

PIPING PLOVER (*Charadrius melodus*) MONITORING AT  
CAPE LOOKOUT NATIONAL SEASHORE

2012 SUMMARY REPORT



Two Piping Plover Nests with Predator Exclosures at Old Drum Inlet Site. NPS Photo 2012

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## ***Abstract***

A total of 51 pairs of piping plovers nested at Cape Lookout National Seashore (CALO) in 2012. The birds at CALO accounted for 75% of the nesting pairs in North Carolina. Forty-three pairs nested on North Core Banks and eight pairs on South Core Banks. Egg-laying was initiated on April 17<sup>th</sup> and a total of 66 nests were documented. Thirty-six nests hatched and 29 chicks fledged. Productivity was 0.57 chicks fledged per nesting pair. Two broods foraged on the oceanside in 2012.

## **Introduction**

The piping plover is listed as a federal threatened species by the U.S. Fish and Wildlife Service. Piping plover monitoring at CALO began with a baseline study in 1989. The park is a significant nesting area, containing 75% of the nesting pairs in the state of North Carolina. CALO is also an important wintering and migratory site. There are three designated wintering critical habitat units within the seashore. Monitoring focuses on documenting reproductive success, implementing methods to increase the productivity of this threatened species, and non-breeding use surveys. This report contains a summary of monitoring results for 2012, comparisons to results from previous years and discussions based on long-term monitoring of piping plovers at CALO.

## **Site Description**

Cape Lookout National Seashore is located in the southern Outer Banks of North Carolina between Beaufort and Ocracoke Inlets. With the natural reopening of Old Drum Inlet in August 2011 the seashore was divided into four barrier islands for the 2012 breeding season. The northernmost island, North Core Banks (NCB) was approximately 23 miles long, extending from Ocracoke Inlet to Ophelia Inlet, and includes the Middle Core Bank (MCB) section from Old Drum Inlet to Ophelia Inlet. South Core Banks (SCB) extends southward from Ophelia Inlet to almost 24 miles to Barden Inlet. The Core Banks have a northeast to southwest orientation and exhibit a low profile landscape. The third island, Shackleford Banks (SB) is nine 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**

Bird sanctuary signs were used to close all known piping plover nesting habitat to pedestrian and vehicular entry by April 1. Beginning in early April, nesting areas were surveyed daily for territorial pairs and nests. Potential habitat outside posted areas was

monitored and posted as necessary with a minimum 150 foot buffer distance from scrapes and nests. Locations of nests were recorded and nests were monitored daily until they hatched or were lost. The Interim Protected species Management Plan/ Environmental Assessment, March 2006, developed for CALO provides guidance for monitoring and management (National Park Service 2006).

Nests were protected with predator exclosures if the topography of the location was suitable and monitoring was sufficient. Exclosures were circular, 10 feet in diameter, made of 4”x 2” mesh wire fence anchored with steel rebar and were topped with ¾” mesh bird netting. Exclosures with a wire mesh size of 2”x 2” were also used in 2012. Because of high rates of losses to raccoons, nest exclosures were sometimes constructed before the clutch was complete.

After nests hatched, broods were monitored daily until the chicks fledged or were lost. Any ocean beach foraging areas were closed to vehicle traffic while the chicks were present.

Counts of wintering and migrating piping plovers were made monthly from August to March. The counts were made near the 15<sup>th</sup> of each month in the non-nesting season. The ocean beach, inlets and soundside sandy beaches were surveyed. Banded birds were searched for more frequently during the fall migration.

## Results

### Nesting Pairs

A total of 51 pairs of piping plovers nested at CALO in 2012 (Table 1 & 2). Forty-three pairs nested on North Core Banks (NCB), and eight pairs on South Core Banks (SCB), Appendix 1. Birds nested in six distinct areas (Figure 1). Appendix 1 shows the results of the June census window pair count. The four mile area around Ophelia Inlet contained the highest number of nesting pairs. The birds at CALO accounted for 75% of the nesting pairs in North Carolina in 2012.

Table 1. Number of Pairs by Occupied Nesting Areas

ISLAND	NESTING AREA	NUMBER OF PAIRS
North Core Banks	Ocracoke Inlet	1
North Core Banks	Portsmouth Flats	19
North Core Banks	Old Drum Inlet	8
North Core Banks	New Drum Inlet	10
North Core Banks	Ophelia Island	5
South Core Banks	Plover/Ophelia Inlet	8

Table 2. Piping Plover Breeding Pairs at Cape Lookout National Seashore 1989-2012

	1989	1992	1993	1994	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ocracoke Inlet	0	2	0	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Portsmouth Flats	14	8	9	7	8	17	15	9	11	9	8	6	4	6	8	14	14	12	13	12	19
Kathryn-Jane Flats	7	11	9	12	11	10	8	2	1	1	2	1	1	2	1	3	0	1	0	0	0
Old Drum Inlet	3	2	1	1	2	1	1	0	0	0	0	1	0	0	0	0	2	3	6	8	8
New Drum Inlet (NCB/MCB) Mile 21 to 22	4	5	9	10	6	3	2	3	1	2	2	2	2	3	3	5	6	5	8	8	10
New Drum Inlet (SCB)/ Ophelia Island Mile 22 to 23	3	3	4	5	4	2	3	3	2	3	2	2	2	2	2	2	2	2	2	2	5
Plover Inlet/ Ophelia Inlet Mile 23 to 24	0	0	0	0	0	1	1	1	1	1	1	1	4	8	15	17	18	11	11	8	8
Cape Point	0	0	0	0	0	0	0	1	0	0	0	0	0	4	3	2	3	2	2	1	0
Power Squadron Spit	3	2	3	2	2	1	2	1	0	0	0	1	0	1	1	2	1	1	1	1	0
Shackleford Banks														1	0	0	0	0	0	0	0
CALO Total	34	33	35	39	35	36	32	21	16	16	15	14	13	27	33	45	46	37	43	41	51

## Nests

There were 66 nesting attempts made in 2012 (Appendix 2). The earliest nest initiation was on April 17<sup>th</sup> and the latest was on July 2<sup>nd</sup>. Fifty-six nests were on NCB and ten were on SCB. Of the 66 nests, 15 were re-nests. Thirty-six nests hatched and 29 chicks fledged from 18 different broods. The average clutch size was 3.31 eggs and 87 of 202 known eggs hatched. Productivity for CALO was 0.57 chicks fledged per nesting pair (Table 3 & Appendix 3). Refer to Figures 2-5 for detailed maps of nests and nesting sites, (2009 & 2011 DOQQ base layers).

Table 3. Piping Plover Nesting Success at CALO 1989-2012

YEAR	NESTING PAIRS	NESTS	CHICKS FLEDGED	FLEDGE RATE
1989	34	56	25	0.74
1992	33	39 (NCB only)	7 (NCB only)	0.25
1993	35	56	26	0.74
1994	39	66	9	0.23
1995	35	43	15	0.43
1997	36	41	7	0.19
1998	32	39	11	0.34
1999	21	22	2	0.09
2000	16	18	8	0.50
2001	16	19	5	0.33
2002	15	20	4	0.27
2003	14	15	6	0.43
2004	13	13	12	0.92
2005	27	31	23	0.85
2006	33	37	29	0.88
2007	45	58	11	0.24
2008	46	57	9	0.20
2009	36	45	30	0.83
2010	43	58	31	0.72
2011	41	48	37	0.90
2012	51	66	29	0.57

## Predator Exclosures

In 2012, predator exclosures were used to protect 27 (40%) nests. Of the nests with exclosures 19 (70%) hatched. Eight nests with predator exclosures didn't hatch. Seven were lost to weather (flooding/wind) and one was abandoned. Predator exclosures were not used on 39 (60%) nests due mainly to the inaccessibility of MCB. Of the nests without exclosures 17 hatched (44%). Twenty-two nests didn't hatch; eleven were lost unknown reasons, four nests were lost to raccoon predation, three to ghost crabs, three were lost to weather, and one was abandoned (Appendix 1). Table 4 shows likely causes of nest losses for all nests. The predator column includes four raccoon losses and three

ghost crabs losses. There were no observations of raccoons circling or digging at predator exclosures on SCB or NCB.

