

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

2011 SUMMARY REPORT



Great Lakes banded bird, breeding pair NCB 25 at Old Drum Flats. Matthew Hillman NPS Photo 2011

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Abstract

A total of 41 pairs of piping plovers nested at Cape Lookout National Seashore (CALO) in 2011. The birds at CALO accounted for 65% of the nesting pairs in North Carolina. Thirty one pairs nested on North Core Banks and 10 pairs on South Core Banks. Egg-laying was initiated on April 16th and a total of 48 nest attempts were documented. Thirty five nests hatched and 37 chicks fledged. Productivity was 0.90 chicks fledged per nesting pair. Four broods foraged on the oceanside in 2011.

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 65% 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 2011, 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 closing of Old Drum and New Drum Inlets in March 2009 the seashore was divided into three barrier islands for the 2011 breeding season. The northernmost island, North Core Banks (NCB) was approximately 23 miles long, extending from Ocracoke 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.

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 2011. 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 15th 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 41 pairs of piping plovers nested at CALO in 2011 (Table 1 & 2). Thirty one pairs nested on North Core Banks (NCB), and ten pairs on South Core Banks (SCB), Appendix 1. Birds nested in eight distinct areas (Figure 1). The four mile area around Ophelia Inlet contained the highest number of nesting pairs. The birds at CALO accounted for 65% of the nesting pairs in North Carolina in 2011.

Table 1. Number of Pairs by Nesting Areas

ISLAND	NESTING AREA	NUMBER OF PAIRS
North Core Banks	Ocracoke Inlet	1
North Core Banks	Portsmouth Flats	12
North Core Banks	Old Drum Inlet	8
North Core Banks	New Drum Inlet	8
North Core Banks	Ophelia Island	2
South Core Banks	Plover/Ophelia Inlet	8
South Core Banks	Cape Point	1
South Core Banks	Power Squadron Spit	1

Table 2. Piping Plover Breeding Pairs at Cape Lookout National Seashore 1989-2011

	1989	1992	1993	1994	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Ocracoke Inlet	0	2	0	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Portsmouth Flats	14	8	9	7	8	17	15	9	11	9	8	6	4	6	8	14	14	12	13	12
Kathryn-Jane Flats	7	11	9	12	11	10	8	2	1	1	2	1	1	2	1	3	0	1	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
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
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
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
Cape Point	0	0	0	0	0	0	0	1	0	0	0	0	0	4	3	2	3	2	2	1
Power Squadron Spit	3	2	3	2	2	1	2	1	0	0	0	1	0	1	1	2	1	1	1	1
Shackleford Banks														1	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

Nests

There were 48 nesting attempts made in 2011 (Appendix 2). The earliest nest initiation was on April 16th and the latest was on June 20th. Thirty five nests were on NCB and thirteen were on SCB. Of the 48 nests, 7 were re-nests. Thirty five of the 48 nests hatched and 37 chicks were fledged from 24 different broods. The average clutch size was 3.37 eggs and 102 of 155 eggs hatched. Productivity for CALO was 0.90 chicks fledged per nesting pair (Table 3 & Appendix 3). Refer to Figures 2-9 for detailed maps of nests and nesting sites, (2009 DOQQ base layer).

Table 3. Piping Plover Nesting Success at CALO 1989-2011

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

Predator Exclosures

In 2011, predator exclosures were used to protect 34 (71%) nests. Thirty one (91%) of the nests with exclosures hatched. Three nests with predator exclosures didn't hatch. Two were abandoned and one was lost to flooding. Predator exclosures were not used on 14 nests, of these four nests hatched, three were lost to ghost crabs, two nests were lost to raccoon predation, one nest was lost to mink predation, two were abandoned, one was lost to flooding, and one was lost to unknown reason (Appendix 1). Table 4 shows likely causes of nest losses for all nests. The predator column includes one mink loss, three ghost crabs losses, and two raccoon losses.

Table 4. Likely Causes of Piping Plover Nest Losses in 2011.

NESTING AREA	# NESTS	# LOST	PREDATORS	STORM	ABANDONED	UNKNOWN
Ocracoke Inlet	1	0	0	0	0	0
Portsmouth Flats	14	2	0	0	2	0
Old Drum Inlet (NCB)	9	2	1	1	0	0
New Drum Inlet (NCB)	9	2	0	1	0	1
Ophelia Island (NCB)	2	0	0	0	0	0
Plover Inlet (Mile 23.6)	10	5	3	0	2	0
Cape Point	1	0	0	0	0	0
Power Squadron Spit	2	2	2	0	0	0
Total	48	13	6	2	4	1

Predator Control

There was no predator control in 2011.

Brood Foraging and Beach Closures

Four broods foraged on the ocean beach in 2011. The area between Ophelia Inlet and Ramp 24, 1 mile in length, was completely closed to vehicles (except for NPS monitors) from May 26th to July 20th. A second ocean beach closure to vehicles was established on the west side of Cape Point, 0.5 mile in length, from June 1st to June 7th specifically for expected piping plover chicks. The third ocean beach closure to vehicles was established at New Drum Flats from mile 21.3 to Ophelia Inlet, 1.4 mile in length, from June 4th to July 7th. A fourth ocean beach closure to vehicles was posted at Portsmouth Flats from mile 2.9 to mile 3.62, from June 4th to June 16th. A fifth ocean beach closure was posted again at Portsmouth Flats from mile 2.45 to mile 3.22, from July 27th to August 10th. 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.

Two of these broods were observed foraging on the oceanside at Portsmouth Flats. Two broods foraged on both the oceanside and soundside of New Drum Flats. The chicks at Cape Point were lost by day 3 and were not seen out on the ocean beach. 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 2011 covered the entire seashore from January to August. Hurricane Irene re-opened Old Drum and New Drum Inlets in late August. Surveys from September to December didn't include Middle Core Banks. Table 5 below list this year's counts. Appendix 4 lists non-nesting counts from 2003-2011. Figure 10 illustrates non-breeding piping plover observations and critical habitat units.

Table 5. Non-Nesting Piping Plover Counts at Cape Lookout National Seashore, 2011.

	January	February	March	August	September	October	November	December
NCB	6	7	12	81	29	26	7	2
SCB	2	0	8	26	8	19	3	4
SB	7	8	13	0	20	6	11	11
Total	15	15	33	107	57	51	21	17

Banded Piping Plovers

Thirty re-sight observations of 18 non-breeding banded birds were made in the park in 2011. Two banded females nested in the seashore on NCB. One was banded as a chick in the Great Lakes (Of, YY: X, R) and nested at Old Drum Flats, nest 26. This is the first known record of an Endangered Great Lakes bird nesting in the seashore. This pair successfully fledged two chicks. The second female was banded in the Bahamas as a wintering adult (-, W:-, YL) and nested at Portsmouth Flats, nest 30. This is the second record of a Bahaman banded bird nesting in the seashore.

Discussion

Nesting Habitat

The habitat at New Drum Flats and Old Drum Flats continued to provide excellent nesting and foraging opportunities in the breeding season of 2011. In late August after the breeding season had finished, Hurricane Irene reopened Old Drum and New Drum Inlets, cutting channels and causing severe erosion at these sites. Much of the 2011 nesting sites are currently exposed only at low tides. 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. That section supported 4 pairs in the breeding season before the storm. The remaining nesting habitat is much improved after the storm. The storm surge and overwash removed most of the vegetation, created big sand flats, created ponds and mudflats. This high quality nesting habitat from Old Drum to Plover Inlet contained 63% (26 pairs) of the nesting pairs in 2011. It is unknown if this area will be able to support as many pairs in 2012. Portsmouth Flats, another important area, continued to provide nesting habitat on NCB for 12 pairs (29%). In 2011, 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 vehicles before the nest was discovered and then posted closed to all entry the day of discovery. The north tip of NCB at Ocracoke Inlet supported one nesting pair in 2011, the last nesting pair documented in this area was in 1999. Heavily revegetated Kathryn-Jane flats did not attract any nesting pairs in 2011. Hurricane Irene did clear away vegetation and create good sand flats which may attract pairs in 2012. Cape Point and Power Squadron spit only contained one nesting pair each.

Pair Numbers

The number of breeding pairs in the seashore decreased from 43 in 2010 to 41 in 2011. Although there was good productivity in 2010, the fledging success was 0.72 (31 fledglings), the pair count was down two pairs in 2011. The Plover Inlet nesting site lost 3 pairs and Cape Point was down one pair from 2010, while Old Drum Inlet gained 2 pairs from 2010 to 2011.

