

AMERICAN OYSTERCATCHER (*Haematopus palliatus*) MONITORING AT
CAPE LOOKOUT NATIONAL SEASHORE

2015 SUMMARY REPORT



American Oystercatcher dark green (JA), banded as a chick in 2010, returned to nest at Cape Point in 2015. NPS Photo 2015.

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Abstract

There were 66 American Oystercatcher pairs nesting throughout the ocean beach habitat of the seashore in 2015. North Core Banks had 29 pairs, South Core Banks had 30 pairs, and Shackleford Banks had 7 pairs. Egg-laying was initiated on April 13th and a total of 112 nests were documented. Fifty chicks fledged: 28 from South Core Banks, 17 from North Core Banks, and 5 from Shackleford Banks. There was variation in fledge success among islands. South Core Banks was the most productive with a fledge success rate of 0.93, Shackleford Banks' fledge success was 0.71, and North Core Banks' was at 0.59. Overall for the entire seashore, the fledge success rate was 0.76 fledglings per nesting pair.

Introduction

American Oystercatchers are common nesters throughout the park, primarily on the ocean beach. They have been listed since 2008 as a North Carolina Special Concern species by the North Carolina Wildlife Resource Commission (2014). Their choice of nesting habitat makes them particularly vulnerable to disturbance by park visitors and off-road vehicles.

Monitoring American Oystercatcher nesting at Cape Lookout National Seashore (CALO) began in 1995. A researcher from Duke University studied nesting on South Core Banks and found low reproductive success (Novick 1996). The research documented chick mortality caused by off-road vehicles. Researchers from North Carolina State University (NCSU) and park staff have also recorded vehicle traffic chick mortality (Schulte and Simons 2015). Since 1997 NCSU and park staff has conducted censuses, monitored nesting success, and banded oystercatchers primarily on the core banks of the seashore. Data in this summary report are presented from the last twelve breeding seasons when all of the seashore was monitored regularly, 2004 to 2015.

Site Description

Cape Lookout National Seashore is located in the southern Outer Banks of North Carolina between Ocracoke and Beaufort Inlets. The seashore was physically divided into four barrier islands at the beginning of the 2015 breeding season. The northernmost island, North Core Banks (NCB), is 18 miles long, extending from Ocracoke Inlet to Old Drum Inlet. Middle Core Banks (MCB) extends from Old Drum Inlet to Ophelia Inlet at four miles in length. During the 2015 breeding season Old Drum Inlet shoaled, however the MCB section remained closed to off-road vehicles (ORVs) for the duration of the breeding season. For reporting purposes MCB is treated as part of NCB, representing breeding pairs from Ocracoke Inlet to Ophelia Inlet, mile 0 to mile 22.7. South Core Banks (SCB) extends southward from Ophelia Inlet almost 24 miles to Barden Inlet. The Core Banks have a northeast to southwest orientation and exhibit a low profile landscape. The fourth island, Shackleford Banks (SB), is 9 miles long and has an east-west orientation with a higher dune system and larger areas of vegetation. All islands in the park are subject to constant and dramatic change by the actions of wind and waves.

Methods

The Interim Protected Species Management Plan/ Environmental Assessment (IPSMP/EA) contains management guidelines and monitoring protocols (National Park Service 2006). Park staff conducted surveys of Shackleford Banks nesting birds twice a week beginning in April. Weekly surveys of nesting habitat on North and South Core Banks also began in April and breeding monitoring continued seven days per week until the end of the nesting season.

In 2015, researchers from North Carolina State University conducted an experiment at Cape Lookout National Seashore and Cape Hatteras National Seashore to determine if and to what degree nesting American Oystercatchers might respond to off-road vehicles on the beach. This research project involved closing small portions of the ocean beach to vehicles and pedestrians to monitor American oystercatcher incubation behavior in response to controlled vehicle disturbance events. Cameras and heart rate monitors were used to document any responses by incubating oystercatchers. The aim of this project was to assess management strategies for American Oystercatchers.

Management actions for oystercatchers included closing the area around a nest with “Bird Sanctuary” signs if the nest was in danger of being run over by off-road vehicles or stepped on by pedestrians. Generally, nests found in the dunes were not posted. There is some concern that predators might learn to associate posts with nests. Small posted areas may also unnecessarily attract curious park visitors and cause disturbance.

In addition to the closure around the nest, a 600-foot buffer was established around each nest to reduce disturbance. McGowan and Simons (2006) found evidence that human recreational disturbance can alter incubation behavior. This buffer allowed vehicle and pedestrian traffic to pass by on the lower beach by the ocean shoreline, but prevented stopping, parking, or camping near the nest that could reduce nest attendance by parents. The buffer zone was defined by two sets of 18” X 18” yellow signs placed on each side of a nest.

The locations of the nests were recorded using a GPS unit and the park’s mile marker system. Nest locations were marked inconspicuously with either a stake or objects like sticks or shells to facilitate follow-up checks. Information about the habitat type was also noted. If one or both adults were banded, that information was recorded on the nest data sheet.

Nests were checked regularly, every 1 to 3 days, to monitor the status of incubation and document losses. One day before the expected time of hatch, the ocean beach in that area was closed to vehicles with traffic routed to the backroad, a sand trail behind the primary dunes. In areas where there is no backroad, signs were placed on the beach warning of the presence of flightless chicks and reducing the speed limit to 15mph. Chicks were monitored daily until they fledged or were lost. Since 2010, chicks are considered fledged at 35 days old for range wide

productivity records. The range wide standard was established by the American Oystercatcher Working Group. For seashore management purposes, the chicks are considered fledged when strong flight is actually observed.

Results

Sixty-six pairs of American Oystercatchers nested at CALO (Table 1). Counts were for pairs on or near the ocean beach and did not include marsh islands.

Table 1. American Oystercatcher Nesting Pairs- 2015.

