# U. S. FISH AND WILDLIFE SERVICE CHINCOTEAGUE NATIONAL WILDLIFE REFUGE

# PIPING PLOVER MONITORING AND MANAGEMENT

# **SUMMER 1995**



U.S. FISH AND WILDLIFE SERVICE CHINCOTEAGUE NATIONAL WILDLIFE REFUGE ASSATEAGUE ISLAND, VIRGINIA

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# PIPING PLOVER MONITORING AND MANAGEMENT SUMMER 1995

### I. INTRODUCTION

The piping plover monitoring and management program for the 1995 breeding season continued to follow the guidance developed as a result of a three year study that concluded in 1991. Experiences gained during the previous field seasons add to the knowledge and management capability. This report represents data collected in the 1995 season (February through August) and presents the results of this year's nesting success and offers recommendations that will help promote increased productivity in the 1996 nesting season.

# **II. MANAGEMENT AREAS**

Chincoteague National Wildlife Refuge (CNWR) is a 5,565 ha (13,750 acres) wildlife refuge complex of barrier islands located along Virginia's Eastern Shore in Accomack County, Virginia. The Assateague Island portion of the refuge is the largest of the barrier islands that extends approximately 59 km (37 miles) along the Maryland/Virginia Coast. Assateague Island includes beach, dune, saltmarshes, freshwater impoundments, and maritime shrub/forest habitats. Adjacent islands that are a part of the refuge complex and support piping plovers include Assawoman, the northern end of Metompkin, and parts of Cedar. Wallops Island, just south of Assateague, is administered by the National Aeronautics and Space Administration (NASA) and is included as part of the Wallops Island National Refuge under a Use Agreement (UA) with NASA.

The three principal monitoring areas within the Assateague Island portion of the refuge included the Hook Beach, Wild Beach, and North Wash Flats (Figures 1 and 2). The Hook is the southernmost portion of Assateague Island and extends for approximately 4.5 km (2.8 miles). The Hook is approximately 316 ha (780 acres) of multiple tidal flats and pools, small vegetated dunes, blowouts, and relatively wide beach areas. Since 1988, the Hook has been closed to all public use from March 15 to August 31, the piping plover's breeding season.

The Wild Beach nesting area extends from D Dike north to the North Wash Flats cross over for approximately 5.9 km (3.7 miles). The Maryland/Virginia state line is located approximately 4.8 km (3.0 miles) north of this nesting area. The Wild Beach is also typified by small vegetated dunes,

75°22'30 South Wash \* SCALE .5 1.10 4000 2000 N D 6 A ŝ LINIE OVERE BET Seashore Boundary D Pool C<u>r</u>e' CHINCOTEAGUE CHANNEL Janeys Creek Piney Island OCEAN Ĺ , **1** 1, **1** National 8 <sup>pt</sup> EAGUE g R Memo Park < B Pool South S Refuge Headquarters ATLANTIC s A Pool F Pool Bwen Swan Co 5 Pony Trall. D 2 Little Toms Cove 2 Spur Toms Cove Fishing Fish Factor Ruins Ve Hook Coast Gua Station (NPS) OTEAQUE INLET CHINCOTEAGUE National Wildlife Refuge 75 20 75°22'30





Figure 2 Base map of the Chincoteague National Wildlife Refuge. (northern portion)

occasional tidal pools, and varying widths of beach. This area tends to be highly vulnerable to adverse weather conditions, i.e. flooding, wind gusts, and blowing sand. Areas behind the high tide line were posted and closed to public access during the nesting season. However, the intertidal zone was accessible to pedestrian traffic throughout the year.

The North Wash Flats is a 324 ha (800 acres) impoundment between the bay and the ocean. It is a brackish water impoundment that is managed according to the refuge's Marsh and Water Management Plan to allow nesting and feeding by piping plovers and other migrant shorebirds. Waterfowl use the impoundment extensively during the fall and winter months. In past years, the low elevation of this area has rendered it highly subject to flooding. All public access was prohibited year round.

The barrier islands of Assawoman, Cedar, Metompkin, and Wallops are composed of narrow sandy beaches with intermittent dunes and extensive saltmarshes. Public access was restricted during the breeding period (March through August) on most of the islands.

# III. METHODS

The techniques employed to monitor plovers have evolved over the past eight years as more information became available and monitoring techniques improved. The procedures used were those that have proven to be the most cost-effective to date and yet provide the types of data needed to determine the effectiveness of the refuge's piping plover management program.

#### A. POPULATION MONITORING

Population monitoring included both the pre-nesting and nesting periods throughout the spring and summer months. Monitoring activities were confined to specific periods to lessen disturbance to territorial pairs, incubating adults, and adults with young.

