USING HABITAT FEATURES TO PREDICT AND MANAGE NEST SUCCESS OF AMERICAN OYSTERCATCHERS (*HAEMATOPUS PALLIATUS)* AND WILSON'S PLOVERS *(CHARADRIUS WILSONIA)* ALONG THE GEORGIA COAST.

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Background: American Oystercatchers

Photo: Brad Winn

100 nesting pairs in GA
Rare (SWAP, 2005)

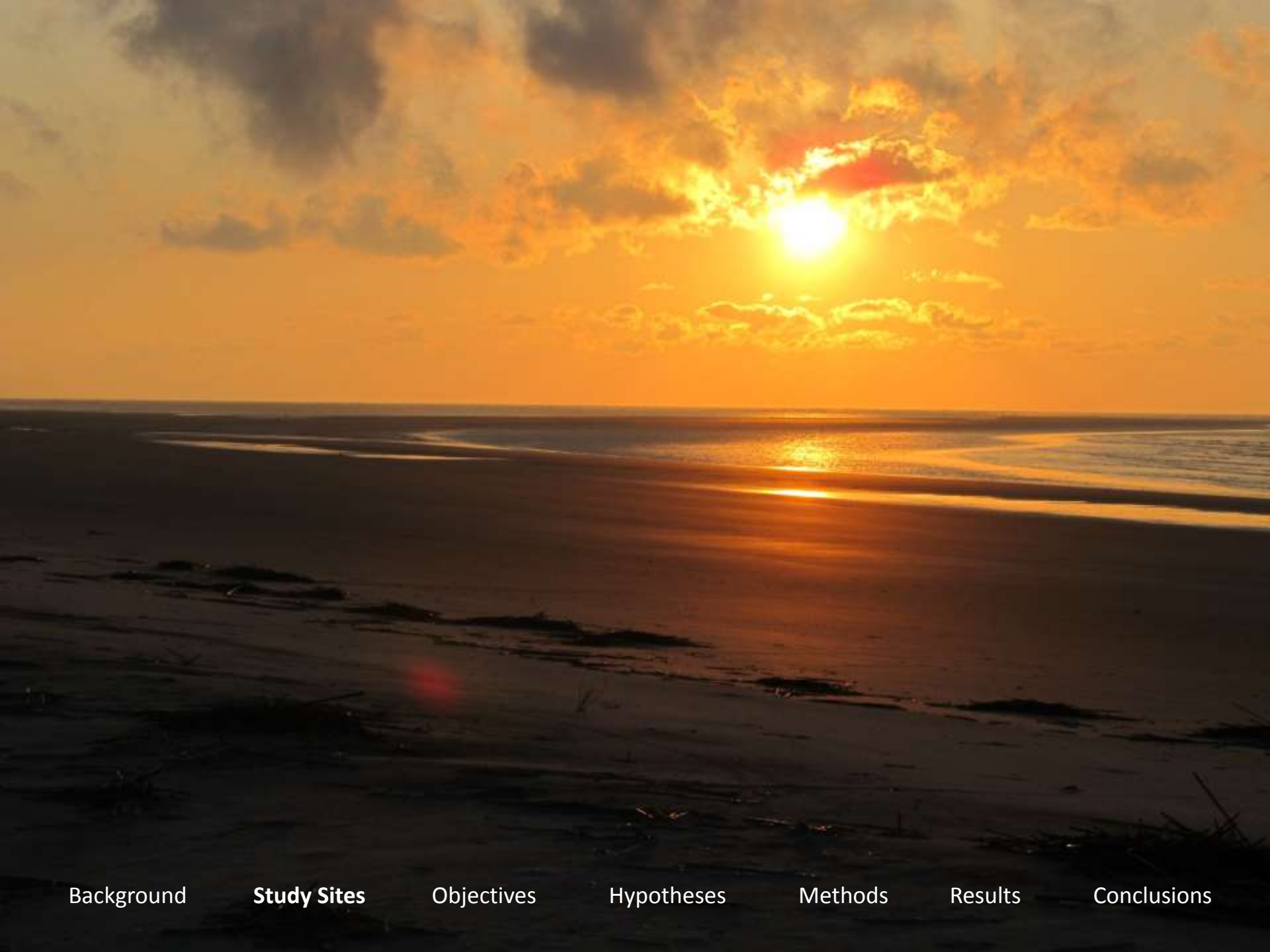
Background: Wilson's Plovers

300 nesting pairs in GA (2010)
Threatened (SWAP 2005)

Study Sites

COASTAL GEORGIA
ATLANTA
AUGUSTA
MACON
STATESBORO
SAVANNAH
TIFTON
VALDOSTA
ST. MARYS

Brunswick
Camden
Little St. Simons Island
Little Cumberland Island
Cumberland Island
Data SIO, NOAA,