North Core Banks	29 pairs
South Core Banks	30 pairs
Shackleford Banks	7 pairs

Nesting pairs were spread throughout most of the ocean beach habitat in the park (Figures 1 & 2). The birds did not use areas adjacent to buildings and concentrations of people. The Middle Core Banks section is considered part of the North Core Banks for reporting purposes, mile 0 to mile 22.7

Hatch and Fledge Success

Throughout the seashore, 112 nests were found, 37 of which hatched at least one egg. Fifty chicks were known to survive 35 days to fledge (Table 2). Of the nests that failed, 30 nests failed due to unknown causes, 41 were lost to predation, and four were abandoned (Table 3). Raccoon (19), coyote (5), ghost crab (3), and crow (2) were found to be predators of oystercatcher eggs. There were 12 nests predated by undetermined predators. NCSU study nest cameras confirmed nest failures due to raccoon predation (5), crow predation (2), coyote predation (2), and abandonment (2). There were no documented instances of nest failure due to human disturbance or weather events. Table 4 summarizes the reproductive success over the last 12 years of standardized monitoring. The fledgling success is calculated using the known nesting pairs. This allowed for cross-year comparisons with variable monitoring efforts and other unknowns. Chart 1 illustrates the reproductive success over the last 12 years and shows the upward trending fledge success. In 2015, sixty-six known nesting pairs produced fifty fledglings for a fledge success rate of 0.76. Individual nest data are found in Appendix 1. Tables 5, 6, 7, and 8 summarize the reproductive success by island with known and comparable data.

Table 2. Oystercatcher Nesting by Island 2015.

Island	#pairs	#Nests	#Nests Hatched	#Chicks Fledged
North Core Banks	29	49	13 (27%)	17
South Core Banks	30	54	20 (37%)	28
Shackleford Banks	7	9	4 (44%)	5
CALO Total	66	112	37 (33%)	50

Table 3. 2015 Causes of Nest Failure.

Island	Predation	Flooding/ Storms	Human Disturbance	Abandoned	Unknown
North Core Banks	18	0	0	2	16
South Core Banks	22	0	0	2	10
Shackleford Banks	1	0	0	0	4
CALO total	41	0	0	4	30

Table 4. Summary of Seashore Oystercatcher Reproductive Success Data, 2004-2015.

Year	Island	#Nests	#Nests Hatched	#Pairs (nesting)	#Chicks fledged
2004	Cape Lookout N.S.	71	38 (54%)	52	45 (0.86)
2005	Cape Lookout N.S.	66	26 (39%)	54	18 (0.33)
2006	Cape Lookout N.S.	70	23 (33%)	52	26 (0.50)
2007	Cape Lookout N.S.	99	21(21%)	61	31 (0.51)
2008	Cape Lookout N.S.	91	17 (19%)	57	15 (0.26)
2009	Cape Lookout N.S.	83	20(24%)	61	21 (0.34)
2010	Cape Lookout N.S.	113	28 (25%)	62	34 (0.55)
2011	Cape Lookout N.S.	114	29 (25%)	62	37 (0.60)
2012	Cape Lookout N.S.	99	31 (31%)	58	42 (0.72)
2013	Cape Lookout N.S.	104	32 (31%)	63	25 (0.40)
2014	Cape Lookout N.S.	87	39 (37%)	65	40 (0.62)
2015	Cape Lookout N.S.	112	37 (33%)	66	50 (0.76)

Chart 1. The Number of Seashore Oystercatcher Nesting Pairs and Chicks Fledged by Year with Simple Linear Regression Lines, 2004 to 2015.

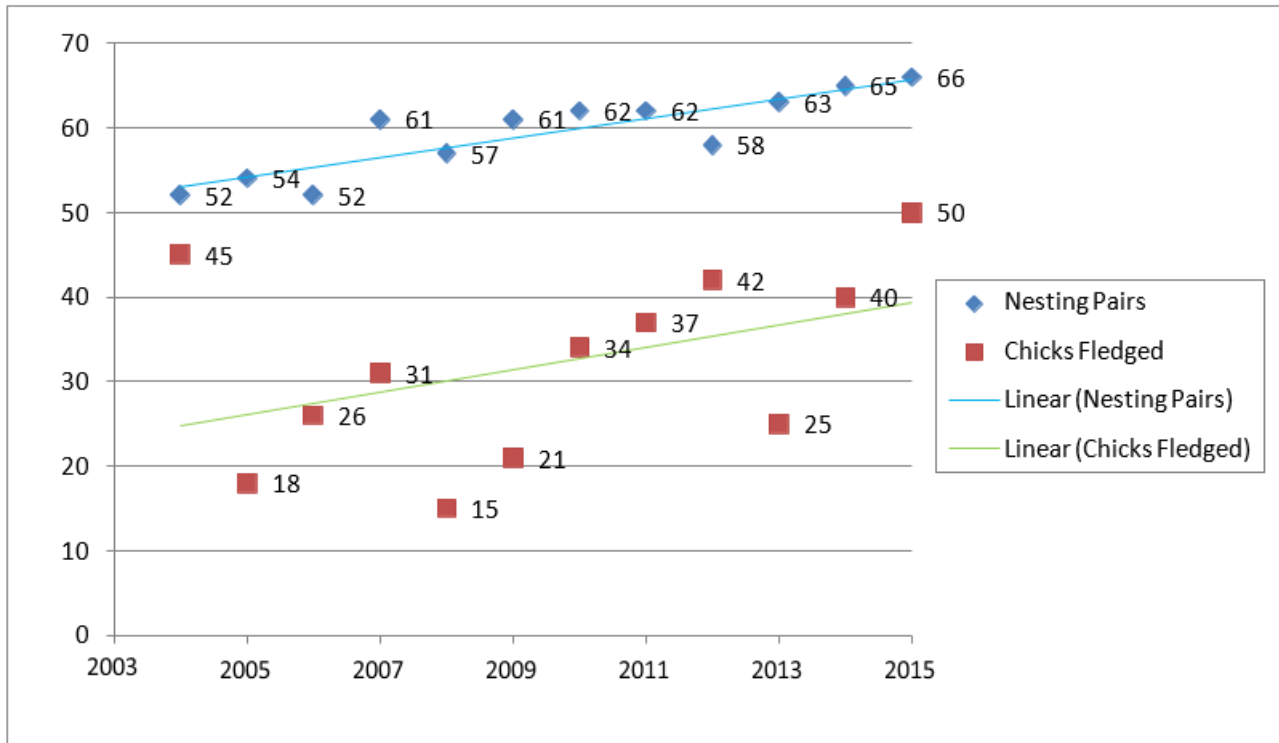


Table 5. Summary of North Core Banks, Ocracoke Inlet Mile 0 to Ophelia Inlet mile 22.7 Oystercatcher Reproductive Success Data, 2004-2015.