#### 1. PRE-NESTING

Prior to the nesting season, refuge staff and volunteers began surveys to document the arrival of migrant and resident plovers. Beginning in late February all beach areas were periodically surveyed for plover arrival, establishment of territories, courtship display, and preliminary nest scrapes. One to two surveys were conducted each week to obtain an idea of population density and dispersal. More intense monitoring began in mid-April when territorial pairs were firmly documented.

# 2. NEST SEARCHES AND MONITORING

Locating nests was accomplished by observing territorial individuals or pairs from a distance until their behavior revealed the nest or approximate location. In vegetative concealed areas, tracks were followed to locate the nest once the general area was known. The time frame for searches was established between late April and the second week of July, with the second week of May set aside for intense nest searches. Search time was limited to less than 10 minutes when nest searches were held after 1000 hours or in extreme weather conditions such as mid-day heat, rain, wind, etc. The time restraint was adhered to even at the expense of not finding a new nest. During the rest of the season, nests were found only by observing territorial adults. Intense nest searches were defined as walking through potential nesting areas at a slow pace, looking for nests, scrapes, or plover tracks. Once a nest was located, the observer flagged the nest approximately 10 meters (33 feet) north and south of the nest and recorded it in the nest records so any observer could locate the nest. Throughout the season, visits to the areas were limited to once a day to minimize disturbance. Disturbance to incubating or territorial adult(s) was limited to a maximum of 20 minutes on any given day with most nests monitored with a spotting scope at a distance that did not disturb the incubating bird.

### B. MANAGEMENT TECHNIQUES

Several direct and indirect management techniques have been used over the past eight years to increase plover productivity. Direct techniques included the use of soft catch leg-hold traps for fox and raccoon and den gassing for red fox. Indirect techniques used to control predation on plovers and nests has been the use of predator-proof exclosures and predator-proof fencing around North Wash Flats nesting area. The placement of shells fragments within the North Wash Flats nesting area began in the 1994 nesting season. Shell placement this year was modified to increase the number and distribution of sites within the impoundment to reduce the potential responce of predators to these highly visible nesting sites.

# 1. PREDATOR MANAGEMENT

Predator management techniques utilized this year included den gassing and soft catch leg-hold trapping. The use of gas cartridges to gas fox dens was used early in the season and whenever an active den was discovered within the plover nesting areas. Den searches were performed several times throughout the spring and summer to locate active dens within plover nesting areas. Active dens located were gassed which resulted in a quick and humane control method for fox(es) within the nesting area. Leg-hold trapping was limited in use this year and was conducted within the Hook nesting area for a four day period during July.

2. NEST EXCLOSURES

Nest exclosures were comprised of a 10.9 m (36 foot) piece of 122 cm (48 inch) wide 5.1 cm by 10.2 cm (two by four inch) welded wire mesh. The wire mesh was placed around the nest forming a 3.7 m (12 foot) diameter circle surrounding the nest. Five-1.8 m (six foot) pieces of 15.9 mm (five-eights inch) rebar were evenly spaced around the perimeter and were driven into the ground to secure the wire mesh in place. The nest exclosure is then covered by 3.8 cm (1.5 inch) mesh nylon netting to deter avian predation. Each exclosure requires approximately ten to fifteen minutes to construct and set up time is recorded for each to determine if abandonment could be caused due to excessive set up time.

A predator-proof exclosure was placed around each nest after the third egg was laid, or on smaller clutches, if no additional eggs were laid after three days. After exclosure placement, the nest was observed at a distance to allow the adult to resume incubation. The exclosure was removed if one of the adults failed to return within 60 minutes to resume incubation.

The 3.7 m (12-foot) diameter predator-proof exclosure used in past seasons was continued this year to provide a greater distance between the nest and the exclosure. In addition, the single piece of 3.8 x 3.8 (1.5 X 1.5 inch) mesh bird netting was also continued this season. The netting has proven to be effective in keeping out avian predators and facilitated a quicker and easier placement and handling during exclosure construction. All nests found on the Hook and North Wash Flats were protected by predator-proof nest exclosures except those nests occurring within or behind the primary dunes and in dense vegetation with approximately 75% or more coverage. This was done to allow the natural topography and vegetation to protect the nest without interference from the predator proof exclosures or the possibility of increasing depredation rates.

## 3. NEST HABITAT ENHANCEMENT

The placement of shells fragments to provide enticement and to help elevate nesting sites within the North Wash Flats nesting area was tested in the 1994 nesting season. Additional shells were placed this year to increase the number and distribution of sites within the impoundment. Instead of a long linear shell line, irregular shaped piles of shells were spread within know nesting areas. The irregular shape distribution pattern was chosen to reduce the potential response of predators to these highly visible sites.

# IV. MANAGEMENT RESULTS

Results presented in this report were compiled from data collected throughout the 1995 nesting season. These data come from approximately 25 weeks of monitoring: February 27 through August 18. Tables are presented that depict data for all the years that plover monitoring and/or studies have been conducted to better facilitate comparisons between years.