Objectives

- Estimate nest success and fledging success
- Quantify nest site characteristics
- Determine nest site characteristics that predict productivity
- Identify common features between species to determine suitability as focal species
- Develop predictive models to guide management

Hypotheses

- Nest Location:
  - Density of vegetation and substrate type will influence nest location for both species
  - At a landscape scale, proximity to open water, marsh and known foraging areas will influence nest location

Hypotheses

- Nest and Fledging Success:
  - Nests at higher elevation and located in vegetation will have increased hatching success
  - Nests located near tidal creeks, beach ponds or marshes will produce more fledglings than those in other locations

Hypotheses

- Common features:
  - Areas of high productivity will not differ significantly between the two species

Methods

- Locate and monitor nests during 2012 and 2013 breeding season
  - Visual survey, tracking, parental behavior
  - Assess cause of failure by track identification

Methods

- Band and monitor chicks

Methods

- Measure nest-site characteristics at nests and random sites

Methods

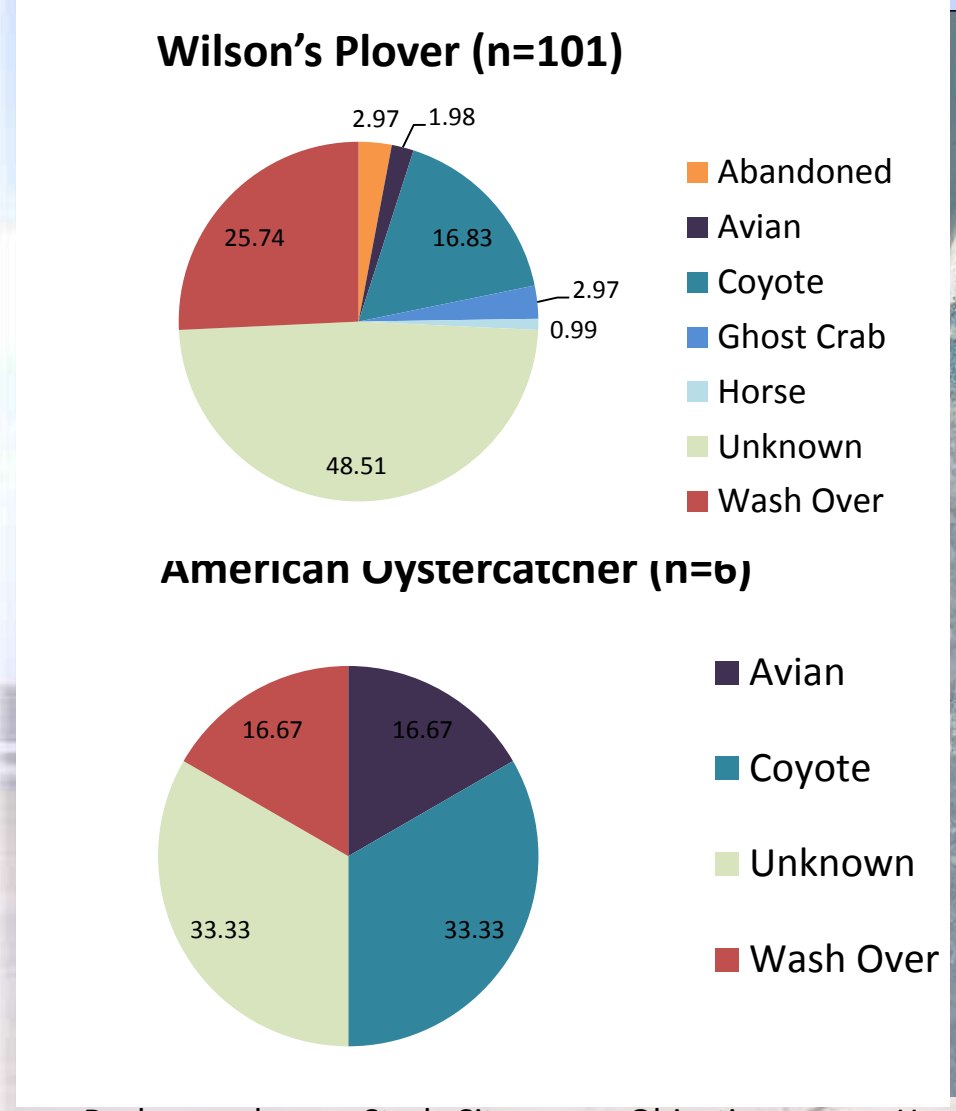
Scale and Measurements:

1. Microhabitat (1 meter quadrat)
   - Percent cover of vegetation, open sand, wrack and shell, elevation
   - Presence of predators
2. Macrohabitat (25 meter line transects)
   - Characterization of vegetation
   - Presence of predators
3. Landscape Scale
   - Distances to marsh edge, mud flats, tideline

