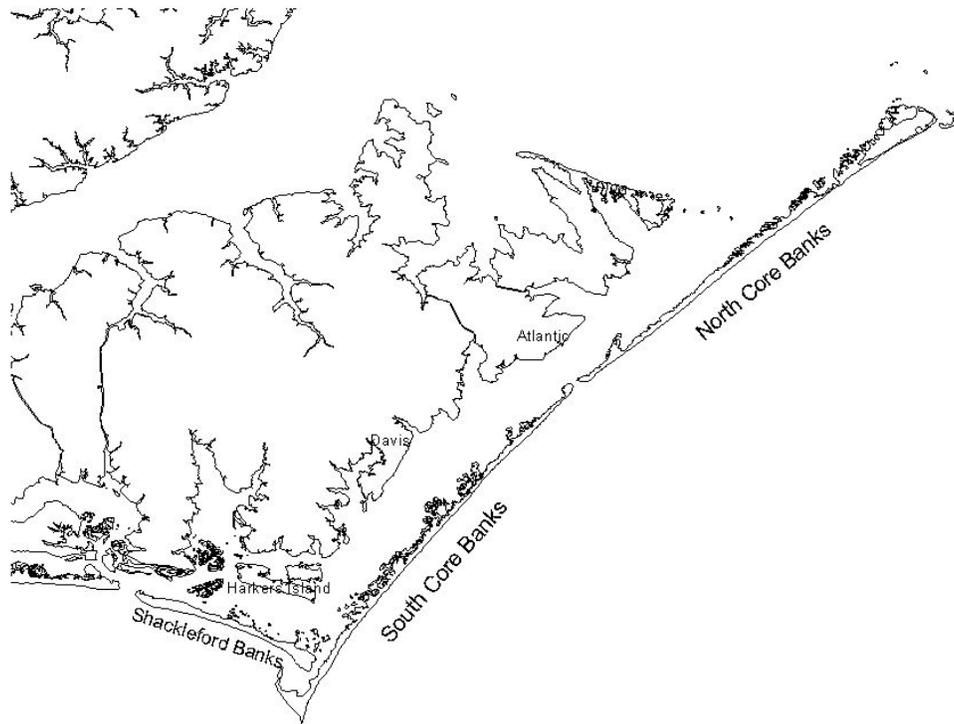


PIPING PLOVER (*Charadrius melodus*) MONITORING AT  
CAPE LOOKOUT NATIONAL SEASHORE

2006 SUMMARY REPORT



NATIONAL PARK SERVICE  
CAPE LOOKOUT NATIONAL SEASHORE  
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## **Introduction**

Piping plover monitoring at Cape Lookout National Seashore (CALO) began with a baseline study in 1989. The park is a significant nesting area, containing about 2/3 of the nesting pairs in the state of North Carolina. Monitoring focuses on identifying factors limiting nesting success and implementing methods to increase the productivity of this threatened species. This report contains a summary of monitoring results for 2006, comparisons to results from previous years and discussions based on long-term monitoring of piping plovers at CALO.

## **Methods**

Bird sanctuary signs were used to close all known piping plover nesting habitat to pedestrian and vehicular entry by April 1. Beginning in mid April, nesting areas were searched at least three times per week for territorial pairs and nests. The locations of nests were recorded, and the nests were monitored daily until they hatched or were lost. The area between Old Drum Inlet and Ophelia Inlet was only monitored about once a week.

Nests were protected with predator exclosures if the topography of the location was suitable. Exclosures were circular, 10 feet in diameter, made of 4"x 2" mesh wire fence anchored with steel rebar. Exclosures were topped with 3/4" mesh bird netting. 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 (except once a week in the area between Old Drum and Ophelia Inlet) until the chicks fledged or were lost. Any ocean beach foraging areas were closed to vehicle traffic while the chicks were present.

