Management of the Piping Plover (*Charadrius melodus)* and the Least Tern (*Sterna antillarum*) 2008 Report

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2008 Piping Plover and Least Tern Report

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I. Acknowledgements

The Nature Conservancy gratefully acknowledges the U.S. Fish and Wildlife Service for providing funding for the plover monitoring, public education, and predator monitoring for the 2008 season, which would not be possible without this support.

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II. Abstract

The 2008 Piping Plover breeding season at nesting sites in Little Compton, RI and nearby Westport, MA was fair, with varied results at each site. Despite an increase of three nesting pairs at Goosewing, there was an overall decrease in productivity compared to last year (1.92 chicks per pair in 2007). This year, a total of 16 pairs of piping plovers fledged 21 chicks for a productivity of 1.31 chicks per pair (Table 1). This productivity is below the recovery objective of 1.5 chicks per pair established by the U.S. Fish and Wildlife Service. The Nature Conservancy's Goosewing Beach Preserve had a significant decrease in plover productivity, with 10 nesting pairs producing only seven fledglings. Briggs Beach, however, supported four pairs (a decrease of one pair from 2007) that fledged 12 chicks for a productivity of 3.00 chicks per pair, which is the highest recorded at this site since 1986. The success at this site, which is only one mile west of Goosewing with very similar habitat, was due primarily to absence of predators. Plovers were present at Elephant Rock Beach but did not nest at the site this year. Richmond Pond, just west of Elephant Rock, has not had a nesting pair since 2004. This year, two pairs successfully nested here. The decrease in productivity this year was due primarily to loss of chicks at Goosewing Beach. Nest failure was minimal, with only two of 16 nests depredated or abandoned, both at Goosewing Beach. These pairs that lost nests did not re-nest. The overall hatch rate was 81% (50 of the 62 eggs laid at all sites hatched) and chick survival was 42% (21 chicks fledged of the 50 that hatched).

The Least Tern nesting season was poor this year, with zero chicks hatched from an estimated 35 pairs at all observed sites. Tern nests were depredated systematically at Goosewing probably by an avian predator, evidenced by egg shells with a hole in one side found at nest sites. Herring Gulls and American Crows visited the east side of the breach at Goosewing frequently. At Briggs Beach, the mudflat habitat was flooded after late April rain and remained submerged for the entire season. The one Least Tern nest found at Briggs was depredated.

The Nature Conservancy supported three staff positions for plover monitoring and education, which resulted in greater visibility and outreach to visitors. The education and outreach program consisted of staff lead nature programs and walks on the beach for children and adults/families, and informal programs or "staffing" of the beach, where there were numerous opportunities to speak with beach visitors. In addition, two special invitation events were held for donors. Nine types of plover and beach ecology programs were offered at various dates throughout the season, totaling 17 programs. These programs attracted a large and diverse number of participants either locally or from outside areas. See section IX for more detail on the education program.

Table 1: 2008 Reproductive Data for Piping Plovers at all Observed Sites

Site	Nesting Pairs	Nests	Eggs	Eggs Hatched	Chicks Fledged	Chicks Fledged/Pair
Goosewing Beach	10	10	39	27	7	0.70
Briggs Beach	4	4	16	16	12	3.00
Cockeast Pond	0	0	0	0	0	0
Richmond Pond	2	2	7	7	2	1.00
Acoaxet	0	0	0	0	0	0
Total	16	16	62	50	21	1.31 (21/16)

III. Introduction

The Nature Conservancy monitored Piping Plovers and Least Terns at Goosewing Beach and Briggs Beach in Little Compton, RI, in addition to three sites in Westport, MA: Elephant Rock Beach (Cockeast Pond), Richmond Pond, and Acoaxet Point. Monitoring of Piping Plovers began in the first week of April and continued through the second week of August.

The 2008 season had unusual weather patterns that impacted the plover nesting season. Plover nests were established earlier this year at Goosewing. The first six nests at this site were found by May 6. These first nests sustained the heavy rain that the area received in late April. The water levels of Quicksand Pond were high in the early spring, eliminating potential habitat on the mudflats. The breach opened for the first time this spring on May 2 and remained open until May 25. At the high tide on July 1, the surf was just meeting the pond waters. The breach opened for the second time this season on August 12. An early heat wave the first week of June was a stress for hatched chicks, with temperatures in the upper 90s and high numbers of beach visitors.