Nest Success

2011 brought relatively high hatch success for piping plover nests in the park, 73% of the nests and 66% of the eggs hatched successfully. The six predator related nest losses accounted for 46 % of total losses. Mink predation took one nest, three were ghost crab predation, and two were raccoon predation. Four (31%) nests were abandoned. Only two (2%) nests were lost to flooding or wind. This low storm loss was important to the high hatch success. One (1%) nest loss was recorded as unknown. Nest hatch success by area for the time period of 1998 to 2011 is presented in Table 6.

In 2011, predator exclosures were effective in protecting nests from predators. No nests were lost to predators with predator exclosures. This includes no losses to ghost crabs which can enter the predator exclosures. Since 1997, at least 33 nests protected by exclosures have lost eggs to ghost crabs. Predator exclosure use decreased slightly from 79% in 2010 to 71 % in 2011. This decrease was in part due to four missed nests that were discovered after they hatched and because nests were lost early in the egg laying stage. There were no observations of raccoons circling or digging at predator exclosures on SCB or NCB.

Predator exclosures have generally been effective in increasing hatch success. From 1997-2011, 68% of the nests protected with exclosures hatched, compared with 41% of the nests left unprotected.

Fledging Success

The fledging success for piping plovers at CALO was the second highest recorded for the seashore at 0.90 chicks fledged per nesting pair in 2011 (Appendix 3, Chart 2). The actual number of chicks fledged, 37 fledglings, is the highest on record for CALO.

Traditionally unproductive, Portsmouth Flats continued to produce chicks for the third year in a row with 13 fledglings from 12 pairs for productivity of 1.08. The Old Drum Flats nesting site has grown from one nesting pair in 2008 to eight nesting pairs in 2011. The eight pairs hatched seven nests and produced 11 fledglings for a productivity of 1.38. The New Drum site, which includes old Ophelia Island, had 10 pairs, 11 nests and fledged 11 chicks for a productivity of 1.10. At the Plover Inlet site, two fledglings were

produced from 8 pairs for a fledge success of 0.25. At Ocracoke Inlet, Cape Point and Power Squadron Spit there was no fledgling success in 2011 and Kathryn-Jane Flats had no nesting activity. Site by site reproductive successes for 2011 can be compared to the long term averages in Table 6. In 2011 Portsmouth Flats, Old Drum, and New Drum had a significantly higher fledge success than the 14 year average for these same sites. Table 6 reflects positive numbers only, Kathryn-Jane, Old Drum, and Cape Point have multiple years with zero pairs and nests.

Oceanside foraging areas contributed to fledgling success in 2011. At Portsmouth Flats two chicks from two different broods foraged on the oceanside. One of these chicks fledged. At New Drum Flats two broods foraged on both the oceanside and soundside, with one chick from each brood fledging. Chicks at the above areas received ocean beach closures.

Table 6. Differences in Reproductive Success between Major Nesting Areas for the Period of 1998-2011.

Nesting Area	Hatch Success	Fledge Success
Portsmouth Flats	50%	0.43 chicks per pair
Kathryne-Jane Flats	47%	0.61 chicks per pair
Old Drum Flats	62%	0.67 chicks per pair
New Drum& Ophelia Island	68%	0.67 chicks per pair
Plover Inlet	58%	0.71 chicks per pair
Cape Point	76%	0.22 chicks per pair

Predators

There were no confirmed reports of red fox (*Vulpes vulpes*) in the seashore in 2011. A gray fox (*Urocyon cinereoargenteus*) was spotted on Shackleford Banks this summer. In an effort to prevent mink predation, three piping plover nests were fitted with predator exclosures with 2X2 inch wire mesh. Two of these nests hatched and one nest was abandoned for unknown reasons. There were no signs of mink at these nest exclosures. It is unknown if the 2X2 inch wire mesh helped or not. One nest without any exclosure was predated by mink within 0.5 mile of the above three nests. Mink were first recorded on SCB in 2007. Raccoon and feral cat tracks at nest sites continue to be a concern. One nest was taken by raccoon on NCB and one on SCB. In 2011 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 four citations for pedestrians in bird areas and four citations for vehicles in bird areas in 2011.

Dogs were also a potential source of disturbance to nesting birds. Resource management staff documented 158 dogs on leash and 49 dogs off leash in 2011. This survey revealed

76% of dogs were on leash and 24% were off leash. This survey did not cover all dog sightings in the seashore. Law enforcement rangers issued 63 dogs off leash citations, 26 written warnings, and 145 verbal warnings in 2011.

Non-nesting piping plovers

CALO continues to be an important migration stopover location and wintering site for piping plovers. In 2011, 341 observations of piping plovers were recorded 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; as well the area from Old Drum Inlet flats to Ophelia Inlet had high numbers of birds counted in August before access was cut off by Hurricane Irene. On NCB, 81 piping plovers were counted on the August 15th count. Eleven banded piping plovers from the endangered Great Lakes population were re-sighted in 2011. In addition two birds banded in the Bahamas were re-sighted in 2011.

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. Forty one breeding pairs were found in CALO in 2011 surpassing the target of 25 or more pairs of performance measure one. Forty one pairs produced 48 nests (1.17 nest per pair) surpassing the target of at least one nest per breeding pair of performance measure two. The 41 nesting pairs produced 37 fledglings for a fledge rate of 0.90, which is above 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.

Conclusions

2011 was a record year for the number of piping plover fledglings, 37 in total. This surpasses the 2009 and 2010 highs of 30 and 31 fledglings respectively. The majority of the fledglings were produced from North Core Banks at three sites, New Drum, Old Drum, and Portsmouth Flats. New Drum Flats raised 11 chicks, Old Drum fledged 11 chicks, and Portsmouth Flats produced 10 chicks. In 2012 we may see productivity shift away from New Drum and Old Drum Flats to Plover Inlet due to the storm effects of Hurricane Irene.

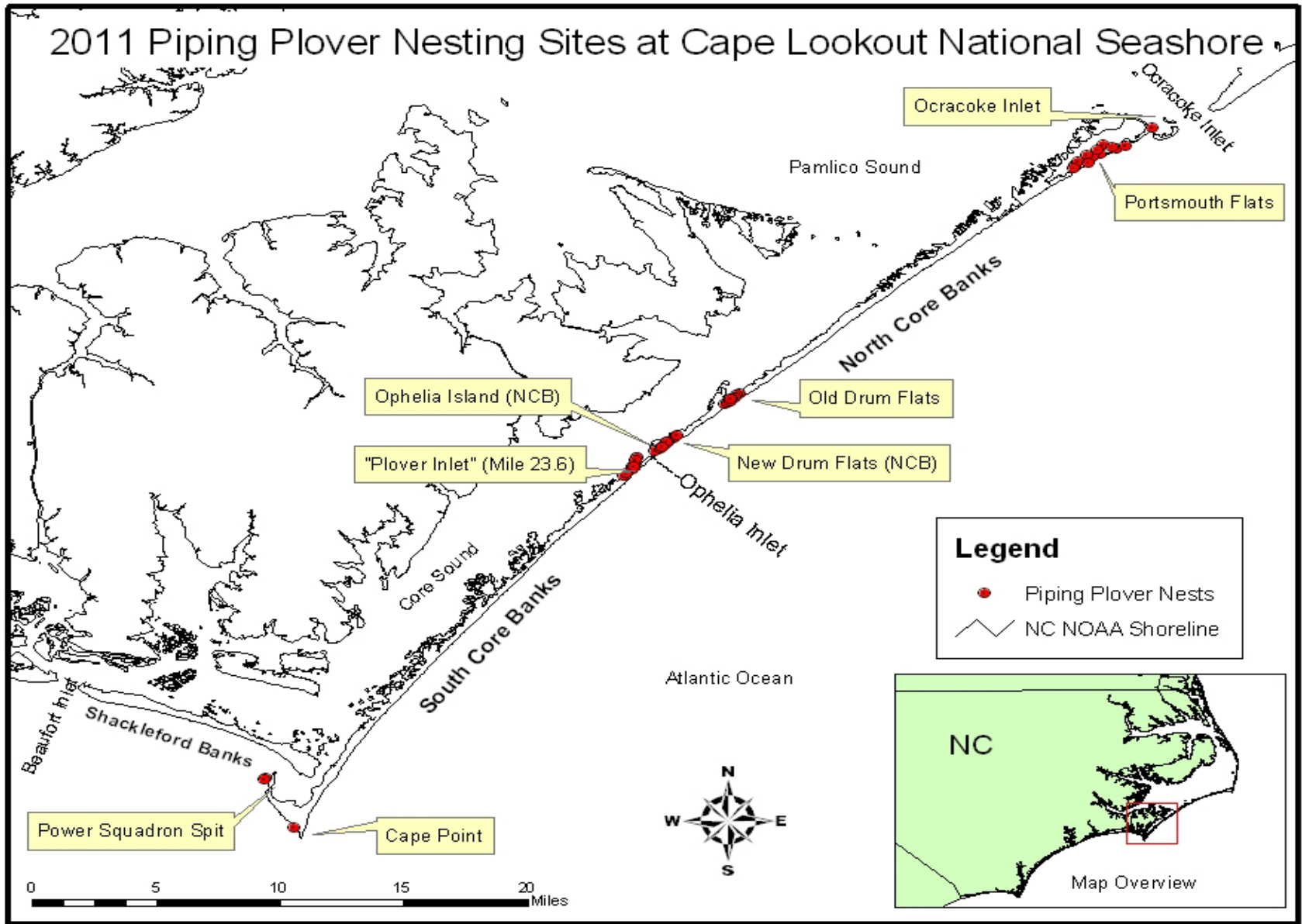


Figure1. Map of 2011 Piping Plover Nesting Sites at Cape Lookout National Seashore.