The area between Ophelia Inlet and Ramp 24 was completely closed to vehicles (except for NPS monitors) from May 12-August 8. The closure began two days before the expected hatch of the first nest in that area and remained in place until the last chick fledged.

Counts of wintering and migrating piping plovers were made monthly from August to March. The counts were made near the fifteenth of each month in the non-nesting season. The ocean beach, inlets and soundside sandy beaches were surveyed. Counts near Ocracoke Inlet were also done twice a week between July 31 and October 13.

## Results

### Nesting Pairs

A total of 33 pairs of piping plovers nested or held a territory at CALO in 2006, the most since 1997. Nine pairs nested on North Core Banks (NCB), three pairs on Middle Core Banks (MCB), two pairs on Ophelia Island (OI), and nineteen pairs on South Core Banks (SCB). Birds nested in seven distinct areas (Table 1). The area around Ophelia Inlet contained the highest number of nesting pairs. The birds at CALO accounted for 72% of the nesting pairs in North Carolina in 2006.

Table 1. Number of Nesting Pairs by Nesting Areas

ISLAND	NESTING AREA	NUMBER OF PAIRS
North Core Banks	Portsmouth Flats	8
North Core Banks	Kathryn-Jane Flats	1
Middle Core Banks	New Drum Inlet	3
Ophelia Island		2
South Core Banks	Ophelia Inlet	15
South Core Banks	Cape Point	3
South Core Banks	Power Squadron Spit	1

Table 2. Piping Plover Breeding Pairs at Cape Lookout National Seashore 1989-2006

	1989	1992	1993	1994	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Ocracoke Inlet	0	2	0	2	2	1	0	1	0	0	0	0	0	0	0
Portsmouth Flats	14	8	9	7	8	17	15	9	11	9	8	6	4	6	8
Kathryn-Jane Flats	7	11	9	12	11	10	8	2	1	1	2	1	1	2	1
Old Drum Inlet	3	2	1	1	2	1	1	0	0	0	0	1	0	0	0
New Drum Inlet (NCB)	4	5	9	10	6	3	2	3	1	2	2	2	2	3	3
New Drum Inlet (SCB)	3	3	4	5	4	2	3	3	2	3	2	2	2	2	2
Plover Inlet (Mile 23.6)	0	0	0	0	0	1	1	1	1	1	1	1	4	8	15
Cape Point	0	0	0	0	0	0	0	1	0	0	0	0	0	4	3
Power Squadron Spit	3	2	3	2	2	1	2	1	0	0	0	1	0	1	1
Shackleford Banks														1	0
CALO Total	34	33	35	39	35	36	32	21	16	16	15	14	13	27	33

## Nests

At least 37 nesting attempts were made in 2006. Nine nests were on NCB, four on MCB, three on OI, and 21 on SCB. 29 of the nests hatched and 29 chicks were fledged from 19 different broods. The average clutch size was 3.57 eggs and 87 of 125 eggs hatched. Productivity for CALO was 0.88 chicks fledged per nesting pair (Table 3).

Table 3. Piping Plover Nesting Success at CALO 1989-2006

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

## Predator Exclosures

In 2006, predator exclosures were used to protect 21 nests. 81% of the nests with exclosures hatched. Twelve of the sixteen nests without exclosures hatched (75%). Two nests with predator exclosures were lost to ghost crab predation.

Table 4. Likely Causes of Piping Plover Nest Losses in 2006.

NESTING AREA	# NESTS	# LOST	PREDATORS	STORMS	ABANDONED	UNKNOWN
Portsmouth Flats	8	2	2	0	0	0
Kathryn-Jane Flats	1	0	0	0	0	0
New Drum Inlet (MCB)	4	1	1	0	0	0
Ophelia Island	3	1	0	0	0	1
Plover Inlet (Mile 23.6)	17	3	2	0	1	0
Cape Point	3	1	0	0	1 (infertile)	0
Power Squadron Spit	1	0	0	0	0	0
Total	37	8	5 (63%)	0 (0%)	2 (25%)	1 (12%)

### Brood Foraging

No broods foraged on the ocean beach in 2006. Chicks foraged on soundside beach, sand flats, mudflats and ephemeral pools in areas closed to vehicles and in most cases all entry.