IV. Methods and Materials

The monitoring of piping plovers and location of nests was performed using careful field observations as described in the Piping Plover Monitoring Program Staff Handbook (Goldin, 1994). Symbolic fencing was erected in April at Goosewing Beach, Briggs Beach, Elephant Rock Beach and Richmond Pond. Symbolic fencing was not used at Acoaxet, as plovers were not observed at this site. A sign was posted on every other metal post along the symbolic fencing, marking the area as nesting habitat and prohibiting entry and disturbance. These signs were numbered to provide a reference distance when referring to plover activity and nest locations. The numbering began at the breach (0), and increased to the west and to the east. The posts in between the signs were designated as 0.5. For instance, the post in between the second and third signs, west of the breach, is referred to as "2.5 West" (2.5 W). The posts were placed about 20 feet apart. Thus the distance between post 1 E and post 3 E would be approximately 80 feet. This system was very useful for recording purposes and is recommended for the future. The numbers were marked in small print on the bottom right corner of the sign. Predator exclosures were used at all sites where plovers nested this year and at all nests. Circular exclosures of 2" x 4" opening wire with bird netting top were constructed at nests as described in the Staff Handbook (Goldin, 1994). The majority of the Goosewing nests were found with one or two eggs; one nest was found with three eggs.

Predator Removal

During the winter of 2008, the Conservancy hired a professional trapper to remove predators of plovers and terns at Goosewing and Briggs Beaches to increase plover and tern productivity. The target species for these sites included mink, skunk, coyote, fox and raccoon. Traps were placed at the far east end of Goosewing, along the dune/shrub areas near the Massachusetts state line. At Briggs Beach, traps were placed adjacent to the parking lot and along the southwest shore of the pond (see Appendix C). Between January 7 and February 27, a total of nine raccoon, one red fox, four skunk, and one opossum was removed. Only raccoon and skunk were removed from Goosewing Beach. The high water levels of the ponds at these two sites, as well as human/dog activity behind the dunes at Goosewing minimized the areas where traps could be placed, which made for less than ideal trap locations for some of the target species.

Predator Monitoring and Assessment

Predator presence and disturbances at nesting areas were documented through visual observations of predators, tracks, and by using infrared digital game cameras. These cameras were an important tool in documenting predators at nest sites, especially where the sand/cobble substrate makes identifying predator tracks difficult. An infrared digital game camera (Moultrie Game Spy I40 Digital Game Camera) was used at Goosewing and Briggs Beach. Three separate game camera units were employed, each

triggered by a laser beam directed out the front of the camera itself, making these units more compact and practical than the set up used last year. The cameras were locked inside protective metal housings which in turn could be secured to the ground. We locked cameras to the trunk of large shrubs, posts, and to lobster traps, which allowed for disguise and ease of placement near nests, but at the expense of some security. A single camera set-up at Briggs was employed for five periods at different locations including exclosures and nearby clearings that showed signs of animal activity such as tracks (See Figure 4- map of Briggs nest and camera locations). At Goosewing Beach, two different cameras were installed at four locations in a similar manner (Figures 2 and 3). See Appendix D for the report on predator monitoring with game cameras.

V. Productivity Results of Piping Plovers at each observed site

Goosewing Beach

Ten pairs of Piping Plovers nested at Goosewing Beach this season, an increase of three pairs from last year. However, only four of these pairs fledged chicks. A total of 27 eggs hatched from 8 nests (Table 1). The two pairs that lost nests (nest 7 and 8) did not re-nest, most likely due to the close density of neighboring pairs and intense territorial disputes. The first nest of the season was found at Goosewing on April 26, and the last nest hatched on July 3. The 2008 nest locations at Goosewing are shown in Figures 2 and 3.

The habitat available to Piping Plovers was similar to last year. The dune on the west side of the breach was altered by growth of vegetation (primarily beachgrass and goldenrod) and plovers did not nest here this year. The terrain on the beach front west of the breach consisted of a high cobble line parallel to the dunes, with a steep bank and stratification layers visible. This provided a buffer to the plovers incubating nest 4, as pedestrians tended to walk below the cobble ridge closer to the water. The majority of nests were around the east side of the breach, with two nests along the shore, and five nests fairly evenly spaced down the beach front. The distance between these nests on the front was between 20 and 50 feet . The density of nests in this area resulted in intense territorial displays. On May 16, two plovers were observed exhibiting territorial behavior in the clearing between nests 5 and 7, and the plover incubating nest 5 got off the nest to join in the confrontation. This territorial pressure may account for pairs 7 and 8 failing to re-nest. One pair nested on the west side of the beach (nest 4), and one nested at the far east end of the beach, probably the same birds that nested at these locations last year.

Four plover nests along the beachfront, showing density of nests.

The first five plover nests at Goosewing were located within one week (between April 26 and May 6). The first nesting pair continued to incubate the nest through heavy rain and cold temperatures on April 28 and 29. The water level of Quicksand Pond approached within five feet of this nest before the breach opened on May 2. This event exposed the mudflats and attracted a large number of shorebirds. Three days after the breach opened, 12 plovers were observed on the mudflats.