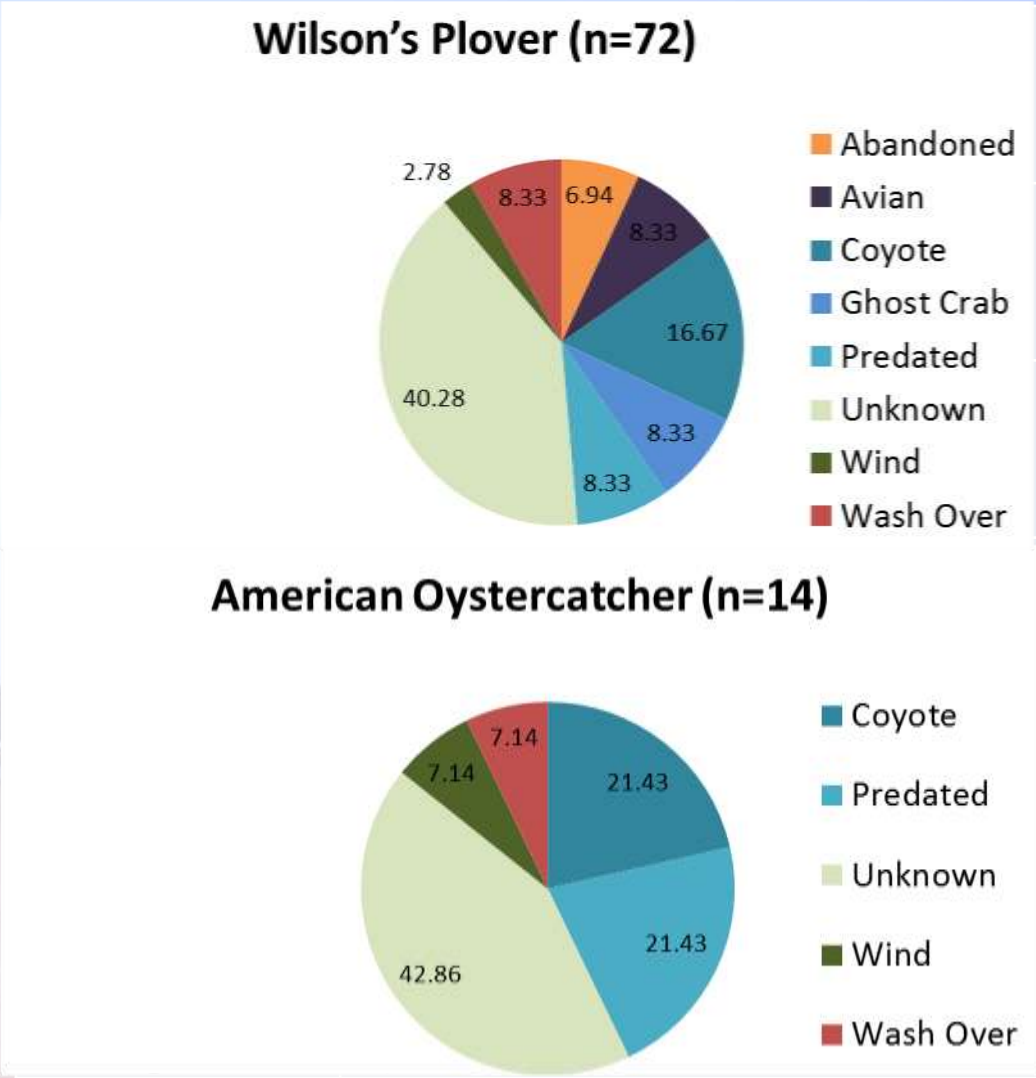
Methods

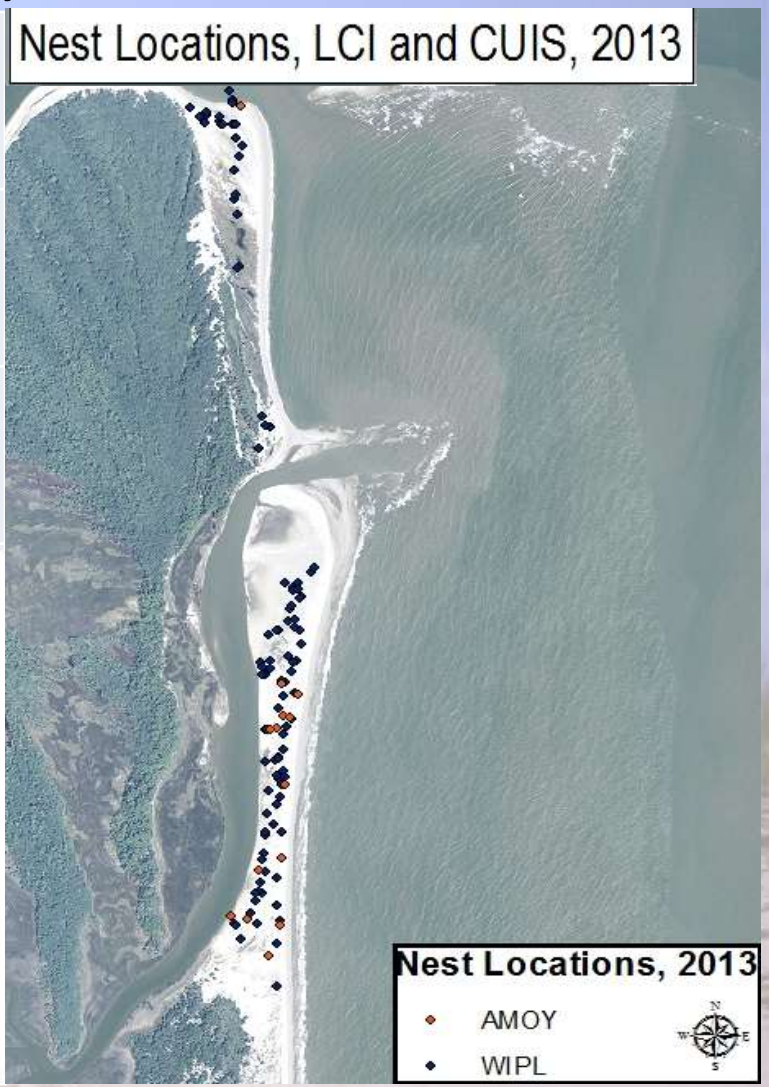
- Estimate nest survival (Mayfield)
- Compare site characteristics to random sites and between species for significant differences
- Use Shaffer's logistic exposure estimate and AIC to create and compare models predicting nest location, nest success and productivity

