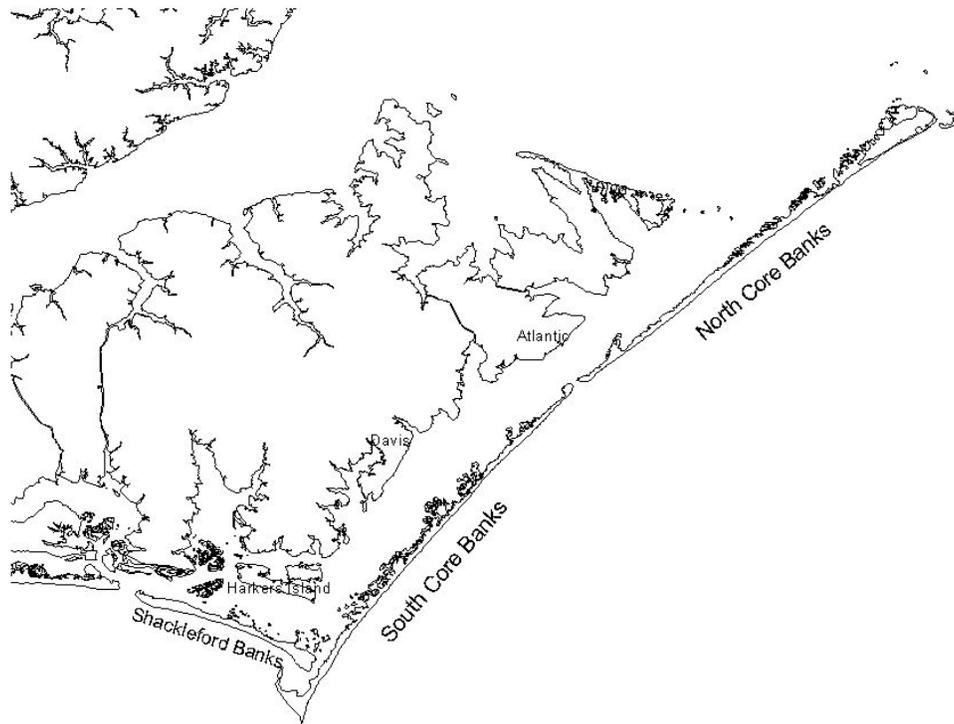


PIPING PLOVER (*Charadrius melodus*) MONITORING AT
CAPE LOOKOUT NATIONAL SEASHORE

2004 SUMMARY REPORT



NATIONAL PARK SERVICE
CAPE LOOKOUT NATIONAL SEASHORE
131 CHARLES STREET
HARKERS ISLAND, NC 28531

Introduction

Piping plover monitoring at Cape Lookout National Seashore (CALO) began with a baseline study in 1989. The park is a significant nesting area with 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 2004, comparisons to results from previous years and conclusions 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 late 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 until they hatched or were lost. The area between Old Drum Inlet and New Drum Inlet was not monitored regularly. This section of beach is inaccessible to vehicles.

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 several times a week 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 fifteenth of each month in the non-nesting season. The ocean beach, inlets and soundside sandy beaches were surveyed.

Results

Nesting Pairs

A total of 13 pairs of piping plovers nested or held a territory at CALO in 2004, one fewer pair than in 2003. Seven pairs nested on North Core Banks (NCB) and six pairs on South Core Banks (SCB). Birds held territories in five distinct nesting areas (Table 1). The area around New Drum Inlet contained the highest number of nesting pairs. The birds at CALO accounted for 65% of the nesting pairs in North Carolina in 2004.

Table 1. Number of Nesting Pairs by Nesting Areas

| ISLAND | NESTING AREA | NUMBER OF PAIRS |
|------------------|--------------------------|-----------------|
| North Core Banks | Portsmouth Flats | 4 |
| North Core Banks | Kathryn-Jane Flats | 1 |
| North Core Banks | New Drum Inlet | 2 |
| South Core Banks | New Drum Inlet | 2 |
| South Core Banks | Plover Inlet (Mile 23.8) | 4 |

Table 2. Piping Plover Breeding Pairs at Cape Lookout National Seashore 1989-2004

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

Nests

13 nests were found in 2004. Seven nests were on NCB and six on SCB. Eleven of the nests hatched and 12 chicks were fledged from seven nests. The average clutch size was 3.67 eggs. At least 37 of 44 eggs hatched. Productivity for CALO was 0.92 chicks fledged per nesting pair (Table 3).