Nest 7 at Goosewing was abandoned for unknown reasons. The nest was located under a clump of beachgrass on the east side of the breach (Figure 2). The plover abandoned the nest on May 19, just two days after the nest was completed. The pair remained in the area but did not re-nest.

Nest depredation at Goosewing was minimal. On June 8, nest 8 was discovered to have been depredated, and feathers of an adult plover were found inside the exclosure. No clear predator tracks were identified, but a small space under the bottom row of the exclosure wire suggested that a small mammalian predator dug under the wire. The nest was in a clearing of beachgrass and visibility was poor. As a result, the plovers flushed easily upon approach to the nest, and on one occasion, the incubating adult flew into the netting several times before finding an escape route.

Nest 8: Remains of plover feathers inside exclosure

Nest 8: Area where animal dug under exclosure

The other occurrence of nest depredation at Goosewing was at nest 9, which lost one egg on June 14, after it was exclosed. The predator entered the exclosure without digging under or altering the exclosure wire. A mink was photographed in the area by the game camera, and crows were observed on several days in this area. One week after hatching, the one chick that remained moved out to the beach front with the adults. The chick disappeared at 18 days of age.

The broods of chicks at Goosewing were challenging to track because six of the nests hatched within one week. There was significant movement and mixing of the broods (see Figure 6); one chick from nest 1 was observed foraging with two chicks from nest 5. Nest 4 brood moved east across the breach several days after hatching, where they experienced territorial pressure from nest 1 brood. The brood (nest 4) was seen at the far west end of the beach on June 3 after the adults were observed in a contact fight with nest 1 brood. This pressure to move greater distances probably made them more susceptible and visible to predators. Crows frequented the area and a gull was observed being chased out by a nest 4 adult two days after the nest hatched. Nest 6 brood moved the largest distance, being observed between 6 E and as far east as 12 E. The broods that hatched around the breach had the least amount of territory to move around in, and were more susceptible to pressure from neighboring adults. On occasion, plover adults were observed chasing another pair's chicks.

Plover chicks from the first six nests to hatch were lost at a peak period around June 6-8 (Figure 7), most likely to predators known to be on the beach, such as gulls, crows, skunks, raccoons, mink, fox and coyote (all documented on the game camera). The last chicks fledged by the end of June at Goosewing. Sightings of fledglings at Goosewing continued until the last field observations on August 29, probably fledglings that hatched at other sites.

Briggs Beach

Four pairs of Piping Plovers nested successfully at Briggs. Of 16 eggs in four nests, a total of 12 chicks survived to fledgling age, resulting in a productivity of 3.00 at Briggs Beach, an improvement over 1.2 and 0.6 from the years 2007 and 2006, respectively.

Piping Plovers engaged in scraping and mating behavior from the start of the observation period in mid-April. New, active scrapes and associated tracks were visible daily all along the beach, centered mostly around the mouth of the breach, with some activity along the mudflats on the adjoining salt pond. Two or three pairs, as well as individuals were active for a few weeks before the first three nests were found on May 5. By this time, heavy rains had filled much of the salt pond, and no further nesting activity occurred along the mudflats. Two nests were on opposite sides of the closed breachway, and a third nest was further to the east end, near the Bogle property. A fourth nest was found on May 22, just to the east of the rocky point on the beach, in between the breach

nests and the eastern-most nest. All four established nests were along the beach front, generally high above the high tide line near the dune front. All four nests were exclosed before the nests were completed, and no eggs were lost prior to hatching.

No established nests were lost at Briggs, unlike the previous 2007 season when two nests were washed out by wave action. However, several storm events, particularly early in the season, washed out parts of the beach that had active scrapes and numerous tracks. It is possible that some mating plovers may have abandoned nesting, or moved to other sites. The last established nest, high up on the beach near the dune grass, is likely a final successful effort on the part of one such pair. Two pairs of plovers were observed along the beach, often scraping and engaging in mating behavior for much of the season, well after the other nests had hatched, but no further nests were found.

The first chicks began to hatch on June 5. Within a few days, the first three nests had hatched. Two nests only produced two surviving chicks, despite all four Briggs nests having four eggs each. A dead chick was found in one nest the day after hatching, but there was no sign of either the eggs or other missing chicks. Four chicks from each of the other two nests survived. The final four chicks, from the fourth nest, hatched on June 22. All twelve of the chicks at Briggs appeared to develop faster than the young at Goosewing, becoming fledglings sooner despite a later hatch date. The first attempts at flight were observed on June 23, with some chicks being fully fledged by June 28.

Briggs had relatively low presence of people throughout the season, though dogs were daily occurrences, with dog tracks often being seen throughout the nesting areas. Beyond dogs and rough weather, the plovers had few other apparent threats; the only predators that were seen by observers or game cameras was a trio of crows that spent a day at the site on June 26. A healthy population of rabbits, as evidenced by hundreds of game camera images, indicated a relative lack of predators, which may be due to removal of coyote and fox during the winter of 2007.