Appendix 1- 2011 PIPING PLOVER WINDOW CENSUS

2011 Piping plover breeding census results: June 1-9

North Core Banks: 31 pairs, 1 single

Ocracoke Inlet 1 pairs, 1 single

Portsmouth Flats 12 pairs

Old Drum Inlet 8 pairs

New Drum Inlet 7 pairs

Ophelia Island 3 pairs

South Core Banks: 10 pairs

Plover Inlet 8 Pairs

Cape Point 1 Pair

Power Squadron Spit 1 Pair

Shackleford Banks: 0 piping plovers

Cape Lookout National Seashore: 41 pairs, 1 single bird

Appendix 2- 2011 PIPING PLOVER NEST DATA

NORTH CORE BANKS

Nest #	Pair #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS
1	1	21.48	16-Apr	4	21-Apr	16-May	4	1	fledged 6/12 at day 27, foraged on soundside, on oceanside on 6/11
2	2	21.74	22-Apr	4	26-Apr	22-May	3	1	fledged 6/18 at day 27, foraged on soundside
3	3	19.23	25-Apr	4	30-Apr	28-May	4	2	fledged 6/25 at day 28, foraged soundside
4	4	19	25-Apr	4	27-Apr	26-May	3	2	fledged 6/25 at day 29, foraged soundside
5	5	22.26	26-Apr	4	26-Apr	23-May	1	1	fledged 6/18 at day 27, foraged soundside
6	6	22.39	26-Apr	2	30-Apr	21-May	2	1	fledged 6/16 at day 28, foraged on soundside of inlet
7	7	3.22	27-Apr	1	NA	NA	0	0	found with one egg and then never relocated, area sanded in
8	8	21.76	30-Apr	3	2-May	28-May	3	1	fledged 6/27 at day 30, foraged soundside
9	7	3.23	30-Apr	4	5-May	1-Jun	4	0	lost by 6/10 at day 10, foraged ocean and pond behind dune. Maintenance drove thru ocean beach closure unassisted in tractor on 6/7. Last day chick seen 6/8/11
10	9	18.52	2-May	4	5-May	UNK	4	1	fledged 7/5 at day 29, foraged soundside,
11	10	2.24	2-May	4	7-May	4-Jun	3	2	fledged 7/3 at day 27, foraged pond 3
12	11	21.91	3-May	4	5-May	4-Jun	4	3	fledged 7/2 at day 28, foraged soundside
13	12	18.65	2-May	3	7-May	6-Jun	2	1	fledged 7/4 at day 28, foraged soundside,
14	13	1.94	5-May	4	9-May	NA	0	0	eggs stacked one up top the three others abandoned
15	14	21.35	5-May	4	7-May	2-Jun	3	1	fledged 6/30 at day 29, foraged ocean beach moved south to ND. Foraged between ND and ND wash area soundside.
16	15	1.63	6-May	3	9-May	2-Jun	2	2	fledged 6/28 at day 27, foraged pond 1 PF.
17	16	1.76	8-May	4	9-May	6-Jun	4	2	fledged 7/4 at day 27, foraged pond 2,

18	17	18.77	10-May	4	10-May	29-May	3	2	fledged 6/25 at day 27, foraged soundside,
19	18	2.7	10-May	4	11-May	5-Jun	4	0	lost 6/10 at day 6, foraged at back pond on soundside south portsmouth.
20	19	2.52	11-May	4	12-May	3-Jun	4	2	fledged 7/3 at day 30, foraged at pond 3 PF.
21	20	22.04	12-May	1	NA	NA	0	0	nest flooded out on 5/15
22	21	1.38	14-May	4	14-May	2-Jun	3	1	fledged 6/28 at day 27, foraged pond 1 PF.
23	22	22.18	17-May	2	NA	NA	0	0	lost on 5/22, unknown
24	23	18.88	17-May	2	NA	NA	0	0	PIPL laid two eggs 5/19, two eggs 5/21, 0 eggs 5/22 Raccoon tracks present.
25	24	19.14	18-May	4	21-May	18-Jun	3	1	fledged 7/17 at day 31, foraged soundside
26	25	19	22-May	4	23-May	15-Jun	4	2	fledged 7/12 at day 30, foraged soundside. Banded Female Of,YY;X,R
27	26	21.8	25-May	4	29-May	24-Jun	4	0	Chicks lost 7/6. nest flooded on 6/23
28	20	22	26-May	4	30-May	26-Jun	3	2	fledged 7/23 at day 27, foraged soundside
29	27	3	27-May	4	31-May	26-Jun	3	0	Chicks lost 7/11 at day 9
30	28	2.7	30-May	4	30-May	22-Jun	3	0	Bahaman banded bird: black upper, yellow bottom; left white (female).
31	29	2.4	1-Jun	4	NA	30-May	4	3	missed nest, estimated hatch date 5/30, fledged 6/30 at day 27. Foraged at pond 3
32	30	3.4	31-May	UNK	NA	29-May	1	0	missed nest, estimated 5/29 hatch date, foraged at ocean beach- closure 6/4-6/16 2.9 to 3.62 and back pond . Lost 6/13 at day 9,
33	23	18.91	2-Jun	3	4-Jun	NA	0	0	flooded and lost 6/18
34	31	0.22	12-Jun	4	15-Jun	12-Jul	1	0	Lost 1 egg before hatch date due to flooding. 1 chick seen on 7/12, Chick lost 7/13 at day 2.
35	19	2.7	27-Jul	UNK	NA	17-Jul	1	1	missed nest, estimated hatch date 7/17 fledged 8/9 at day 27., foraged ocean beach, beach closure 2.47 to 3.23, found foraging on beach aged at 10-12 days old

31 nesting pairs, 35 nests, 29 hatched nests, 35 chicks fledged

SOUTH CORE BANKS

Nest #	Pair #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS
1	1	23.04	24-Apr	4	9-May	28-May	1	0	Chick lost 6/4 at day 8. Foraged soundside Lost two eggs on 5/13 washed over and Ghost Crab holes present.
2	2	23.06	25-Apr	4	8-May	28-May	4	1	Fledged 6/30 at day 33. Foraged at soundside mudflats south of nest.
3	3	23.38	25-Apr	1	NA	NA	0	0	Abandoned 4/29. Unknown why.
4	4	23.26	25-Apr	2	NA	NA	0	0	4/28 high winds, maybe abandoned, Lost by 5/1 ,raccoon tracks surrounding nest.
5	3	23.38	30-Apr	3	NA	NA	0	0	Lost 5/4,mink tracks next to nest.
6	5	44.59	2-May	4	10-May	1-Jun	2	0	Lost 6/3 at day 3.
7	6	23.52	9-May	3	NA	NA	0	0	Lost 5/19 , Large ghost crab hole present a 1 foot from nest
8	7	47.12	12-May	2	NA	NA	0	0	Lost 5/16, reason unknown, possible ghost crab predation
9	8	23.08	14-May	3	20-May	15-Jun	3	0	Lost 6/28 at day 13, foraged south of nest at mudflat, 2x 2 inch mesh exclosure
10	7	47.03	21-May	2	NA	NA	0	0	Lost 5/25, Ghost Crab predation
11	3	23.37	27-May	4	31-May	NA	0	0	Abandoned 6/11 reason unknown, PIPL flushed at human disturbances, did bounce off net top once. 2x 2 inch mesh exclosure
12	9	23.85	30-May	4	31-May	22-Jun	2	0	Chick lost 7/12 at day 21, looked until 7/19, on 7/17 saw 2 adults with a fledgling on oceanside of area- unknown? , 2x 2 inch mesh exclosure
13	10	23.75	2-Jun	3	NA	UNK	3	1	Fledged 7/7 , missed nest found brood with three chicks foraged north end of mudflat & Oyster Cove.