Table 4. Likely Causes of Piping Plover Nest Losses in 2012.

NESTING AREA	# NESTS	# LOST	PREDATORS	STORM	ABANDONED	UNKNOWN
Ocracoke Inlet	2	1	0	1	0	0
Portsmouth Flats	25	15	4	8	0	3
Old Drum Inlet (NCB)	9	5	1	1	1	2
New Drum Inlet (NCB)	14	4	1	0	0	3
Ophelia Island (NCB)	6	3	0	0	0	3
Plover Inlet (Mile 23.6)	10	2	1	0	1	0
Total	66	30	7	10	2	11

### **Predator Control**

There were no predator control efforts in 2012.

### **Beach Closures and Brood Foraging**

The area between Ophelia Inlet and Ramp 24, 1 mile in length, was completely closed to vehicles (except for NPS monitors) from May 24<sup>th</sup> to July 30<sup>th</sup>. A second ocean beach closure to vehicles was posted at Portsmouth Flats from mile 2.7 to mile 2.2, from June 4<sup>th</sup> to June 27<sup>th</sup> for a chick that foraged on the ocean beach. A third ocean beach closure to vehicles was established at Old Drum Inlet on NCB, 0.3 mile in length, from June 1<sup>st</sup> to June 12<sup>th</sup> specifically for piping plover chicks. Though the chicks did not forage on the ocean beach the island was narrow enough that the 600 feet vehicle-free buffer necessitated the closure. A similar narrow beach at Ocracoke Inlet required a fourth beach closure for piping plover chicks from June 13<sup>th</sup> until June 25<sup>th</sup>, 0.4 mile in length. The closures began the day of expected hatch of the first nest at Ophelia Inlet (SCB) or when chicks were present on the ocean beach and remained in place until the last chick was fledged, confirmed lost, or moved out of area. The middle core banks section was closed to motor vehicle use from April 1<sup>st</sup> until August 31<sup>st</sup> in accordance with the Interim Protected Species Management Plan when Old Drum Inlet is open (National Park Service, 2006).

Two broods foraged on the ocean beach in 2012. One of these broods was observed foraging on the oceanside and inlet beach at Ophelia Inlet at the north end of SCB. The other brood foraged on both the oceanside and open sand flats of Portsmouth Flats. All other chicks foraged on soundside beach, sand flats, mudflats and ephemeral pools in areas closed to vehicles and in most cases all entry.

## Non-nesting Piping Plover Surveys

Surveys in 2012 covered the entire seashore from January to December with the exception of the three mile Middle Core Banks section. Hurricane Irene re-opened Old Drum Inlet in late August 2011 making access and monitoring difficult. We were able to census MCB during fall migration in August and September. Table 5 below list this year's counts. Appendix 4 lists non-nesting counts from 2006-2012.

Table 5. Non-Nesting Piping Plover Counts at Cape Lookout National Seashore, 2012.

	January	February	March	August	September	October	November	December
NCB	0	0	5	82*	112*	0	3	6
SCB	2	2	1	32	7	3	7	6
SB	5	10	?	4	9	12	5	2
<b>Total</b>	<b>7</b>	<b>12</b>	<b>&gt;6</b>	<b>121</b>	<b>128</b>	<b>15</b>	<b>15</b>	<b>14</b>

\*Includes MCB

## Banded Piping Plovers

Thirty three observations of 20 individual non-breeding banded birds were made in the park in 2012, Appendix 5. Birds banded from the Great Lakes, Massachusetts, New Jersey, Maryland, and the Bahamas were re-sighted during migration and over wintering. One banded female (-, W:-, YL) nested in the seashore at Portsmouth Flats on NCB, nest 36. Nest 36 failed due to high winds and was sanded in. This is the second year that this Bahaman banded bird nested in the seashore. We were unable to confirm if Great Lakes banded female Of, YY: X, R nested in 2012. This bird did successfully nest in 2011. Hurricane Irene opened Old Drum Inlet and rearranged this bird's nesting habitat from 2011. We initially had difficulty monitoring this area in the spring and may have missed this bird's nest or a band re-sight. This bird was re-sighted on 6/19/12 within three miles of the 2011 nest and appeared non-territorial.

## **Discussion**

### **Nesting Habitat**

The habitat at New Drum Flats and Old Drum Flats/Inlet continued to provide excellent nesting and foraging opportunities in the breeding season. Hurricane Irene in 2011 reopened Old Drum Inlet and temporally over washed New Drum Flats, scouring the vegetation and opening bare sandy habitat at these sites. On the north end of SCB, erosion from Hurricane Irene removed 0.3 mile of island off the north tip making Ophelia Inlet much wider. The remaining nesting habitat was much improved after the storm. The storm surge and over wash removed most of the vegetation, created big sand flats, ponds and mudflats. This high quality nesting habitat from Old Drum to Plover Inlet contained 61% (31 pairs) of the nesting pairs in 2012. Portsmouth Flats, another important area, continued to provide nesting habitat on NCB for 19 pairs (37%). In 2012, there were no nests on the beach berm, but there was one nest north of the entrance road to Portsmouth Village. The upper beach was posted closed to all entry in March since this area was a nesting site in 2011. The north tip of NCB at Ocracoke Inlet supported one nesting pair in 2012 as it did in 2011, even with shrinking habitat due to erosion. The habitat at Kathryn-Jane flats, Cape Point and Power Squadron spit did not attract and hold nesting pairs in 2012.

### **Pair Numbers**

The number of breeding pairs in the seashore increased from 41 in 2011 to 51 in 2012. This is the highest number of pairs recorded in the seashore. This may be the result of relatively high productivity for the last three years (Appendix 3) and habitat improvements from Hurricane Irene.

### **Nest Success**

2012 brought low hatch success for piping plover nests in the park, only 54% of the nests and 43% of the eggs hatched successfully. Ten (33%) nests were lost to flooding or wind. The seven predator related nest losses accounted for 23 % of total losses. Raccoon predation took four nests and three were lost to ghost crab predation. Two (6%) nests were abandoned. Eleven (37%) nests losses were recorded as unknown. This unknown nest loss rate reflects the decreased monitoring ability on MCB due to inaccessibility. In 2012, predator exclosures use was low. Only 27 nests or 40% of nests received predator exclosures. These 27 nests with predator exclosures had 19 nests hatch and a 70% hatch success. Predator exclosures were not used on MCB due to uncertainty of monitoring ability early in the nesting season. MCB had 27 nests without predator exclosures and 16 nests hatched for a hatch success of 60%.



Predator exclosures have generally been effective in increasing hatch success. From 1997-2012, 69% of the nests protected with exclosures hatched, compared with a 42% hatch rate of the nests left unprotected.

### **Fledging Success**

The fledging success for piping plovers at CALO was 0.57 chicks fledged per nesting pair in 2012 (Appendix 3, Chart 2). The actual number of chicks fledged were 29 fledglings.