The breach remained closed for most of the breeding and feeding season, until successive heavy rains caused it to open up August 11, by which time the plovers had all reached fledgling age and no more breeding behavior was observed in other plover adults. As a result, plovers were only observed feeding along the wrack on the beach front and the limited amount of the pond accessible by the head of the closed breach.

Richmond Pond

Two pairs of plovers nested at Richmond Pond. Of eight eggs in two nests, two chicks hatched and survived to fledge, resulting in a productivity of 1.00 chicks fledged per pair. Previously, no birds had nested here since 2003. A mean productivity of 3.00 occurred for several years prior, underscoring Richmond's potential for future years.

Intermittent Piping Plover activity was seen along the beach and breachway at the Richmond Pond site for the first six weeks of the breeding season, including occasional

tracks, a few scrapes, and some limited breeding behavior by a pair of birds. A nest with one egg was found on the west side of the breachway on May 28, with two more eggs being laid over a week later; a fourth egg may have been depredated in the interim. The same day the first nest was exclosed, four clear scapes and numerous associated tracks were found on the east side of the breachway. On June 16, a second nest was found at this site, and exclosed the next day.

Two chicks hatched from the first nest on July 2, with no sign of the third egg. The second nest hatched two chicks on July 15, with no sign of two remaining eggs. Within two days, only one chick from the second nest remained, and within another two days it also disappeared. It is unclear what may have caused these losses. Large flocks of about 75 to 150 seagulls were present from day to day on the beach in front of these nests, but no signs of depredation were evident, though a game camera was not used at this site to provide any information. The parents from both nests were observed to be very active in defending their territory from possible threats. The breachway, which normally provided a secure feeding area for the resident plovers, underwent a period of drought during the first few weeks of July. This limited food availability may have caused the plovers and their young to attempt feeding on the beach, among all the seagulls. Additionally, the site was subject to the same weather events as the other sites. The breach did not open until August 11, well after the two surviving chicks became fledglings.

Elephant Rock Beach (Cockeast Pond)

No nests were established at Elephant Rock Beach, therefore the productivity was 0. Plovers have nested at the site four of the five years previous, but not successfully since 2003, when an average of three chicks per pair fledged. Some intermittent and moderate plover activity was seen along this site over the first couple months of the breeding season, including scrapes and numerous tracks, as well as observation of one or two adults. It is possible that the second nesting pair at the Richmond Pond site may have been a pair that initially attempted nesting at this site.

Acoaxet Beach

This site did not support any nesting plovers this season. The stretch of beach front at Acoaxet has a high level of human, canine and vehicular disturbance. The last plover activity at this site was in 2004, when a pair from Elephant Rock re-nested here on the Westport River side of the point and fledged one chick (Table 7).

Table 2 summarizes the nest data for all observed sites.

Table 2

2008 Piping Plover Nests at a Glance

Site	Nest No.	Clutch Size	Eggs Hatched	Chicks Fledged	Date Nest Found	Eggs when Nest Found	Date Clutch Complete	Date Nest Hatched or Failed(f)	Fledge Date	Exclosure Date
	1	4	4	1	26-Apr	1	2-May	30-May	24-Jun	30-Apr
	2	4	2	0	27-Apr	1	3-May	31-May	25-Jun	1-May
	3	4	4	1	30-Apr	1	8-May	4-Jun	29-Jun	5-May
	4	4	4	0	30-Apr	1	6-May	1-Jun	na	5-May
Goosewing	5	4	4	2	1-May	2	4-May	1-Jun	26-Jun	1-May
Beach	6	4	4	3	6-May	2	9-May	5-Jun	30-Jun	7-May
	7	4	0	0	10-May	1	17-May	19-May(f)	na	14-May
	8	4	0	0	21-May	1	28-May	8-Jun(f)	na	26-May
	9	3	2	0	25-May	2	28-May	24-Jun	na	26-May
	10	4	2	0	2-Jun	2	8-Jun	3-Jul	na	3-Jun
	1	4	4	2	5-May	3	7-May	6-Jun	9-Jul	6-May
	2	4	4	4	5-May	2	9-May	8-Jun	3-Jul	6-May
Briggs Beach	3	4	4	2	5-May	3	9-May	3-Jun	27-Jun	6-May
	4	4	4	4	22-May	1	26-May	22-Jun	21-Jul	26-May
Richmond Pond	1	3	3	2	28-May	1	4-Jun	1-Jul	26-Jul	30-May
	2	4	4	0	16-Jun	2	19-Jun	15-Jul	na	17-Jun

Tables 3-7 display the Piping Plover results of the last 10 years at each observed site.