Table 3. Piping Plover Nesting Success at CALO 1989-2004

| 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 |

Predator Exclosures

Predator exclosures were used to protect 10 nests. 80% of the nests with exclosures hatched. All three of the nests without exclosures hatched (100%). One nest with a predator exclosure was lost to ghost crab predation. Since 1997, at least 18 nests protected by exclosures have lost eggs to ghost crabs. One nest protected by an exclosure was washed away during Hurricane Alex.

Table 4. Likely Causes of Piping Plover Nest Losses in 2004.

| NESTING AREA | # NESTS | # LOST | PREDATORS | STORMS | ABANDONED | UNKNOWN |
|--------------------------|---------|--------|-----------|---------|-----------|---------|
| Portsmouth Flats | 4 | 2 | 1 | 1 | 0 | 0 |
| Kathryn-Jane Flats | 1 | 0 | 0 | 0 | 0 | 0 |
| New Drum Inlet (NCB) | 2 | 0 | 0 | 0 | 0 | 0 |
| New Drum Inlet (SCB) | 2 | 0 | 0 | 0 | 0 | 0 |
| Plover Inlet (Mile 23.6) | 4 | 0 | 0 | 0 | 0 | 0 |
| Total | 13 | 2 | 1 (50%) | 1 (50%) | 0 (0%) | 0 (0%) |

Brood Foraging

No broods foraged on the ocean beach in 2004. Chicks foraged on soundside beach and sandflats or mudflats in areas closed to vehicles and in most cases all entry.

Predator Control

No predator removal was done in 2004.

Non-nesting Piping Plover Surveys

Surveys in 2004 did not include the area from south of Old Drum Inlet to the north side of New Drum Inlet. This 3-mile stretch of beach is currently not accessible by vehicle and difficult to reach by boat. In past years the north side of New Drum Inlet was an important migratory stop for piping plovers so our surveys are potentially undercounting the number of birds in the park. Appendix III lists non-nesting counts since 2000.

Table 5. Non-Nesting Piping Plover Counts at Cape Lookout National Seashore, 2004.

| | January | February | March | August | September | October | November |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| NCB | 0 | 0 | 16 | 49 | 50 | 18 | 13 |
| SCB | 10 | 15 | 3 | 14 | 15 | 11 | 7 |
| SHACK | 9 | 12 | 29 | 6 | 13 | 18 | 16 |
| Total | 19 | 27 | 48 | 69 | 78 | 47 | 36 |

The highest concentration of wintering birds in the park occurred on the northern end of North Core Banks. The ocean beach from Ocracoke Inlet to Mile 3 regularly had a high number of piping plovers. Other concentrations occurred at Power Squadron Spit, New Drum Inlet and the east and west ends of Shackleford Banks.

Banded Piping Plovers

30 observations of at least 16 different banded birds were made in the park in 2004 (Table 6). At least four birds were identified as members of the Great Lakes breeding population. Three of these birds (RXOO, --OX and LXRO) also were seen in the park in 2001, 2002 and 2003.

There were three observations of birds banded in Canada, one from Prince Edward Island. Seven observations were made of birds with only a single metal band. These are likely birds banded in Canada that have had their color bands removed.

Table 6. Band Combinations of piping plovers observed at CALO, 2004.

| DATE | LEFT LEG-TOP | LEFT LEG-BOTTOM | RIGHT LEG-TOP | RIGHT LEG-BOTTOM | ISLAND | COMMENTS |
|-------|----------------------------|-------------------------|----------------------|-------------------------|--------|--|
| 2/19 | | metal | | red/green bicolor metal | SHACK | alpha code "N?" banded at Prince Edward Island |
| 2/19 | red | USFWS | orange | orange | SHACK | banded in Northern Michigan (RXOO) |
| 3/12 | | | orange | USFWS | SHACK | |
| 3/12 | black | USFWS | red | orange | SHACK | female banded in N.Michigan (LXRO) |
| 3/12 | red | USFWS | orange | orange | SHACK | banded in Northern Michigan (RXOO) |
| 8/19 | | | orange | USFWS | SHACK | |
| 9/16 | | | orange/green split | USFWS | NCB | Great Lakes bird (O/GX) |
| 9/16 | | yellow/red/orange split | USFWS | orange/blue split | NCB | |
| 9/21 | | faded bicolor metal | | metal | SCB | ?Canadian bird |
| 9/21 | yellow | USFWS | | | SCB | |
| 9/21 | | | | USFWS | SCB | |
| 9/22 | white | USFWS | | | SHACK | |
| 9/22 | | | orange | USFWS | SHACK | |
| 9/22 | | | | USFWS | SHACK | |
| 9/22 | | | grn/orange/grn split | USFWS | NCB | |
| 9/22 | | | | USFWS | NCB | |
| 9/22 | | yellow/red/orange split | USFWS | orange/blue split | NCB | |
| 9/22 | | | | black/orange split | NCB | banded in Northern Michigan (L/O) |
| 9/22 | | faded bicolor metal | | metal | NCB | ?Canadian bird |
| 9/24 | | USFWS | | | NCB | |
| 9/24 | | yellow/red/orange split | USFWS | orange/blue split | NCB | |
| 10/12 | | | | metal | NCB | |
| 10/13 | | | orange | USFWS | SHACK | |
| 10/13 | | | | metal | SHACK | |
| 11/15 | yellow | USFWS | | | SCB | |
| 11/16 | Yellow/orange yellow split | orange | orange | light blue | NCB | |
| 11/17 | | | black | USFWS | SHACK | |
| 11/17 | | | orange | USFWS | SHACK | |
| 11/17 | | | | metal | SHACK | |
| 11/17 | | | | orange/white? split | SHACK | |