In an effort to provide a more comprehensive report of piping plover productivity within the refuge complex, data from the refuge's Lower Island units of Assawoman, Metompkin, and NASA's Wallops Island are also presented. Although the monitoring of these units was not as intense as the refuge portion of Assateague Island, accurate data on nesting pairs and productivity were obtained through the Virginia Department of Game and Inland Fisheries' None-Game Division.

#### A. <u>POPULATION MONITORING</u>

Plover surveys began on February 27, but no birds were sighted until March 3. A plover was first observed on the Hook on that date. The first plover on the Wash Flats was sighted on March 8. No plovers were observed on the Wild Beach until March 23. Surveys continued throughout the summer, with the last nest found July 13 on the Wash Flats. Two nests occurred in the overwash area adjacent to the ORV zone this year. Unlike the nests found in this area in the past two years, both of these nests were successful in hatching and fledging chicks.

Plovers nested in all three major nesting areas, with the most nests (22) being located on the Hook. The Wash Flats had six nests and the Wild Beach five. The first nest initiation date was estimated to be approximately April 19 on the Hook; nine days earlier than in 1994. Nests were initiated about a week later on the Wild Beach. The first nest was not initiated on the Wash Flats until May 5.

Nesting plovers increased by six pair on Assateague Island this year. Overall pairs increased by four pair with an decrease of two pair on Assawoman Island. Wallops and North Metompkin Islands had three and four nesting pair, respectively, as in 1993 and 1994.

Surveys and monitoring activities were conducted throughout the spring and summer in all potential plover nesting areas with emphasis on the three known nesting sites. Most nesting activity occurred in traditional breeding areas with the exception of the two nests found adjacent to the off-road vehicle zone on the Hook (overwash on bay side).

#### 1. EGG AND CHICK LOSS

Egg and chick losses were attributed to a variety of factors with many unknowns associated with chick losses. In all instances, direct and indirect evidence were used to attribute loss to a particular cause.

### a. ASSATEAGUE ISLAND EGG LOSSES

A total of 109 eggs were produced in 33 nests on the Assateague Island portion of the refuge this year. That was a decrease of five eggs even though the number of nests increased by two. The most eggs lost (13) were due to predation (Table 1). All of the egg predation was attributed to avian species. All weather related losses were due to rain rather than high tides. Only three eggs were infertile. No eggs were lost due to abandonment this year. All nests that were found on the Hook and Wash Flats were exclosed after the third egg was laid or the clutch was completed.

# b. **EXCLOSED NEST/EGG LOSSES**

A total of 20 nests were exclosed this year compared to 23 last season. Nests on the Wild Beach were not exclosed this year. The Wild Beach nests were exclosed last season for the ghost crab study that was taking place. Weather was the major cause of egg loss in exclosed nests with 45% (4 eggs/1 nest) lost due to rain. Two exclosed nests contained a total of three infertile eggs, or 33% of egg losses. Avian predation occurred in one exclosed nest, accounting for 22% (2 eggs) of losses.

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Causes of Piping Plover Egg Loss on Assateague Island, 1995

	Number of Eggs (Nests) Lost To:							
AREA	Predation	Weather	Infertile	Abandon	Unk	Total		
Hook Beach	13(6)	4(1)	2(1)	0	0	19(8)		
Wild Beach	0	0	0	0	0	0		
Wash Flats	0	1(1)	1(1)	0	0	2(2)		
Total	13(6)	5(2)	3 (2)	0	0	21(10)		

## C. ASSATEAGUE ISLAND CHICK LOSSES

Chick losses rose sharply this year, from 25 chicks lost in 1994 to 63 chicks lost in the 1995 nesting season. The Hook accounted for 52% (33 chicks) of the chick losses. All chicks from the Wild Beach were lost, accounting for 30% (19 chicks) of losses. Eleven chicks were lost on the Wash Flats, accounting for 18% of chick losses. Although most chick losses were not directly observed, most predation is attributed to boattailed grackles. Fish Crows and gulls were also suspected and in a few cases, foxes may have been the predator. The only actual observance of a chick being taken was by a grackle on the Wild Beach (See Appendix I).

# 2. HATCHING AND FLEDGING SUCCESS

Even without the benefit of predator exclosures, the Wild Beach had the highest hatching success on the refuge. All 19 eggs from 5 separate nests successfully hatched for an average of 3.80 chicks hatched/nest. That was up from only 2.20 chicks hatched/nest in 1994. Hatching success decreased in the Wash Flats and Hook areas. The Wash Flats had a hatch rate of 2.50 chicks hatched/nest, down from 2.75 in 1994. The number of chicks hatched/nest on the Hook decreased from 2.65 in 1994 to 2.45 this nesting season.