10 nesting pairs, 13 nests, 6 hatched nests, 2 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

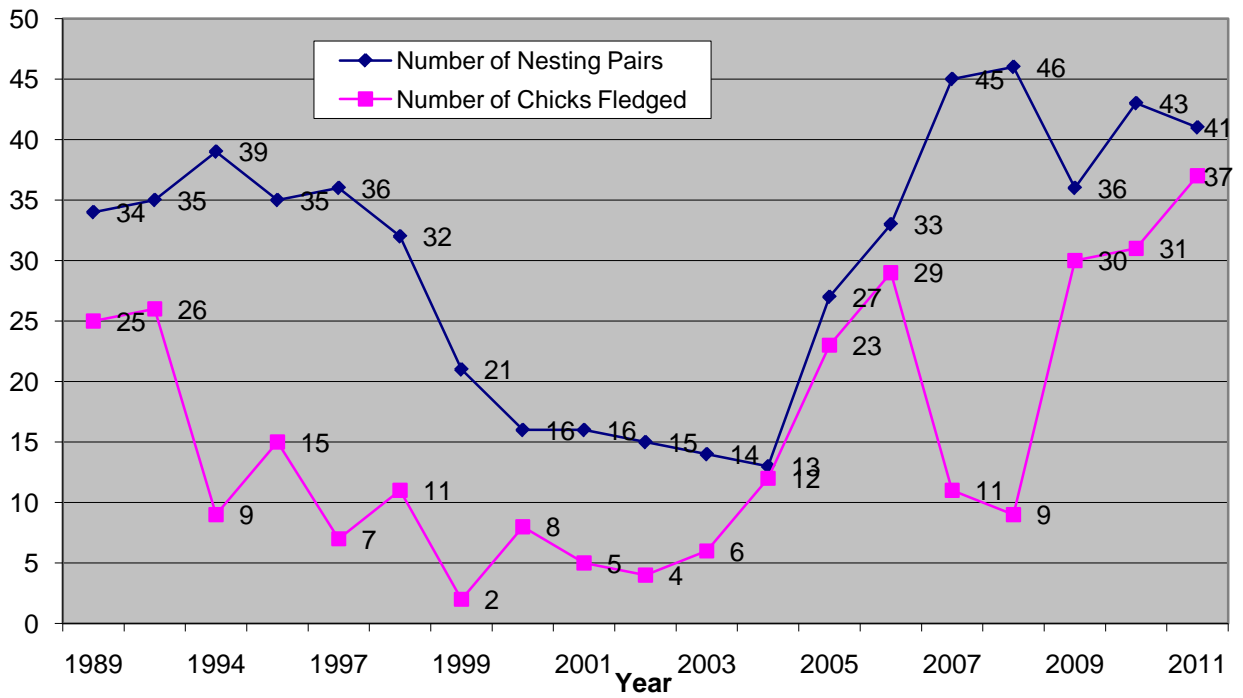


Chart 2. Piping Plover Productivity at Cape Lookout National Seashore

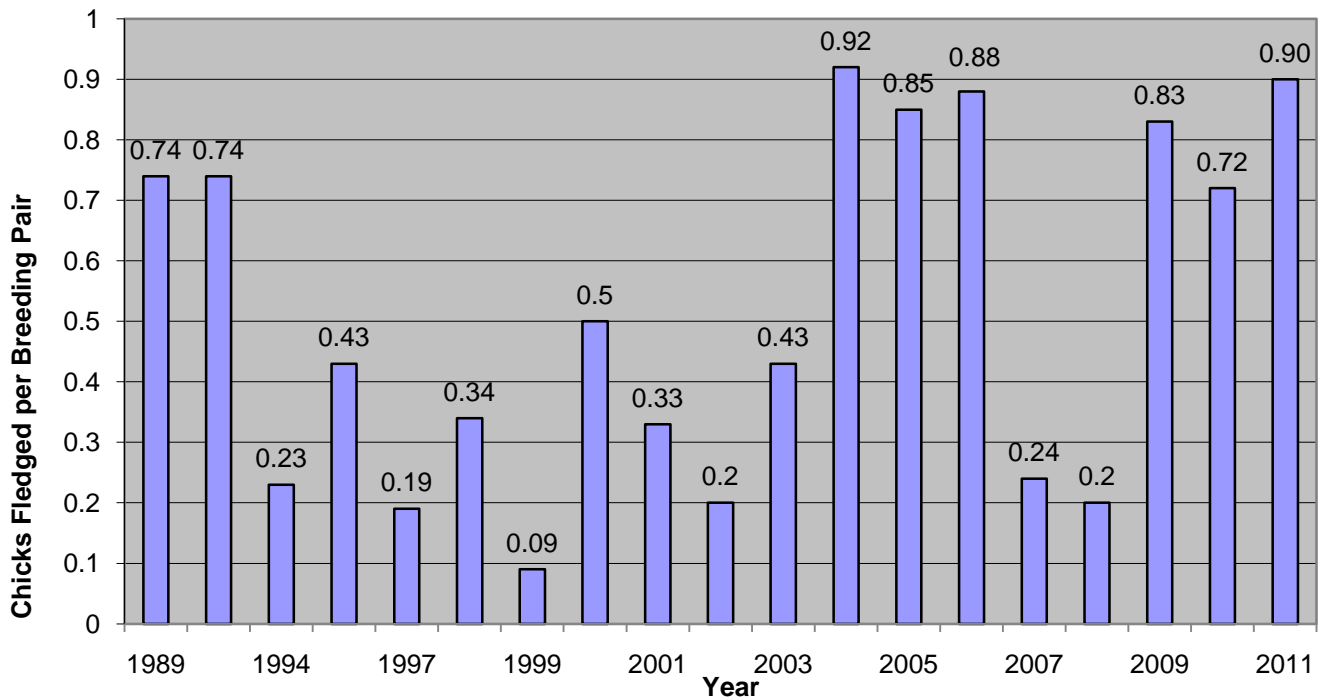




Figure 2. Ocracoke Inlet Nesting Site

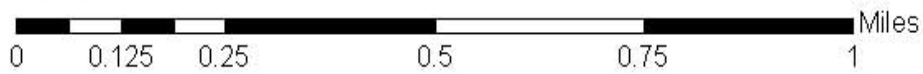