### Predator Control

No predator removal was done in 2006.

### Non-nesting Piping Plover Surveys

Surveys in 2006 did not include the area from south of Old Drum Inlet to the north side of Ophelia Inlet. These areas were, in past years, important migratory stops for piping plovers so our surveys are likely undercounting the number of birds in the park. Appendix 3 lists non-nesting counts from 2000-2005.

Table 5. Non-Nesting Piping Plover Counts at Cape Lookout National Seashore, 2006.

	January	February	March	August	September	October	November
NCB	3	0	0	16	26	22	14
SCB	5	0	21	22	7	6	0
SB	9	10	7	6	5	7	8
<b>Total</b>	<b>17</b>	<b>10</b>	<b>28</b>	<b>44</b>	<b>38</b>	<b>35</b>	<b>22</b>

To investigate the movement of birds through the area around Ocracoke inlet, counts were made twice a week from the end of July to mid October.

An average of 16 birds were counted in the area south of the inlet. The number of birds found on the North Core Banks side was lowest at high tide with the birds using an unknown roost site. No banded plovers were seen on the North Core Banks side of the inlet.

Table 6. Counts of Piping Plovers near Ocracoke Inlet during Fall Migration.

Date	Number of Piping Plovers	Tide
31-Jul	13	low
4-Aug	11	low
10-Aug	7	mid+
14-Aug	16	low
18-Aug	25	low
25-Aug	7	high
29-Aug	43	low
4-Sep	37	low
8-Sep	7	high
11-Sep	8	high
15-Sep	26	low
18-Sep	19	low
22-Sep	3	high
29-Sep	6	low
2-Oct	16	low
6-Oct	3	high
13-Oct	21	mid+

### Banded Piping Plovers

Two observations of banded birds were made in the park in 2006 (Table 6). One of the birds was from the Great Lakes breeding population. One observation was made of a bird with only a single metal band which was likely a bird banded in Canada that had its color band removed.

Table 6. Band Combinations of piping plovers observed at CALO, 2006.

DATE	LEFT LEG-TOP	LEFT LEG-BOTTOM	RIGHT LEG-TOP	RIGHT LEG-BOTTOM	ISLAND	COMMENTS
1/25				USFWS	NCB	
1/27	USFWS	orange	orange flag	green/green	SCB	Great Lakes bird

## **Discussion**

### **Nesting Habitat**

The large overwash fans created by Hurricane Isabel in 2003 on SCB south of New Drum Inlet held the biggest concentration of nesting piping plovers in the park (and in North Carolina). The mudflats on the north side of newly created Ophelia Inlet were productive for piping plovers and used by many other shorebird species. The ephemeral pool that was at Cape Point in 2005 was not present in 2006. The adults usually flew well out of the area to feed.

### **Pair Numbers**

The number of nesting pairs in the park continued to increase to the highest total since 1997. Improved productivity in the park and the creation of nesting and foraging habitat by storms were likely factors in the increase. There was also a small increase in the number of nesting pairs throughout North Carolina this year.

In addition to the 33 nesting pairs in the park, an unpaired individual bird was observed on Shackleford Banks early in the nesting season. This male defended a territory but never formed an established pair and is not included in our pair numbers. The ephemeral pool that was at this site in 2005 was absent this year.

### **Nest Success**

2006 was a successful year for piping plover nests in the park. 78% of the nests and 70% of the eggs hatched successfully. In the period between 1998 and 2003 only 43% of the eggs hatched.

In 2006, predator exclosures were effective in protecting nests from all predators except for two nests lost to ghost crabs. Since 1997, at least 22 nests protected by exclosures have lost eggs to ghost crabs. One nest protected by an exclosure was found with four plover eggs and one least tern egg. The tern egg hatched and the chick died and the plover nest was lost to ghost crabs. Predator exclosures have generally been effective in increasing hatch success. From 1997-2006, 69% of the nests protected with exclosures hatched, compared with 40% of the nests left unprotected.