Little Cumberland and Cumberland, 2012

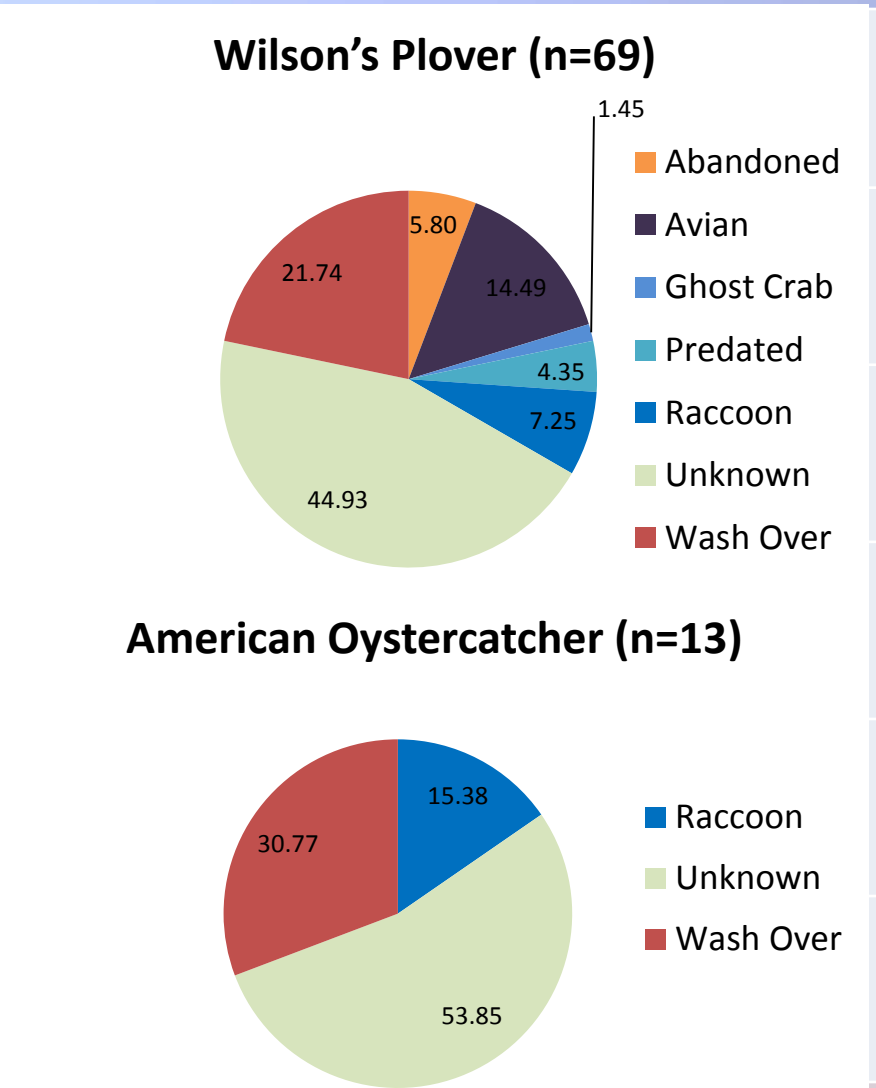


Little Cumberland and Cumberland, 2013





Little St. Simons



