

INTRODUCTION

Cape Lookout National Seashore (CALO) is one of the last remaining undeveloped stretches of barrier island in North Carolina. CALO consists of three islands, North Core Banks, South Core Banks, and Shackleford Banks. Each island in itself is unique, and this uniqueness offers a large variety of nesting habitat for piping plovers (*Charadrius melodus*). Shackleford Banks has not had a documented nesting attempt since monitoring began in 1989.

North Core Banks contains at its north end Ocracoke Inlet and stretching from there are expansive mudflats (Portsmouth Flats), that extend 4 miles. There are also several closed inlets on the island. Whalebone and Kathryn-Jane Inlet are located in the area between mile 6 and 7. Old Drum Inlet at mile 19 and New Drum Inlet (mile 21-21.5) mark the southern end of the island and the remainder of Plover habitat.

South Core Banks, at its northern end is bordered by New Drum Inlet (mile 22.5-23.5), and in recent years areas below New Drum have been overwashed to create a sandflat, these two areas serve as the primary piping plover nesting habitat for this island. However, the southern end of the island, Power Squadron Spit (mile 47.0), has been known to harbor one to three pairs of plovers.

In 1986, the Atlantic Coast Population of piping plover was listed under the Endangered Species Act, as threatened. The first comprehensive study of piping plover distribution and reproductive success was conducted at CALO in 1989. Only limited monitoring was carried out in 1990 and 1991. Intensive monitoring was conducted from 1992-1995, which documented the plover population over an extended period of time.

The purpose of this report is to summarize piping plover distribution and nesting activities at CALO for 1998, conducted by the National Park Service.

METHODS AND MATERIALS

In late March, nesting areas were posted to prohibit entry by visitors and ORV's. Posting of nesting areas continued through June, as pairs of piping plovers were located in new areas. Monitoring of piping plovers began in late April and continued through mid-August. Daily searches were conducted in each area for territorial pairs of plovers. At first these searches were in areas where piping plovers had nested in previous years. Later other areas were searched such as on the ocean beach in front of the Portsmouth flats; the whole flats themselves and other likely areas. Once a territorial pair was located, a determination was made based on behavior whether the pair had a clutch started or not. If a clutch was then located with 1 to 3 eggs, it was monitored once every other day until the clutch was complete or lost. Once a clutch was complete, varying from 1 to 4 eggs, it was then protected with a predator exclosure. Exclosures were circular, made of 2x4-inch wire fence, which had the top row of wire cut off to expose spikes along the top edge. The purpose of the exposed spikes was to 1) allow an area for 3/4 inch bird netting to be secured, and 2) to deter predators such as grackles and crows from landing on top of the exclosure and stressing the incubating adult. Once a nest was exclosed it was checked every other day for: 1) possible wind blown debris such as trash that may have blown against the exclosure that could disturb an incubating adult 2) for sand buildup around a nest, 3) for predator tracks and possible means of entry into an exclosure, and 4) for hatch date of nests. Nests that hatched were monitored until the chicks were lost or fledged. Foraging areas used by chicks were closed to vehicles and visitors when necessary.

RESULTS

South Core Banks (SCB)

Six pairs of piping plovers defended a territory or had a nest on SCB for the nesting season of 1998. The largest concentration of plovers on SCB was at New Drum Inlet with a total of three pairs nesting (Table 2).

There were a total of seven nesting attempts by plovers on SCB, of which 4 nests were exclosed (57%). All four exclosed nests hatched, with a 0.25 chicks / nesting pair fledge success. Unexclosed nests accounted for 3 of the total of 7 nests. Of the three unexclosed nests one was lost prior to hatching, and two hatched but fledged no chicks

(Table 15). 86% the total nests hatched, with 17% of the hatched nests fledging young (Table 5). The only area with any fledge success was Plover Inlet (Mile 23.6) with 1 chick fledging (Table 3). There were a total of 25 eggs laid, 18 eggs hatched with one chick fledging (94% mortality rate), giving 0.16 chicks per nesting pair (Table 6). Of the 7 nesting attempts, 1 was lost prior to hatching (14%). The nest was lost to predation, probably by raccoons (Table 4).

North Core Banks (NCB)

Twenty-six breeding pairs of piping plovers were found on NCB for the nesting season of 1998 (3 pairs did not nest but were territorial). Most of the plovers on NCB were at Portsmouth Flats with a total of 15 pairs nesting. However the greatest concentration for a given area of plovers was at Kathryn-Jane with a total of 8 nesting pairs (Table 7). There were a total of 32 nesting attempts by plovers on NCB, of which 20 nests were protected with exclosures (63%). Of the 20 nests exclosed, 70% hatched (14 nests), while 30% (6 nests) were lost (Table 14). Twelve nests were not protected with exclosures; all of these were lost prior to hatching. 44% of the total nests hatched, with 43% of the hatched nests fledging young (Table 10). The area with the highest hatch success was New Drum Inlet with 67% of the nests hatching (Table 8). There were a total of 51 eggs hatched with 10 chicks fledging (80% mortality rate), giving 0.38 chicks per nesting pair (Table 10). 63% of all fledged chicks occurred on Portsmouth Flats (Table 12).

