

# Ecology and population dynamics of American Oystercatchers in North Carolina



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# Overview

- Background and Conservation
- Ecology of American Oystercatchers
- Study Area
- Reproductive success
  - Nest survival
  - Chick survival
    - Radio tracking
    - Behavioral observations
- Hurricane effects
- Demographic modeling
- Migration/Dispersal



# Project history

- Our American Oystercatcher research in NC began at Cape Lookout in 1997
- Initiated as a study of basic ecology
- Ongoing cooperative research and monitoring between the NPS, and the USGS Cooperative Fish and Wildlife Research Unit at NCSU
- Oystercatchers have emerged as a species of concern in NC and along the Atlantic seaboard recent years



# Conservation

- Widespread along Atlantic and Gulf Coasts
- Sensitive to a variety of factors affecting coastal resources
  - Habitat loss, coastal development
  - Pressure from human recreation
  - Pollution
  - Non-native predators
- Large, charismatic, easily identified
- Long-lived, amenable to long term mark-resight studies

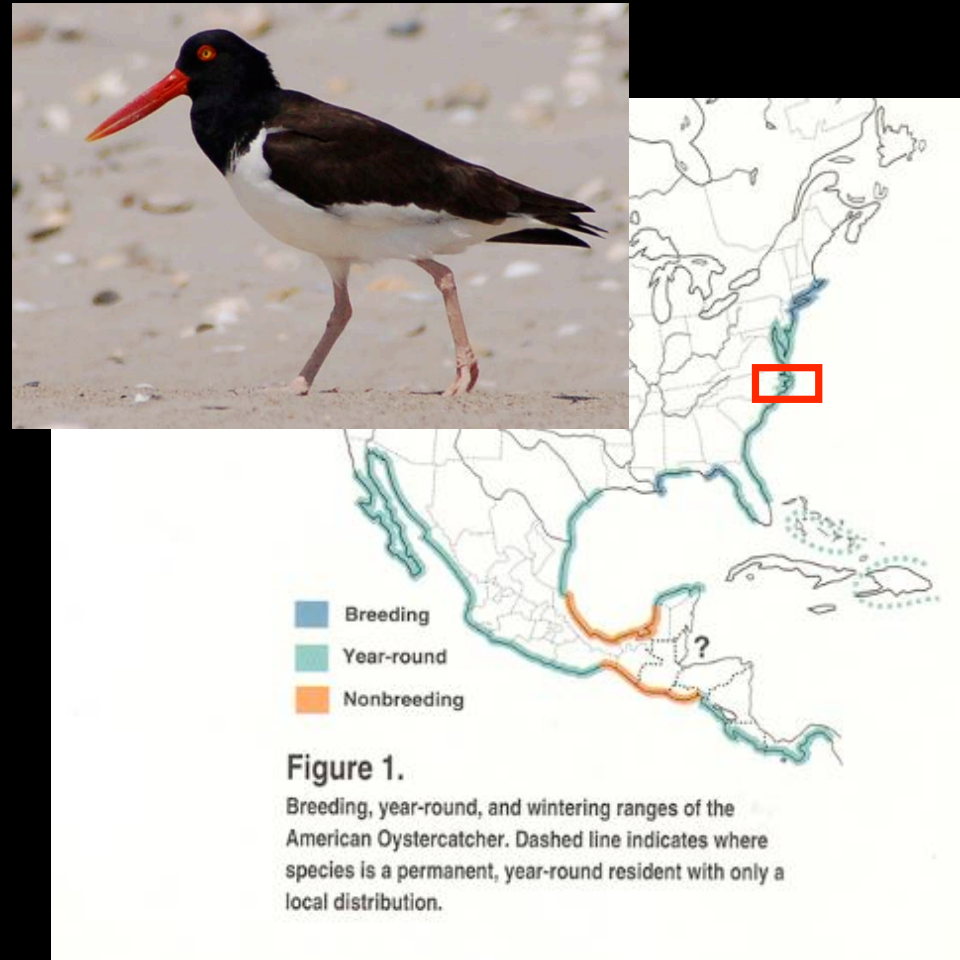


# Research objectives

- Understand the factors affecting the reproductive success of American Oystercatchers on the Outer Banks
- Develop population models that incorporate the effects of humans, predators, and environmental conditions on population trends.
- Understand patterns of adult migration and juvenile dispersal through a large scale mark-recapture study.

# Ecology

- American Oystercatchers are closely tied to the coastal zone
- Population:
  - 11000 (North America)
  - 700 (North Carolina)
- Oystercatchers in our study area nest mainly on barrier islands
- Pairs defend stretches of beach and adjacent marsh
- Territory size ranges from 100 to 1500 meters