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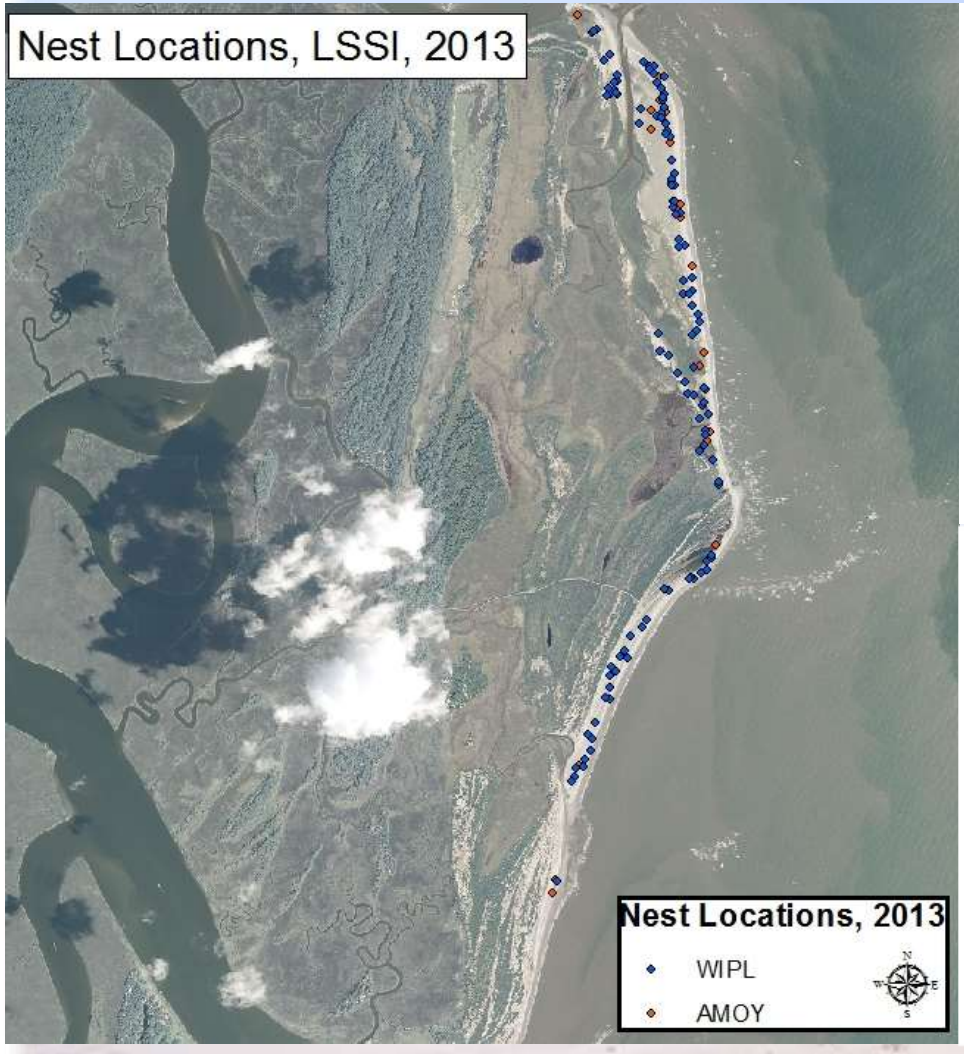
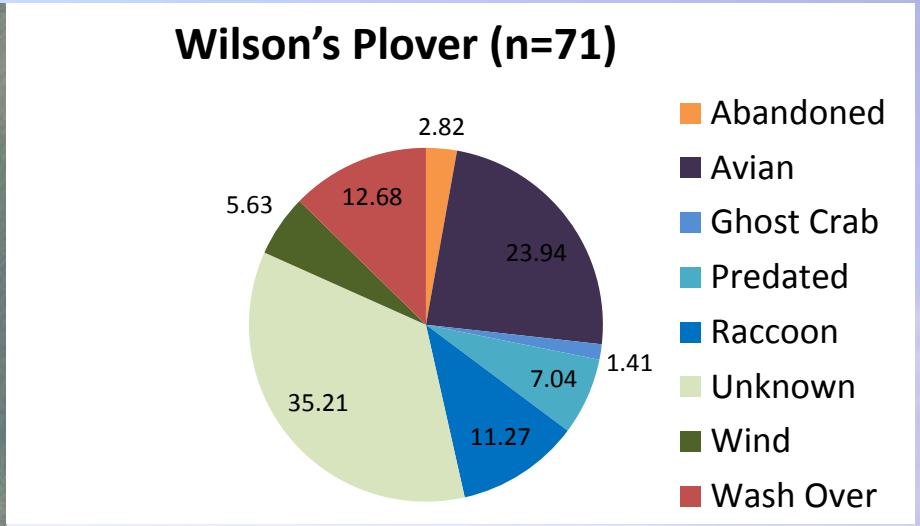
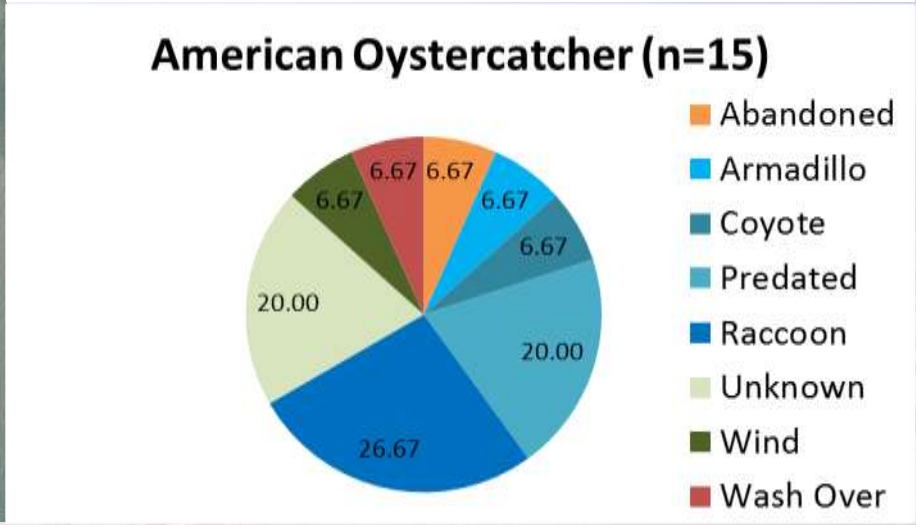