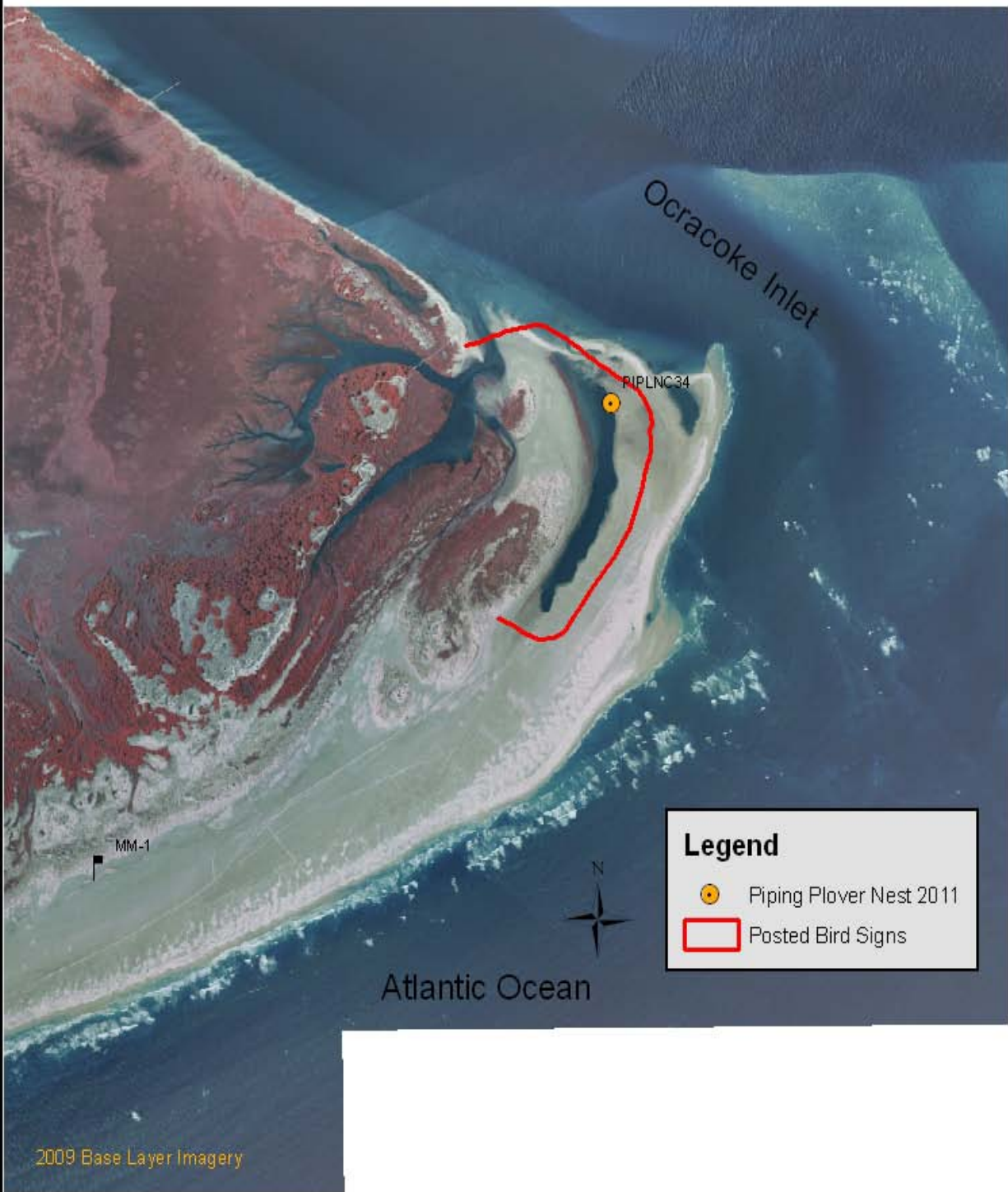
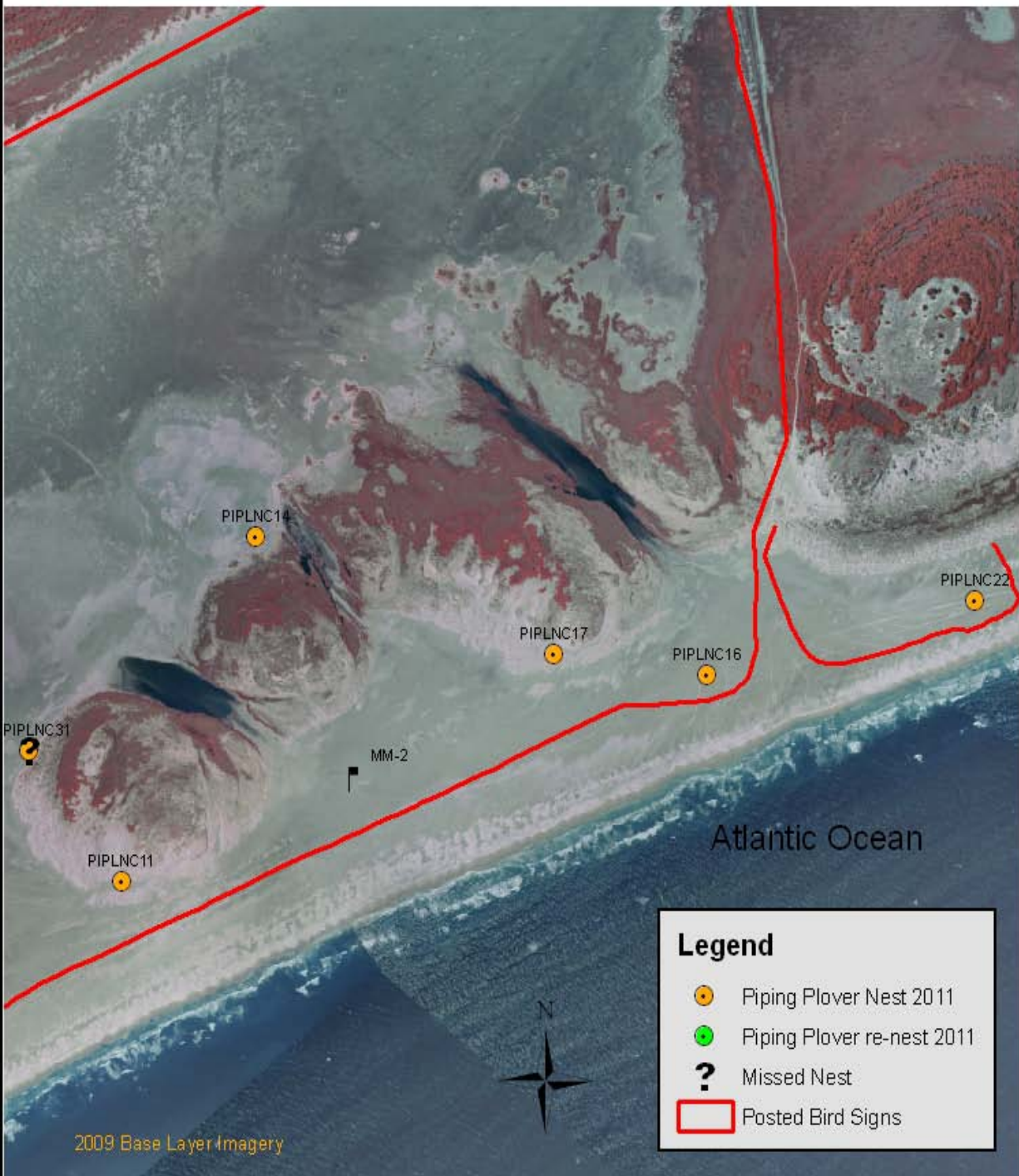




Figure 3. North Portsmouth Flats Nesting Site



0 0.125 0.25 0.5 0.75 1 Miles

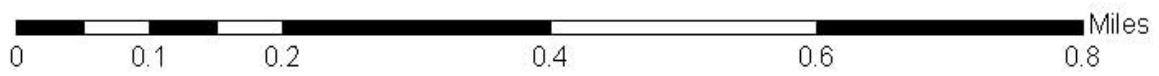
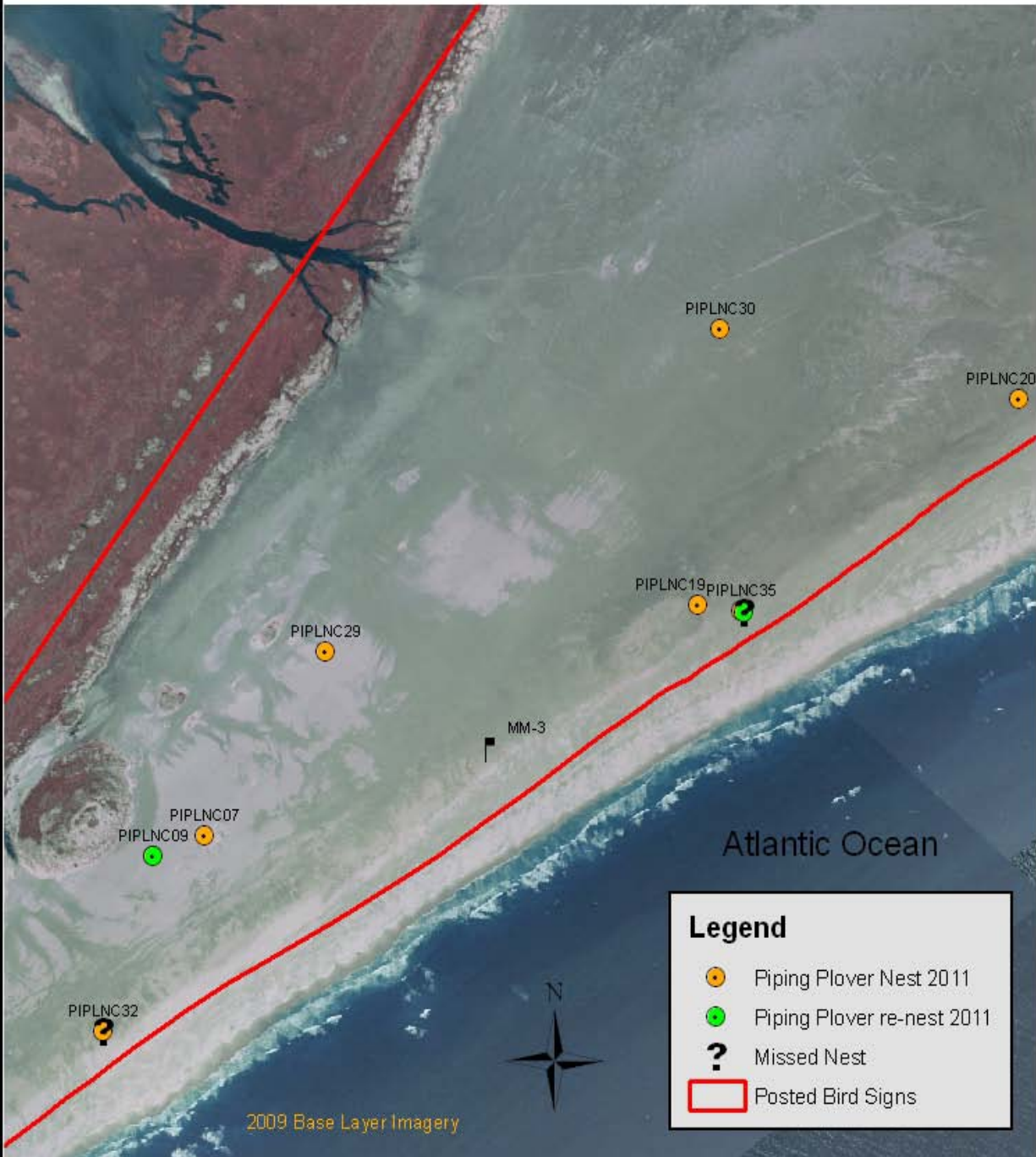
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FILE: PIPL_nest_maos_2011.mxd