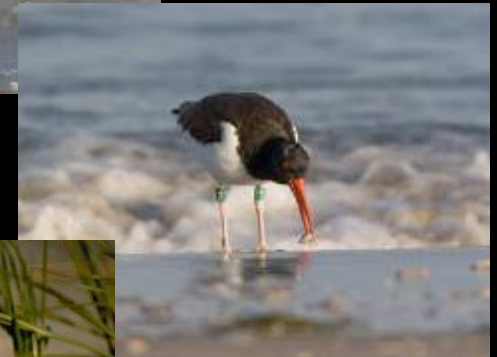


From Nol and Humphrey 1994

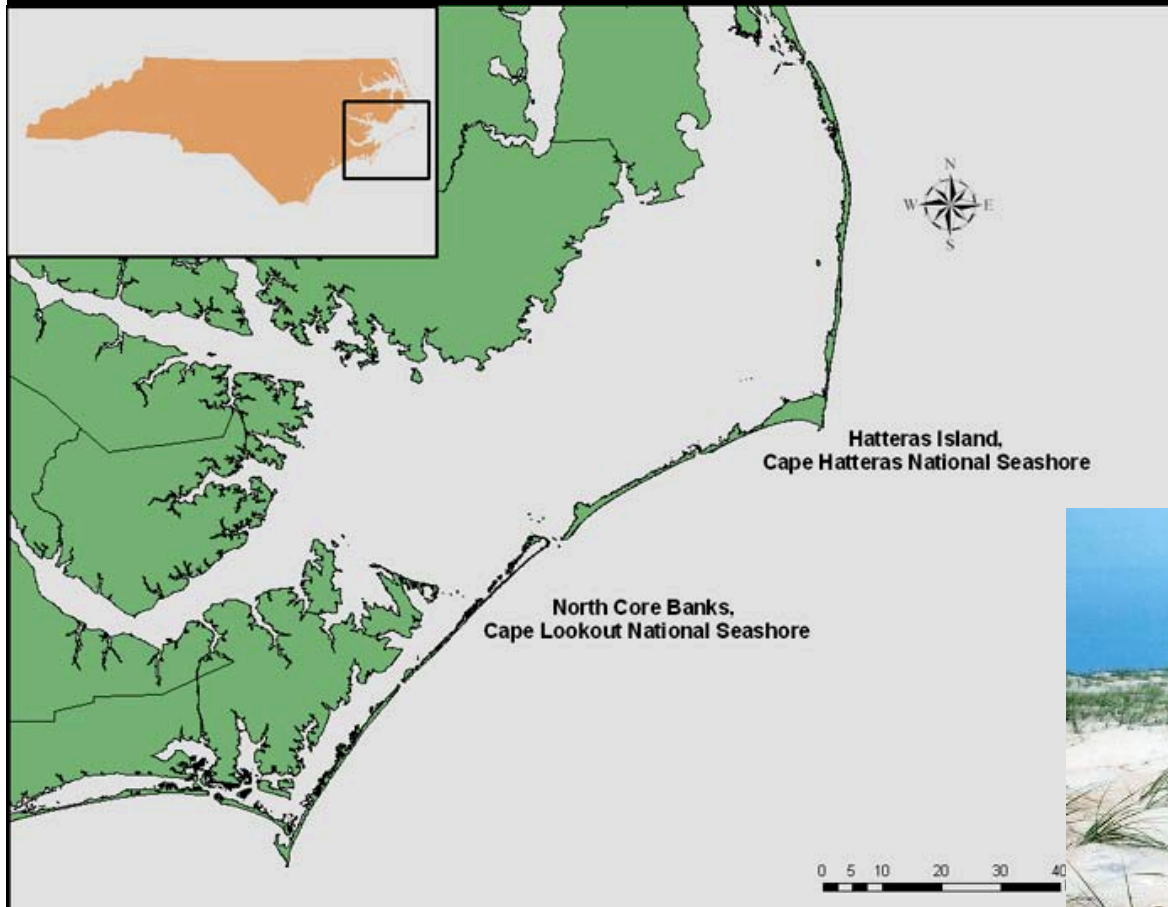


# Ecology

- Food: Shellfish and other marine invertebrates that inhabit intertidal areas.
- Strong mate and nest site fidelity
- Clutch size 2-4, in shallow scrape
- Precocial chicks, 35-45 days to develop flight capability, young fed by adults up to 6 weeks after fledging



# Study Area

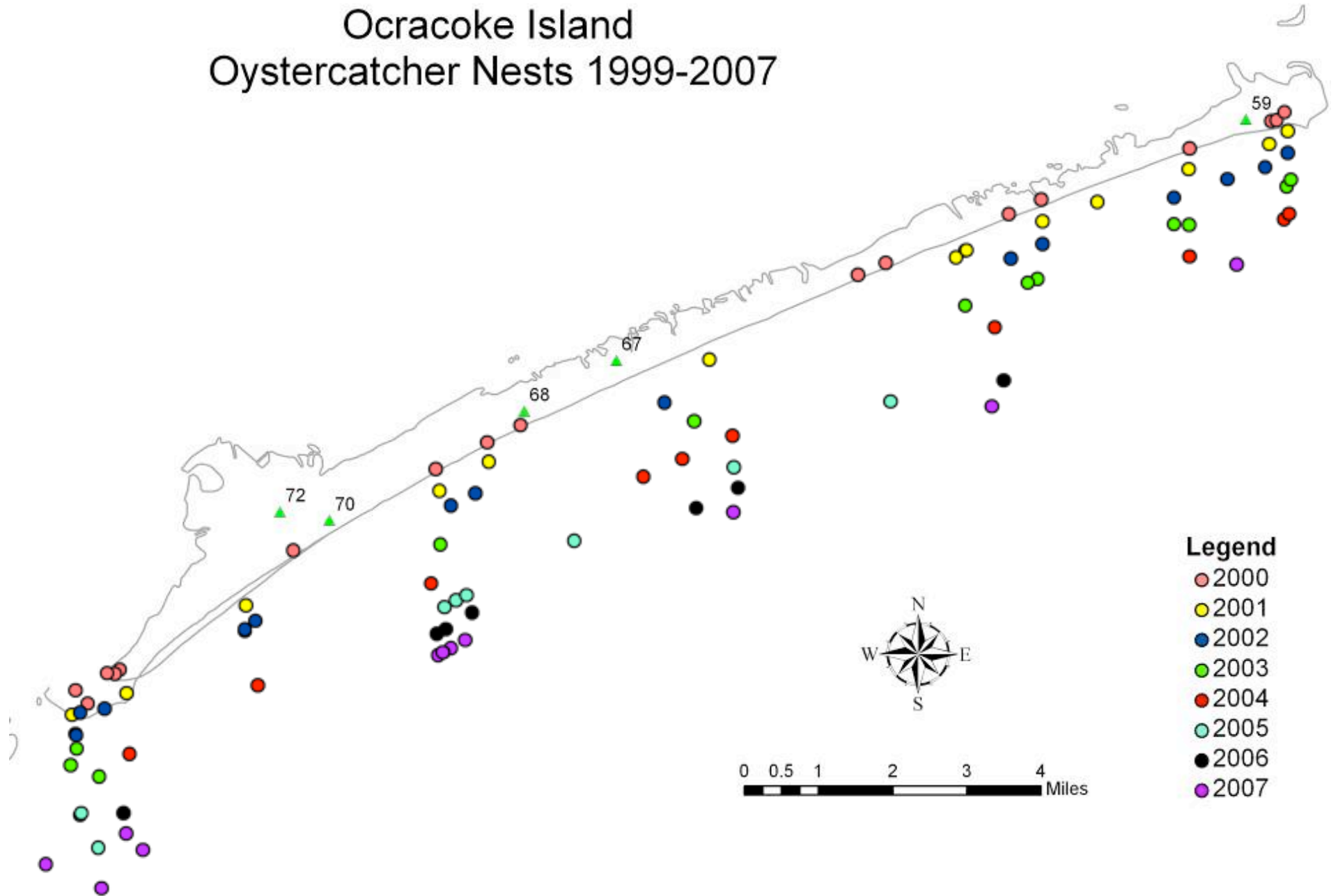


- Cape Hatteras and Cape Lookout National Seashores
- Over 160 km of barrier island habitat