Nest Site Comparison, WIPL

More wrack at used nest sites

t=3.5, df = 211, p= 0.0004

More open sand at **random nests**

t=6.9,df = 211,p <0.01

t=8.1,df=211, p <0.01

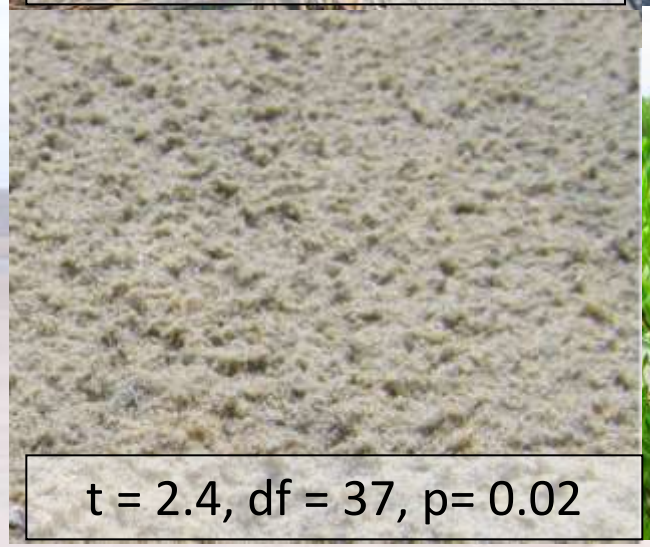
More vegetation at used nest sites

Nest Site Comparison, AMOY

More wrack at used nest sites

t=2.7, df=37, p= 0.01

More open sand at **random nests**



t = 2.4, df = 37, p= 0.02

Nest Survival

WIPL (logistic exposure estimate)
Daily Survival= **0.95** (N=210, 95% CI= 0.92-0.96)
Period Survival= **0.25** (N=210, 95% CI=0.24-0.27)
AMOY (logistic exposure estimate)
Daily Survival= **0.96** (N=38, 95% CI=0.97-0.94)
Period Survival= **0.32** (N=38, 95% CI=0.28-0.37)