Figure 4. South Portsmouth Flats Nesting Site



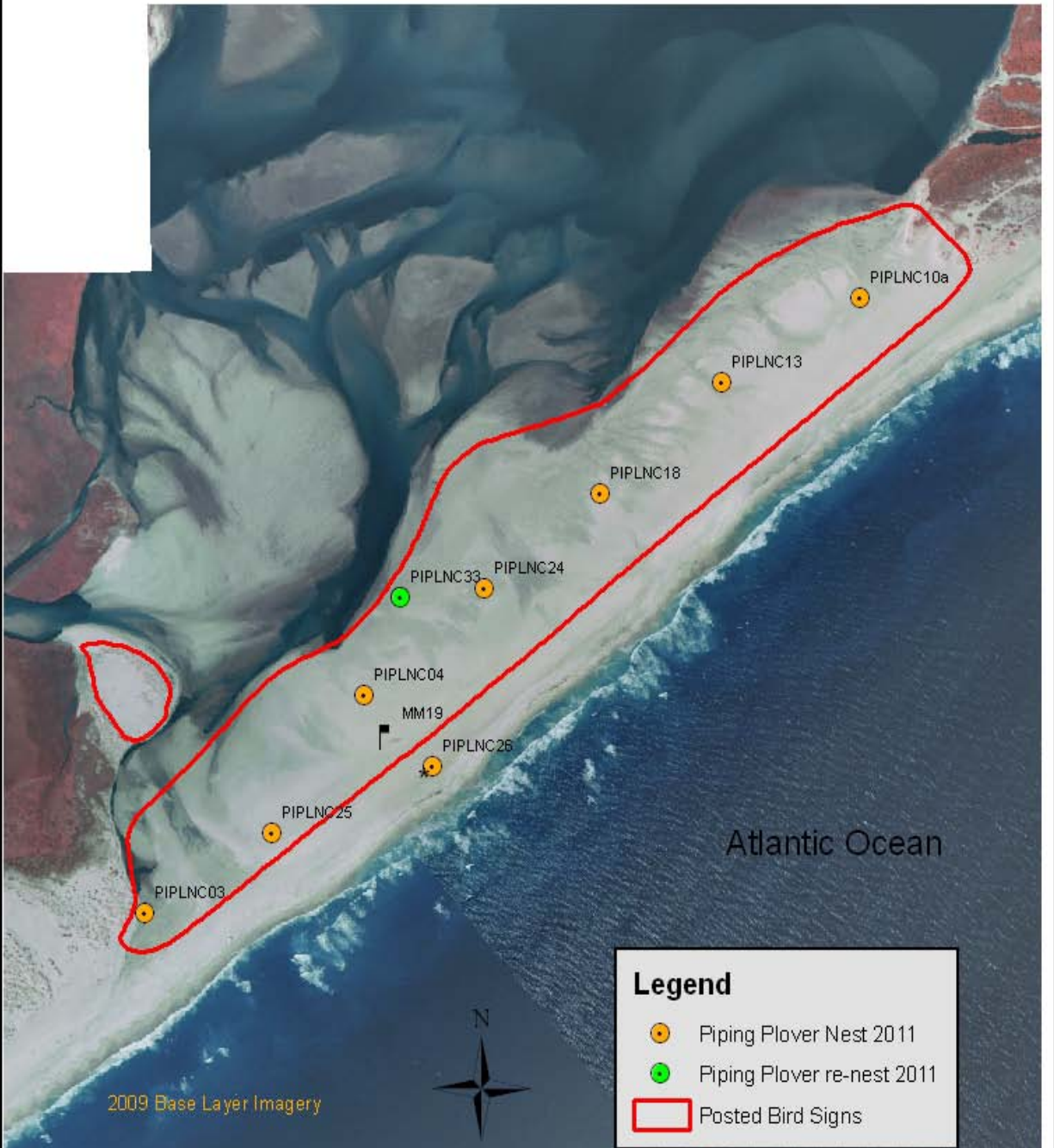
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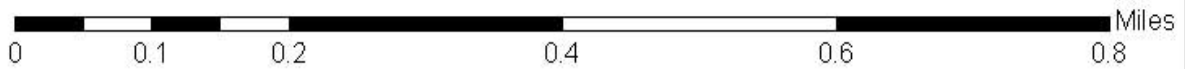
FILE: PIPL_nest_maos_2011.mxd



Figure 5. Old Drum Flats Nesting Site



* Posted bird area was expanded to include this nesting pair territory



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FILE: PIPL_nest_maos_2011.mxd