Of the 32 nesting attempts 18 were lost prior to hatching (56%). The highest rate of nest loss occurred on Portsmouth Flats, with 9 of the 16 lost before hatching (56%) (Table 9). This accounts for 50% of the total nests lost. The distribution for the total number of nests lost ranges from 11% of nests lost to predation, 22% of the nests lost to wind/flooding, 0% lost due to human interference, 22% lost to abandonment, and 39% unknown (Table 9).

Cape Lookout National Seashore (SCB and NCB)

The Seashore as a whole had a total of 32 pairs of piping plovers defending a territory or attempting to nest. There were a total of 39 nests, of these 20 hatched, with a 51% hatch success. Of the 20 nests that hatched 55% fledged chicks, giving a .34 chicks per nesting pair (Table 12). Twenty-three of the 39 nests were exclosed, with six nests lost prior to hatching, while 17 hatched. 11 chicks fledged from exclosed nests. Sixteen nests were unexclosed in the park, of these, 14 nests were lost prior to hatching, while only 2 unexclosed nests hatched. Of the 39 nests, 19 were lost prior

to hatching (49%). Thirty-seven percent of nests were lost to unknown causes, while flooding/wind accounted for 21% of nests loss; predation accounted for 16%, abandonment 21%, and human interference 0% (Table 11).

DISCUSSION

Pairs and Nesting Areas:

South Core Banks had six pairs of piping plovers holding a territory or nesting. This number has remained somewhat constant ranging from four to seven pairs in the years of 1989 through 1997. This was the second year that a pair attempted to nest at "Plover Inlet" (Mile 23.6). In recent years the area has been overwashed creating a sandflat with an outlet to the sound. Power Squadron Spit's numbers increased this year from one territorial pair in 1997 to two nesting pairs in 1998.

NCB had twenty-six nesting pairs of piping plovers, six fewer pairs than in 1997. However, in comparison with 1992-1995, which had an average number of 29.75 pairs, the number is relatively consistent. New Drum Inlet's number of nesting pairs continue to decrease from a peak in 1994 of 10 pairs, to 6 pairs in 1995, 4 pairs in 1997, and 2 pairs in 1998 (Table 1). Reasons for this decline are not clear; the nesting habitat offers access to Core Sound which floods the sand flats daily. Old Drum Inlet at its peak only supported two nesting pairs. Now with vegetative growth reclaiming the area only one pair attempted to nest there this year. Kathryn-Jane Flats supports the largest concentration of piping plovers for the given area. Suggestions for such a dense population could range from: 1) NE winds flood the flats on the back side of the area, providing large quantities of food; 2) this area is protected from winds by large dunes that separate corridors; 3) since there are separate corridors this could provide more territories. The population on Portsmouth Flats has increased dramatically. Portsmouth Flats from 1992-1995 had an average of 10.5 pairs of plovers (14 pairs in 1989). In 1998 15 pairs attempted to hold territories or nest, this increase in the number of pairs is unexplained. Possible explanations could be 1) the flats are immense, this could offer large nesting and foraging territories; 2) the flats are wet frequently with NE winds increasing food quantities; 3) immigration into the area, from areas less desirable (i.e. areas with increased amounts of vegetation). Ocracoke Inlet had no pairs attempting to nest, although this habitat seems most favorable for piping plovers nesting, it is frequently flooded by high tides.

Nests and Hatch Success:

Predator exclosures continue to be a valuable resource in increasing hatch success. 77% of the nests were protected with exclosures and 75% of these nests hatched (Table 13). While exclosures protect nests, they do little to deter flooding. This year experimental efforts were made to reduce the affects of flooding on nests in a given habitat, Portsmouth Flats. See attachment IV. Nest elevations for Piping Plovers on the Atlantic Coast. On Portsmouth flats, an adult was killed just outside of an exclosure. It is really a mystery as to whether the adult was startled and flew up off the nest into the exclosure, and was captured trying to exit or if the adult was returning to the nest and was caught. A ghost crab took one egg from a nest at Kathryn-Jane. Its burrow was excavated and one egg was found.

Of unexclosed nest, (38% of all nests) only 13% hatched. Nest loss occurred primarily before the clutch was complete (Table 13). In most cases nests were lost to predators, but flooding, abandonment, and unknown causes play into the scenario as well.

Once a nest hatched, foraging habitat seemed to vary. Adults frequently moved chicks from one area to another. In extreme circumstances chicks traveled relatively large distances. In one instance, a chick foraging on sand flats at Kathryn-Jane Inlet moved to the ocean beach when it was approximately two weeks old. The beach was subsequently closed from July 10-25. Vehicles where permitted to drive through the closure only when escorted by park staff.

MANAGEMENT RECOMMENDATIONS

1) Research is needed to identify the factors limiting the survival of piping plover chicks at Cape Lookout. High abundance of predators, temperature, flooding and poor prey availability in foraging habitats are all possible factors.

Using predator exclosures and reducing human disturbance has not improved fledge success of plovers at Cape Lookout as it has in other areas.

2) The park needs to continue to increase hatch success. Elevating nests in danger of being flooded on Portsmouth Flats should remain an option. Constructing predator exclosures around nests sooner in areas with high rates of predation may be necessary. Before nests can be exclosed with a complete clutch, many are lost.

3) Law Enforcement personnel need to make more frequent trips to monitor human disturbance factors in nesting areas.

This is not something that can be done by visiting the area once every two weeks, the areas need to be visited three to four times a week to deter human impacts.