AIC Results for WIPL

	model	npar	AIC_c	delta	wt
23	year+elev+open	5	965.3956	0	0.1382
17	year+wrack_cov+open	5	965.9603	0.564668	0.1042
16	year+wrack_cov+elev+open	6	966.2225	0.826862	0.0914
30	year+open	4	966.2664	0.870721	0.0894
20	year+wrack_cov+elev	5	970.629	5.233364	0.0101
14	year+wrack_cov+elev+Nest_in_veg	6	972.0417	6.646096	0.005
13	year+wrack_cov+shell_cov+elev	6	972.1601	6.764429	0.0047
31	year+Nest_in_veg	4	972.256	6.860325	0.0045
32	year	3	972.2903	6.894659	0.0044
27	year+wrack_cov	4	973.0699	7.674307	0.003
28	year+shell_cov	4	973.4686	8.07292	0.0024
5	year+wrack_cov+shell_cov+elev+Nest_in_veg	7	973.7913	8.395645	0.0021
24	year+shell_cov+Nest_in_veg	5	973.8867	8.491061	0.002
19	year+wrack_cov+Nest_in_veg	5	973.9238	8.528174	0.0019
18	year+wrack_cov+shell_cov	5	974.1479	8.752291	0.0017
8	shell_cov+elev+Nest_in_veg	6	974.498	9.102378	0.0015
12	year+wrack_cov+shell_cov+Nest_in_veg	6	975.4267	10.03104	0.0009

Model	npar	AIC_c	delta	weight
Year+Elevation+Open	5	965.3956	0	0.1382
Year+ Wrack+Open	5	965.9603	0.564668	0.1042
Year+Wrack+ Elevation+Open	6	966.2225	0.826862	0.0914
Year+Open	4	966.2664	0.870721	0.0894
Year+Shell+Elevation+Open	6	967.0729	1.677288	0.0598
Year+Wrack+Nest in Veg+Open	6	967.2303	1.83462	0.0552
Year+ Wrack+Shell+Open	6	967.2483	1.852695	0.0547

IMPORTANCE WIEGHTS	
Open	0.907
Elevation	0.5461
Wrack	0.4839
Shell	0.3268
Nest in Veg	0.3144