Fledging success on the Assateague Island portion of the refuge was very poor compared to 1994 with only 0.81 chicks fledged/pair for a total of 25 chicks fledged. The fledge rate in 1994 was 2.12 chicks/pair, or 53 chicks fledged. The Hook was the most successful area in 1995. A total of 21 pair (67%) of piping plovers nested on the Hook and produced 21 fledglings for an average of 1.00 chicks/nesting pair, the highest average of the three nesting areas. Five pair of plovers fledged 4 chicks from the Wash Flats for an average of 0.80 chicks/nesting pair. None of the 19 chicks hatched on the Wild Beach survived to the fledgling stage. The average age at which the chicks were lost was approximately three days old. Only two chicks survived more than one week. The number of plovers on the Wild Beach decreased by 2 pair to 5 pair.

Monitoring of the Lower Island units continued this year with a cooperative agreement between the Virginia Department of Game and Inland Fisheries and the Service. During the summer months, VADG&IF consutant and refuge biologists conducted periodic surveys on breeding success of plovers on the barrier islands of Assawoman, the northern end of Metompkin, and Wallops. Table 3 provides a summary of this year's data. The fledgling success on these islands combined with the Assateague Island portion of the refuge resulted in an overall total of 50 chicks fledged, or 1.04 chicks fledged/nesting pair.

# B. MANAGEMENT TECHNIQUES

Management techniques employed to enhance the success of nesting plovers included the continued placement of predator-proof exclosures around nests and predator trapping within and adjacent to known plover nesting areas. The use of sodium nitrate gas cartridges to gas fox dens was continued for the second year. Plover exclosures were placed around all nests found on the Hook and the Wash Flats after the third or final egg was laid. The placement of shells fragments to provide enticement and to help elevate nesting sites within the North Wash Flats nesting area was tested in the 1994 nesting season.

AREA	YEAR	NESTS	NESTING PAIRS	TOTAL <sup>1</sup> EGGS	HATCHED/ NEST	CHICKS FLEDGED	FLEDGLINGS/ NESTING PAIR
Hook	1989	20	19	75	2.60	22	1.16
	1990	33	23	91	1.09	16	0.70
	1991	25	20	83	2.32	19	0.95
	1992	25	17	87	1.44	19	1.12
	1993	21	17	60	2.33	21	1.24
	1994	17	15	64	2.65	41	2.73
	1995	22	21	73	2.45	21	1.00
Wild	1989	8	7	25	2.88	4	0.57
Beach	1990	16	13	54	2.50	2	0.15
	1991	9	9	33	2.89	3	0.33
	1992	16	12	55	2.55	-0	0.00
	1993	12	10	44	3.71	8	0.80
	1994	10	7	35	2.20	2	0.29
	1995	5	5	19	3.80	0	0.00
Wash	1989	8	6	27	2.25	10	1.67
Flats	1990	10	6	34	2.10	6	1.00
	1991	12	9	43	0.91	8	0.89
	1992	15	7	57	0.00	0	0.00
	1993	0	0	0	0.00	0	0.00
	1994	4	3	15	2.75	10	3.33
	1995	6	5	17	2.50	4	0.80
	1989	36	32	127	2.03	36	1.13
Т	1990	59	42	179	1.64	24	0.57
T T	1991	46	38	159	2.07	30	0.79
Ĺ	1992	56	36	199	1.36	19	0.53
	1993	33	27	104	3.08	29	1.07
	1994	31	25	114	2.52	53	2.12
	1995	33	31	109	2.67	25	0.81

TABLE 2Piping Plover Hatching and Fledgling Success, 1989 - 1995

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1. Includes chicks from broods found after hatching.

ISLAND	NO PAIRS	% OF ISLAND POPULATION	CHICKS FLEDGED	CHICKS FLEDGED, NESTING PAIR
Assateague	31	42	25	0.81
Wallops	3	100	6	2.00
Assawoman	10	100	10	1.00
Metompkin	4	14	9	2.25
TOTAL	48		50	1.04

TABLE 3Piping Plover Productivity on Islands Owned/Managed by the<br/>Chincoteague National Wildlife Refuge, Summer 19951.

Additional shells were placed this year to increase the number and distribution of sites within the impoundment.

1. PREDATOR EXCLOSURES

Of the 30 nests found prior to hatching, 20 received predator exclosures. Four nests were depredated before the clutch contained three or four eggs, therefore, the exclosures had not yet been erected around the nests. Of the 20 exclosed nests, 90% (18 nests) successfully hatched at least one egg. Of the two exclosed nests that were unsuccessful, one loss was attributed to weather and one was lost to predation, possibly a red-winged blackbird. All exclosures were accepted within one hour of placement and no nests were abandoned.

2. PREDATOR MANAGEMENT

The predator program this year continued to emphasize mammalian (red fox, raccoon) control within and adjacent to plover nesting areas. Trapping efforts decreased this season with more emphasis placed on early detection and gassing of fox dens. No raccoons were taken due to the discontinuation of live trapping this season. On July 3, six soft catch leghold fox traps were set on the Hook adjacent to the plover nesting area for a period of four days. This action was taken in response to reports of heavy fox use in the Hook nesting area. No fox were captured during the four day trapping period.