The MCB section produced the majority of the fledglings and although hatch success was low on MCB nests without predator exclosures, the fledging success was high. Of the 21 pairs that nested on MCB they produced 20 fledglings, 0.95 productivity. Compared to the 27 nests with predator exclosures in the seashore, exclusive of MCB, 25 pairs only produced 8 fledglings, 0.32 productivity. Individual nesting sites varied in productivity. At The Old Drum Flats/Inlet nesting site eight pairs produced six fledglings for a productivity of 0.75. The New Drum flats site had 10 pairs and fledged 10 chicks for a productivity of 1.00. The Ophelia Island site produced four fledglings from five pairs for a productivity rate of 0.80. At the Plover Inlet site, seven fledglings were produced from 8 pairs for a fledge success of 0.88. Though productive in the last three years was high, Portsmouth Flats only produced two fledglings from 19 pairs for productivity of 0.10 in 2012. Ocracoke Inlet had no fledging success from the one pair that nested. Cape Point, Power Squadron Spit, and Kathryn-Jane Flats had no nesting activity. Site by site reproductive successes for 2012 can be compared in Table 6.

Oceanside foraging areas contributed to fledging success in 2012. At Portsmouth Flats one chick from one brood foraged on the Oceanside and fledged. At the Plover Inlet site one brood foraged on both the oceanside and soundside, with one chick fledging. Chicks at the above areas received ocean beach closures.

Table 6. Differences in Reproductive Success between Major Nesting Areas in 2012.

<b>Nesting Area</b>	<b>Hatch Success</b>	<b>Fledge Success</b>
Ocracoke Inlet	50%	0.00 chicks per pair
Portsmouth Flats	40%	0.12 chicks per pair
Old Drum Flats/Inlet	44%	0.75 chicks per pair
New Drum Flats	71%	1.00 chicks per pair
Ophelia Island	50%	0.80 chicks per pair
Plover Inlet	80%	0.88 chicks per pair

### **Predators**

There were wild canine tracks on SCB in the Cape Point and Power Squadron Spit area in the summer. They appeared to be fox or coyote tracks. This may partially explain the lack of piping plover pairs at these sites. A coyote (*Canis latrans*) was spotted on Shackleford

Banks this autumn and tracks were seen in the summer. Raccoon and feral cat tracks at nest sites continue to be a concern. Four nests without predator exclosures were taken by raccoons. In 2012 no attempts were made to dig into predator exclosures by raccoons.

### **Human Disturbance**

Posted closures for bird nesting areas were not always respected by park visitors. Law enforcement rangers issued eight citations for pedestrians in bird nesting areas and nine citations for vehicles in bird areas in 2012.

Dogs were also a potential source of disturbance to nesting birds. Resource management staff documented 596 dogs on leash and 73 dogs off leash in 2012. This survey revealed 89% of dogs were on leash and 11% were off leash. The survey period was from April to mid-October and did not cover all dog sightings in the seashore. Law enforcement rangers issued 35 dog off leash citations, 12 written warnings, and 118 verbal warnings in 2012.

### **Non-nesting piping plovers**

CALO continues to be an important migration stopover location and wintering site for piping plovers. Figure 6 illustrates non-breeding piping plover observations and critical habitat units. In 2012, 323 birds were recorded during 111 observations of piping plovers in the seashore during the non-nesting season. The area on NCB near Ocracoke Inlet again had high numbers of birds in spring and fall migrations. The area from Old Drum Inlet flats to Ophelia Inlet also had high numbers of birds counted in August and September. On NCB, 82 piping plovers were counted on the August 15<sup>th</sup> count and 112 on the September 15<sup>th</sup> count. Eleven banded piping plovers from the endangered Great Lakes population were re-sighted in 2012. In addition three birds banded in the Bahamas, two banded in Maryland, one banded in Massachusetts, one banded in New Jersey, and two unknown banded birds were re-sighted in 2012.

### **US Fish and Wildlife Service Biological Opinion**

The USFWS provided CALO a biological opinion that included four performance measures for the Interim Protected Species Management Plan. Fifty one breeding pairs were found in CALO in 2012 surpassing the target of 25 or more pairs of performance measure one. Fifty one pairs produced 66 nests (1.29 nest per pair) surpassing the target of at least one nest per breeding pair of performance measure two. The 51 nesting pairs produced 29 fledglings for a fledge rate of 0.57, which is below the target of 0.75 of performance measure three. Winter plover surveys at CALO were conducted at least once monthly from August until March to meet performance measure four.

### **Literature Cited**

National Park Service. 2006. Interim Protected Species Management Plan/  
Environmental Assessment. Cape Lookout National Seashore, North Carolina.

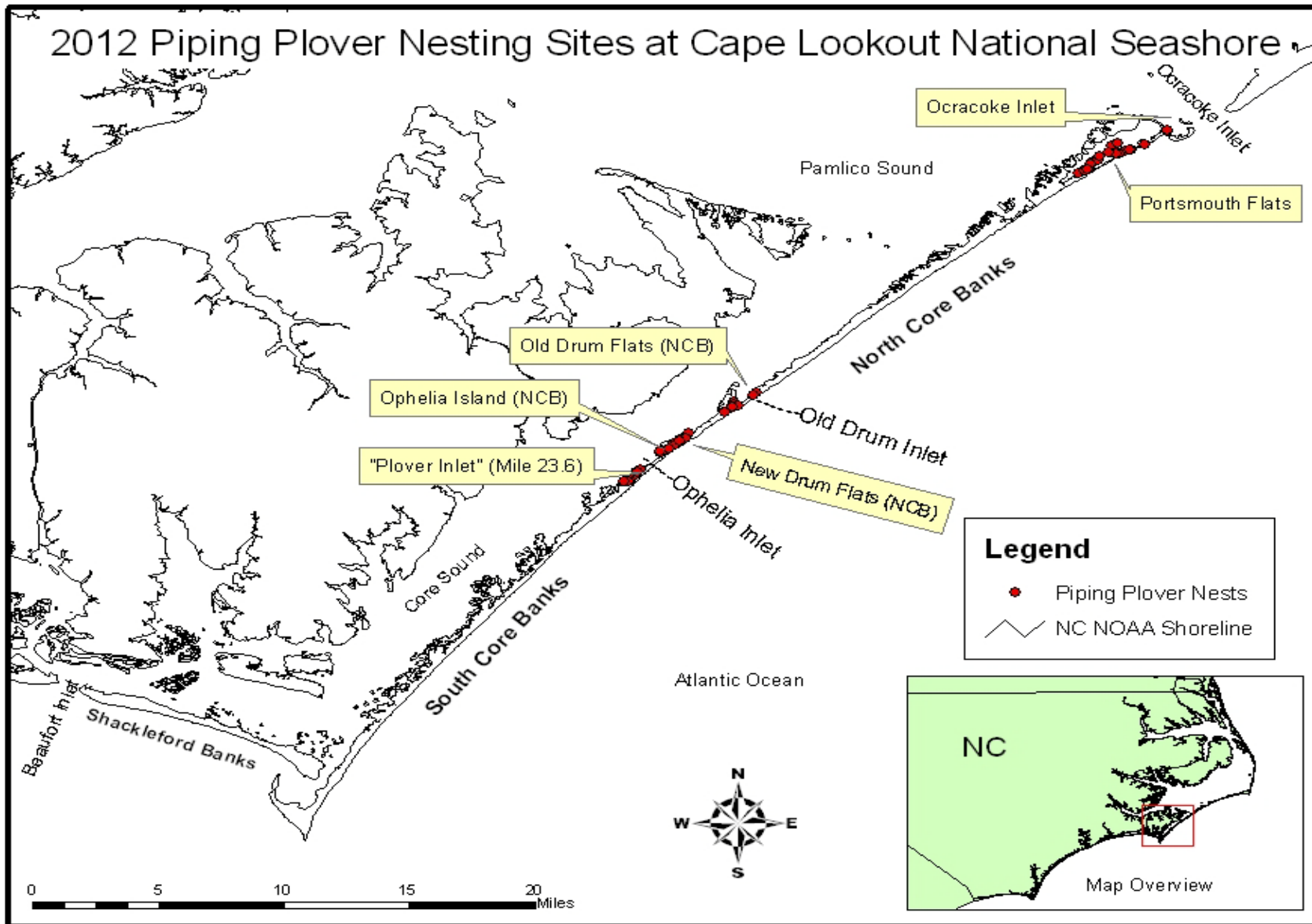


Figure1. Map of 2012 Occupied Piping Plover Nesting Sites at Cape Lookout National Seashore.