Discussion

Nesting Habitat

Hurricane Isabel made landfall in the park in September 2003. The storm created large overwash fans over much of Core Banks, including piping plover nesting areas. Dune vegetation was buried in nesting areas creating open sand flats that seemed ideal for nesting birds. The large overwash fans created nesting habitat on the soundside of SCB south of New Drum Inlet, which became the biggest concentration of nesting piping plovers in the park.

Pair Numbers

The thirteen nesting pairs was the lowest number ever recorded in the park. This decline is a continuation of a downward trend of pair numbers that began in 1999. The most likely explanation for this decline is poor productivity in the park over a long period. The state of North Carolina has also seen a decline from 55 nesting pairs in 1990 to 20 pairs in 2004.

In addition to the 13 nesting pairs in the park, unpaired individual birds were observed in a number of locations. Male piping plovers defended territories briefly at Power Squadron Spit, Cape Point, Old Drum Inlet, and Ocracoke Inlet. None of these ever became established pairs and they are not included in our pair numbers.

Nest Success

2004 was a very successful year for piping plover nests in the park. 85% of the nests and 82% of the eggs hatched successfully. In the period between 1998 and 2003 only 43% of the eggs hatched. Newly created habitat, a nesting season largely free of storms and a reduction of predator populations following Hurricane Isabel may have been the factors that made this season so successful.

In 2004, predator exclosures were effective in protecting nests from all predators but the single nest lost to ghost crabs. One nest protected by exclosures was washed away by Hurricane Alex. Predator exclosures have generally been effective in increasing hatch success. From 1997-2004, 66% of the nests protected with exclosures hatched, compared with 24% of the nests left unprotected.

Fledging Success

The fledging success for piping plovers at CALO was the highest ever recorded in the park. The 0.92 chicks fledged per nesting pair is still below the "Recovery Plan" goal of 1.5 chicks per nesting pair, but is a great improvement. From 1989 to 2003 the productivity of piping plovers in the park was only 0.40 chicks fledged per nesting pair.

Nine of the twelve chicks that fledged came from the area around New Drum Inlet. Six of those chicks utilized habitat on the soundside beach that was created by Hurricane Isabel.

Portsmouth Flats had both the lowest hatch success (50%) and the lowest fledging success (0.25) of the nesting areas in the park. This area has no access to soundside foraging areas and traditionally has poor nesting success (Table 7). The number of nesting pairs at Portsmouth Flats has fallen from 17 pairs in 1997 to just four pairs this year.

Table 7. Differences in Reproductive Success Between Major Nesting Areas for the Period of 1998-2004

| Nesting Area | Hatch Success | Fledge Success |
|---------------------|----------------------|-----------------------|
| Portsmouth Flats | 41% | 0.16 chicks per pair |
| Kathryne-Jane Flats | 31% | 0.75 chicks per pair |
| New Drum Inlet | 59% | 0.45 chicks per pair |
| Plover Inlet | 72% | 1.10 chicks per pair |

Human Disturbance

Posted closures for all bird nesting areas, including colonially nesting species, were not well respected by park visitors. A total of 71 violations of bird nesting closures by pedestrians or off-road vehicles were documented by monitoring staff.

N.C. Marine Patrol staff drove two ATVs into a closure where two 14 day old piping plover chicks were foraging. One of those chicks was never seen again.

Four chicks from two different broods disappeared over July 4th weekend. It was impossible to document the cause of chick loss but it came at a time of very heavy visitation.