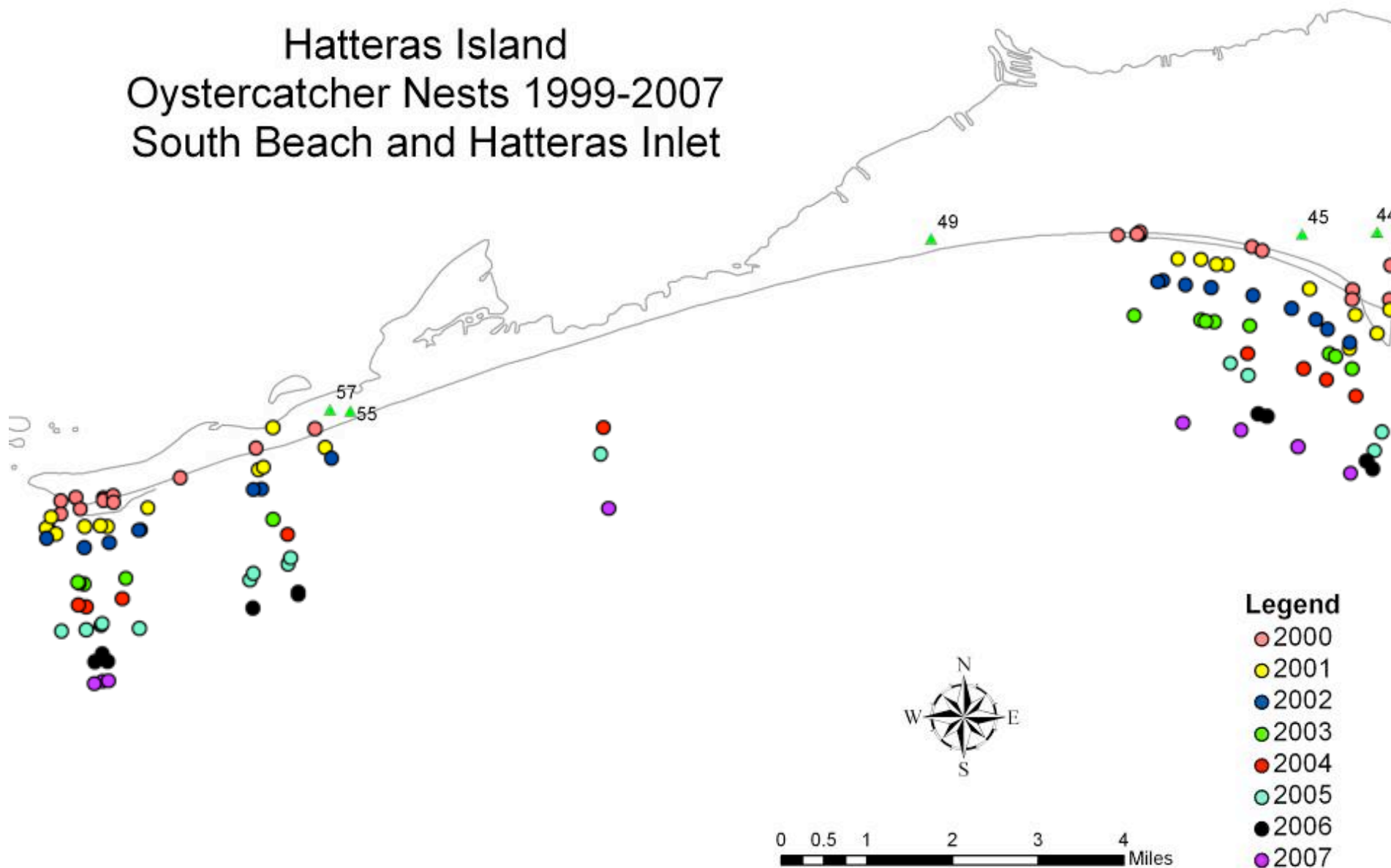




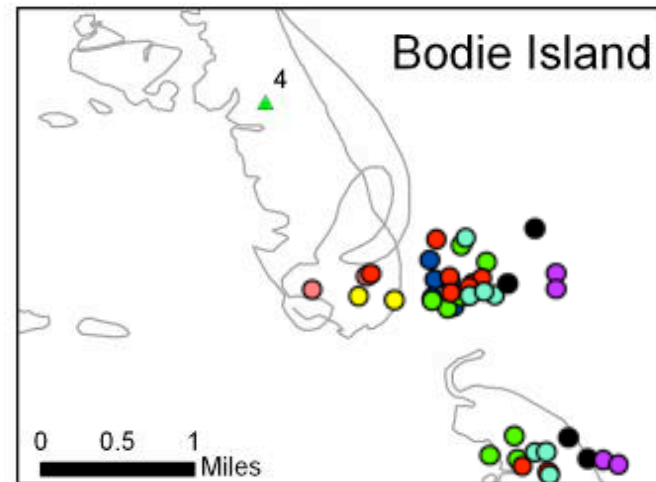
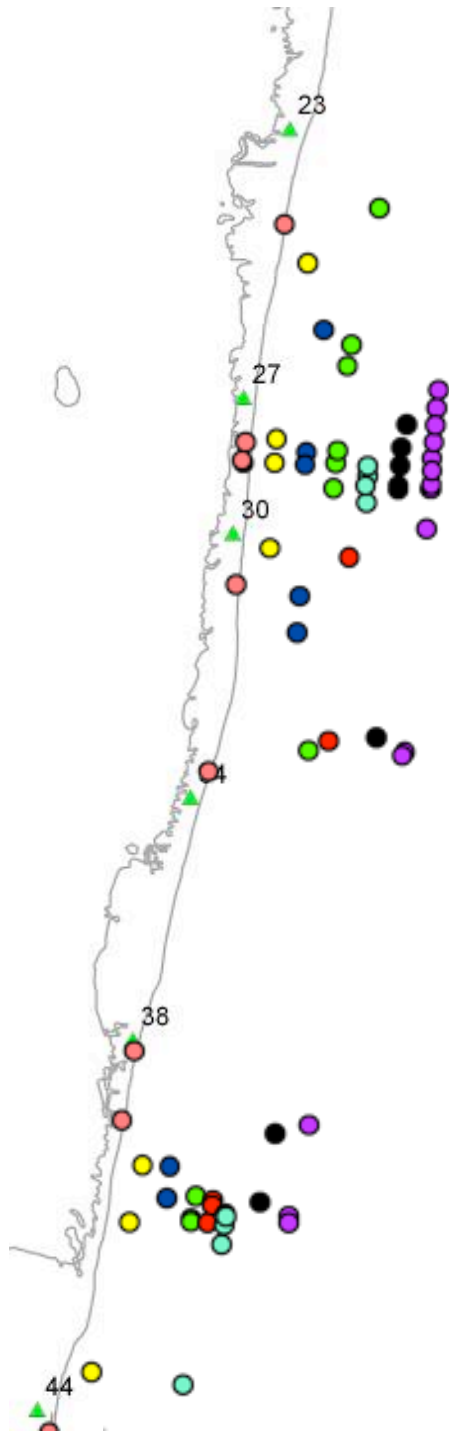
# Ocracoke Island Oystercatcher Nests 1999-2007