## Appendix 1- 2012 PIPING PLOVER WINDOW CENSUS

2012 Piping plover breeding census results: June 1-9

North Core Banks: 39 pairs, 1 single

Ocracoke Inlet 1 pairs

Portsmouth Flats 17 pairs, 1 single

Old Drum Inlet 6 pairs

New Drum Inlet 10 pairs

Ophelia Island 5 pairs

South Core Banks: 9 pairs

Plover Inlet 9 Pairs

Cape Point 0 Pair

Power Squadron Spit 0 Pair

Shackleford Banks: 0 piping plovers

Cape Lookout National Seashore: 48 pairs, 1 single bird

## Appendix 2- 2012 PIPING PLOVER NEST DATA

### NORTH CORE BANKS

Nest #	Pair #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS (abbreviated)
1	1	3.62	17-Apr	3	19-Apr	N/A	0	0	abandoned/sanded in 5/8
2	2	22.29	25-Apr	4	N/A	27-May	4	2	fledged 6/20 at day 26; foraged soundside
3	3	21.64	25-Apr	4	N/A	27-May	3	0	1 chick last seen 6/9; foraged soundside
4	4	2.93	29-Apr	4	30-Apr	26-May	4	0	1 chick last seen 5/28, possible GBTE predation, looked like a chick in its bill
5	5	2.38	29-Apr	4	12-May	29-May	3	1	chick on oceanside and flats, beach closed to vehicles 6/4-6/27; fledged 6/27 at day 29
6	6	22.22	30-Apr	4	N/A	27-May	4	1	foraged soundside, fledge 6/25 at day 29
7	7	18.44	2-May	3	9-May	3-Jun	2	0	chicks lost by 6/7, two egg loss on 6/2 by ghost crab, beach closure 6/1 to 6/12
8	8	2.76	3-May	4	9-May	5-Jun	3	0	brood failed 6/10, unknown
9	9	0.22	4-May	2	N/A	N/A	0	0	nest failed 5/7 due to over wash
10	10	2.14	5-May	4	9-May	8-Jun	4	1	foraged at pond 3, fledged 7/4 at day 26
11	11	1.92	5-May	3	N/A	N/A	0	0	nest failed 5/21-predated by ghost crab
12	12	21.41	14-May	4	N/A	N/A	0	0	nest failed 5/17-predated by ghost crab
13	13	3	8-May	4	12-May	7-Jun	3	0	6/7 1 chick was seen and 1 egg was in the nest cup. brood was not seen after 6/7, UNK
14	14	2.36	9-May	4	12-May	9-Jun	4	0	brood failed 6/13, UNK, high wind
15	9	0.37	9-May	4	16-May	13-Jun	3	0	brood failed 6/14 UNK, high wind
16	15	1.19	10-May	4	12-May	10-Jun	4	0	brood failed 6/14 UNK, high wind
17	16	3.22	10-May	1	N/A	N/A	0	0	no scrape, just a single egg on top of sand when found failed 5/11
18	17	22.53	10-May	3	N/A	N/A	0	0	nest failed 5/21, UNK
19	18	21.52	10-May	4	N/A	N/A	0	0	nest failed between 6/9 & 6/18, UNK
20	19	18.46	11-May	4	13-May	N/A	0	0	nest failed 5/31-overwash

21	20	1.69	11-May	4	11-May	N/A	0	0	nest failed 5/26-extremely windy, sanded in
22	21	19.37	13-May	4	N/A	N/A	0	0	nest failed between 5/18 & 5/21, UNK
23	22	19.23	13-May	3	N/A	N/A	0	0	nest failed between 6/12 & 6/18, UNK
24	23	21.66	14-May	4	N/A	27-May	4	0	brood failed between 5/29 & 5/31, UNK
25	24	21.64	17-May	3	N/A	2-Jun	1	0	brood failed between 6/8 & 6/9, UNK
26	25	2.17	18-May	4	N/A	N/A	0	0	nest failed 5/24-predated by raccoon
27	26	2.98	19-May	2	N/A	N/A	0	0	nest failed 5/22, UNK
28	27	22.29	21-May	4	N/A	N/A	0	0	Nest failed between 6/12 & 6/18, UNK
29	28	1.55	22-May	3	29-May	N/A	0	0	nest failed 5/31-overwash
30	29	22.47	24-May	4	N/A	9-Jun	4	2	chicks foraged on mudflat, assumed fledged 7/4 at day 25
31	30	19.23	27-May	4	N/A	25-Jun	3	3	fledged 7/23 at day 28; foraged soundside
32	31	22.53	28-May	UNK	N/A	28-May	UNK	0	missed nest, brood failed between 6/5 & 6/7
33	32	21.26	28-May	4	N/A	N/A	0	0	nest failed between 6/12 & 6/18-unknown
34	33	18.28	1-Jun	1	N/A	N/A	0	0	nest failed 6/7-abandoned
35	16	3.22	1-Jun	2	N/A	N/A	0	0	nest failed 6/7- predated by ghost crab
36	34	2.13	8-Jun	4	10-Jun	N/A	0	0	banded female -,W:-,YK, Bahama bird, nest failed 6/21 sanded in
37	20	1.76	8-Jun	4	10-Jun	N/A	0	0	nest failed 7/2- rain and 50mph winds the night before, tree branch lodged in enclosure
38	17	22.49	9-Jun	4	N/A	N/A	0	0	nest failed between 6/24 & 6/25, UNK
39	35	2.22	11-Jun	4	17-Jun	9-Jul	4	0	hatched and failed on 7/9, UNK-chicks were never seen
40	36	3.73	17-Jun	2	N/A	N/A	0	0	nest failed 6/19-unknown
41	37	3.33	17-Jun	3	20-Jun	15-Jul	3	0	brood failed 7/18; GBTE seen going after chicks on 7/16; foraged soundside
42	4	2.9	18-Jun	2	25-Jun	N/A	0	0	went down to 1 egg on 7/2 (rain & 50+ mph winds the night before)
43	26	3.12	18-Jun	2	N/A	N/A	0	0	nest failed 6/22-predated by raccoon
44	38	3.44	18-Jun	3	N/A	N/A	0	0	nest failed 6/24-flooded out