TABLE 3
Plover Nesting Results- Goosewing Beach

Year	Pairs	Total Nests	Sucsful Nests	Dprdtd Nests	Abanded Nests	Hatched Eggs	Fledged Chicks	Fledged per Pair
1998	9	20	2	12**	3	10	6	0.67
1999	5	12	4	5	3***	13	8	1.60
2000	6	6	3	0	1	17	6	1.00
2001	7	8	3	1	0	27	6	0.86
2002	7	8	5	0	1	26	14	2.00
2003	9	10	7	1	2	26	10	1.11
2004	9	10	7	2	1	26	13	1.44
2005	8	9	5	0	4	17	13	1.63
2006	8	11	3	3	1	23	7	0.88
2007	7	10	6	1	2	22	19	2.71
2008	10	10	4	1	1	27	7	0.70

Successful Nests are any that fledged at least one chick.
Depredated Nests are any that lost at least one egg to a predator.
** No exclosures were used after early May.
*** A fourth abandonment is possible.
2001 nests exlcosed with electric fencing.
2003 nests exclosed without electric fencing, one nest not exclosed

TABLE 4
Plover Nesting Results- Briggs Beach

Year	Pairs	Total Nests	Sucsful Nests	Dprdtd Nests	Abanded Nests	Hatched Eggs	Fledged Chicks	Fledged per Pair
1998	6	13	4	4**	4	16	8	1.33
1999	7	13	5	3	1	22	12	1.71
2000	8	11	2	5***	3	10	4	0.50
2001	5	7	5	0	1	19	9	1.80
2002	7	8	4	3****	1	14	9	1.29
2003	9	19	5*****	10	0	15	5	0.56
2004	6	10	2	6	2	8	4	0.67
2005	5	10	2	8	0	6	2	0.40
2006	5	9	1	5	0	4	3	0.60
2007	5	5	2	0	1	8	6	1.20
2008	4	4	4	0	0	16	12	3.00

** 1998 Exclosures removed from 4 nests on June 15. Two of those nests were depredated within 4 days.
***2000 Exclosures were removed from 4 nests on May 22 and 23. Two of those nests were depredated within 4 days.
2001 nests exclosed with electric fencing. One nest overwashed in 2001
****2002 Exclosures removed from 3 nests on June 9. All 3 were depredated.
*****2003 4 nests were flooded, no exclosures used on beach.

TABLE 5
Plover Nesting Results- Richmond Pond

Year	Pairs	Total Nests	Sucsful Nests	Dprdtd Nests	Abanded Nests	Hatched Eggs	Fledged Chicks	Fledged per Pair
1998	1	2	1	0	1	4	4	4.00
1999	1	1	1	0	0	4	4	4.00
2000	1	2	1	0	0	8	2	2.00
2001*	1	1	1	0	0	4	1	1.00
2002	1	1	1	0	0	4	3	3.00
2003	0	0	0	0	0	0	0	0.00
2004	1	1	0	1	0	0	0	0.00
2005	0	0	0	0	0	0	0	0.00
2006	0	0	0	0	0	0	0	0.00
2007	0	0	0	0	0	0	0	0.00
2008	2	2	1	0	0	7	2	1.00

*2001 nest exclosed with electric fencing.

TABLE 6
Plover Nesting Results- Cockeast/Elephant Rock

Year	Pairs	Total Nests	Sucsful Nests	Dprdtd Nests	Abanded Nests	Hatched Eggs	Fledged Chicks	Fledged per Pair
1998	1	2	0	0	2	0	0	0
1999	1	1	1	0	0	4	3	3.00
2000	1	1	1	0	0	4	3	3.00
2001	1	1	1	0	0	3	1	1.00
2002	2	2	2	0	0	6	4	2.00
2003	2	2	2	0	0	8	6	3.00
2004	2	3	1	0	2	4*	0	0.00
2005	0	0	0	0	0	0	0	0.00
2006	1	1	0	0	1	0	0	0.00
2007	1	2	0	0	1	0	0	0.00
2008	0	0	0	0	0	0	0	0.00

*No eggs in nest but only 1 chick observed on day of hatching

TABLE 7
Plover Nesting Results- Acoaxet

Year	Pairs	Total Nests	Sucsful Nests	Dprdtd Nests	Abanded Nests	Hatched Eggs	Fledged Chicks	Fledged per Pair
98	1	1	1	0	0	4	4	4.00
99	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	1	1	1	0	0	4	1	1.00
2005	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0

VI. Discussion

Piping Plover Populations

The populations of nesting pairs of Piping Plovers at all observed sites have been relatively stable the last several years (Tables 3-7). The most notable change was observed at Richmond Pond, which has not had a nesting pair since 2004. This year, two pairs successfully hatched chicks at Richmond. The last time two pairs nested here was in 1989. Goosewing Beach had an increase of three nesting pairs this season, but this increase unfortunately did not lead to increased productivity. The U.S. Fish and Wildlife's 1993 estimate of the capacity of this site is 15 pairs. There was an increase in pairs at Goosewing in 1995-1997, when 10 pairs nested here. The estimate of 15 pairs capacity seems achievable if the plovers were able to use the beachfront habitat on the west side of the breach in addition to mudflat habitat. The west side of Goosewing, adjacent to the town beach receives the heaviest volume of beach visitors and human disturbance. The east side of the breach continues to provide the most ideal habitat at this site.