Year	Island	#Nests	#Nests Hatched	#Pairs (nesting)	#Chicks fledged
2004	North Core Banks	30	24 (80%)	26	38 (1.46)
2005	North Core Banks	29	16 (64%)	23	15 (0.65)
2006	North Core Banks	28	16 (57%)	24	15 (0.62)
2007	North Core Banks	46	17 (37%)	30	27 (0.90)
2008	North Core Banks	30	9 (30%)	22	10 (0.45)
2009	North Core Banks	40	7 (18%)	29	8 (0.28)
2010	North Core Banks	58	15 (26%)	31	15 (0.48)
2011	North Core Banks	54	18 (33%)	32	24 (0.75)
2012	North Core Banks	45	16 (36%)	28	26 (0.93)
2013	North Core Banks	50	12 (24%)	30	13 (0.43)
2014	North Core Banks	44	11 (25%)	31	10 (0.32)
2015	North Core Banks	49	13 (27%)	29	17 (0.59)

Table 6. Summary of Middle Core Bank Section of NCB, Old Drum Inlet Mile 18.85 to Mile 22.7 Ophelia Inlet, Oystercatcher Reproductive Success Data from 2004 to 2015.

Year	Island	#Nests	#Nests Hatched	#Pairs (nesting)	#Chicks fledged
2004	Middle Core Banks	5	4 (80%)	5	7 (1.40)
2005	Middle Core Banks	9	5 (55%)	7	9 (1.28)
2006	Middle Core Banks	10	8 (80%)	10	10 (1.00)
2007	Middle Core Banks	14	9 (64%)	13	13 (1.00)
2008	Middle Core Banks	8	5 (62%)	8	7 (0.88)
2009	Middle Core Banks	13	3 (23%)	10	1 (0.10)
2010	Middle Core Banks	24	4 (17%)	13	2 (0.15)
2011	Middle Core Banks	23	8 (35%)	14	12 (0.86)
2012	Middle Core Banks	19	7 (37%)	13	12 (0.92)
2013	Middle Core Banks	17	7 (39%)	13	9 (0.69)
2014	Middle Core Banks	18	4 (22%)	13	5 (0.38)
2015	Middle Core Banks	24	2 (8%)	13	1 (0.08)

Table 7. Summary of South Core Banks Oystercatcher Reproductive Success Data from 2004 to 2015.

Year	Island	#Nests	#Nests Hatched	#Pairs (nesting)	#Chicks fledged
2004	South Core Banks	33	13 (39%)	20	6 (0.30)
2005	South Core Banks	27	9 (33%)	22	3 (0.14)
2006	South Core Banks	31	6(19%)	19	10 (0.53)
2007	South Core Banks	41	4(21%)	21	4 (0.19)
2008	South Core Banks	44	5 (11%)	24	5 (0.21)
2009	South Core Banks	30	11(37%)	22	11 (0.50)
2010	South Core Banks	43	11 (25%)	23	17 (0.74)
2011	South Core Banks	51	9 (18%)	24*	12 (0.50)
2012	South Core Banks	41	15 (36%)	22	16 (0.73)
2013	South Core Banks	46	19 (41%)	27	12 (0.44)
2014	South Core Banks	35	23 (66%)	27	26 (0.96)
2015	South Core Banks	54	20 (37%)	30	28 (0.93)

*Shackleford and South Core shared a nesting pair

Table 8. Summary of Shackleford Banks Oystercatcher Reproductive Success Data from 2004 to 2015.

Year	Island	#Nests	#Nests Hatched	# Pairs (nesting)	#Chicks fledged
2004	Shackleford Banks	8	1 (12%)	6	1 (0.17)
2005	Shackleford Banks	10	1 (10%)	9	0 (0.00)
2006	Shackleford Banks	11	1 (9%)	9	1 (0.11)
2007	Shackleford Banks	12	0 (0%)	10	0 (0.00)
2008	Shackleford Banks	17	3 (18%)	11	0 (0.00)
2009	Shackleford Banks	13	2 (15%)	10	2 (0.20)
2010	Shackleford Banks	12	2 (17%)	8	2 (0.25)
2011	Shackleford Banks	9	2 (22%)	7*	1 (0.14)
2012	Shackleford Banks	13	0 (0%)	8	0 (0.00)
2013	Shackleford Banks	8	1 (12%)	6	0 (0.00)
2014	Shackleford Banks	8	4 (50%)	7	4 (0.57)
2015	Shackleford Banks	9	4 (44%)	7	5 (0.71)

*Shackleford and South Core shared a nesting pair

Banding

Forty-three chicks were captured and banded along the seashore by NCSU staff and park staff working under a NCSU banding permit. Eight chicks fledged without bands mainly due to inaccessibility of soundside foraging sites on SB and NCB. Park staff recorded band re-sights of individuals and nesting pairs in the seashore throughout the summer. Of the 66 nesting pairs, 48 pairs (73%) had at least one individual of the pair banded, while 15 pairs (23%) were unbanded and three pairs (4%) were undetermined. NCB had 22 pairs banded and seven pairs unbanded. SCB had 25 pairs banded and five pairs unbanded. SB had one pair banded, three unbanded pairs, and three unknown pairs that were not identified. There were 65 (50%) individual adults that are banded, 60 (46%) individuals that are unbanded, and 5 unknown individuals in the nesting population in 2015. See appendix 1 for nesting pair re-sight data and 2015 chick band data. Round bands with three letter codes in a triangle configuration were used this year on all birds. There was no chick mortality due to banding efforts. Details on oystercatcher band combinations can be found at the website: <http://www.amoywg.org/banding-re-sighting/>.