# Hatteras Island Oystercatcher Nests 1999-2007 South Beach and Hatteras Inlet



# Hatteras Oystercatcher Nests 1999-2007 North Beach and Bodie Island



## Legend

- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007

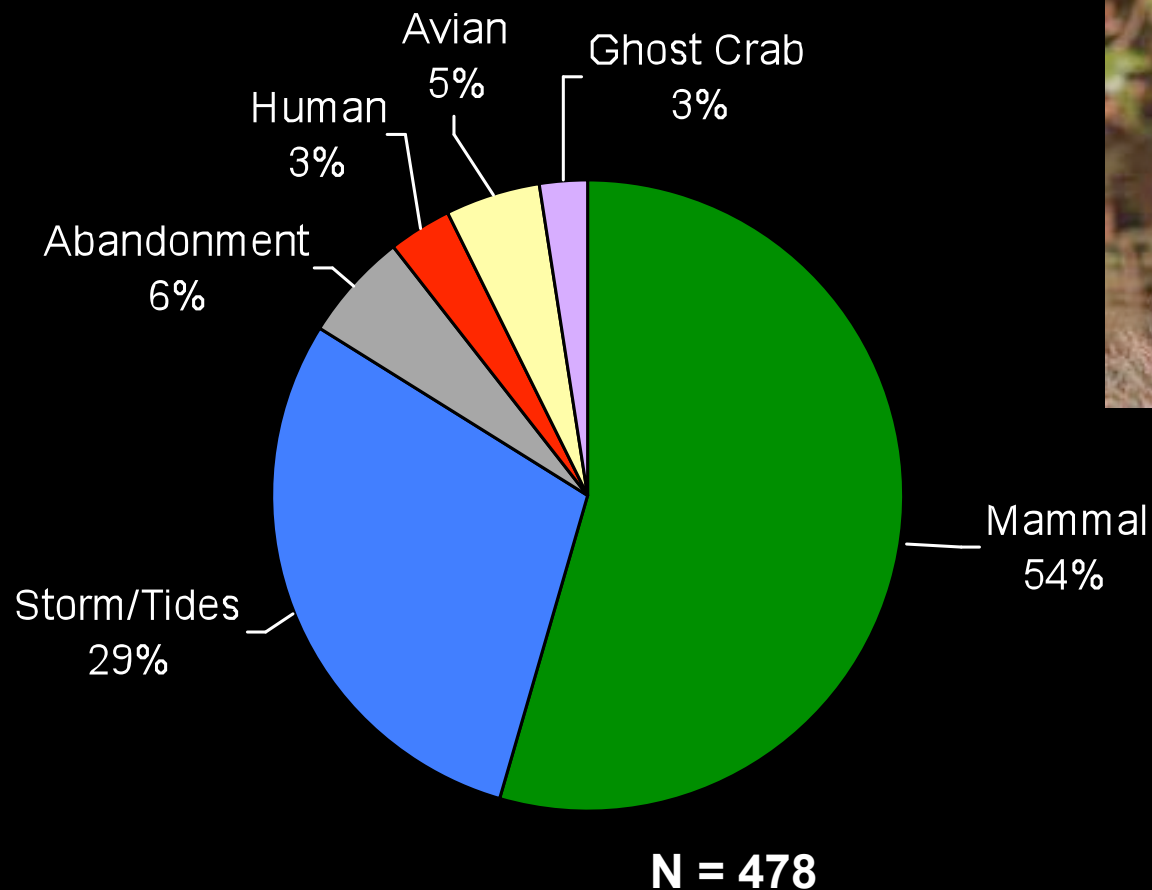


# Reproductive Success

- The breeding season is divided into two distinct periods: nesting and chick rearing
- Oystercatcher chicks are mobile shortly after hatch and do not remain in the nest
- Nest survival is variable between islands and years, but is generally low; ~ 25% of all nests survive to hatch
- 0.32 chicks produced per breeding pair



# Sources of nest failure



Source of failure could not be determined for 52% of failed nests (N = 518)

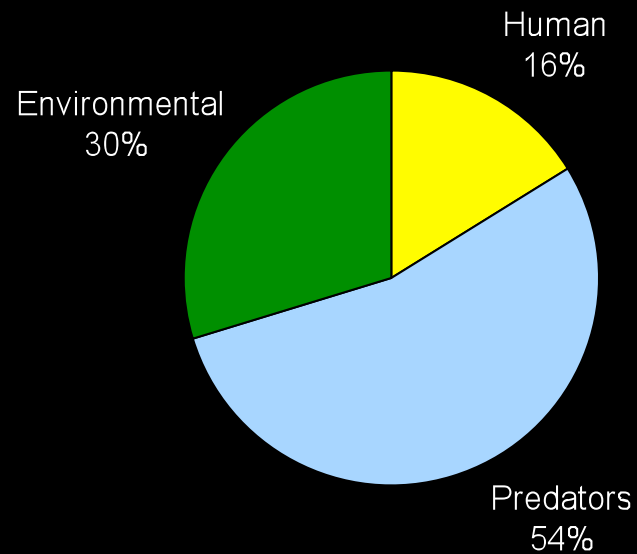


# Chick survival

- Oystercatcher chicks are camouflaged and highly mobile, which makes them difficult to monitor
- We used radio tags to track chicks and identify sources of mortality

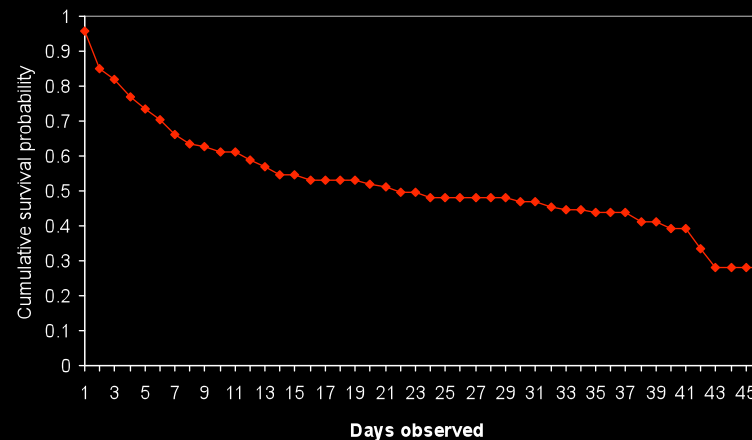


# Sources of chick mortality



**N = 37**

Source of mortality could not be determined for 51% of chick mortalities (N = 39)