45	39	19.66	18-Jun	3	N/A	N/A	0	0	nest failed between 7/6 & 7/7-predated by raccoon
46	3	21.64	19-Jun	2	N/A	UNK	UNK	2	UNK hatch; fledged 8/4; foraged soundside by sand peninsula head
47	23	21.7	19-Jun	2	N/A	N/A	0	0	nest failed between 6/21 & 6/23-unknown
48	40	21.7	23-Jun	2	N/A	2-Jul	2	2	fledged 7/26 at day 24; foraged soundside
49	41	22.1	19-Jun	UNK	N/A	UNK	UNK	1	missed nest, estimated hatch 6/13; foraged soundside, fledged 7/9
50	42	19.14	25-Jun	4	N/A	UNK	UNK	2	UNK hatch ,fledged 7/30,foraged soundside
51	36	3.53	30-Jun	2	N/A	N/A	0	0	nest failed 7/2- rain and 50mph winds the night before, abandoned
52	43	22.1	2-Jul	UNK	N/A	UNK	UNK	1	missed nest, estimated hatch 6/30; fledged 7/23 at day 23; foraged soundside
53	21	19.3	5-Jul	4	N/A	UNK	UNK	1	estimated hatch 7/9; fledged 8/4 at day 26; foraged soundside
54	12	21.45	9-Jul	3	N/A	9-Jul	UNK	1	considered fledged 8/4 at day 26; foraged soundside
55	38	3.41	10-Jul	1	14-Jul	29-Jul	1	0	brood failed 7/30, UNK
56	24	21.67	2-Aug	UNK	N/A	23-Jul	UNK	2	missed nest, fledged 8/16 foraged soundside

43 nesting pairs, 56 nests, 28 hatched nests, 22 chicks fledged

SOUTH CORE BANKS

Nest #	Pair #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS (abbreviated)
1	1	23.81	27-Apr	4	3-May	28-May	4	3	foraged on wash through mudflat, fledged on 6/28 at day 31
2	2	23.64	1-May	4	3-May	N/A	0	0	nest abandoned and considered lost on 6/1, no adults and eggs sanded in, unknown
3	3	23.5	11-May	4	17-May	28-May	2	1	foraged on oceanside at Ophelia Inlet, fledged on 6/30 at day 33
4	4	24.24	15-May	4	N/A	N/A	0	0	nest lost 5/16, raccoon tracks near
5	5	23.67	22-May	4	22-May	28-May	4	0	chicks last seen on 6/5, lost unknown, chicks in grass at ephemeral pool on soundside
6	6	23.74	22-May	3	1-Jun	25-Jun	3	0	chicks last seen on 6/30, lost by 7/6, soundside, 2X2 inch mesh Predator enclosure
7	7	24.13	27-May	3	27-May	19-Jun	3	0	chicks last seen on 6/21, foraged soundside
8	4	24.2	28-May	4	2-Jun	25-Jun	4	2	chicks foraged on soundside, fledged on 7/27 at day 32
9	8	24.29	7-Jun	4	8-Jun	14-Jun	4	0	brood lost, UNK
10	2	23.62	1-Jul	UNK	N/A	UNK	UNK	1	missed nest, found chicks at 3or 4 days old on 7/1, foraged soundside, fledged on 7/28

8 nesting pairs, 10 nests, 8 hatched nests, 7 chicks fledged



Appendix 3. Chart 1 Piping Plover Nesting and Chart 2 Piping Plover Productivity.

