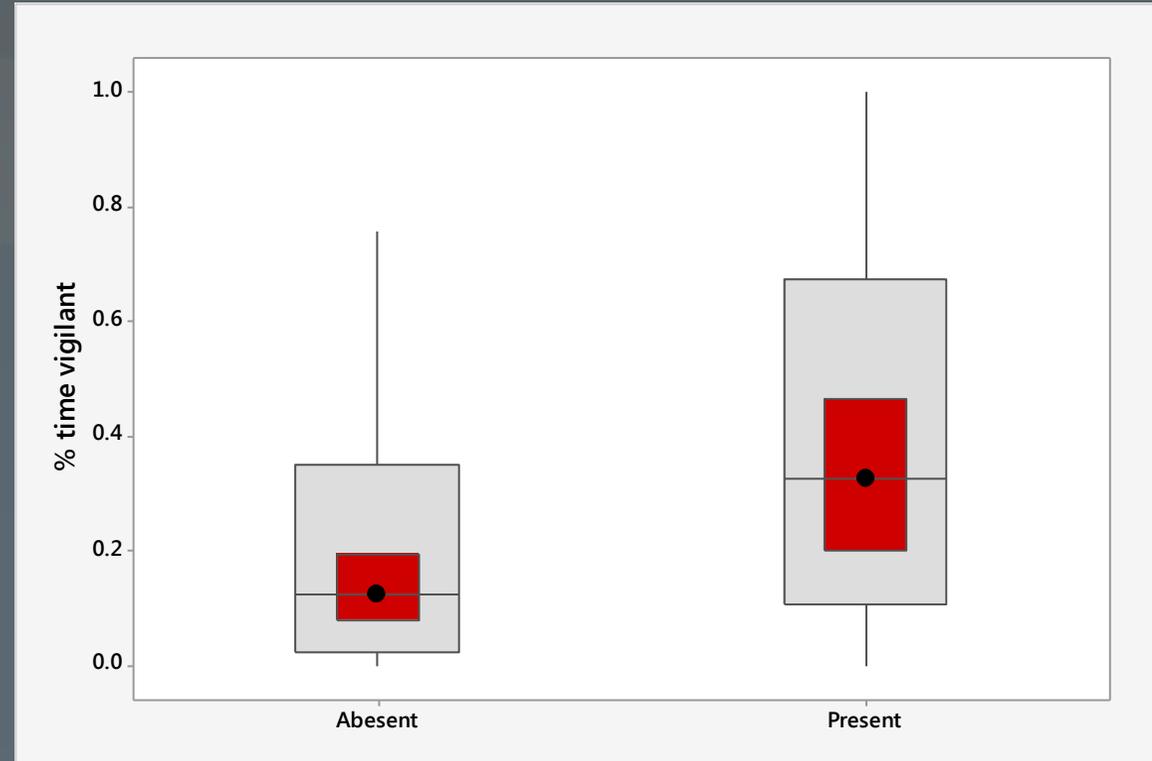
- Roosting increased significantly when nesting gulls were absent