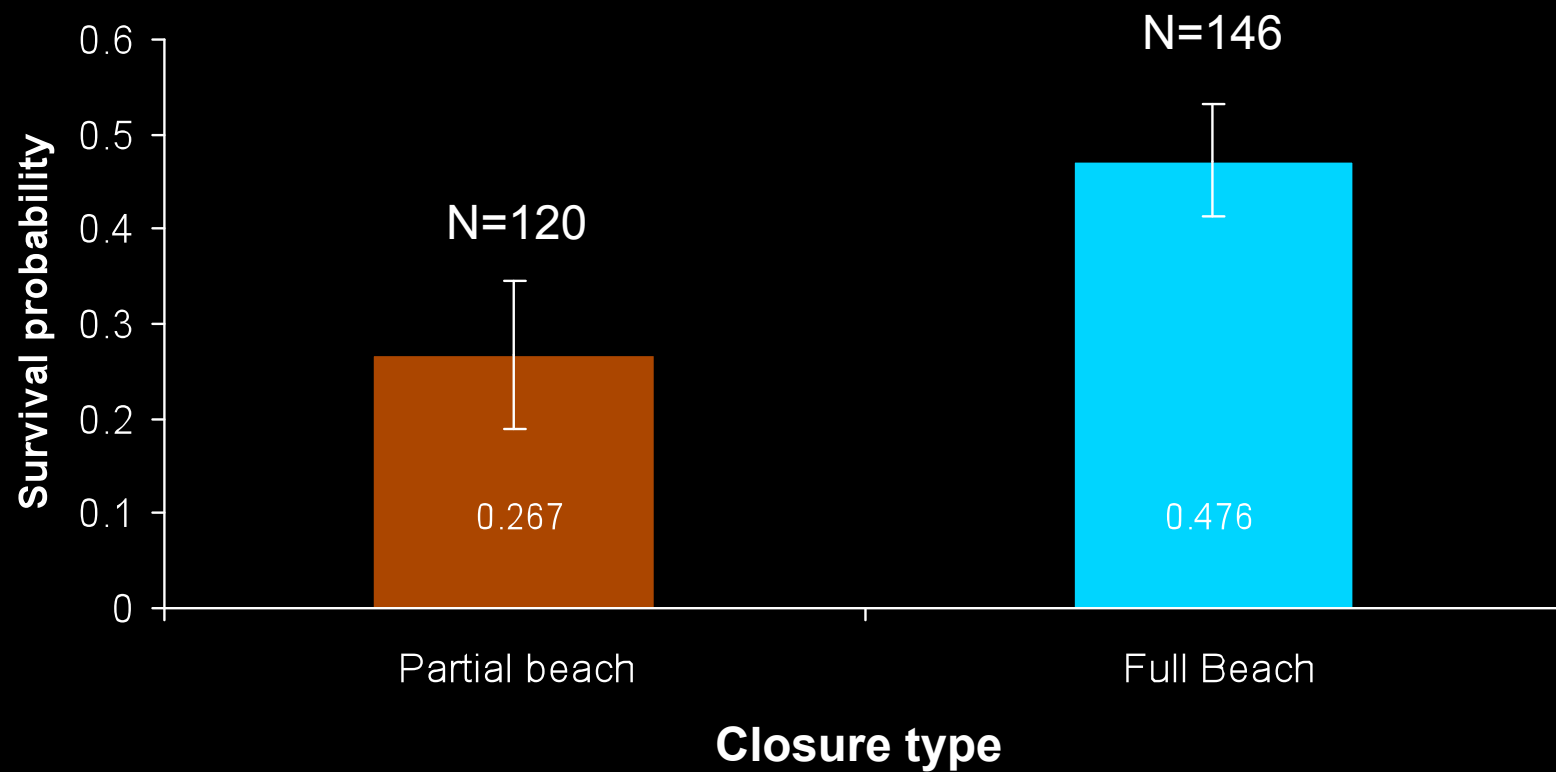


# Vehicles and chick survival

- Humans have direct and indirect effects on chick survival
- Oystercatcher chicks are highly mobile
- Chicks use truck ruts and beach debris for hiding
- 13 chicks killed by vehicles on Hatteras and Lookout from 2003-2007
- Cape Lookout closed beach sections with oystercatcher broods after two chicks were killed in 2005
- No mortality from vehicles documented on CALO after the policy was implemented



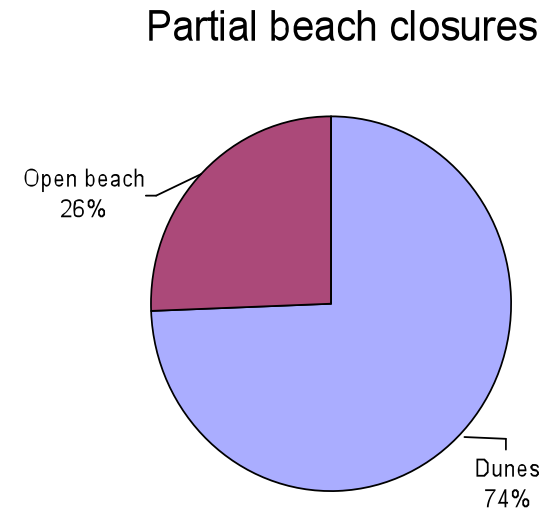
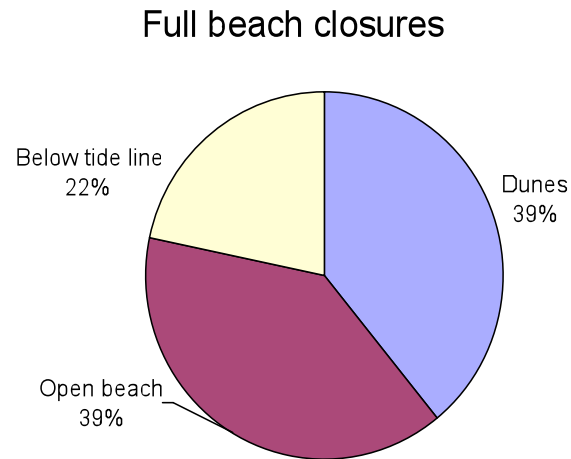
# Chick survival and vehicle closures



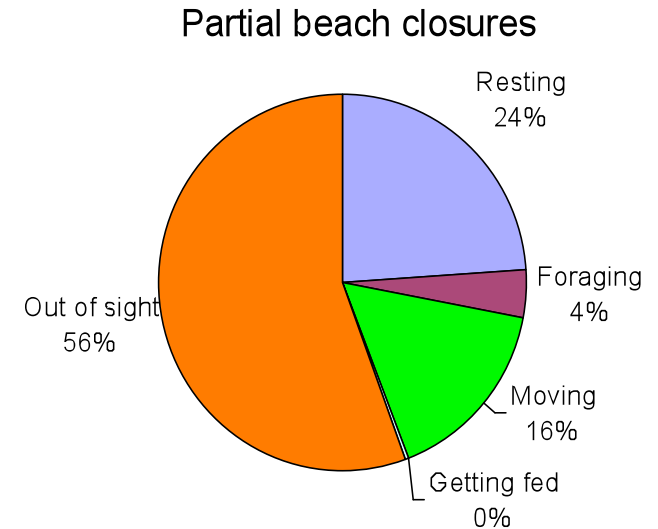
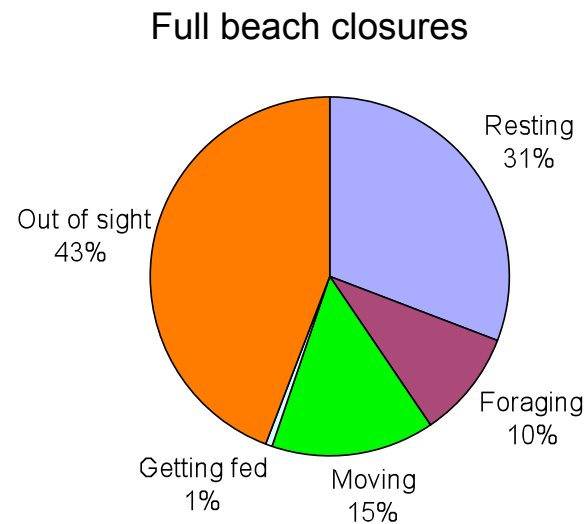
# Factors affecting productivity and survival