Briggs Beach supported four nesting pairs of plovers, a decrease of one pair from 2007 (Table 4). The productivity increased to 3.00 chicks per pair from last year's productivity of 1.20. The U.S. Fish and Wildlife's estimate of capacity at Briggs Beach is seven pairs.

The productivity over the last ten years appears to have stabilized around one chick per pair (Figure 1). The trends at Goosewing and Briggs Beach this year reflect the difference in predator presence, namely, an excess of predators at Goosewing leading to poor chick survival, and a relative lack of predators at Briggs, contributing to high chick survival.

Two additional sites in Little Compton were visited to check for the presence of Piping Plovers. A visitor to Goosewing reported that a Piping Plover nest was found and had hatched (eggs gone, but chicks were not observed) at Tappin's Beach, which is west of Briggs Beach and directly west of and accessible from Warren's Point Beach Club. Tappin's Beach is a small, private, narrow beach with some suitable plover habitat. The individual said that the nest had been marked with a ring of stones around it to alert other beach visitors. The site was visited in the second week of July. The "ring" (less than 10" diameter) of stones which presumably marked the nest was found in an open sand area about 5 feet from the dune edge. No plovers adults or chicks were observed, although possible plover tracks were observed. The beach front is narrow and heavily visited.

The second new site visited was Chase Point area, the beach in front of Little Pond, with access and parking on Point Meadows Road. The site was visited on July 10 and no plovers or tracks were observed. The area is very rocky, with thick vegetation. The small breachway to the pond was closed, with a deep cut out section. The only potential

habitat was a small section of open sand west of the breach area, about 40 feet in length. These two sites are potential plover habitat, and should be visited in future seasons, especially given the report from the visitor to Tappin's Beach.

Figure 1

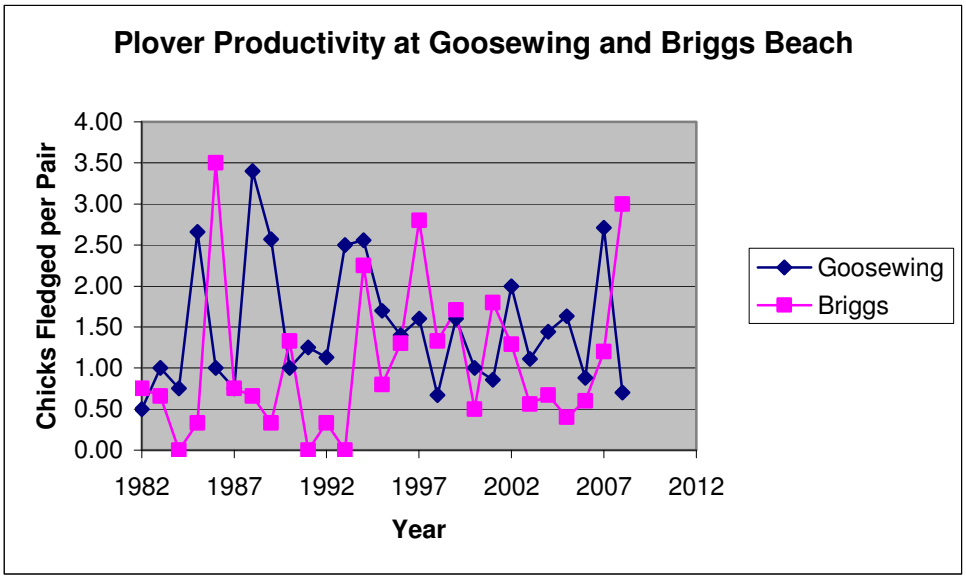


Figure 2: Goosewing Beach Piping Plover Nest and Camera Locations 2008

Figure 3: Enlargement of Goosewing Beach - Piping Plover Nests and Camera Locations