Discussion

Hatch success rates were 27% on North Core Banks, 37% on South Core Banks and 44% on Shackleford Banks. Predators (41) and abandonment (4) were the known causes of nest losses. There were 30 unknown nest losses, 16 on NCB, 10 on SCB, and 4 on SB. On NCB, raccoon (14) predation was the prominent cause of nest loss. There were also two cases of ghost crab predation and two cases of abandonment. One nest (number 46) was suspected to be abandoned due to a non-viable egg (never hatched after 40 days of incubation). A second nest (number 11) was thought to be abandoned after one adult was predated by a peregrine falcon. There was a high discrepancy in hatch success for NCB (mile 0-18.85) and MCB (mile 18.85-22.7). While NCB (excluding data from MCB section) hatched 11 out of 25 nests (44%), the MCB section only hatched 2 out of 24 nests (8%). It is unclear why hatch success has decreased so sharply on MCB since previous years showed the highest hatch rates in the seashore. Coyote (5) and raccoon (5) predation were the leading causes of nest loss on SCB. Coyote, raccoon, and crow predation were all confirmed by NCSU study cameras on SCB. Two instances of nest abandonment were also recorded. Evidence of fox and coyote activity has been suspected to have played a role in low productivity on SB in past years. There was no coyote or fox predation documented on SB in 2015 and hatch success was the highest across the seashore at 44%. There was no indication of human disturbance or weather events as a cause of nest loss in 2015.

Fledge success in the park was 0.76 chicks per nesting pair. The overall fledge success across the seashore was the second highest in the past 12 years, surpassed only by 2004 which had a fledge success of 0.86. The high fledge success in 2004 was a response to Hurricane Isabel in 2003 positively modified the nesting habitat and reduced predator abundance on NCB. The 2015 season produced the largest number of fledglings in the last 12 years. The seashore also attracted the highest number of oystercatcher pairs on record. Both the number of pairs and productivity is trending upward. SB showed the highest fledge success in the last 12 years at 0.71. Out of 13 nests that hatched on NCB, 10 fledged chicks (77%). When excluding data from MCB, the NCB section (mile 0-18.85) produced 16 fledglings from 16 pairs, resulting in a fledge success of 1. Conversely, on the MCB section (mile 18.85-22.7) productivity declined to just 1 fledgling from 13 pairs, resulting in a low fledge success of 0.08. Nest failure was problematic on the MCB section with the lowest hatch success in 12 years, hatching only 2 of 24 nests (8%). Predation appears to have increased on all beach nesting birds on MCB in the last four years. However MCB still shows the highest concentration of oystercatcher pairs along the seashore at 3.4 pairs per mile, while NCB (mile 0-18.85), SCB, and SB have approximately 1 pair per mile. Although MCB may continue to attract more breeding pairs than other islands, productivity (0.08) was the lowest of all four islands in the seashore. Out of 20 nests that hatched on SCB, 13 fledged chicks (65%). SCB produced the most fledglings (28) in the past 12 years. Seven broods were lost after hatching on SCB. Though the causes of these chick failures are unknown

the presence of a canine predator on SCB is suspect since there are documented coyote nest predations.

A range-wide productivity standard was established in 2010 by the American Oystercatcher Working Group defining fledging at 35 days old. This standard provides consistency throughout the nesting range. A total of 50 chicks reached 35 days old and were considered fledged: this is reflected in the seashore-wide 0.76 productivity rate. However, most chicks cannot actually fly at day 35. The average age of chicks fledging in 2015 from 17 broods was 44 days from the hatch date. This calculation excludes 9 broods with unknown exact fledge dates. The range of fledging age, determined from the 17 broods, was from 40 to 53 days (Appendix 1). Chicks are monitored and managed until they exhibited strong flight greater than 150 feet. In 2015 three chicks were known to survive to day 35 but were not observed to fledge. There was no known chick loss to motor vehicles this year.