Fox control was performed by den gassing, therefore the total number of animals taken is unknown. A total

<sup>&</sup>lt;sup>1</sup> Data provided by Robert C. Cross, contract Biologist for the VDG&IF, Onancock, VA.

of 19 dens were treated on the refuge. Of the 19 dens treated, eight were previous year's dens and five were new dens for a total of thirteen dens on the refuge. Six dens were re-opened and had to be retreated accounting for the nineteen total dens being treated.

With the emphasis on den gassing and having only a brief trapping period, data on predator removal for the 1995 season was undetermined. The results of previous year's predator program are presented in Table 4 indicating no data were available on the number of predators removed from the refuge this season.

Predator	Year	Hook	North Assateague <sup>1</sup>	Assateague Island Total
Raccoon	1988	no data	no data	241
	1989	12	4	53
	1990	16	61	77
	1991	16	121	137
	1992	19	65	84
	1993	2	22	24
	1994	6	12	18
_	1995	no data	no data	no data
Red Fox	1988	no data	no data	46
	1989	7	15	22
	1990	13	10	23
	1991	10	21	31
	1992	9	27	36
	1993	7	2	9
	1994	1	1	2
	1995	no data	no data	no data

TABLE 4Predator Removal by Trapping/Shooting/gassing 1988-1995

1. North refuge includes the Wild Beach, North Wash Flats, and adjacent areas.

# 3. NEST HABITAT ENHANCEMENT

Shells were placed on the Wash Flats this year prior to the arrival of plovers. Instead of placing shells in a long line as was done in the previous year, shells were dispersed in irregular shaped piles of varying size throughout the nesting area. Unlike the 1994 season, the new shell piles were not used by the plovers. The plovers instead chose natural vegetation and shells or the shell line that was constructed prior to the 1994 nesting season.

### V. DISCUSSION

Plover productivity on the Assateague Island portion of the refuge decreased considerably this season, dropping from 53 chicks fledged in 1994 to 25 chicks in 1995. This decrease is attributed mainly to avian predation of both chicks and eggs. Boat-tailed grackles and fish crows appear to have keyed in on the alarm calls of the piping plover and possibly to human footprints leading to the nest. In one case, three nests were visited early in the morning by a refuge staff member. Later in the morning, when refuge staff returned to exclose the nests, all three nests had at least one egg removed. Lack of clear footprints would indicate that it was a small, lightweight bird. In another case, a fish crow flew into an area where plovers with a young brood had begun alarming. The crow perched on a post in the midst of the alarming plovers, apparently searching for a chick.

Although the ghost crab study conducted on the Wild Beach in 1994 showed no direct predation by ghost crabs, it did show a great deal of defensive behavior by the plovers toward the crabs. Due to the high concentrations of ghost crabs on the Wild Beach, adult plovers spend much time alarming and feigning, possibly drawing in the crows and grackles which then prey upon the chicks. In Appendix I, a detailed report on brood observations by Tom Penn, a Virginia Tech summer intern, provides an insight into the many obstacles plover chicks face each year on the Wild Beach.

Tidal flooding did not cause any egg losses this nesting season. Only five eggs (two nests) were lost to weather events in the form of heavy rains which caused flooding. Egg laying was delayed in several instances, when active scrapes were lost on the Hook due to high tides and on the Wash Flats due to flooding. All nests present on the Wild Beach during the high tides were safely above the high tide line.

Additional shells were placed on the Wash Flats this year prior to the arrival of the plovers. Rather than placing the shells in a long line as was done in the previous year, shells were dispersed in piles of varying size and shape throughout the nesting area. The new shell piles were not used by the plovers this year, but they were used by nesting least terns. The plovers instead chose natural vegetation and shells or the shell line that was constructed prior to the 1994 nesting season. The old shell line had the added advantage of a slightly raised elevation due to the accumulation of sand around the shells over the winter. This additional elevation is very important in an area prone to flooding.

Plovers nesting in the overwash this year were closely monitored after hatching to reduce disturbance to the adults and chicks by beach users and to prepare for the closure of the off-road vehicle zone if needed. Staff and refuge volunteers were on site from early morning to late evening observing the movement of the broods. Monitoring continued on both broods until the chicks were approximately 10 to 15 days old, at which time daily checks were made to verify the chicks were still surviving and were within the bayside feeding area.

## VI. RECOMMENDATIONS

The 1996 field season recommendations are presented below. When implemented, these recommendations will provide protection to nesting birds and their habitat, minimize disturbance to plovers during the early spring migration, nest site selection, incubation, and chick rearing stages, and to secure additional potential nesting areas. Deviations from any established procedure or protocol will be implemented only to provide more protection or less disturbance to nesting birds.