Figure 4: Briggs Beach Piping Plover Nest and Camera Locations

Figure 5: Richmond Pond Piping Plover Nest Locations

Figure 6. Daily location of Piping Plover chicks on Goosewing Beach, 2008

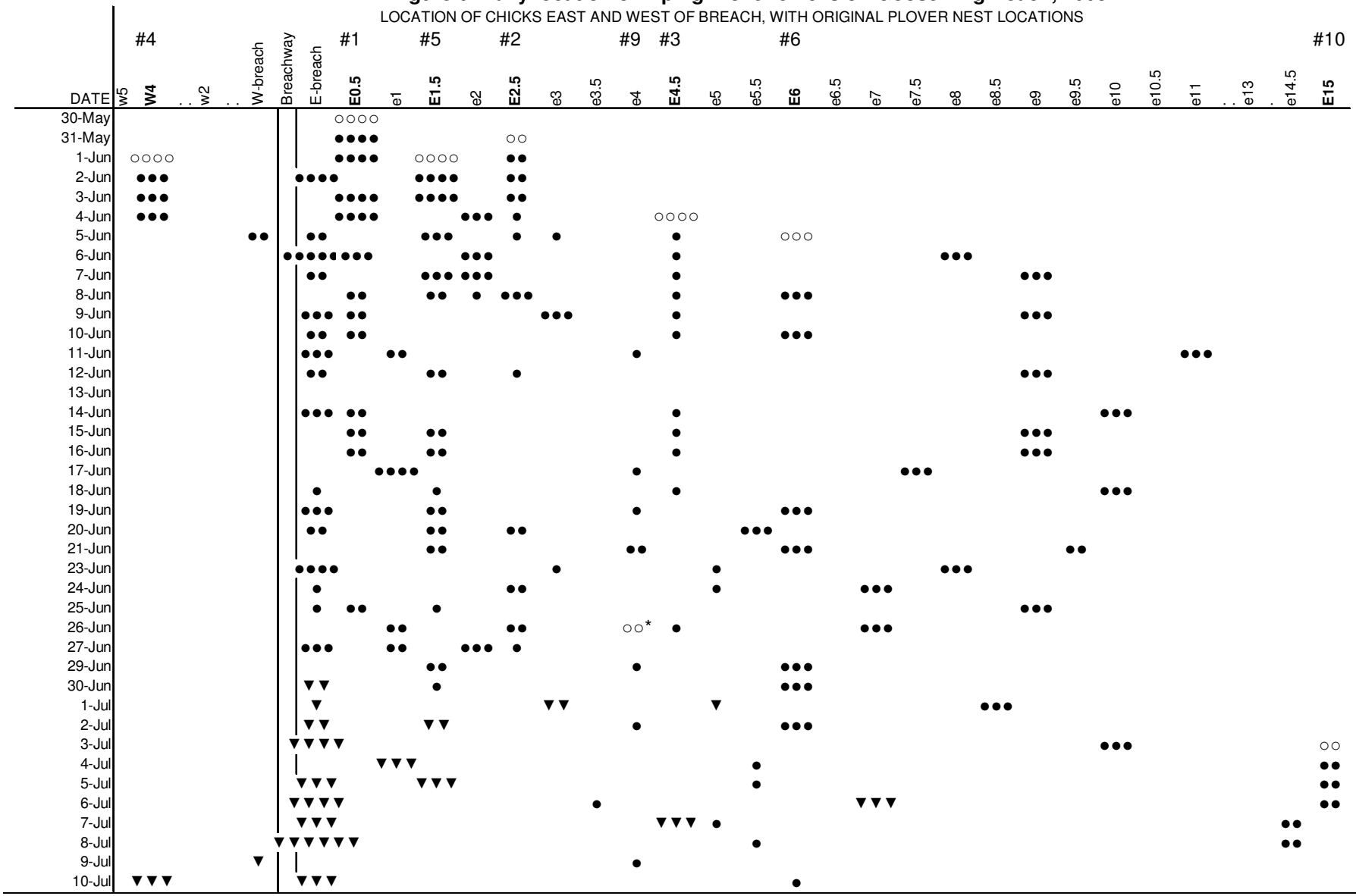


Figure 6: A plot of the daily location of each chick observed at Goosewing Beach, from hatchling to fledgling. Each circle is a chick, open circles are newly hatched chicks, and triangles are fledglings. The x-axis is observed location of individual chicks along the beach, both east and west of the salt pond breachway, as delineated by fencing markers. *Nest #9 was along the back of the breachway, off the beach front, but the surviving chick moved to the beach within two days.