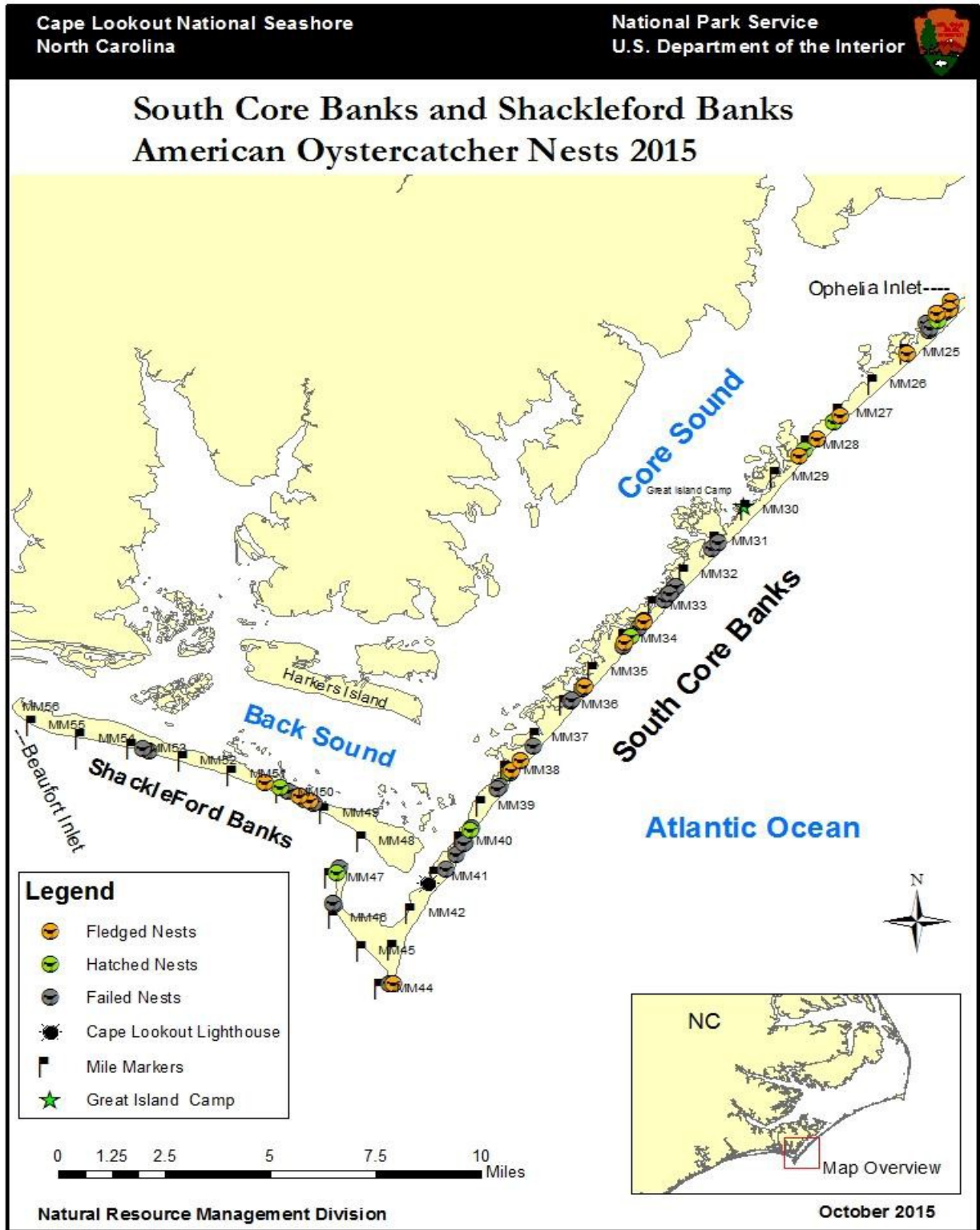
Nesting pairs increased from 65 pairs in 2014 to 66 pairs in 2015. This change can be explained with the addition of new pairs and/or marked individuals. There were fifteen new birds identified by their unique leg bands. Dark Green CM, CCE, TX, TL, T3, XX, PW, MC, JH, CEF, WP, WK, KR, JA, and Red 5F were all new nesters along the shoreline. Red 2L and Red 4L, NCB nesters from previous years, were re-sighted exhibiting breeding behavior with their mates on territory throughout the breeding season. However, nests were never found and they were not counted as breeding pairs for this season. The long term banding and monitoring program at the seashore can also tell us about the nesting population dynamics, such as pairs that persist and produce fledglings over the years. Dark green 16 has been nesting at Cape Point on SCB every year since 2003 when it was first tagged and has produced seven fledglings. Dark Green TX, TL, T3, JH, CEF, KR, and JA all fledged from Cape Lookout in 2010-2011 and have since established their own breeding territories along the seashore. Dark Green CM, CCE, XX, PW, MC, WP, and WK were all banded as chicks from 2009-2011 in areas adjacent to Cape Lookout. Red 5F was banded as a chick in 2011 in Georgia.

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Figure 1.

Figure 2.



APPENDIX 1A AMERICAN OYSTERCATCHER NESTS- NORTH CORE BANKS-2015

Nest #	Pair #	Adult Bands	Mile	Location	Found	Eggs	Closure	Comments (Abbreviated)
01	01	LL-blue, UNB	20.50	upper beach	4/15/2015	3	no	Nest failed 04/20 - cause unknown
02	02	UNB, UNB	20.04	upper beach	4/17/2015	3	no	Nest failed 04/29- raccoon predation; yoke in nest cup and raccoon tracks at nest
03	03	DG(CER); DG(UT)	18.65	shellflat	4/18/2015	2	interior	Nest failed 04/22 - cause unknown
04	04	DG(73), UNB	9.52	shell bed on upper beach	4/18/2015	3	600' buffer	Fledged 3 chicks banded on 6/15, DG (CM6), DG (CM7), DG (CM8). Fledged at 44 days.
05	05	DG(T6); DG(CE1)	10.63	base of dunes	4/18/2015	3	600' buffer	Fledged 2 chicks banded on 6/15, DG (CPF), DG (CNN). Fledged on day 43
06	06	UNB, UNB	8.61	base of dunes	4/19/2015	3	600' buffer	Fledged 3 chicks banded on 6/15, DG (CM3), DG (CM4), DG (CM5). Fledged at 40 days.
07	07	UNB, UNB	19.86	shellbed in-between dunes	4/20/2015	3	no	Nest failed 04/20 - raccoon predation; raccoon tracks at nest
08	08	DG(E0), UNB	14.22	base of dune	4/23/2015	3	600' buffer	Nest failed 05/02 - abandoned; 04/25 UNB found dead on beach in front of nest; suspected Peregrine falcon predation, believe UNB to be other adult to this pair. Nest not maintained after 4/30
09	09	UNB, UNB	6.81	shellbed	4/23/2015	2	600' buffer	Fledged 2 chicks banded on 6/15. DG (CM0) fledged by 7/3 at day 46. DG (CNA) last seen on 6/23 at day 38.
10	10	DG(CE), UNB	17.74	upper beach	4/24/2015	3	600' buffer	Fledged 1 chick banded on 6/22, DG (CPJ). Fledged by day 40.
11	11	DG(R2), UNK	19.40	shellflat	4/25/2015	3	interior	Nest failed 05/02 - abandoned; 04/25 UNB found dead on beach in front of nest, suspected Peregrine falcon predation, believe UNB to be other adult to this pair. Nest not maintained after 4/30
12	12	DG(AN), UNB	22.60	shellbed	4/25/2015	3	interior	Nest failed 05/25 - cause unknown. Possible hatch, eggs pipping 5/21 but chicks never seen
13	13	UR-red, UNB	13.04	top of dune	4/26/2015	3	600' buffer	Nest failed 05/02 - cause unknown
14	14	DG(M0), DG(WF)	19.28	shellbed	4/27/2015	3	interior	Nest failed 05/08- cause unknown
15	15	DG(CCE), UNB	7.62	shellbed on upper beach	4/28/2015	3	600' buffer	Nest failed 05/05 - raccoon predation; raccoon tracks and eggshells at nest
16	16	DG(W5), UNB	14.08	upper beach	4/28/2015	3	600' buffer	Nest failed 05/01 - cause unknown
17	17	DG(M8), UNB	19.59	shellbed	4/29/2015	3	interior	Nest failed 05/08 - cause unknown
18	18	DG(P5), UNB	22.53	shellflat	4/29/2015	3	interior	Nest failed 05/21 - predation; eggshells at nest cup, unknown predator