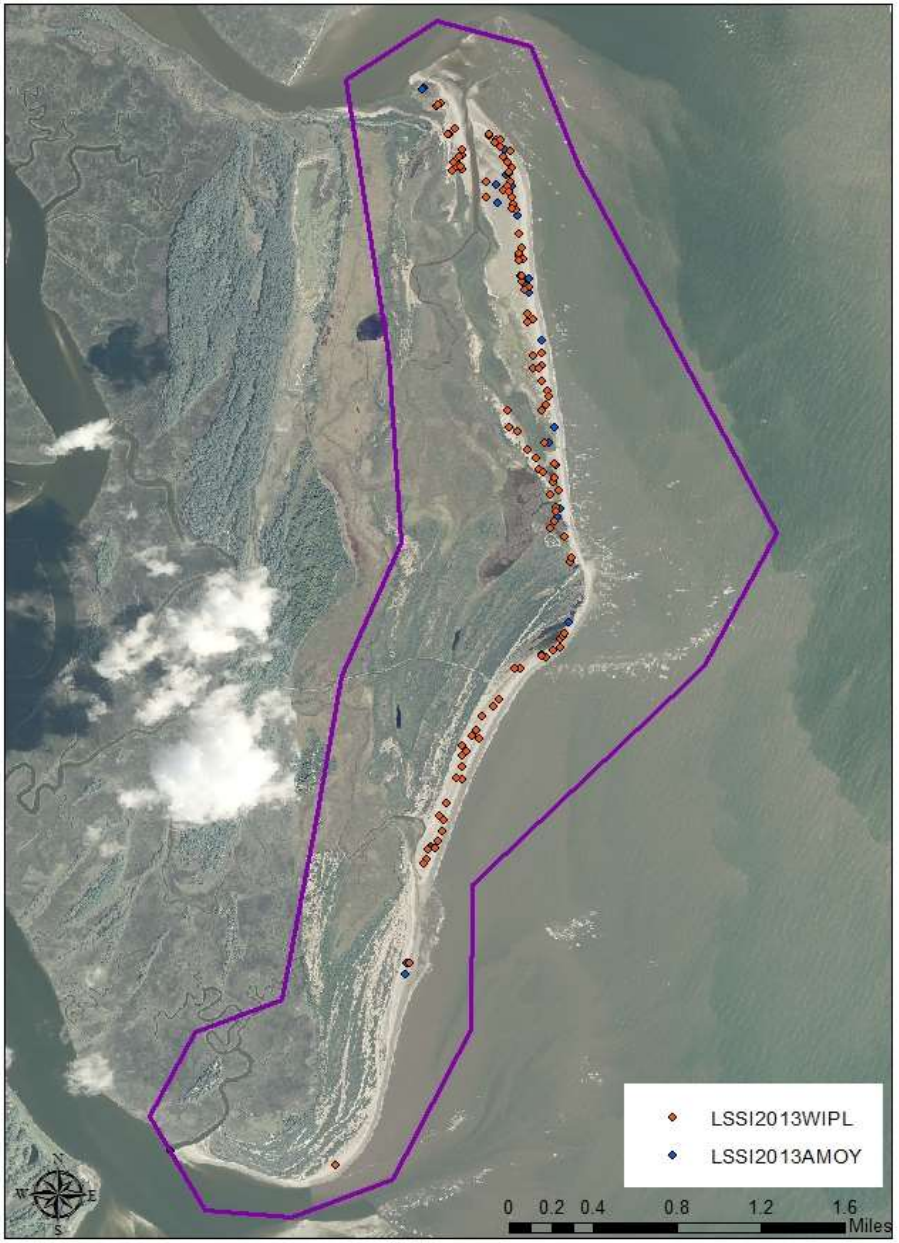
AIC Results for AMOY

	model	npar	AIC_c	delta	wt
32	year	3	173.739	0	0.1519
31	year+Nest_in_veg	4	174.8737	1.134711	0.0861
28	ye				
30	ye				
21	ye				
29	ye				
27	ye				
24	ye				
22	ye				
26	ye				
19	ye				
18	ye				
25	ye				
17	ye				
23	ye				
9	ye				
11	year+wrack_cov+shell_cov+open	6	177.5646	3.825639	0.0224
10	year+shell_cov+open+Nest_in_veg	6	177.5702	3.831227	0.0224
20	year+wrack_cov+elev	5	177.9814	4.242448	0.0182
12	year+wrack_cov+shell_cov+Nest_in_veg	6	178.4686	4.729648	0.0143
8	shell_cov+elev+Nest_in_veg	6	178.657	4.918012	0.013
14	year+wrack_cov+elev+Nest_in_veg	6	179.0458	5.306808	0.0107
7	year+elev+open+Nest_in_veg	6	179.0651	5.32616	0.0106
15	year+wrack_cov+open+Nest_in_veg	6	179.0778	5.338857	0.0105
13	year+wrack_cov+shell_cov+elev	6	179.2678	5.52881	0.0096
16	year+wrack_cov+elev+open	6	179.4979	5.758933	0.0085
6	year+shell_cov+elev+open+Nest_in_veg	7	179.6937	5.954767	0.0077
3	year+wrack_cov+shell_cov+elev+open	7	179.7065	5.967519	0.0077
2	year+wrack_cov+shell_cov+open+Nest_in_veg	7	179.7643	6.025366	0.0075
5	year+wrack_cov+shell_cov+elev+Nest_in_veg	7	180.5947	6.855751	0.0049
4	year+wrack_cov+elev+open+Nest_in_veg	7	181.2277	7.488748	0.0036
1	year+wrack_cov+shell_cov+elev+open+Nest_in_veg	8	181.9231	8.184091	0.0025

Model	npar	AIC_c	delta	weight
Year	3	173.73	0	0.15
Year + Nest in Veg	4	174.87	1.13	0.09
Year + Shell	4	174.98	1.24	0.08
Year + Open	4	175.22	1.48	0.07
Year + Shell +Open	5	175.40	1.67	0.07

Null Model

Landscape Scale Modeling



Landscape Scale Nests: Location

Confidence Models (90%)	K	AICc	Δ AICc	Weight
Mix				
Mix (glo				
Ele				

Model-Averaged coefficients from Confidence Set

Variable	Estimate	Lower Confidence	Upper Confidence
(Intercept)	-1.153	-1.586	-0.720
Mixed Landcover *	0.568	0.172	0.964
Elevation*	0.272	0.173	0.370
Topography*	-1.876	-2.471	-1.280
Edge	-0.000	-0.002	0.00

Landscape Scale Nests: Success

Model-Averaged coefficients from Confidence Set

Variable	Estimate	Lower Confidence	Upper Confidence
(Intercept)	-1.937	-3.591	-0.283
Mixed Landcover *	0.066	0.831	0.962
Elevation	0.275	-0.00	0.551
Topography	0.974	-0.642	2.59
Edge	0.002	-0.000	0.005

Topography	2	178.49	2.68	0.04
Edge + Mixed Landcover + Topography	4	178.56	2.75	0.04
Elevation + Topography	2	178.75	2.94	0.04

Preliminary Summary

	Microhabitat		**Landscape**	
	Location	Success	Location	Success
AMOY	wrack(+), open sand (-)	other scales? Covariates?	mixed landcover (+), elevation (+), topography (-)	mixed landcover (+)
WIPL	vegetation (+), wrack (+), open sand (-)	elevation (+), open(-)		

Summary

- Overwash and predation are leading causes of nest failure
- Some factors influencing location not important to success
- WIPL nest locations compared to AMOY
- Scale may have different influence on AMOY and WIPL

Next Steps

- Analyze nest site data for second study site
- Investigate macro & landscape characteristics
  - Community mapping?
- Create fledgling survival estimates and determine correlation to nest site
- Compare nest site features between species

Acknowledgements

Photo: Brad Winn

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Questions?