### **Fledging Success**

The fledging success for piping plovers at CALO was the second highest ever recorded in the park. The 0.88 chicks fledged per nesting pair is still below the "Recovery Plan" goal of 1.5 chicks per nesting pair, but is still a great improvement. From 1989 to 2003 the productivity of piping plovers in the park was only 0.40 chicks fledged per nesting pair.

Twenty one of the twenty nine chicks that fledged came from nests within 1.5 miles of Ophelia Inlet. All of those chicks utilized habitat on the soundside beach that was created by Hurricane Isabel or Hurricane Ophelia. The productivity for this area was 1.23 chicks per nesting pair. The other nesting sites in the park combined for an average of only 0.5 chicks per pair, which is close to the park's long-term average.

In 2006, hatch success was good throughout the park. The lowest fledging success was at Cape Point where none of the chicks survived.

Table 7. Differences in Reproductive Success between Major Nesting Areas for the Period of 1998-2006

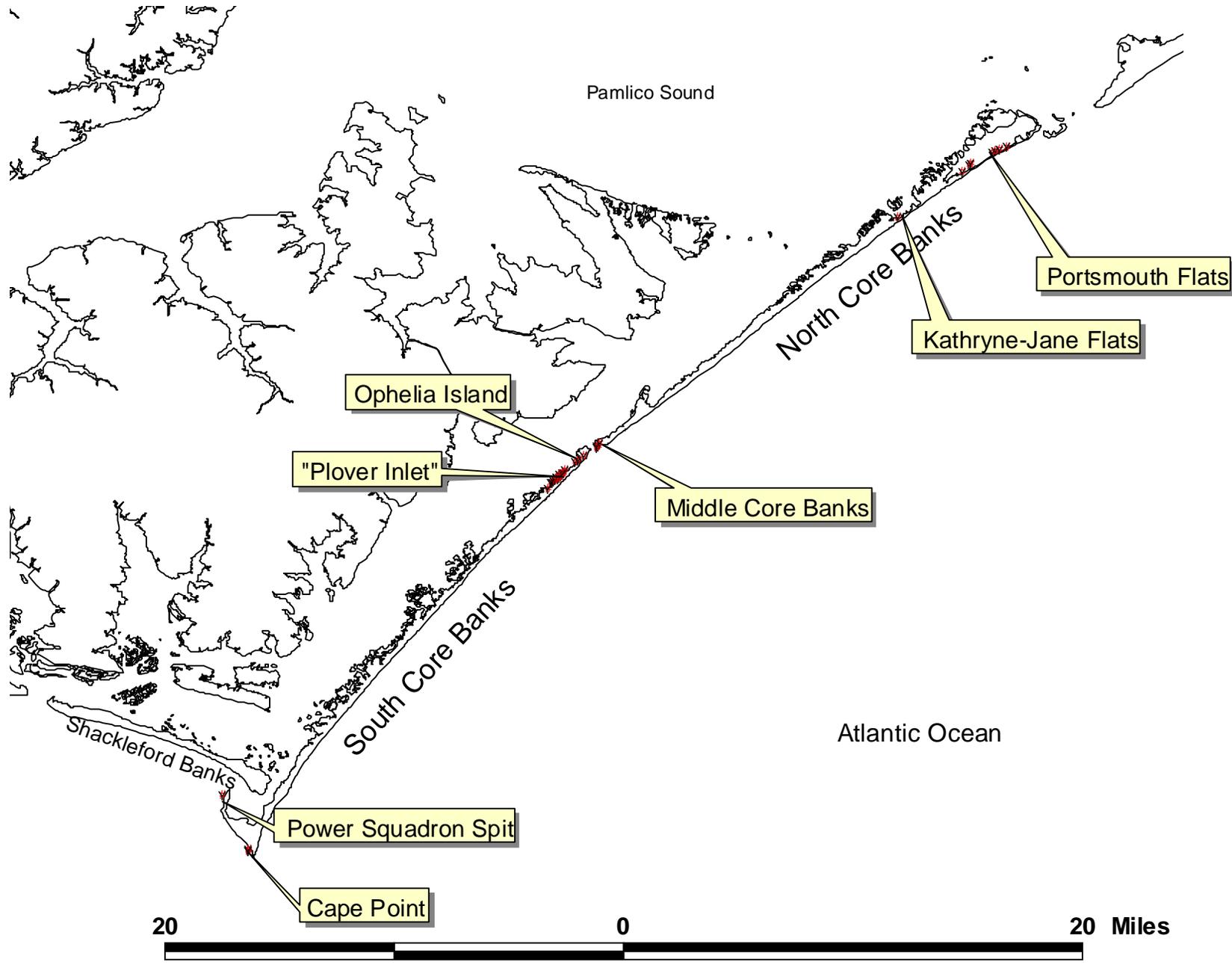
<b>Nesting Area</b>	<b>Hatch Success</b>	<b>Fledge Success</b>
Portsmouth Flats	44%	0.25 chicks per pair
Kathryne-Jane Flats	38%	0.74 chicks per pair
New Drum Inlet	59%	0.51 chicks per pair
Plover Inlet	70%	1.30 chicks per pair
Cape Point	72%	0.25 chicks per pair