19	01	LL-blue, UNB	20.58	upper beach	5/2/2015	3	no	Nest failed 05/17 - cause unknown
20	19	DG(TX), UNB	21.53	shellbed inside wash	5/2/2015	3	no	Nest failed 05/18 - crab predation; ghost crab hole at nest
21	20	DG(CFX), DG(CY)	4.45	upper beach	5/5/2015	3	600' buffer	Nest failed 05/30 - raccoon predation; raccoon tracks at nest
22	03	DG(CER), DG(UT)	18.55	shellflat	5/5/2015	3	interior	Fledged 2 chicks, not banded. Fledged by day 49. 1 unhatched egg
23	21	DG(F3), DG(CM)	5.21	upper beach at base of dune	5/8/2015	3	600' buffer	Fledged 1 chick banded on 7/1, DG (CNH). Fledged by day 47. 5/8 1 egg found 200 ft. south of nest covered in fire ants
24	22	UNB, UNB	1.13	on top of dunelet	5/8/2015	3	600' buffer	Brood failed 6/06- cause unknown. Chick tracks seen near nest on 6/5, no sign of chicks after
25	23	DG(TL), DG(T3)	10.32	shellbed in wash	5/9/2015	2	600' buffer	Fledged 1 chick banded 7/1, DG (CNT). Fledged by day 45. DG (CNR) banded on 7/1 and last seen 7/9 on day 34. Chick band DG(CNR) found near nest site on 09/04
26	24	UNB, UNB	0.27	on top of dunlet	5/9/2015	2	600' buffer	Nest failed 05/17 - raccoon predation; raccoon tracks at nest
27	25	DG(CE3), UNB	6.41	shellbed	5/9/2015	3	600' buffer	Brood failed 6/9 - unknown cause. Chicks last seen 6/7. 1 unhatched egg
28	08	DG(E0), UNB	14.24	upper beach	5/11/2015	3	600' buffer	Nest failed 5/18 - raccoon predation; raccoon tracks at nest
29	26	DG(TN), UNB	18.88	shellbed	5/12/2015	2	interior	Nest failed 05/21 - cause unknown
30	13	UR-red, UNB	11.40	shellbed in wash	5/12/2015	3	600' buffer	Fledged 1 chick banded on 7/11, DG (CUP). Fledged on day 40.
31	16	DG(W5), UNB	14.03	base of dune	5/13/2015	3	600' buffer	Nest failed 05/25 - raccoon predation; raccoon tracks at nest
32	15	DG(CCE), UNB	7.50	shellbed near backroad	5/17/2015	1	600' buffer	Nest failed 05/18 - raccoon predation; raccoon tracks and eggshells at nest
33	27	DG (M0), DG (R2)	19.45	shellbed in wash	5/18/2015	1	interior	Nest failed 05/21- cause unknown
34	17	DG(M8), UNB	19.63	upper beach	5/25/2015	3	interior	Nest failed 06/02 - raccoon predation; raccoon tracks at nest
35	02	UNB, UNB	20.08	upper beach	5/28/2015	3	MCB	Nest failed 06/18 - raccoon predation; raccoon tracks at nest
36	08	DG(E0), UNB	14.37	base of dunes	5/30/2015	3	600' buffer	Nest failed 06/15- raccoon predation; raccoon tracks and eggshells at nest
37	19	DG(TX), UNB	21.29	shellflat	6/2/2015	2	MCB	Nest failed 06/20 - cause unknown
38	01	LL-blue, UNB	20.44	upper beach	6/2/2015	3	MCB	Nest failed 06/06 - cause unknown
39	26	DG(TN), UNB	19.10	shellflat	6/2/2015	2	interior	Nest failed 06/16 - raccoon predation, raccoon tracks at nest
40	27	DG(M0),DG(R2)	19.35	shellflat	6/4/2015	2	interior	Nest failed 06/18 - ghost crab predation; ghost crab hole at nest

41	18	DG(P5), UNB	22.47	shellflat	6/4/2015	3	interior	Brood failed 7/25 - unknown cause. Chicks last seen 7/18
42	28	DG(TF), UNB	21.79	shellflat	6/4/2015	2	no	Fledged 1 chick banded on 7/28, DG (CR1). Chick and adults last seen on territory 7/31, chick at day 37. One band DG (CR1) found on territory 8/5
43	24	UNB, UNB	0.24	on top of dunlet	6/5/2015	2	600' buffer	Nest failed 06/28 - cause unknown
44	16	DG(W5), UNB	13.81	base of dunes	6/6/2015	2	600' buffer	Nest failed 06/13 - raccoon predation; raccoon tracks at nest
45	29	UNB, UNB	18.88	shellflat	6/8/2015	1	interior	Nest failed 06/14 - unknown cause
46	20	DG(CFX), DG(CY)	4.42	mid-beach	6/10/2015	1	600' buffer	Nest failed 7/10 - non-viable egg; adults incubation until 7/20 and then abandoned. Egg gone 8/3
47	07	UNB, UNB	19.80	upper beach	6/11/2015	1	no	Nest failed 06/18 - cause unknown
48	12	DG(AN), UNB	22.60	shellflat	6/14/2015	2	interior	Nest failed 06/29 - unknown predator; eggshell at nest
49	01	LL-blue, UNB	20.34	upper beach	6/14/2015	1	no	Nest failed 06/18 - cause unknown