Non-nesting piping plovers

CALO continues to be an important migration stopover location and wintering site for piping plovers. In 2004, 288 birds were counted in the park during the non-nesting season. The area on NCB near Ocracoke Inlet again had high numbers of birds in spring and fall migrations. Over 40 piping plovers were counted in this area in both August and September. Piping plovers from the endangered Great Lakes population and birds that nest in Canada were found in the park.

Conclusions

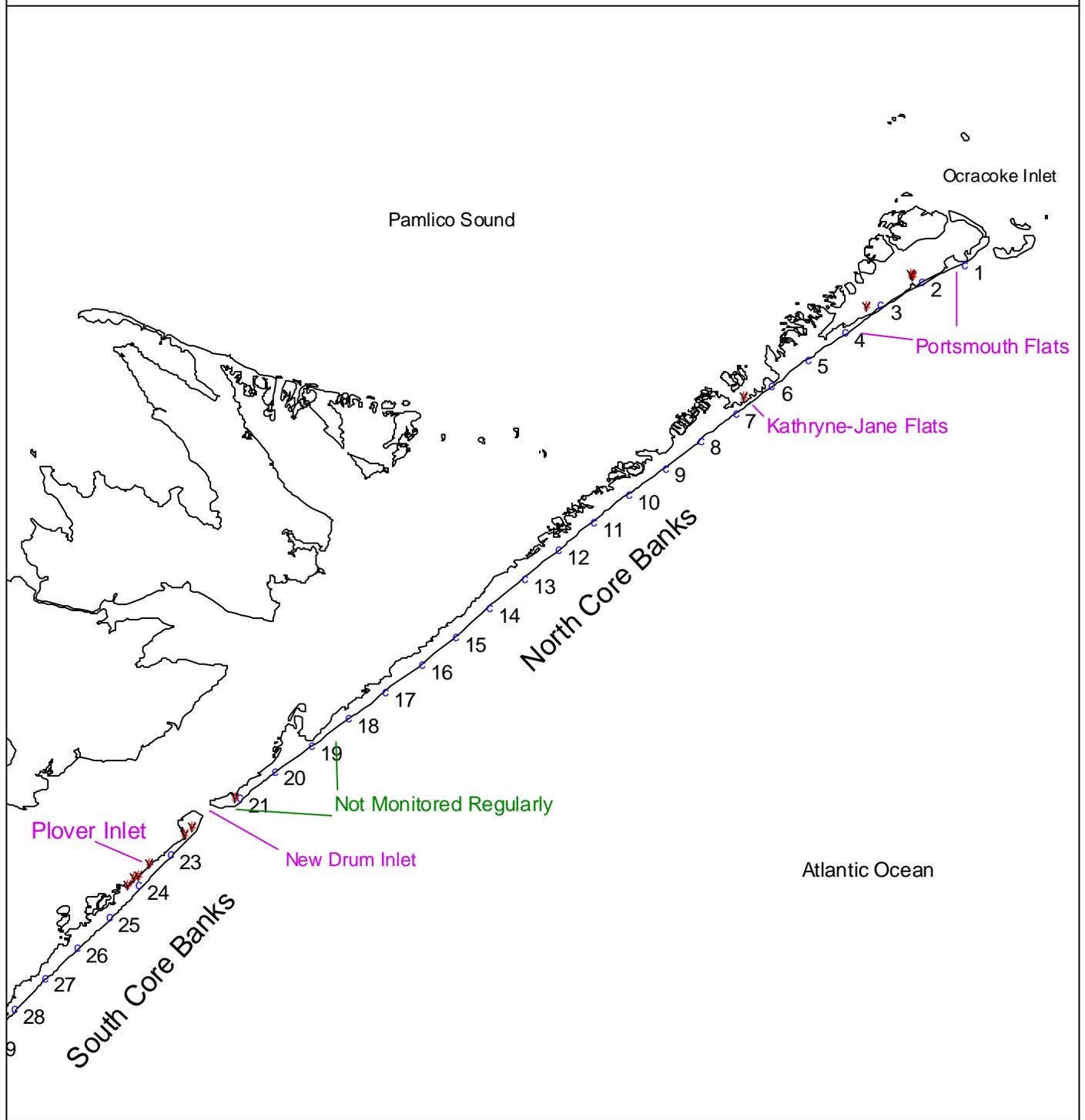
2004 was a record year for piping plover fledging success at CALO. The likely reason for the improvement in success was the habitat changes caused by Hurricane Isabel. The most obvious change was the creation of overwash fans adjacent to foraging areas on the soundside beach. Nesting was concentrated at these areas and fledging success was higher than elsewhere in the park.