### **Human Disturbance**

Posted closures for bird nesting areas were not always respected by park visitors. A total of 8 violations of bird nesting closures by pedestrians or off-road vehicles were documented by resource management staff. This was an improvement over past years in part because an increased effort to enforce closures over July 4<sup>th</sup> weekend. Park staff members from all divisions were stationed at key nesting areas to provide education and enforce closures.

Dogs were also a potential source of disturbance to nesting birds. A total of 31 violations of the park's leash law were documented by monitoring staff during the nesting season.

# 2006 Piping Plover Nesting Sites at Cape Lookout National Seashore



## Appendix 1- 2006 PIPING PLOVER NEST DATA

### NORTH CORE BANKS

Nest #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS
1	2.1	8-May	4	15-May	24-May	4	1	
2	3.2	15-May	2	n/a	8-Jun	2	0	chicks lost in first 3 days
3	2.0	2-Jun	4	5-Jun	14-Jun	4	1	
4	2.3	4-Jun	4	n/a	14-Jun	4	3	
5	3.6	7-Jun	3	n/a	30-Jun	2	0	chicks lost in first 3 days; 1 egg partially developed
6	1.9	nest not found	unknown	n/a	unknown	at least 1	0	1 chick less than 1 week old found on 6/7; chick lost after 6/23
7	6.7	8-Jun	3	12-Jun	22-Jun	3	1	
8	1.9	25-Jun	3	n/a	n/a	0	0	lost to ghost crab predation 6/30
9	3.1	12-Jun	4	12-Jun	n/a	0	0	least tern egg in nest; lost to ghost crab after tern egg hatched

### MIDDLE CORE BANKS

Nest #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS
1	21.6	4-May	2	n/a	n/a	0	0	nest lost by 5/10, probably to predation
2	21.5	10-May	3	10-May	7-Jun	3	1	chick fed on mudflat near soundside beach
3	21.4	1-Jun	4	n/a	21-Jun	1	0	3 eggs undeveloped, chick lost in first week
4	21.6	1-Jun	4	7-Jun	6/?	4	0	chicks lost in first week

### OPHELIA ISLAND

Nest #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS
1	22.6	4-May	4	4-May	5/?	4	2	
2	22.2	18-May	4	n/a	n/a	0	0	lost by 6/7
3	22.5	7-Jun	4	n/a	29-Jun	3	2	