Chart 1. Piping Plover Nesting at Cape Lookout National Seashore

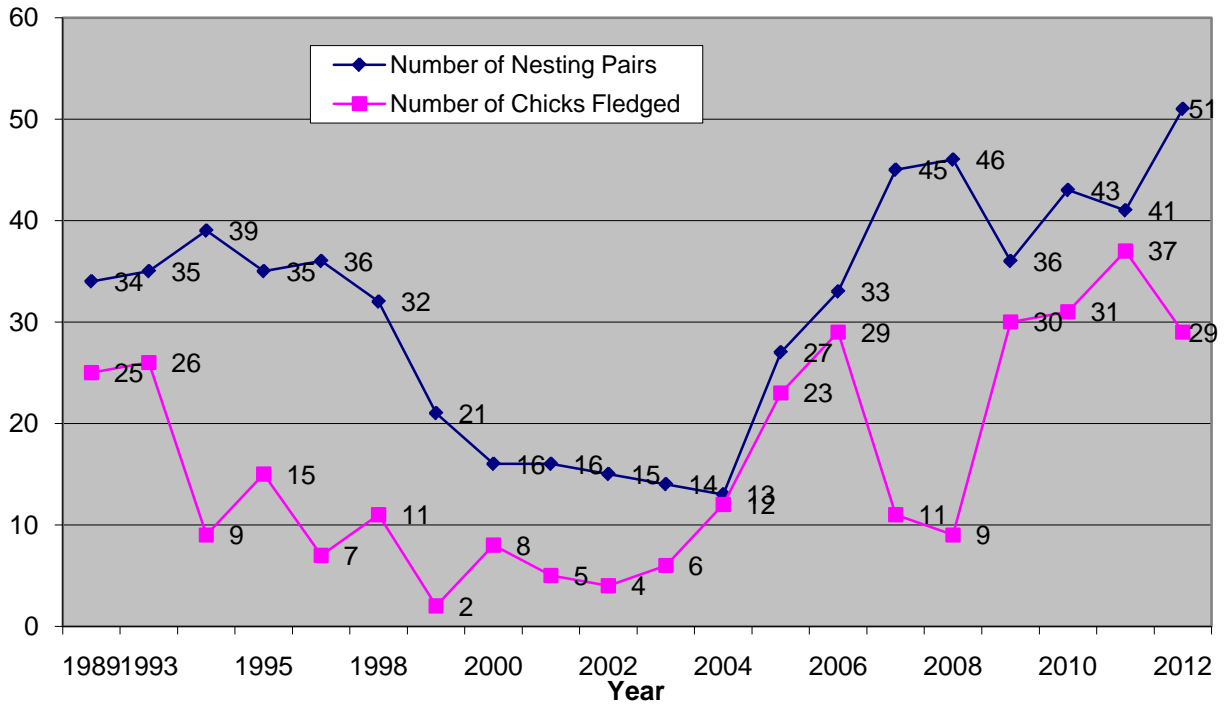
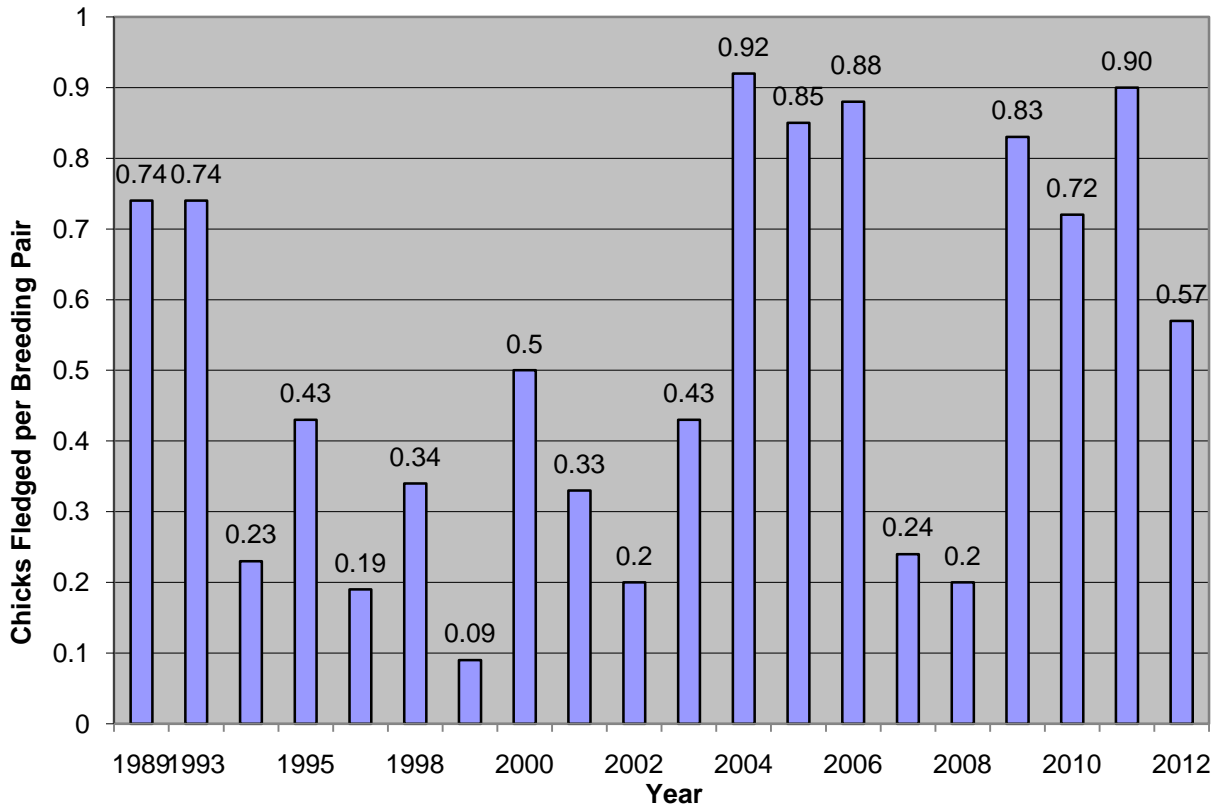
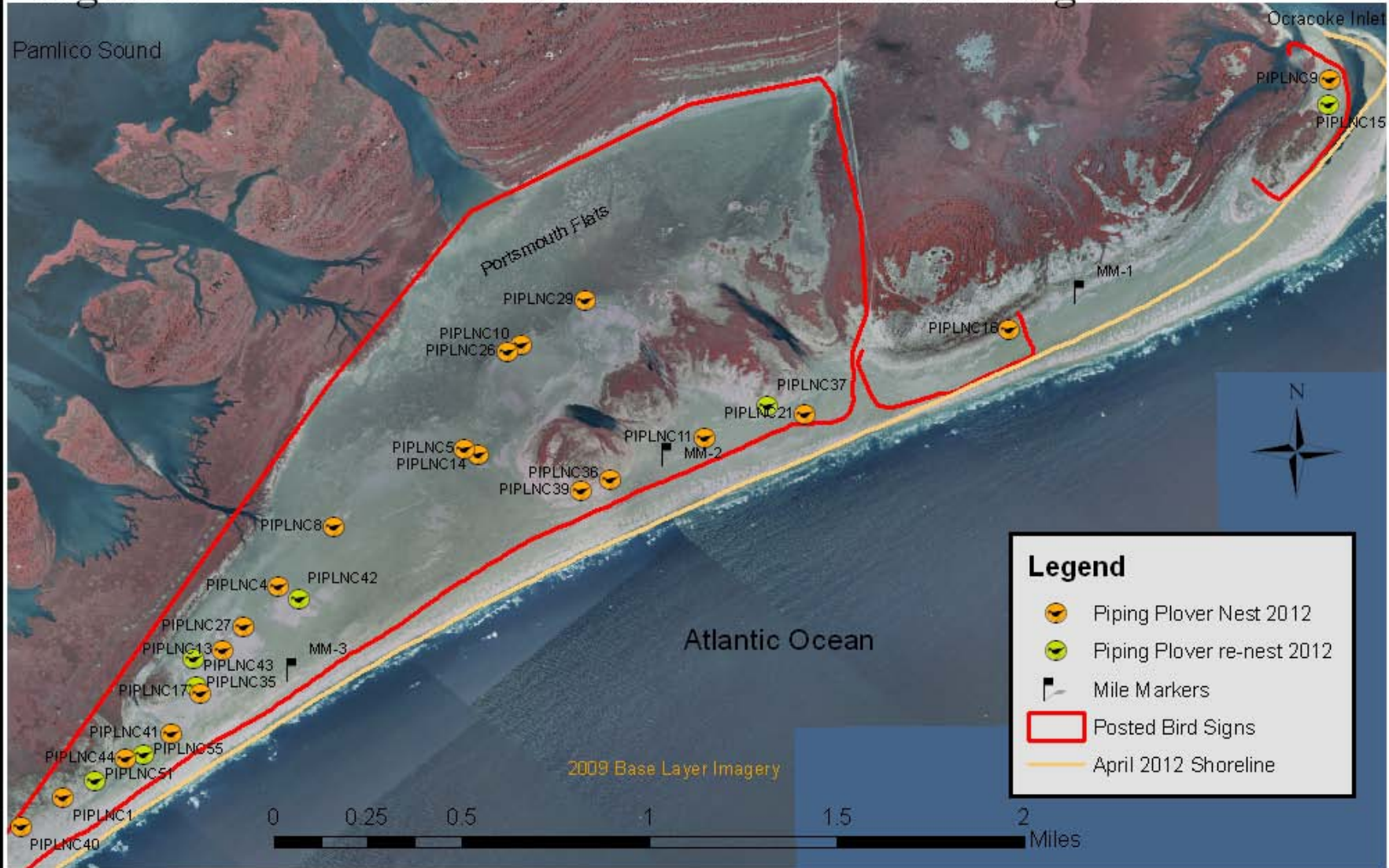


Chart 2. Piping Plover Productivity at Cape Lookout National Seashore





### Figure 2. Ocracoke Inlet and Portsmouth Flats Nesting Sites



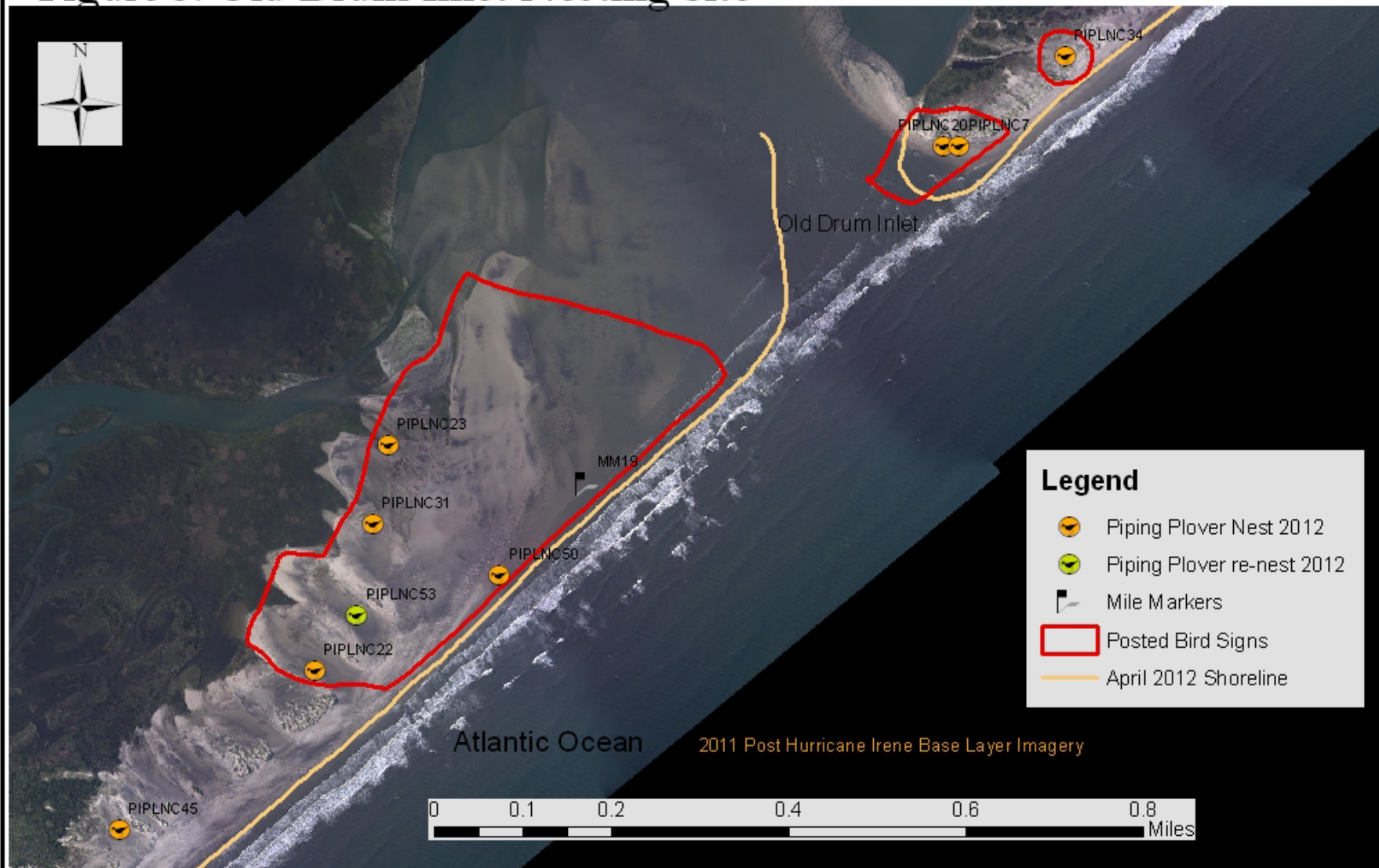
Produced by Natural Resource Management Office