The second possible factor was a reduction of predator numbers, particularly raccoons. Observations by monitoring staff were that fewer signs of raccoons were seen in the nesting areas on North Core Banks than in previous years. Despite this, fledging success was still poor on that island. On South Core Banks raccoon tracks were regularly seen in piping plover nesting areas, but nesting success was very good. We believe that raccoons and ghost crabs are major threats to nests but not the main cause of chick loss in the park.

Weather events including flooding from high tides, high winds and severe thunderstorms are threats to piping plover nests in the park. 2004 was a dry nesting season, free of storms until the arrival of Hurricane Alex in August. Nests hatched at almost twice the park's average rate because of the favorable conditions and the successful use of predator exclosures.

From our observations it appears that quality habitat with access to soundside foraging areas (which presumably have more food) are the keys to chick survival at CALO. Predators and weather events play a lesser role. Hurricane Isabel created the appropriate habitat and the birds responded with a very successful nesting season.

Figure 1. Piping Plover Nests at Cape Lookout National Seashore 2004



| | | |
|--|---------------------|--|
| <ul style="list-style-type: none"> ↗ Piping Plover Nests c Mile Markers | <p>Map Location</p> | <p>National Park Service Cape Lookout National Seashore Resource Management Division</p> |
| | | |

APPENDIX I. PIPING PLOVER NEST DATA

North Core Banks

| Nest # | SITE | MILE | DATE FOUND | CLUTCH SIZE | EXCLOSURE | HATCH DATE | EGGS HATCHED | # FLEDGED |
|--------|------|------|------------|-------------|-----------|------------|--------------|-----------|
| 1 | KJ | 6.6 | 4-May | 4 | 4-May | 25-May | 4 | 2 |
| 2 | PF | 3.2 | 4-May | 4 | 4-May | 31-May | 4 | 0 |
| 3 | PF | 2.0 | 5-May | 4 | 6-May | 31-May | 4 | 1 |
| 4 | PF | 2.0 | 1-Jul | 3 | 1-Jul | n/a | 0 | 0 |
| 5 | PF | 2.0 | 13-Jul | 2 | 16-Jul | n/a | 0 | 0 |
| 6 | ND | 22.? | not found | Unknown | n/a | unknown | unknown | 1 |
| 7 | ND | 21.0 | 10-Jun | 4 | n/a | 14-Jun | 4 | 1 |

South Core Banks

| Nest # | SITE | MILE | DATE FOUND | CLUTCH SIZE | EXCLOSURE | HATCH DATE | EGGS HATCHED | # FLEDGED |
|--------|------|------|------------|-------------|-----------|------------|--------------|-----------|
| 1 | ND | 22.4 | 7-May | 4 | 13-May | 8-Jun | 4 | 0 |
| 2 | PI | 23.8 | 11-May | 4 | 13-May | 7-Jun | 4 | 3 |
| 3 | ND | 22.2 | 11-May | 4 | 13-May | 11-Jun | 4 | 1 |
| 4 | PI | 23.5 | 21-May | 4 | 31-May | 16-Jun | 3 | 0 |
| 5 | PI | 24.2 | 16-Jun | 3 | 17-Jun | 8-Jul | 3 | 3 |
| 6 | PI | 23.9 | 23-Jun | 4 | n/a | 23-Jun | 2 | 0 |

PF=Portsmouth Flats
 KJ=Kathryne-Jane Flats
 ND=New Drum Inlet
 PI=Plover Inlet

Appendix II- 2004 PIPING PLOVER WINDOW CENSUS

2004 Piping plover breeding census results: June 1-9

North Core Banks: 5 nesting pairs + 4 unpaired males

| | |
|------------------|------------------------|
| Ocracoke Inlet | 3 unpaired males |
| Portsmouth Flats | 4 Pairs, 2 with chicks |
| Kathryne Jane | 1 Pair w/ chicks |
| Old Drum Inlet | 1 unpaired male |

Middle Core Banks: 1 nesting pair

| | |
|----------------|-------------------|
| New Drum Inlet | 1 Pair w/ 1 chick |
|----------------|-------------------|

South Core Banks: 4 nesting pairs + 2 unpaired males

| | |
|----------------|----------------------------------|
| New Drum Inlet | 2 Pairs w/ nests |
| Mile 23.5 | 1 Pair w/ nest |
| Mile 23.8 | 1 Pair w/ nest + 1 unpaired male |
| Cape Point | 1 unpaired male |

Shackleford Banks: No birds present

Appendix III: Monthly Counts of Non-nesting Piping Plover at Cape Lookout National Seashore