## SOUTH CORE BANKS

Nest #	MILE	DATE FOUND	CLUTCH SIZE	EXCLOSURE	HATCH DATE	EGGS HATCHED	# FLEDGED	COMMENTS
1	24.1	19-Apr	4	21-Apr	n/a	0	0	lost to ghost crab predation
2	23.1	19-Apr	4	21-Apr	23-May	4	1	
3	23.2	19-Apr	4	21-Apr	21-May	4	2	
4	23.6	25-Apr	4	28-Apr	n/a	0	0	abandoned, 3 eggs taken by ghost crab, fourth egg infertile
5	23.9	25-Apr	4	28-Apr	21-May	3	1	
6	23.3	3-May	4	n/a	5/25?	3	0	
7	23.4	16-May	4	19-May	13-Jun	4	1	
8	23.4	19-May	4	N/A	N/A	0	0	lost 6/9, probably to predation
9	44.4	30-May	3	30-May	n/a	0	0	eggs did not develop
10	23.5	30-May	4	2-Jun	18-Jun	3	2	
11	23.6	30-May	4	2-Jun	13-Jun	4	0	
12	23.7	30-May	4	n/a	25-Jun	4	2	
13	23.6	2-Jun	2	2-Jun	4-Jun	1	1	
14	44.5	5-Jun	4	5-Jun	23-Jun	4	0	chicks lost in first week
15	47.1	6-Jun	3	7-Jun	25-Jun	3	1	
16	23.9	9-Jun	4	n/a	2-Jul	4	1	
17	23.8	13-Jun	4	16-Jun	9-Jul	4	2	
18	44.4	20-Jun	2	2	11-Jul	2	0	chicks lost first day
19	23.4	28-Jun	3	n/a	16-Jul	2	0	re nest of pair from nest #8; chicks lost in first week
20	23.4	not found	4	n/a	10-Jul	4	2	
21	24.1	not found	unknown	n/a	6/?	unknown	2	re nest of pair from nest #1

## Appendix 2- 2006 PIPING PLOVER WINDOW CENSUS

2006 Piping plover breeding census results: June 1-9

### North Core Banks: 7 nesting pairs

Portsmouth Flats 6 Pairs

KJ/Whalebone Flats 1 Pair

### Middle Core Banks: 4 nesting pairs

New Drum Inlet 4 Pairs

### Ophelia Island: 2 nesting pairs

New Drum Inlet 1 Pair

Ophelia Inlet 1 Pair

### South Core Banks: 15 nesting pairs

Plover Inlet 11 Pairs

Cape Point 3 Pairs

Power Squadron Spit 1 Pair

### Shackleford Banks: 0 piping plovers

Appendix 3. Monthly counts of non-nesting piping plovers 2000-2005

Date	North Core Banks	South Core Banks	Shackleford Banks	CALO Total
March-00	43	13	13	69
August-00	75	29	12	116
September-00	43	16	3	62
October-00	28	2	14	44
November-00	27	4	16	47
December-00	18	4	5	27
January-01	1	9	19	29
February-01	15	7	24	46
March-01	?	9	25	?
August-01	18	2	4	24
September-01	21	4	6	31
October-01	37	3	22	62
November-01	14	11	14	39
December-01	14	20	29	63
January-02	25	1	13	39
February-02	4	6	10	20
March-02	41	1	19	61
August-02	31	7	6	44
September-02	42	8	9	59
October-02	40	7	16	63
November-02	16	5	13	34
December-02	17	11	18	46
January-03	11	7	27	45
February-03	6	6	5	17
March-03	34	3	14	51
August-03	54	42	4	100
September-03	74	?	?	74+
October-03	28	12	7	47
November-03	7	14	7	28
December-03	6	10	7	23
January-04	0	10	9	19
February-04	0	15	12	27
March-04	16	3	29	48
August-04	49	14	6	69
September-04	50	15	13	78
October-04	18	11	18	47
November-04	13	7	16	36
December-04	16	4	12	32
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