Figure 6. New Drum Flats and Ophelia Island Nesting Site

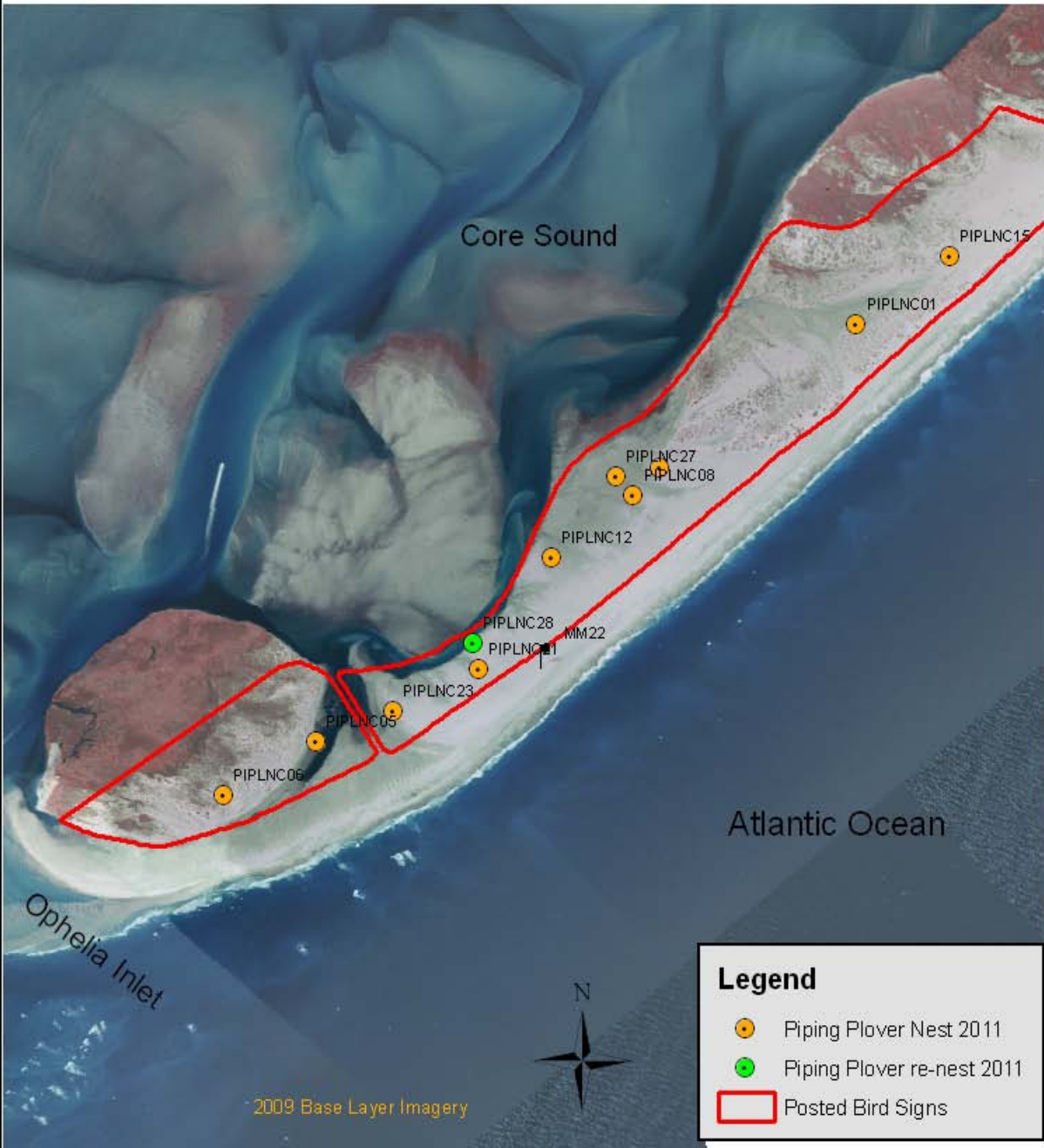
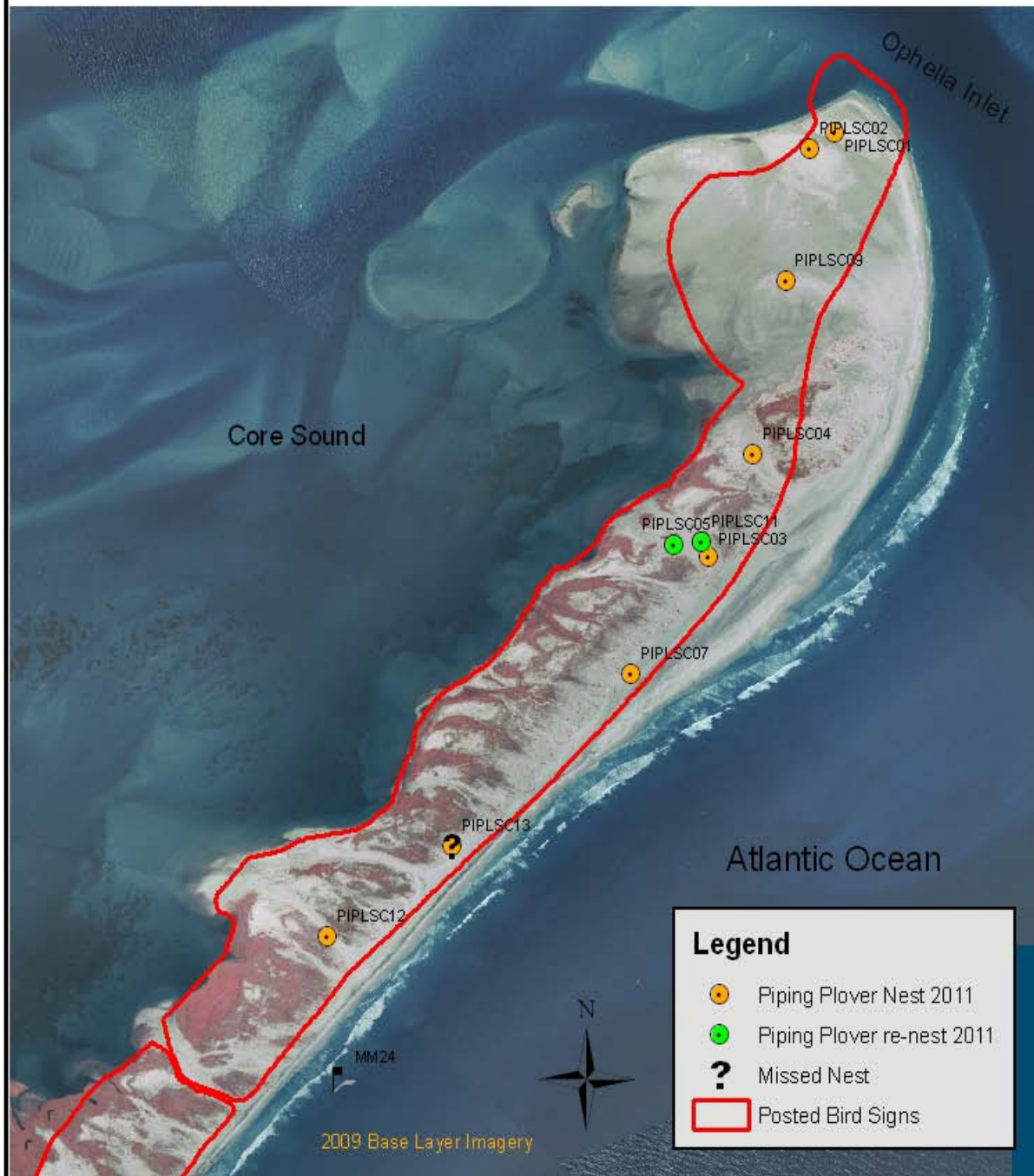




Figure 7. Plover Inlet Nesting Site



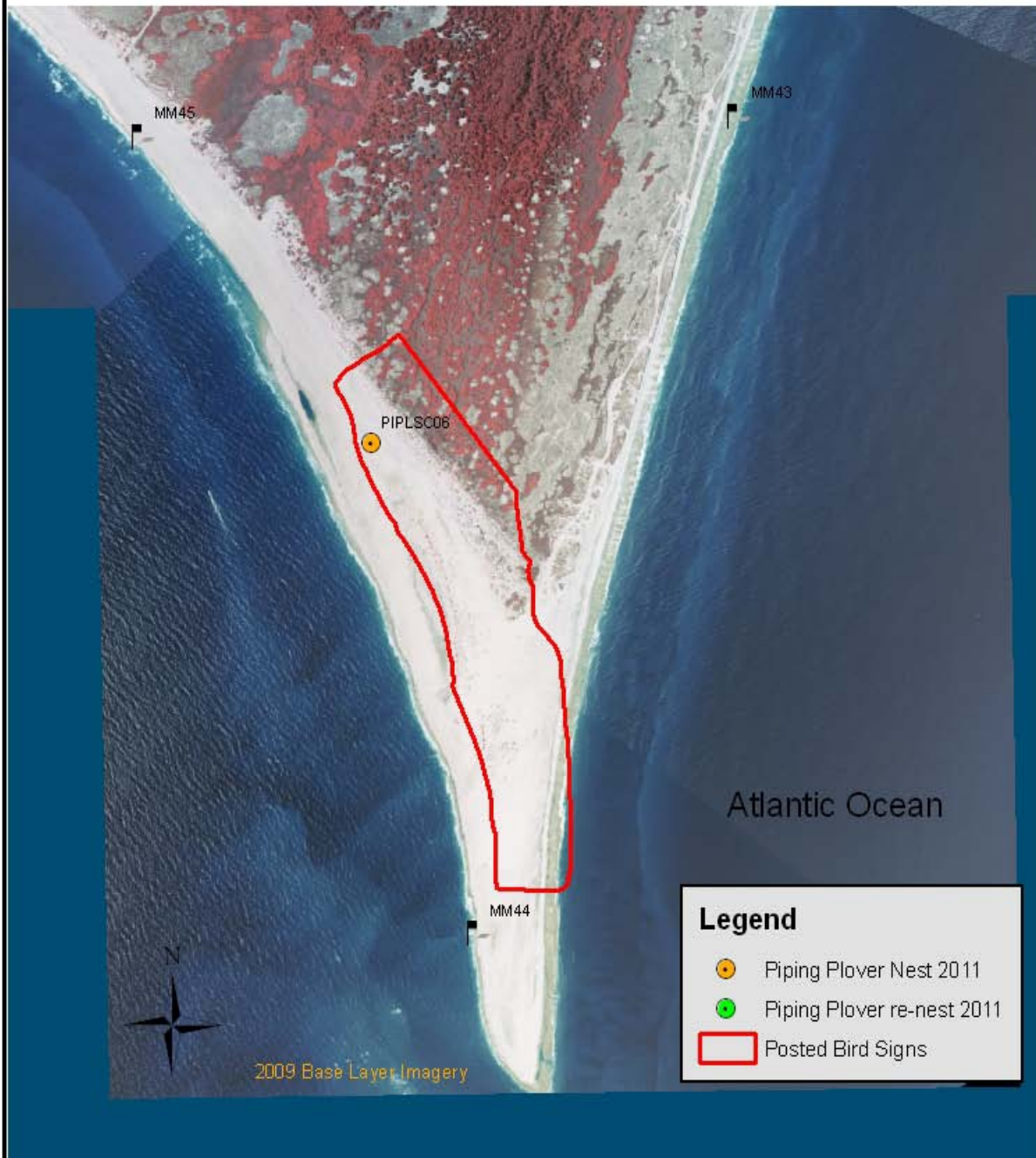
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FILE: PIPL_nest_maos_2011.mxd