## Human disturbance and chick behavior

### Chick habitat use



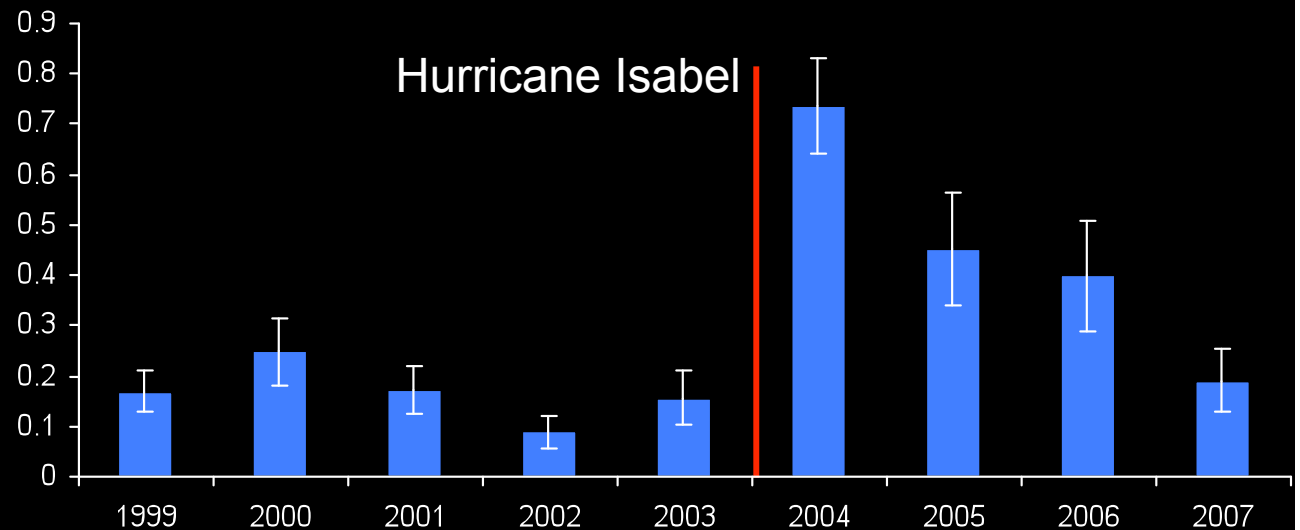
### Chick behavior





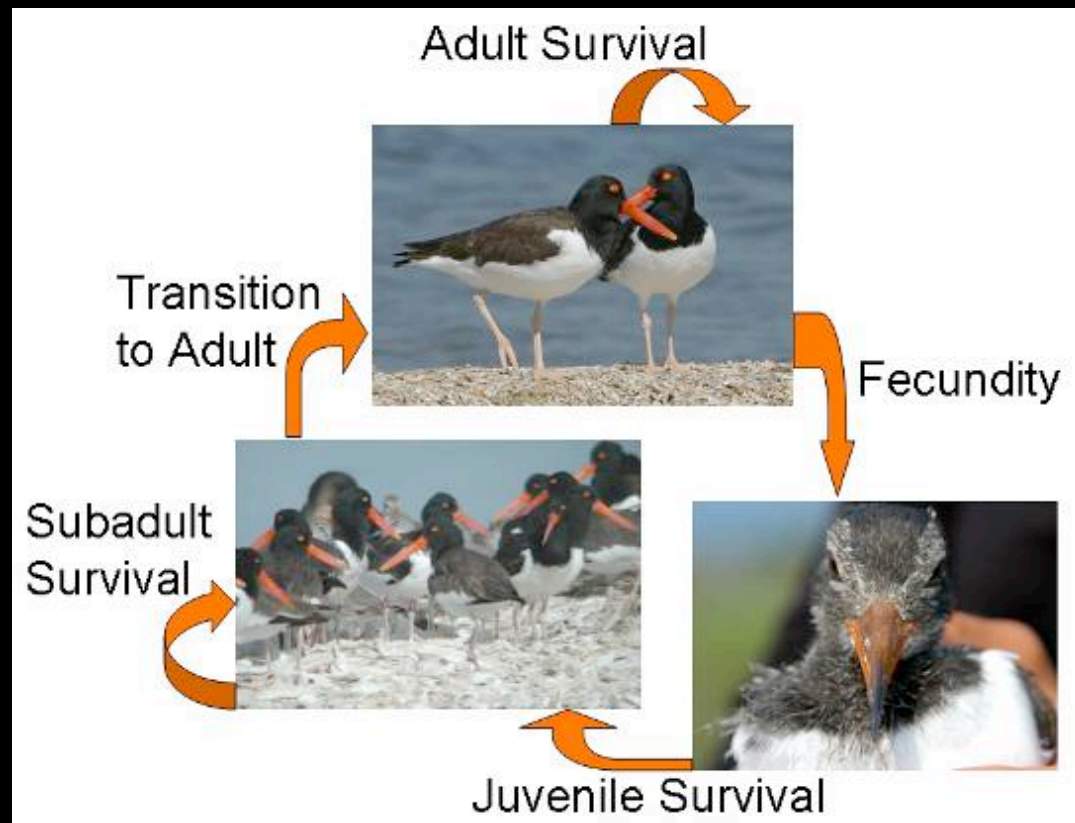
# Hurricane Effects

- Hurricane Isabel made landfall on the Outer Banks in 2003
- Overwash and sand movement improved habitat and reduced predator populations
- Large improvement in reproductive success in areas affected by the storm