$U = 4875.5, P = 0.013$

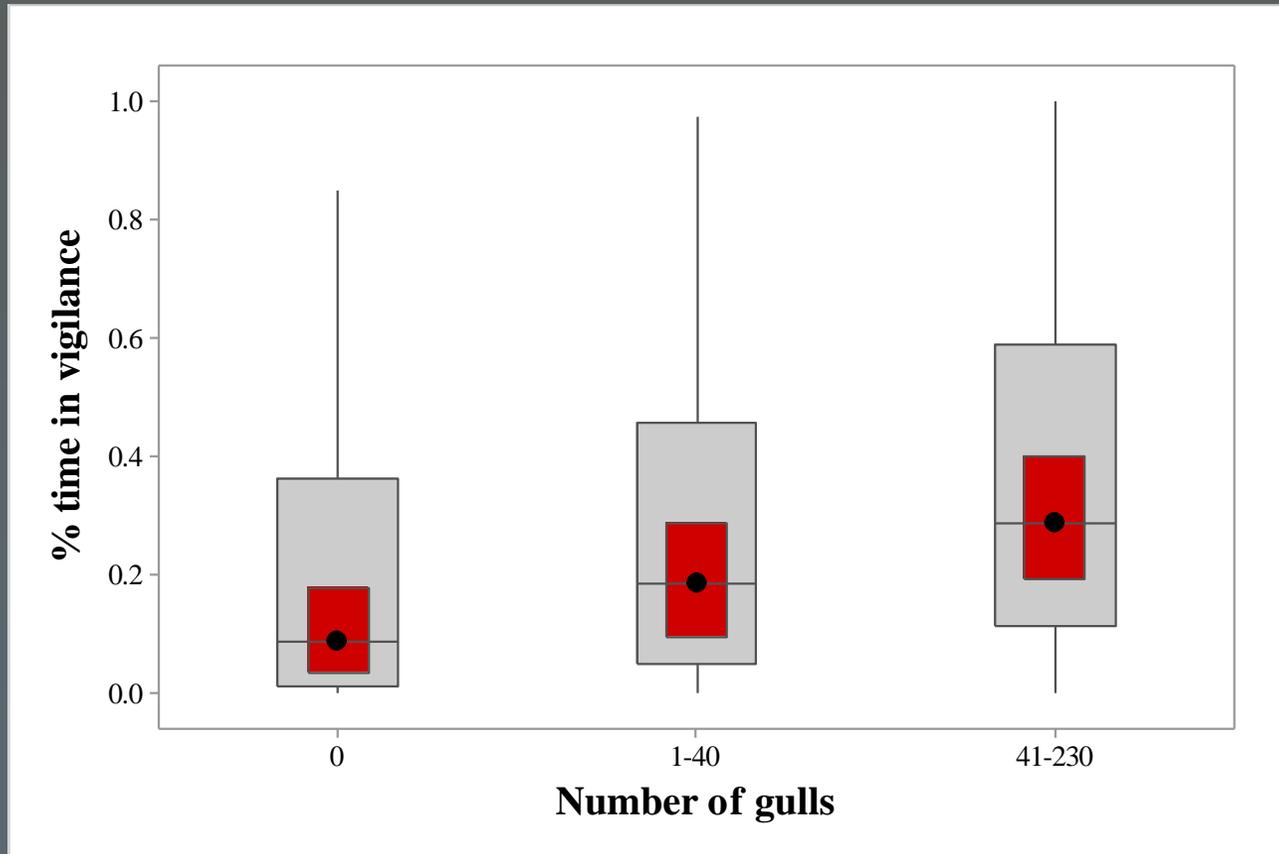


- Vigilance increased significantly when nesting gulls were present

$U = 10601.5, P = 0.000$



# Chick rearing and number of gulls



- Vigilance significantly increased as the number of gulls increased

$$H_2 = 11.11, P = 0.004$$

# Discussion: Nest rearing



- As expected, pairs spent most of their time incubating
  - Consistent with other studies and characteristic of biparental care
  - Incubation bouts are influenced by foraging opportunities and disturbances
  - Nest departures were due to mate switching, human disturbance and nest defense
- Resting and self maintenance behaviors occurred most often following incubation
  - While incubating, oystercatchers were vigilant 38% of the time and roosted only 7% of the time
  - When adults were relieved from incubating, typically began roosting or preening
- Laughing gulls elicited the 50% of agonistic behaviors
  - My study and other studies have documented gull species as opportunistic predators of shorebird eggs and young

# Discussion: Nest rearing and laughing gulls

- I found that most behaviors were not significantly influenced by nesting gulls or the number of gulls
- Why did parental vigilance only significantly increased when there was  $\geq 100$  gulls?
  - I predict that oystercatchers nesting near large nesting colonies are allocating time differently and a density dependent threshold may exist
- Incubation decreased in the presence of nesting gulls and as gulls increased
  - Gulls were the main disturbance and oystercatchers typically flushed to attack gulls
- Roosting increased when more gulls were present
  - Indicative of a stressful environment
  - Reduce nest site activity

# Discussion: Chick rearing

- As expected, adults spent most of their time in vigilant behaviors
  - Consistent with other studies
  - Either one or both adults would exhibit vigilance while standing or laying near a chick, presumable chick guarding
- Surprisingly, foraging and chick care behaviors only accounted for 13% of observations.
- Agonistic behaviors increased from 1% (nest rearing) to 3%
  - Young chicks (< 2 weeks old) are more vulnerable to predation



# Discussion: Chick rearing and laughing gulls

- Vigilance was positively related to the number of gulls and when nesting gulls were present
  - Adults decide to allocate behaviors differently in response to gulls
- Roosting increased significantly in the absence of nesting gulls
  - Chick rearing is an energetically demanding time and adults were able to allocate more time towards individual fitness
- It appears gulls influence parental behavior more during the chick rearing period.
  - More costly to lose a chick
  - Pairs typically do not attempt to reneest after chick loss



# Research considerations

Behaviors may have been underestimated for several reasons:

1. Foraging ecology—observations were not conducted at dawn or dusk; did not include tide levels and feeding area in analysis; observation times were not dependent on reef exposure
2. Nocturnal behaviors not represented—underestimated incubation, foraging, and roosting behaviors
3. I did not consider the sex or age of oystercatchers

# Conclusions

- As predicted, American oystercatchers are allocating time disproportionately among behaviors in response to laughing gulls
- Laughing gulls are the main disturbance and threat to eggs and young chicks
- Additionally, my thesis determined that laughing gulls negatively affected daily nest and brood survival and chick body condition.
  - I suggest laughing gulls are decreasing reproductive success and recommend implementing management strategies that reduce laughing gulls on American oystercatcher nesting sites.

Questions or Comments?