December 2012

FILE: PIPL2012\_FF\_OChests.mxd



### Figure 3. Old Drum Inlet Nesting Site



Produced by Natural Resource Management Office

December 2012

File: PIPL2012\_PostIrene2011\_maps.mxd



### Figure 4. New Drum Flats and Ophelia Island Nesting Site



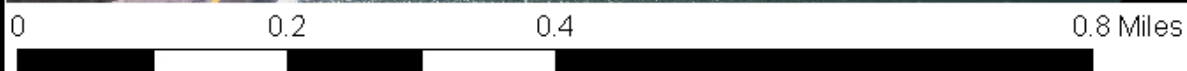
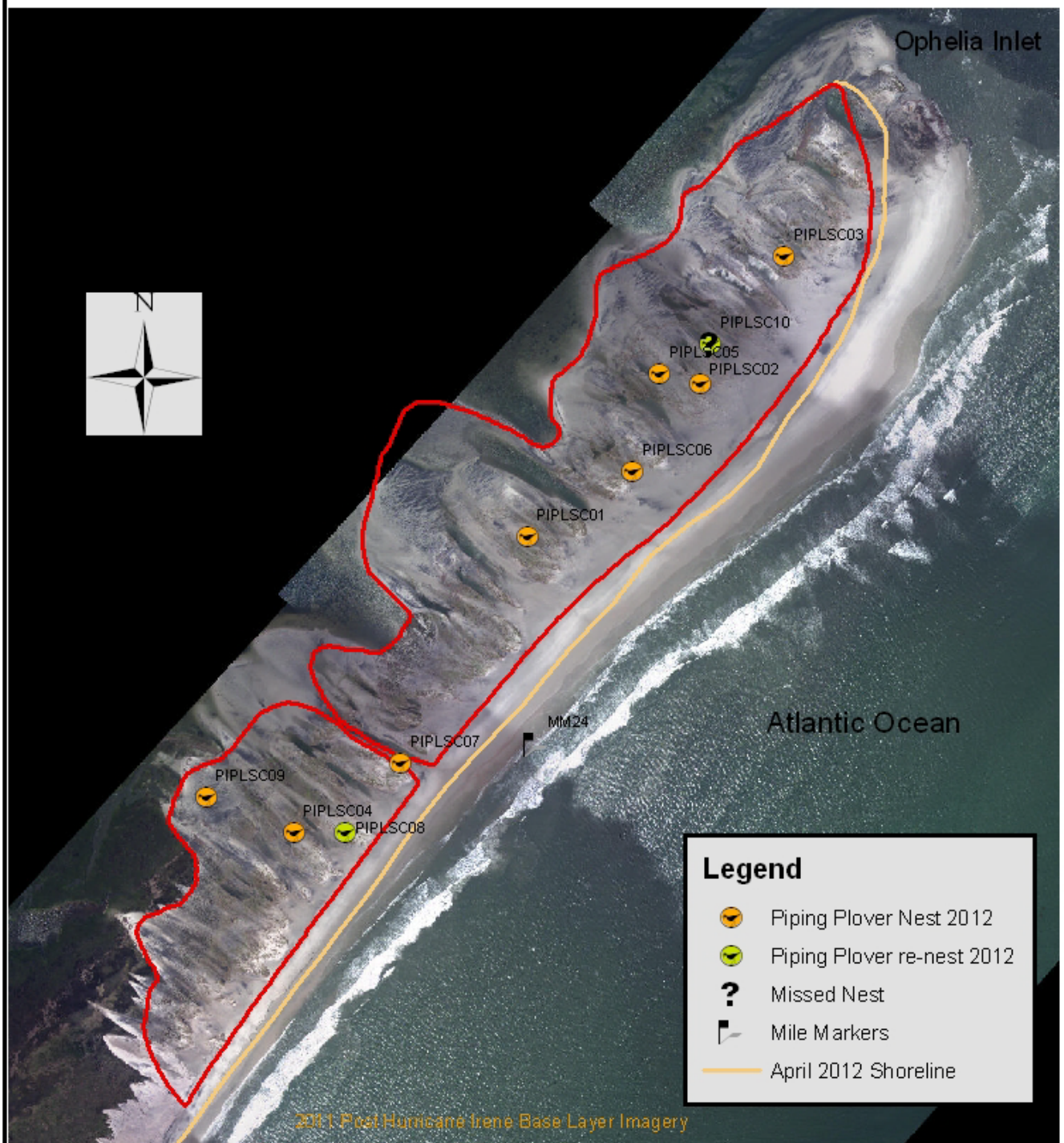
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File: PIPL2012\_PostIrene2011\_maps.mxd



Figure 5. Plover Inlet Nesting Site.



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Appendix 4. Monthly counts of non-nesting piping plovers 2006-2012