- 1. Continue the predator control program through use of den gassing as the primary method with the use of soft catch leg-hold and live traps as conditions dictate. Red fox and raccoon will continue to be the target species. Only experienced trappers familiar with island trapping techniques will be used. All trappers will be required to have pre-exposure rabies inoculation prior to any trapping activity. Trapping and fox den gassing will be confined to areas in and adjacent to piping plover nesting areas.
- Continue plover population monitoring using the same procedures employed during the 1995 season. No more than two surveys per week will be conducted beginning no later than the last week of February.

- 3. Maintain closures and area posting consistent with previous years (March 15 through August 31). Delay reopening of the Hook at the end of the nesting season if conditions warrant. Continue the closed area on the Hook to include the overwash area adjacent to the ORV zone, north of the old Coast Guard station, on the bay side north to the entrance to the ORV zone. Sign and rope off the north and south ends of the closed area to keep pedestrians from walking along the bay side of the area. This would provide protected nesting habitat for both plovers and least terns that nested in this area in 1995.
- 4. Confine intense nest searches to the fourth week of May; the established peak nesting period. During this time conduct walk-throughs in all three refuge nesting areas. During the rest of the season, nests should be found only by observing territorial adults. Limit disturbance to incubating or territorial adult(s) to a maximum of 20 minutes on any given day. Search time will be limited to less than ten minutes when nest searches are held after 1000 hours or in extreme weather conditions such as midday heat, rain, wind, etc. This time limit should be adhered to even at the expense of not finding any new nests.
- 5. Nest monitoring will be limited to direct observations at a distance that does not disturb the incubating bird. The incubating adult will not be flushed from the nest until approximately two to three days prior to the estimated hatching date. At nests that contained complete clutches when found, nest checks will be made six to seven days prior to the estimated hatch date.
- Brood monitoring will be delayed until chicks are at least two weeks (14 days) old to reduce disturbance and decrease the threat of attracting avian predators to the newly hatched chicks.
- 7. Limit vehicle activity (nest monitoring, trapping, etc.) within nesting areas to survey routes established at the beginning of the nesting season and to no more that one trip each day.
- 8. Continue predator-proof exclosures on plover nests, with the exception of the Wild Beach, and only on nests with at least two eggs or completed (3 or 4 eggs) clutches. Nests on the Wild Beach will remain unexclosed with the presumption that heavy predation will encourage renesting on the Wash Flats or Hook. Continue procedure to not place predator-exclosures around nests on the Hook which occur behind primary dunes in dense vegetation, areas naturally protected by at least 75% vegetation.

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Exclosures around hatched or lost nests will remain within the nesting area and removed at the end of the field season.

- 9. Trap and remove all predators detected within the enclosed section of the North Wash Flats nesting area. Protect area with placement of snares in strategic locations along the fence line.
- 10. Continue the expansion of the nesting areas within the North Wash Flats area by placement of additional mounds of shells to encourage more birds to move from the Wild Beach to the Flats.
- 11. Expand or conduct a more extensive study of the Wild Beach plover population to determine the reason(s) for low survival rates. Emphasis of study should be on plover and ghost crab interactions and plover chick food availability.
- 12. If funded, create (bulldoze) shallow depressions behind foredunes on the Wild Beach to create ephemeral interdune pools to provide feeding habitat for plover chicks (Melvin 1993). These pools would provide high quality feeding habitat that would serve to keep chicks off the beach and away from potential ghost crab predation.
- 13. Experimentally remove a scrub vegetation section between the Wild Beach dunes and North Wash Flats nesting area to allow movement of plover adult and young to the less ghost crab populated areas of the flats.
- 14. Limit visits to the Hook by law enforcement personnel to only those requiring direct contact. Patrols for trespassing violations should be conducted by boat whenever possible. Any person who may be required to enter the nesting area during the season should accompany a plover monitor to learn about plover behavior and to be shown the route to be followed.
- 15. Control avian predators where necessary. Carry exclosures at all times and exclose all new nest immediately if found with two, three or four eggs. If nest is found with less than two eggs, sweep footprints from area around nest.
- 16. Prohibit kite flying on the Overwash area during the plover nesting season due to the disturbance to nesting birds.
- 17. Restrict the removal of shells and driftwood from plover nesting areas by signing selected areas on the Hook.

Beach debris provides important shelter areas from blowing wind and sand and also provides a visual cover for the plovers.