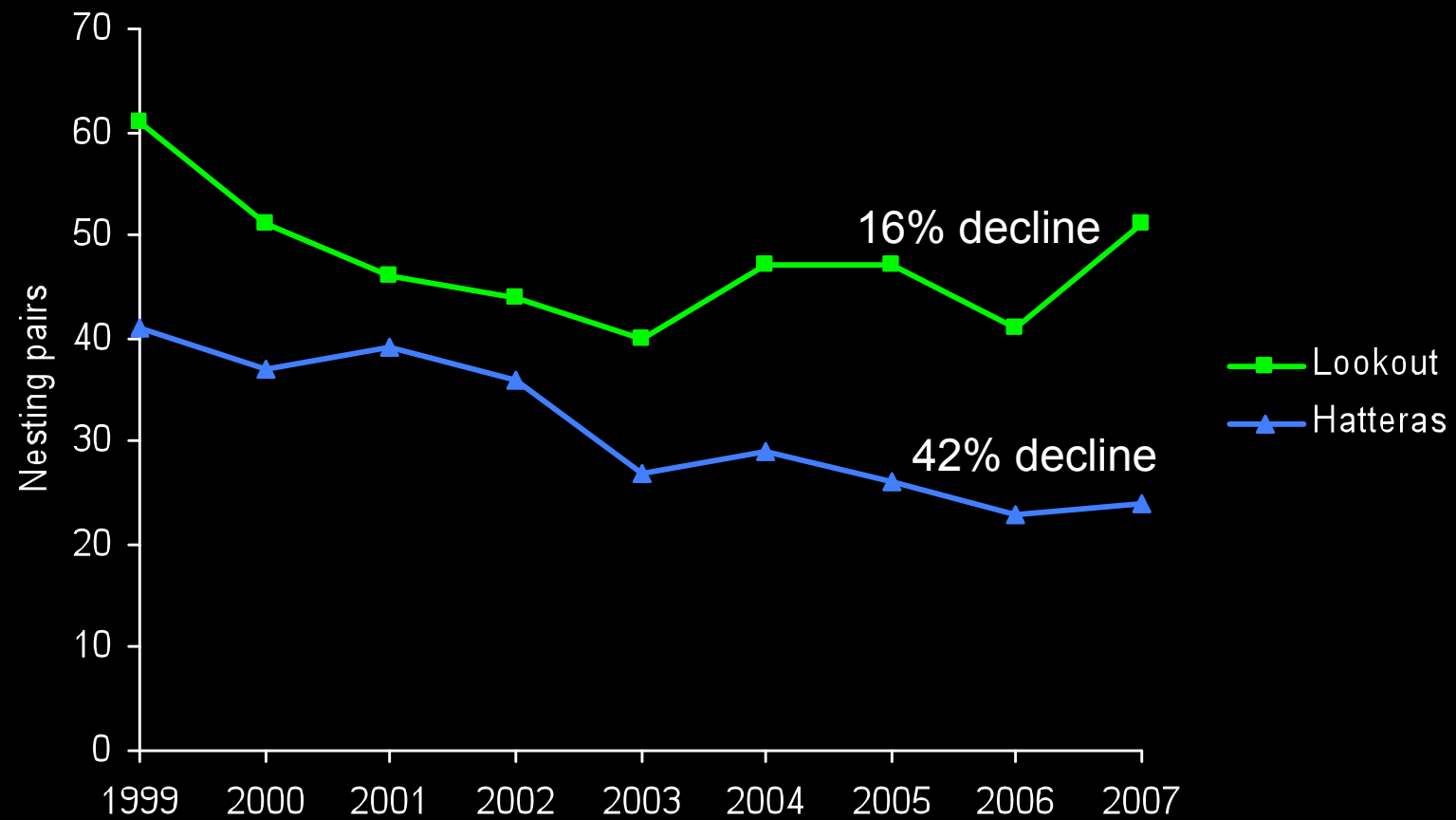


# Population Model

- Constructed a demographic model to assess the status and trajectory of the population



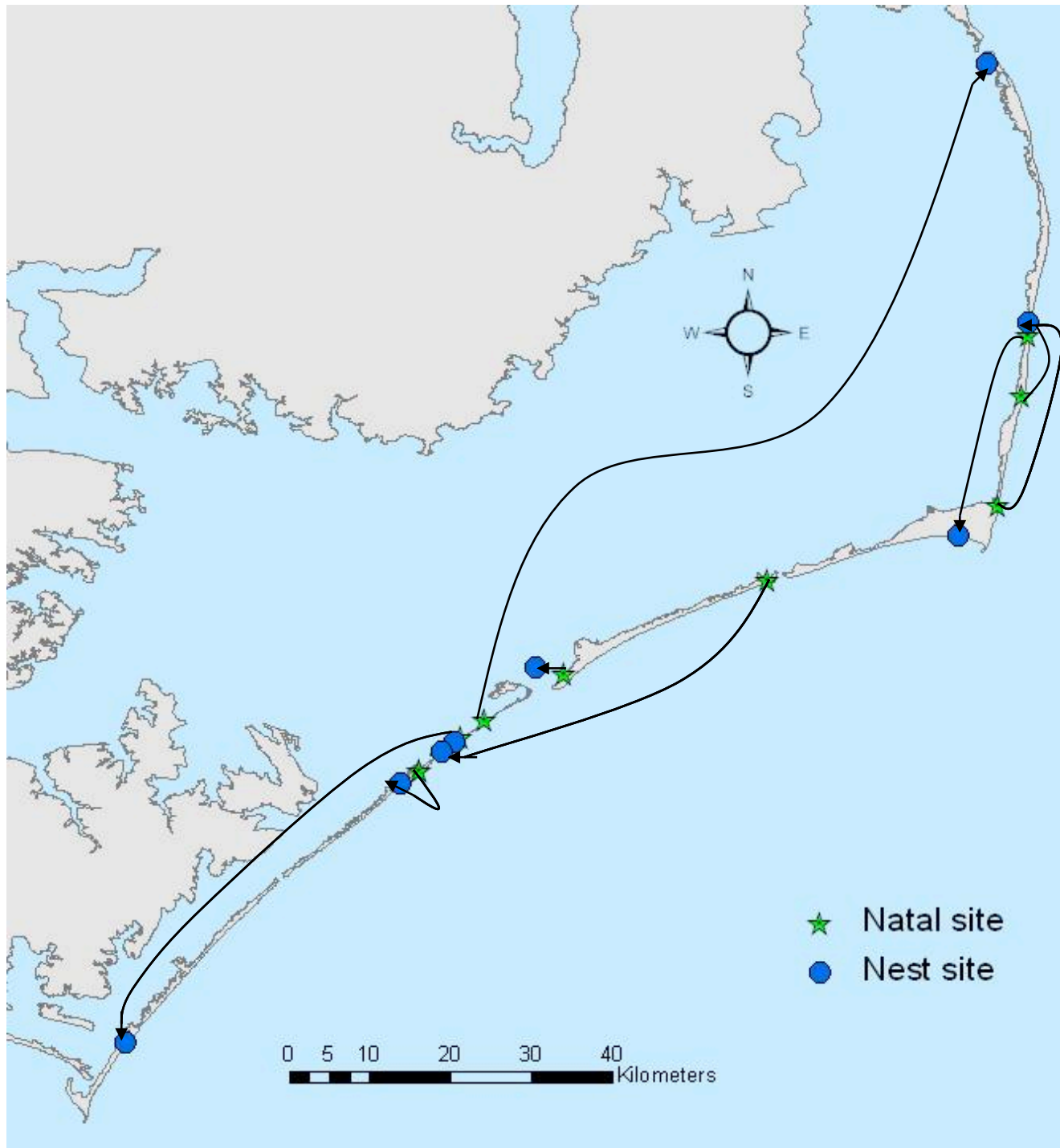
# Population Trends



# Mark – Resight Studies



- 309 Oystercatchers banded in NC
- Hundreds of resights from Virginia to South Florida
- Migration: 5 - 800 km
- Age at first breeding 3-5 years
- Dispersal: 2 -100 km



Connections between  
natal sites and nest  
sites for first-time  
nesters.

Maximum distance  
From natal site for  
first-time nesters:  
96.1 km

Minimum distance:  
2.6 km

Age at first breeding  
3-5 years (n=9, mean  
3.89 years, S.D. 1.05  
years)



# Conclusions

- Nesting success is variable, but generally low
- Raccoons are the primary nest predator
- Populations at CAHA and CALO have shown steady declines over the past decade
- Chicks are vulnerable to vehicle traffic and disturbance and appear to benefit from targeted beach closures
- Hurricanes can improve nesting habitat and reduce predators
- The population is projected to decline in the absence of frequent hurricane events or management to increase annual reproductive success

# Working Group Web Page

<http://www.ncsu.edu/project/simonslab/AMOY/Research.htm>

- A Working Group Web page created in 2002 provides:
  - A summary of Working Group objectives, activities, and contact information
  - Access to the Working Group list server
  - Banding protocols, banding summaries by state, banded bird reporting form
  - Descriptions of field methods



## Links

<a href="#">Home</a>
<a href="#">Banding and Re-sighting</a>
<a href="#">American Oystercatcher Working Group</a>
<a href="#">Field Methods</a>

Inquiries or questions about this web site?