Figure 8. Cape Point Nesting Site



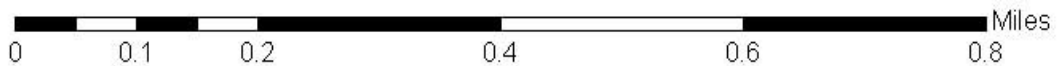
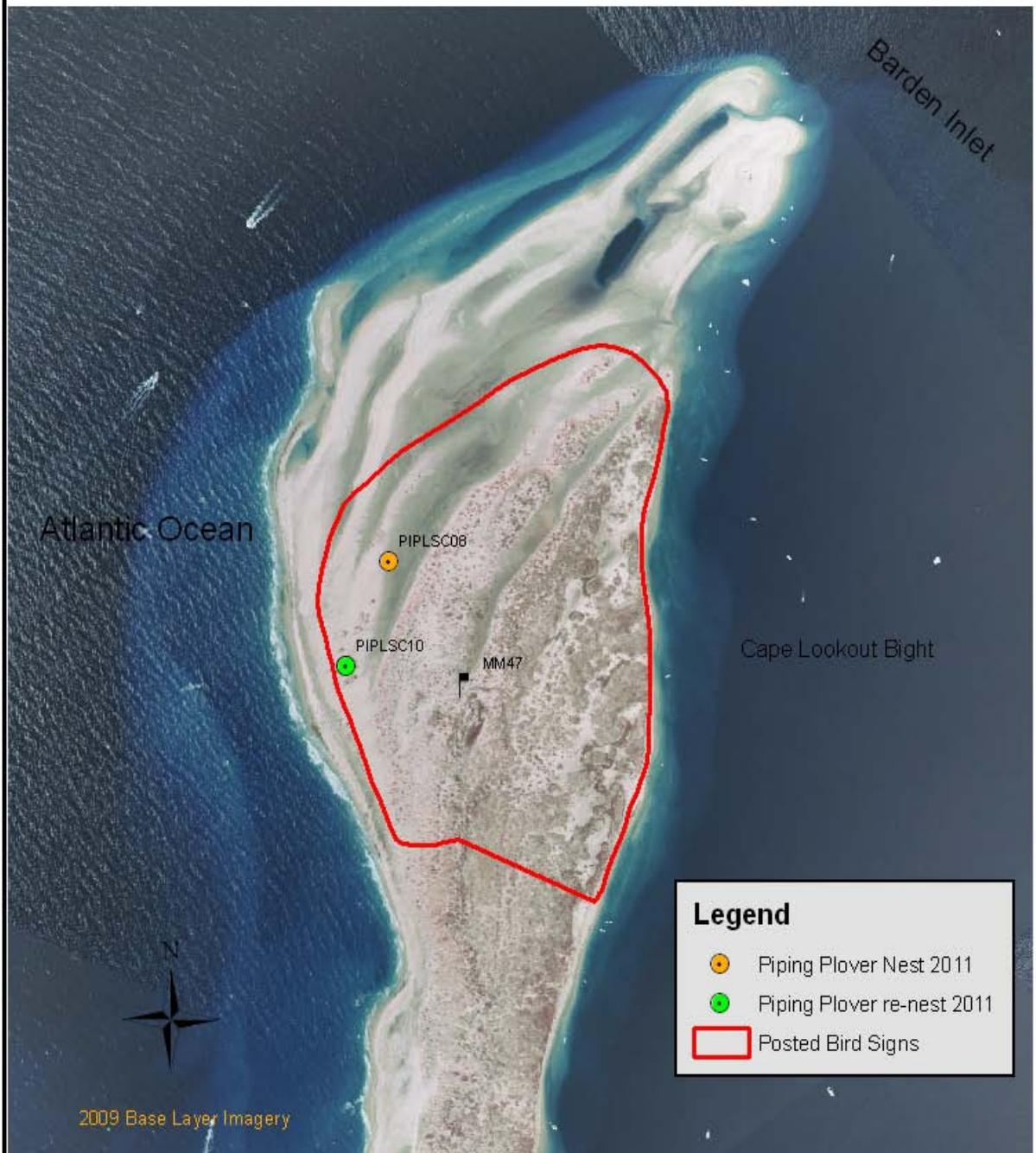
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FILE: PIPL_nest_maos_2011.mxd



Figure 9. Power Squadron Spit Nesting Site



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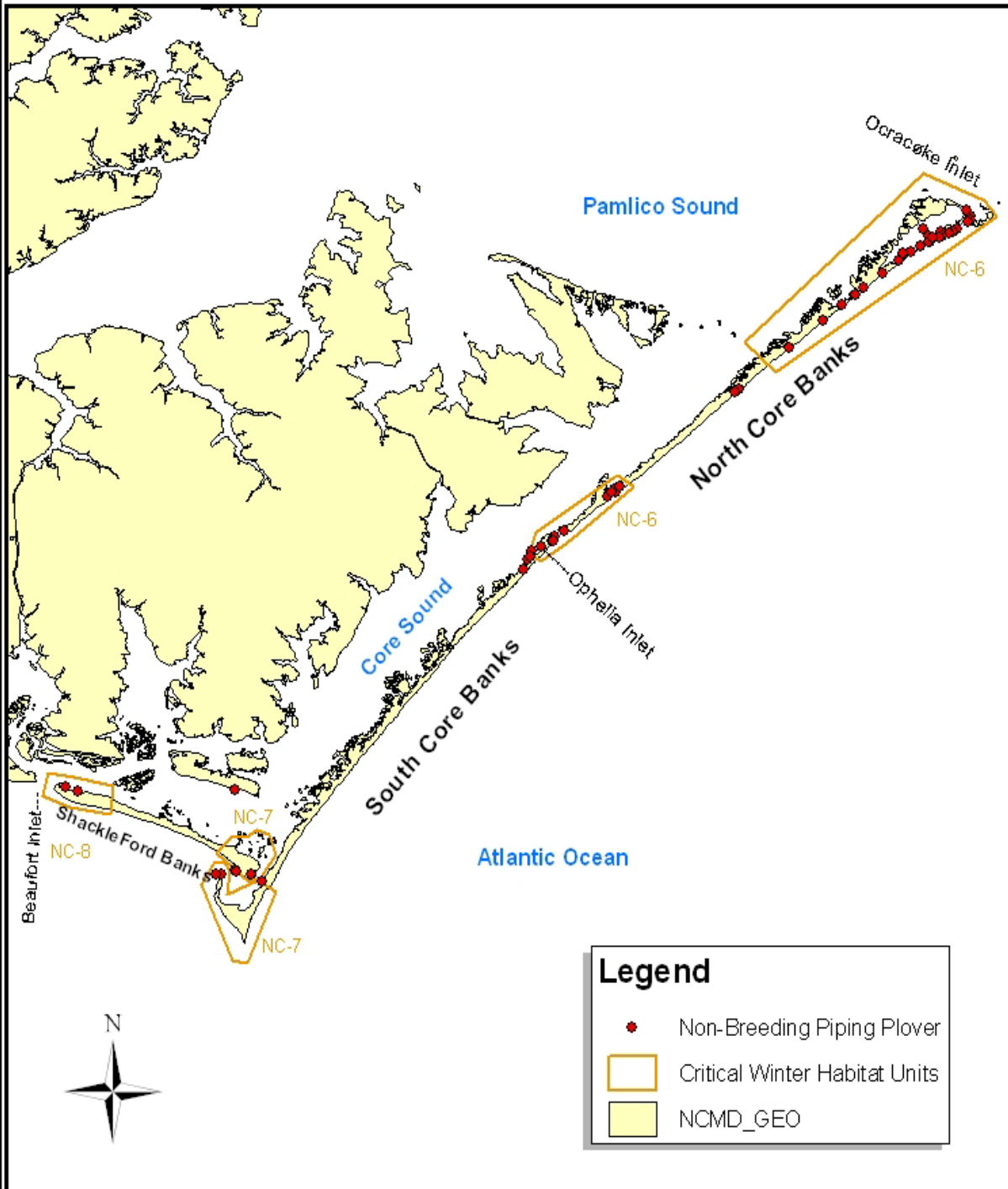
FILE: PIPL_nest_maos_2011.mxd

Appendix 4. Monthly counts of non-nesting piping plovers 2005-2011

Date	North Core Banks	South Core Banks	Shackleford Banks	CALO Total
January-05	26	5	6	37
February-05	0	1	6	7
March-05	7	0	10	17
August-05	29	14	1	44
September-05	44	25	6	75
October-05	18	3	9	30
November-05	4	2	9	15
December-05	2	2	2	6
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



Figure 10. Piping Plover Non-Breeding Observations 2011



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