#### VII. REFERENCES

- Cross, R. R. 1989. Monitoring, Management, and Research of Piping Plover at Chincoteague National Wildlife Refuge, Summer 1989. Unpublished report of the U. S. Fish and Wildlife Service. 80 pp.
- \_\_\_\_\_. 1990. Monitoring, Management, and Research of the Piping Plover at Chincoteague National Wildlife Refuge, Summer 1990. Unpublished report of the U.S. Fish and Wildlife Service. 71 pp.
- \_\_\_\_\_. 1991. Monitoring, Management, and Research of the Piping Plover at Chincoteague National Wildlife Refuge, Summer 1991. Unpublished report of the U.S. Fish and Wildlife Service. 76 pp.
- Haig, S.M. and L.W. Oring. 1985. Distribution and Status of the Piping Plover throughout the Annual Cycle. <u>J.Field Ornith</u>. Vol. 56(4).
- Melvin S. M. 1993. Recommendations for Improving Productivity of Piping Plovers at Chincoteague National Wildlife Refuge. Department of Forestry and Wildlife Management, Holdsworth Natural Resource Center, University of Mass., Amherst, MA. 13 pp.
- U.S. Fish and Wildlife Service. 1988. Piping Plover Monitoring -Summer 1988. Unpublished report of the USFWS, Chincoteague NWR, Chincoteague, VA. 83 pp.
- U.S. Fish and Wildlife Service. 1992. Monitoring and Management of the Piping Plover, 1992. Unpublished report of the USFWS, Chincoteague NWR, Chincoteague, VA. 31 pp.
- U.S. Fish and Wildlife Service. 1993. Piping Plover Monitoring and Management - Summer 1993. Unpublished report of the USFWS, Chincoteague NWR, Chincoteague, VA. 19 pp.
- U.S. Fish and Wildlife Service. 1994. Piping Plover Monitoring and Management - Summer 1994. Unpublished report of the USFWS, Chincoteague NWR, Chincoteague, VA. 17 pp.

### VIII. APPENDIX I

# PIPING PLOVER CHICK MORTALITY ON THE WILD BEACH REGION OF THE CHINCOTEAGUE NATIONAL WILDLIFE REFUGE 1995 Thomas Penn, Student Intern - VPI&SU

The Wild Beach portion of Assateague Island contains over six kilometers of potential Piping Plover (*Charadrius melodus*) nesting habitat. In 1994, only two chicks survived out of a total of 23 chicks hatched. Previous years have met with similar results in this area. This high rate of mortality has been a major concern to CNWR staff for some time. The causes of chick mortality on Wild Beach have been generally unknown, with the primary blame being placed on the ghost crabs (*Ocypode quadrata*) and red foxes (*Vulpes vulpes*). On the Wild Beach, a typical pattern of high hatching success is followed by loss of chicks within one to five days after hatching.

The first nest to hatch on the Wild Beach during the 1995 nesting season was nest number W01/01 on May 29. The nest was located behind the primary dunes in an open shelly area. Four chicks were seen near the nest cup on the first day, but were not seen again during the regular daily surveys conducted by the biology staff. Immediately following the loss of this nest, extended observations of subsequent broods was initiated to determine the possible causes of chick mortality on the Wild Beach.

Nest number W02/07 was the first brood to be observed for an extended period. The nest was located in an open shelly area behind the primary dunes. A clutch of four eggs was laid, and all four eggs hatched on 05/31/95. Observations began at 1100 hours, before the fourth egg hatched. Notes were recorded at approximately fifteen minute intervals to observe interactions of the adults and chicks with any possible predators. The fourth chick hatched at approximately 1800 hours. No significant interactions occurred during the first ten hours of observations. At nightfall, there were still four chicks and two adults in the area of the nest cup.

Observations were continued at 0600 hours the following day. At 0645 there were still four chicks accounted for. Observations were discontinued until 1100 due to other duties on the refuge. When the observer returned to the area, the brood had moved to a new location 100 meters north of the nest in an open shelly area behind the primary dunes. Only one chick remained with the adults. No significant interactions occurred during the next several hours while the chick spent most of its time being brooded or shaded by the adults.

At 1530 hours, the chicks peck rate increased dramatically, and began to move further away from the adults than it had previously. Within a few minutes, ghost crabs began to appear at

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the entrances of their burrows as the chick passed close by as it was feeding. In each case, the adult plovers immediately approached the crab and chased it back down the burrow. As time passed, the crabs became more and more aggressive in their behavior towards the chick. In one instance, both adults were busy defending against a ghost crab fifteen feet from the chick when another crab made a direct attack on the chick, forcing it to try and escape. Until this point, the chick had been virtually oblivious to the ghost crabs movements. The adult female was forced to fly to get between the crab and the chick in order to protect it. This was the only instance in which a ghost crab chased a chick. The entire time the chick was feeding, however, the ghost crabs were seen as a threat to the chick by the adult plovers. It appeared the adult plovers were doing everything in their natural abilities to protect this one chick. Observations ended at 1750 hours when the chick was being brooded by the female and the male plover returned to the surf to feed.

Observations resumed the next morning at 0700, with more of the same results as the previous afternoon. As the chick began to feed, ghost crabs became more active in the area around the chick. No more direct attacks were made on the chick during the morning hours but the adult plovers were constantly moving from one crab burrow to another to defend against threatening crabs. Observations again ceased when the chick stopped feeding and was being brooded by the one of the adults. When the observer returned at 1400 hours, no sighting of the chick or the adults could be made. No further sightings were reported for this nest. The cause for the loss of the chicks is recorded as unknown.