29 nesting pairs, 49 nests, 13 nests hatched, 17 chicks fledged

APPENDIX 1B

AMERICAN OYSTERCATCHER NESTS- SOUTH CORE BANKS-2015

Nest #	Pair #	Adult Bands	Mile	Location	Found	Eggs	Closure	Comments (Abbreviated)
1	1	DG (R8), UL-Orange	38.08	upper beach	4/13/2015	3	600' Buffer	Brood failed 5/14 - suspected coyote predation. Chick last seen 5/13. NCSU STUDY NEST
2	2	DG (JC), DG (TC)	27.83	upper beach, shell bed	4/15/2015	3	600' Buffer	Fledged 2 chicks banded on 6/10/15 DG (CNK), DG (CNL). Fledged at day 44. NCSU STUDY NEST
3	3	DG (T8), UNB	32.71	upper beach	4/16/2015	3	600' Buffer	Nest failed 4/25 - abandoned (confirmed by video). NCSU STUDY NEST ramp 32-
4	4	DG (K0), UNB	32.55	upper beach, shell bed	4/16/2015	3	600' Buffer	Nest failed 5/2/15 - raccoon predation (confirmed by video). NCSU STUDY NEST
5	5	DG (TE), UNB	28.37	upper beach, shell bed	4/16/2015	3	600' Buffer	Fledged 3 chicks banded 6/12/2015. Fledged at day 44. NCSU STUDY NEST
6	6	DG (AR), DG(AP)	33.65	upper beach	4/19/2015	3	600' Buffer	Nest failed 5/14 - cause unknown
7	7	DG (AL), UNK	23.64	shell bed, in plover inlet closure	4/19/2015	4	interior	Nest failed 5/11 - cause unknown
8	8	DG (33), DG (LN)	25.07	in shell bed near back road	4/19/2015	3	600' Buffer	Fledged 3 chicks banded on 5/18, DG (CNU), DG (CPC), DG (CNC). Fledged at day 44
9	9	DG (PW), DG (L2)	39.69	on dune	4/20/2015	3	600' Buffer	Brood failed 5/20- Chick last seen 5/19. Nest hatched 1 egg on 5/19, no chicks or eggs on 5/20- suspected coyote predation. NCSU STUDY NEST
10	10	DG (J0), DG (M1)	35.55	behind low dunes	4/20/2015	3	600' Buffer	Nest failed 5/1 - unknown predator
11	11	UNB, UNB	31.07	sand flat/shell flat	4/20/2015	3	600' Buffer	Nest failed 5/1 - unknown predator
12	12	UNK, UNK	23.78	washover flat on north end	4/20/2015	2	interior	Nest failed 5/11 - unknown cause
13	13	UNB, UNB	23.50	washover flat at plover inlet	4/20/2015	3	interior	Fledged 3 chicks banded on 6/18, DG (CNW), DG (CNF), DG (CNM). 1 "day 35" chick last seen on 6/18 at day 40. 2 chicks fledged on 7/5 at day 47.
14	14	DG (CP), UNB	46.30	upper beach, base of dunes	4/20/2015	3	600' Buffer	Nest failed 5/19 - unknown predation, potential coyote predation
15	15	DG (RU), UNB	34.21	upper beach	4/21/2015	2	600' Buffer	Nest failed 5/1 - unknown predator
16	16	UNB, UNB	38.47	shell bed, upper beach	4/21/2015	3	600' Buffer	Nest failed 5/20 - coyote predation
17	17	DG (UL), UNB	43.84	open washover at south point	4/21/2015	3	interior	Fledged 2 chicks banded 6/23, DG (CPA), DG (CNP). 1 chick fledged on 6/28 at day 41, 1 chick fledged on 7/10 at day 53. 1 unhatched egg
18	18	DG (UP) DG	40.02	upper beach/ base	4/21/2015	3	600' Buffer	Nest failed 5/16 - crow predation (confirmed by video). NCSU STUDY NEST

		(UR)		of dune				
19	19	UNB, UNB	47.24	on dune in grass on sound side	4/22/2015	2	interior	Nest failed 5/20 - unknown cause; Potential hatch of 1 egg 5/18 but chick never seen
20	20	UNB, UNK	35.95	on dune in grass	4/23/2015	3	600' Buffer	Nest failed 5/9 - unknown predator
21	21	DG (NF), UNB	33.47	behind dunelet at base of dune	4/23/2015	3	600' Buffer	Nest failed 5/1 - unknown predator
22	22	UNK, UNK	24.28	soundside	4/27/2015	3	600' Buffer	Nest failed 5/6 - raccoon predation (confirmed by video). NCSU STUDY NEST (control).
23	23	UNB, UNK	37.27	base of dune	4/29/2015	3	600' Buffer	Nest failed 5/20 - coyote predation (confirmed by video) NCSU STUDY NEST.
24	24	R(5F), DG(JH)	40.79	shell bed at base of dunes	5/1/2015	2	600' Buffer	Nest failed 5/2/15 - unknown predator
25	25	DG(CF7), DG (UJ)	27.09	shell bed at base of dunes	5/2/2015	3	600' Buffer	Fledged 3 chicks banded on 6/29, DG (CPE), DG (CPH), DG (CPK). Fledged at day 43. NCSU STUDY NEST.
26	26	DG(CEF), UNB	27.31	shell bed in front of dune	5/3/2015	1	600' Buffer	Brood failed 6/29 - cause of chick loss unknown. Chick last seen 6/28. 1 unhatched egg. NCSU STUDY NEST. Nest continuation from one egg scrape to two egg scrape
27	27	UNK, UNK	24.35	near dunelets behind closure signs on ocean side	5/3/2015	3	interior	Nest failed 5/12 - ghost crab predation
28	3	DG(T8), UNB	32.88	shell bed at base of dunes	5/5/2015	3	600' Buffer	Nest failed 5/28 - raccoon predation (confirmed by video). 2 eggs depredated 5/18, last egg depredated 5/28. NCSU STUDY NEST
29	28	UNB, UNB	47.13	top of dune	5/5/2015	2	interior	Brood failed 6/20 - cause unknown. Chick last seen 6/16. NCSU STUDY NEST (control).
30	15	DG (RU), UNB	34.14	upper beach	5/11/2015	3	600' buffer	Fledged 3 chicks banded on 7/10, DG (CUK), DG (CUL), DG (CUM). Fledged at day 41
31	11	UNB, UNB	31.23	behind dunes	5/11/2015	3	600' buffer	Nest failed 5/15 - predation; suspected avian
32	21	DG (NF), UNB	33.48	shellbed at base of dune	5/12/2015	3	600' buffer	Fledged 3 chicks banded on 7/10, DG (CUF), DG (CUH), DG (CUJ). Fledged at day 41
33	4	DG (K0), UNB	32.42	shellbed	5/13/2015	1	600' buffer	Nest failed 5/15 - unknown cause
34	10	DG (M1), DG (J0)	35.46	base of dune	5/13/2015	3	600' buffer	Fledged 1 chick banded on 7/10, DG (CUN). 2 unhatched eggs. NCSU STUDY NEST
35	24	R(5F), DG(JH)	40.38	base of dune	5/13/2015	1	600' buffer	Nest failed 6/3 - coyote predation (confirmed with video). NCSU STUDY NEST.
36	22	UNK, UNB	24.07	washover shell flat	5/17/2015	2	interior	Nest failed 5/25 - unknown cause
37	29	DG (KR), UNB	28.20	upper beach	5/19/2015	2	600' buffer	Brood failed 6/19 - cause unknown. Chicks last seen 6/15. NCSU STUDY NEST