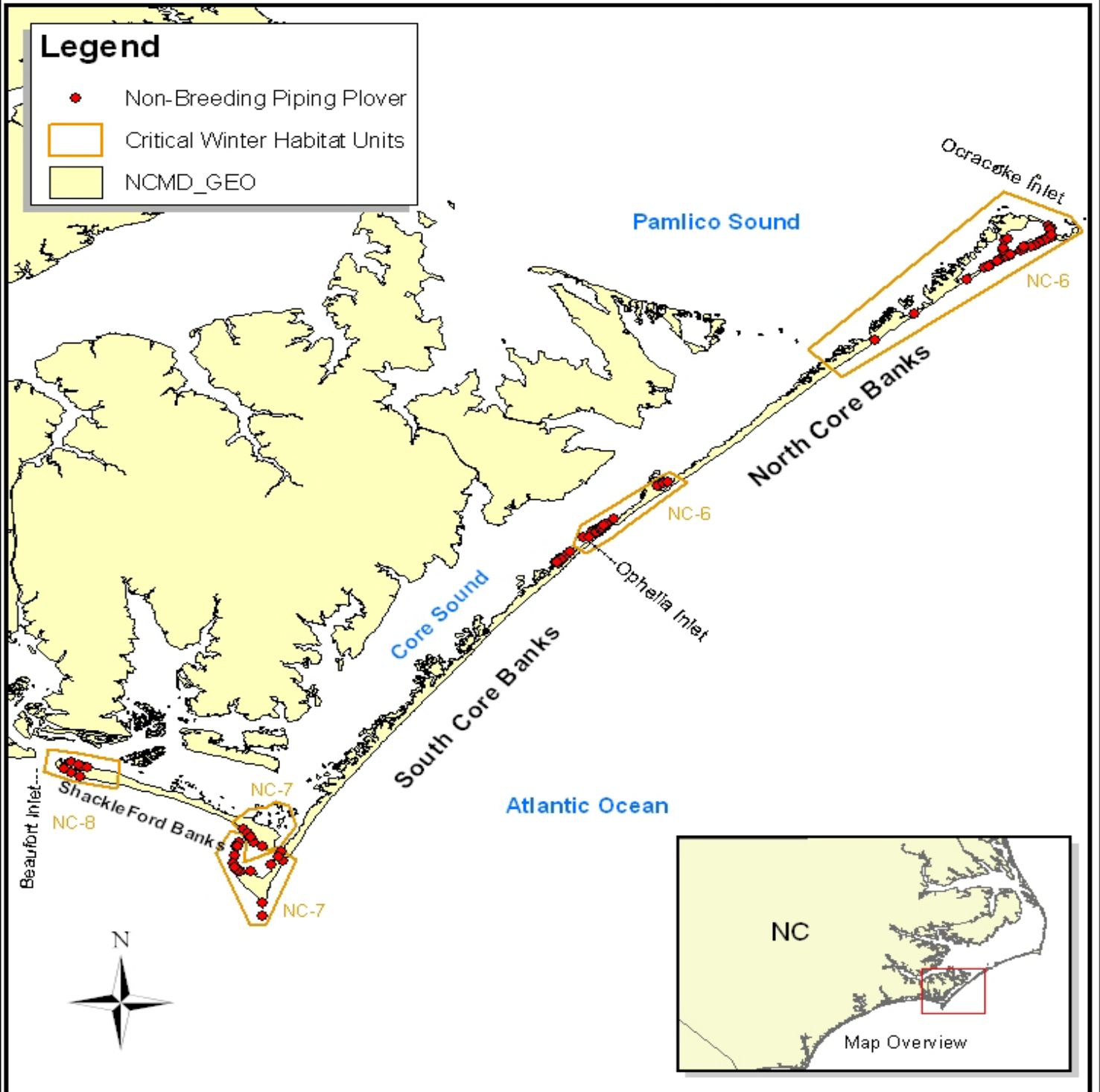
Date	North Core Banks	South Core Banks	Shackleford Banks	CALO Total
January-06	3	5	9	17
February-06	0	0	10	10
March-06	0	21	7	28
August-06	16	22	6	44
September-06	27	7	5	38
October-06	22	6	7	35
November-06	14	0	8	22
August-07	46	46	11	103
September-07	52	27	2	81
October-07	18	26	17	61
November-07	12	8	22	42
December-07	10	9	14	33
January-08	0	2	11	13
February-08	0	6	10	16
March-08	6	6	10	22
August-08	41	28	17	86
September-08	16	20	10	46
October-08	25	9	20	54
November-08	11	4	9	24
December-08	9	7	8	24
January-09	6	18	13	37
February-09	2	9	12	23
March-09	10	17	?	≥27
August-09	83	26	2	111
September-09	144	33	10	187
October-09	22	19	13	54
November-09	18	12	12	42
December-09	12	14	23	49
January-10	17	8	11	36
February-10	8	5	11	24
March-10		10	6	≥16
August-10	125	23	4	152
September-10	70	32	17	119
October-10	35	13	4	52
November-10	8	19	9	36
December-10	4	3	6	13
January-11	6	2	7	15
February-11	7	0	8	15
March-11	12	8	13	33
August-11	81	26	0	107
September-11	29	8	20	57
October-11	26	19	6	51
November-11	7	3	11	21
December-11	2	4	11	17
January-12	0	2	5	7
February-12	0	2	10	12
March-12	5	1	?	≥6
August-12	82	32	4	118
September-12	112	7	9	128
October-12	0	3	12	15
November-12	3	7	5	15
December-12	6	6	2	14

Appendix 5. Banded Piping Plover Observations at CALO in 2012

Date	Upper Left Leg	Lower Left Leg	Upper Right Leg	Lower Right Leg	Island	Comments (population, state, park code)
4/7/12	Orange flag	Blue/Red	metal	Green	SCB	Great Lakes, MI
4/9/12				Green metal	NCB	unknown
4/16/12		White		Yellow/Black	NCB	Bahama, Bred at CALO
6/19/12	Orange flag	Yellow Yellow	metal	Red	MCB	Great Lakes, Canada & MI, Bred at CALO in 2011
7/23/12	metal	Red	Orange flag	Black Blue	MCB	Great Lakes, MI
7/23/12	Orange flag	Blue Green	metal	green	MCB	Great Lakes, MI-SLBE
7/23/12	metal	Orange	Orange flag	Yellow Yellow	MCB	Great Lakes, MI
7/26/12	Orange flag	Yellow Yellow	metal	Red	MCB	Great Lakes, Canada & MI, Bred at CALO 2011
7/28/12	metal	Red	Orange flag	Black Blue	MCB	Great Lakes, MI
7/29/12	Black flag	Red green		White	NCB	Bahama, Bred at CACO
8/2/12	Green		Black		NCB	Banded in MA
8/4/12	Yellow Red		Green Yellow		MCB	Banded in Maryland in 2010 at ASIS
8/4/12	Black flag	Yellow Blue		White	MCB	Bahama, bred at GATE,NY 2010-2012
8/4/12	Yellow Red		Green Yellow		MCB	Banded in Maryland in 2010 at ASIS
8/4/12	metal	Red	Orange flag	Black Blue	MCB	Great Lakes, MI
8/4/12	metal	Orange	Orange flag	Yellow Yellow	MCB	Great Lakes, MI
8/5/12	Blue Yellow		Blue Green		NCB	Banded in NJ
8/12/12	Blue Yellow		Blue Green		NCB	Banded in NJ
8/13/12	Black flag	Yellow Blue		White	MCB	Bahama, bred at GATE,NY 2010-2012
8/13/12	metal	Red	Orange flag	Black Blue	MCB	Great Lakes, MI
8/13/12	metal	Orange	Orange flag	Yellow Yellow	MCB	Great Lakes, MI
8/13/12	Orange flag	Blue Green	metal	?	MCB	Great Lakes
9/12/12	Orange	Yellow	metal	Yellow/Orange/Yellow	SB	Great Lakes, MI-SLBE
9/13/12	Yellow Red		Green Yellow		MCB	Banded in Maryland in 2010 at ASIS
9/13/12	Orange	blue	metal	blue	MCB	Great Lakes, MI-SLBE
9/13/12	metal	Red	Orange	Red	MCB	Great Lakes, MI
9/14/12				metal	NCB	unknown
9/21/12	Orange	blue	metal	blue	MCB	Great Lakes, MI-SLBE
10/16/12	Orange	Yellow	metal	Yellow/Orange/Yellow	SB	Great Lakes, MI-SLBE
10/16/12	Orange		metal	blue/Red/blue	SB	Great Lakes
10/30/12	Orange	Yellow	metal	Yellow/Orange/Yellow	NCB	Great Lakes, MI-SLBE
12/16/12	Orange	Yellow	metal	Orange/Yellow	SB	Great Lakes
12/19/12	metal	Orange/Blue		Blue	SCB	Great Lakes, Canada-Hatched 2012 Wasaga Beach Ontario



### Figure 6. Piping Plover Non-Breeding Observations 2012



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December 2012

FILE: PP\_NB\_12