The next nest to hatch was W04/24 on June 10, located in the wrack line of the foredune. Observations began at 0930, with two chicks hatched and two eggs still unhatched. No significant interactions occurred with ghost crabs or other predators during the first day. Observations ended at 2100 hours due to darkness, with four chicks being brooded by the adults. Observations resumed again at 0630 on following morning with four chicks still alive and feeding near the nest area. Ghost crabs were again more active as the chicks began to feed further from the adults. The adult plovers had several encounters with the crabs but no more direct attacks were made on the chicks by the crabs.

At 0930, a separate pair of adult plovers came into the area and were chased by the parents. These plovers had a nest 150 meters south of nest W04/24. At 0950, a boat-tailed grackle (Quiscalus major) appeared from behind the dune, apparently attracted by the alarming of the parents attempting to chase off the intruding plovers. The grackle was seen pecking on one of the chicks that was feeding in an open area away from the rest of the brood. The adult plovers were alarming and feigning in an attempt to draw the attention of the grackle away from the chick. While the grackle was momentarily distracted, the chick was able to

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escape to some sparse grass where the rest of the chicks were hiding. No longer distracted, the grackle began to search through the grass for the chicks but was unable to locate them. After a few minutes, the grackle gave up and flew off to the densely vegetated area behind the dunes. The two intruding plovers were present for the entire episode, but made no attempt to try and draw the grackles attention away from the chicks. These plovers appeared several more times, only to be chased off by the parental adults. Grackles appeared on two more occasions during the day, but only showed passing interest in the plovers. On both occasions, the adult plovers chased, or attempted to chase the grackles away. Later in the day, one of the chicks displayed a wound just below its right eye, an apparent result of the attack by the grackle. This chick was not seen again after the following day, possibly due to the injury it received from the grackle. Observations ended at 1845 hours and resumed the following morning at 0730.

At 0755, a grackle was chasing an insect near the brood, and was alerted to the plovers location by one of the adults alarming at a ghost crab. The grackle was walking directly towards the brood when both adults got between the grackle and the chicks, and they were able to successfully chase the grackle away. At 0815, the brood had moved to a location over the top of the dune making observation of the brood nearly impossible. The male plover chased a grackle from this area to a location about 120 meters north of their previous location. When the observer arrived to view the encounter, the grackle was seen pecking on a chick under its foot. When the observer approached the grackle to try and retrieve the chick, the grackle picked up the chick and flew behind the dunes into the dense vegetation and was not seen again. Observations were concluded with the loss of this chick to the grackle.

A predator control program of grackles was put into place following the loss of this chick to the grackle. Early results of the predator control were encouraging, with two of the three chicks surviving to ten days old. At that point, false assumptions were made that the chicks could survive without further human assistance. This was not the case, as the chicks did not survive after predator control was curtailed.

In 1995, no chicks survived on the Wild Beach. Plovers in this area face a wide array of problems making survival of young to fledging age nearly impossible at this time. Ghost crabs will certainly take chicks, based on their predatory behavior towards the chicks as observed in this study. The primary problem with the ghost crabs may only be secondary. The adults to spend an enormous amount of energy defending against the crabs, while at the same time alerting other predators to the location of the chicks. One possible way to reduce the number of ghost crab interactions with plovers will be to remove some portions of

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dunes on the Wild Beach to create an overwash area between the Wild Beach and the adjacent North Wash Flats area.

Boat-tailed grackles are opportunistic in their feeding behavior, taking prey whenever the chance arises. The problem with predator control of grackles is determining when a specific grackle could pose a threat to the plovers. It is possible that when a grackle discovers a brood, the grackle will be keyed in to that area and continue to return as long as there is a food supply. If this is the case then these problem grackles can be identified and controlled. If all grackles in an area are a threat to the plovers, then control of the grackles and other avian predators becomes an enormous problem for refuge staff. Reduction of the dense vegetation behind the dunes should effectively reduce the number of grackles and other avian predator species that find cover in these areas.

Red foxes were not a major problem on the Wild Beach in 1995, although fox tracks were discovered in the area of one brood that disappeared. Possible reasons for lack of a fox problem could be attributed to an outbreak of rabies on the island in 1994, along with successful predator control methods employed by the biology staff. Early season trapping and identifying dens during the nesting season should be able to control most problems they pose to the plovers in the future.

The outlook for plovers nesting on the Wild Beach is bleak, yet not hopeless. The Wild Beach can be an ideal nesting area for plovers with careful planning and monitoring. Plans for habitat improvements in the area need to be implemented, and intensive predator control should to be continued, to give the plovers a realistic chance to successfully recover to their former numbers.

James Charles