				shellbed				(control).
38	4	DG (K0), UNB	32.40	base of dunes	5/19/2015	2	600' buffer	Nest failed 6/11 - raccoon predation (confirmed by video). NCSU STUDY NEST.
39	7	DG (AL), DG (XX)	23.68	shellbed	5/20/2015	3	interior	Fledged 1 chick on day 45 (not banded)
40	30	DG (JA), DG (16)	43.85	sand flats	5/20/2015	2	interior	Nest failed 6/11 - coyote predation
41	20	UR-Red, UNB	35.90	on dunelet behind dunes	5/23/2015	3	600' buffer	Nest failed 6/4 - cause unknown
42	27	DG (WP), DG (WK)	24.31	shellbed	5/23/2015	2	600' buffer	Nest failed 5/27 - cause unknown
43	12	DG (MC), UNB	23.91	shellbed	5/25/2015	2	interior	Nest failed 5/28 - abandoned. Adults last seen incubating 5/27 (confirmed by video). NCSU STUDY NEST (control).
44	11	UNB, UNB	31.04	upper beach	5/25/2015	3	600' buffer	Nest failed 6/25 - cause unknown. Eggs seen pipping 6/23 but no chicks ever seen
45	1	DG (R8), UL-Orange	38.01	upper beach	5/25/2015	2	600' buffer	Fledged 1 chick banded on 7/27, DG (CR3). 1 unhatched egg. NCSU STUDY NEST
46	6	DG (AR), DG (AP)	33.94	base of dunes	5/27/2015	2	600' buffer	Brood failed 7/17 - cause unknown; Chicks last seen 7/16. NCSU STUDY NEST (control).
47	18	DG (UP), DG (UR)	40.05	base of dunes	5/30/2015	3	inside beach closure	Nest failed 6/18 - crow predation (confirmed by video). Video shows crow predated 1 egg 6/17, adults incubating, then crow returning 6/18 and predated 2 remaining. NCSU STUDY NEST.
48	16	UNB, UNB	38.55	base of dunes	6/1/2015	3	600' buffer	Nest failed 6/14 - coyote predation
49	14	DG (CP), UNB	46.37	middle beach	6/1/2015	2	600' buffer	Nest failed 6/13 - cause unknown
50	23	DG (J9), UNB	37.71	middle beach	6/2/2015	3	600' buffer	Fledged 2 chicks banded 7/30, DG (CRX), DG (CR2). Fledged on day 41. NCSU STUDY NEST
51	9	DG (PW), DG (L2)	39.64	base of dune	6/2/2015	2	600' buffer	Nest failed 7/3 - unknown predator. 1 egg lost on 6/19, nest moved 5' on 6/24. NCSU STUDY NEST. Nest continuation.
52	3	DG (T8), UNB	32.65	shellbed on upper beach	6/9/2015	2	Unknown	Nest failed 6/18 - raccoon predation (confirmed by Reconyx camera). NCSU STUDY NEST
53	22	DG (J3), UNB	23.80	shellbed in swash	6/9/2015	1	interior	Brood failed 7/16 - cause unknown. Chick last seen 7/13
54	12	DG (MC), UNB	23.90	behind dunes	6/14/2015	2	interior	Fledged 1 chick banded on 8/6, DG (CR4). Chick last resighted on 8/12 at day 36 (non ORV area)

30 nesting pairs, 54 nests, 20 nests hatched, 28 chicks fledged

APPENDIX 1C AMERICAN OYSTERCATCHER NESTS- SHACKLEFORD BANKS -2015

Nest #	Pair #	Adult Bands	Mile	Location	Found	Eggs	Closure	Comments (Abbreviated)
1	1	UNB, UNB	50.48	washover fan	4/24/2015	3	none	Fledged 2 chicks, last seen on 6/26, day 39. Day 35 fledges, chicks foraged on soundside
2	2	UNB, UNB	49.52	back of overwash	4/24/2015	2	none	Fledged 1 chick, last seen on 6/29, day 35 fledge, chick foraged on soundside
3	3	UNK, UNK	50	washover fan	4/24/2015	3	none	Nest failed 5/13 - loss unknown, but broken egg shells and ants in nest
4	4	UNK, UNK	49.74	behind dune, washover	4/24/2015	4	none	Fledged 2 chicks, last seen on 6/26, day 39. Day 35 fledges, chicks foraged on soundside
5	5	UNB, UNK	52.8	dune face	4/24/2015	3	none	Nest failed 5/13 - loss unknown, no adults
6	6	UNB, UNB	49.41	break in dunes	5/1/2015	2	none	Nest failed 5/13 - predation; unknown predator
7	7	UNB, UNK	49.62	toe of dune	5/13/2015	2	none	Nest failed 6/29 - 6/19 1 broken egg out of nest, 1 egg in nest, adult incubating, confirmed failed on 6/26
8	3	UNB, DG (E9)	50.15	back shellflat	5/29/2015	3	none	Brood failed by 6/26 - chicks were on ocean beach on 6/19
9	5	UNK, UNK	52.94	dune face	6/11/2015	1	none	Nest failed 6/15 -loss unknown

7 nesting pairs, 9 nests, 4 nests hatched, 5 chicks fledged