Contact:

[Ted Simons](#)  
919-515-2689



## Introduction

American Oystercatchers (*Haematopus palliatus*) are striking black and white shorebirds with large reddish-orange bills. Oystercatchers breed on coastal beaches from Baja California to Nova Scotia (Nol and Humphrey 1994). Recent evidence of population declines, particularly in the Southeastern U.S. (Davis et al 2001), has prompted research aimed at understanding the bird's biology and conservation needs.



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Have you seen a banded American Oystercatcher? Please let us know!

[\\*Click here to report a banded Oystercatcher\\*](#)

**NEW!**

# Chick Survival and Closure Type

A comparison of American oystercatcher fecundity and fledging rate in two closure types on Cape Hatteras National Seashore from 1999-2007

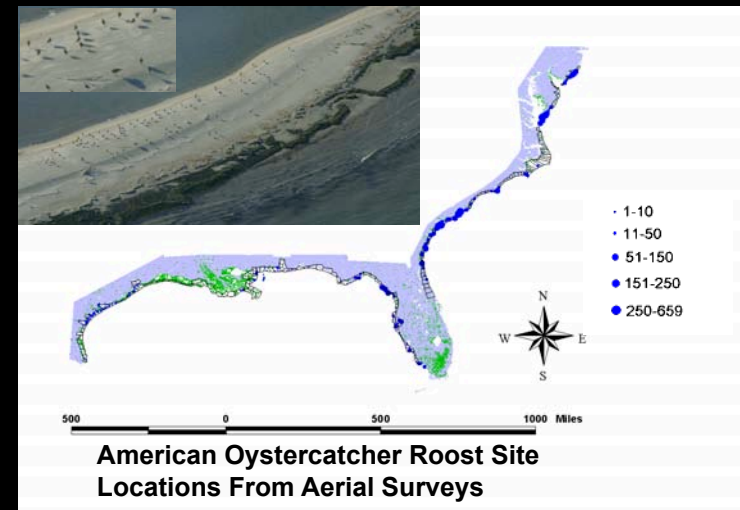
Year	Pairs	Partial beach closure			Full beach closure			Total chicks fledged	Chicks fledged/pair
		Chicks hatched	Chicks fledged	Fledging rate	Chicks hatched	Chicks fledged	Fledging rate		
1999	41	15	4	0.27	5	1	0.20	5	0.122
2000	37	21	4	0.19	10	5	0.50	9	0.243
2001	39	25	12	0.48	17	12	0.71	24	0.615
2002	36	13	6	0.46	6	3	0.50	9	0.250
2003	27	18	3	0.17	3	2	0.67	5	0.185
2004	29	14	2	0.14	33	17	0.52	19	0.655
2005	26	2	0	0.00	23	11	0.48	11	0.423
2006	23	8	0	0.00	25	7	0.28	7	0.304
2007	24	4	1	0.25	24	11	0.46	12	0.500
<b>Total</b>	<b>282</b>	<b>120</b>	<b>32</b>	<b>0.267</b>	<b>146</b>	<b>69</b>	<b>0.473</b>	<b>101</b>	<b>0.358</b>

**American Oystercatcher productivity on Cape Hatteras National Seashore from 1999-2007**

Year and Location	Breeding Pairs	Nests	Nests hatched	Nest survival (observed)	Nest survival (Mark)	Successful pairs (at least 1 chick fledged)	No. of chicks fledged	Fecundity (Chicks fledged/ breeding pair)
<b>Ocracoke Island</b>								
1999	15	17	7	0.412	0.321	2	2	0.13
2000	12	17	6	0.353	0.270	5	7	0.58
2001	13	15	11	0.733	0.624	8	17	1.31
2002	12	18	6	0.333	0.266	3	3	0.25
2003	8	12	4	0.333	0.255	1	1	0.13
2004	9	11	7	0.636	0.566	5	8	0.89
2005	5	10	3	0.300	0.295	1	1	0.20
2006	5	8	5	0.625	0.492	1	2	0.40
2007	5	12	3	0.250	0.102	1	1	0.20
Island	84	120	52	0.455 (0.043)	0.341 (0.042)	27	42	0.50
<b>Hatteras Island</b>								
1999	24	31	7	0.226	0.287	3	3	0.13
2000	23	29	10	0.345	0.251	2	2	0.09
2001	24	28	10	0.357	0.259	6	6	0.25
2002	21	25	3	0.120	0.030	3	4	0.19
2003	14	21	8	0.381	0.372	5	6	0.43
2004	15	18	14	0.778	0.706	7	9	0.60
2005	17	25	13	0.520	0.501	7	10	0.59
2006	14	19	11	0.579	0.525	4	5	0.36
2007	15	23	10	0.435	0.481	6	9	0.60
Island	167	219	86	0.404 (0.031)	0.349 (0.032)	43	54	0.32
<b>Bodie Island</b>								
1999	2	2	0	0.000	NA	0	0	0.00
2000	2	3	0	0.000	NA	0	0	0.00
2001	2	3	1	0.333	NA	1	1	0.50
2002	3	5	1	0.200	NA	1	2	0.67
2003	5	5	1	0.200	NA	0	0	0.00
2004	3	7	0	0.000	NA	0	0	0.00
2005	2	3	1	0.333	NA	0	0	0.00
2006	2	2	1	0.500	NA	0	0	0.00
2007	2	2	1	0.500	NA	0	0	0.00
Island	23	32	6	0.206 (0.069)	NA	2	3	0.13
<b>Green Island</b>								
2004	2	3	2	0.667	NA	1	2	1.00
2005	2	3	2	0.667	NA	0	0	0.00
2006	2	2	2	1.000	NA	2	2	1.00
2007	2	2	1	0.500	NA	1	2	1.00
Island	8	10	7	0.7 (0.145)	NA	4	6	0.75
<b>Total/mean</b>	<b>282</b>	<b>381</b>	<b>151</b>	<b>0.396 (0.025)</b>	<b>0.325 (0.024)</b>	<b>76</b>	<b>105</b>	<b>0.37</b>

# 2002 Winter Roost Survey

- Aerial surveys November 2002 – February 2003
- Stratified sampling, 239 blocks
- High tide +/- 2 hours survey window
- Detection rates calculated from digital photographs and ground truth surveys
  - Detection rate 0.73 for flocks <50 birds
  - Detection rate 1.0 for flocks  $\geq$  50 birds
- Winter population estimate  $10,971 \pm 298$  birds



Brown et al. 2005. Journal of Wildlife Management 69:1538-1545

	Estimate	S.E.
Ground photo	8,354	0
Aerial count	2,460	148
Barrier beach count	157	35
Total	10,971	152