Figure 7: Chick survival at Goosewing Beach, 2008

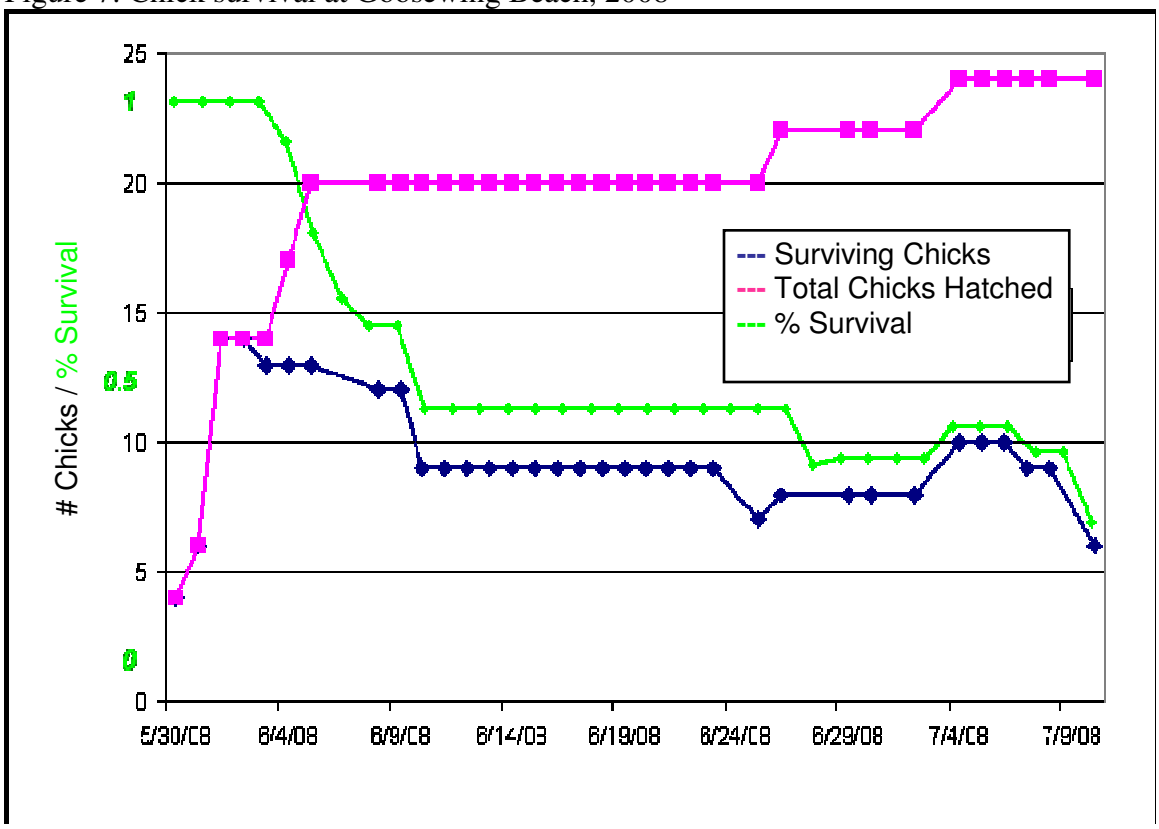


Figure 7 shows the number of chicks hatched (Pink), and surviving (blue) over the course of the Goosewing Beach breeding season in 2008, with percent survival overlaid (green).

Predator Impact on Plovers in 2008

Use of the three game camera set-ups proved to be invaluable for ascertaining predator presence at both Goosewing and Briggs beach sites. The difference in predator presence between the two sites is clear (Table 8). Goosewing Beach had many more photographed predators than Briggs, whereas Briggs photos were predominately of rabbits, indicating a significantly lower number of predators at that site. Interestingly, such a difference exists between Briggs and Goosewing which are only just over one mile apart. This difference correlates directly with the poor egg and chick survival seen at Goosewing, where the 2008 season had a low productivity rate of only 0.70 and a corresponding high number of predators. Conversely, Briggs Beach had a very successful year with a productivity of 3.00, and an almost non-existent predator presence. It would be difficult to surmise the precise nature of this difference in productivity without the information from the game cameras. The role of other factors that can also affect survival, such as human interference and extreme weather events, can be more properly weighed. From a management perspective, this information narrows the focus for planning the management of future breeding seasons.

While no photographs were taken of a predator eating a chick or egg, the correlation is hard to ignore. The last camera series, from location 4 at Goosewing does show a night-time shot of a medium-sized four-legged animal standing right over a Least Tern nest that was gone the next day. Due to heavy fog, the species is not known, but it is possibly a raccoon. Nonetheless, this single image is enough to highlight the capabilities of these cameras, even if they don't clearly capture actual predation events. For further discussion and analysis of the use of game cameras, see Appendix D.

Table 8: Total number of animals photographed by game cameras at Goosewing Beach and Briggs Beach

Game Cam results	**Goosewing**				**Briggs**				
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	
Animal	(34d.)	(26d.)	(27d.)	(13d.)	(12d.)	(10d.)	(2d.)	(15d.)	**5** (5d.)
Crow	4 \ 0	3 \ 0	6 \ 0	2 \ 0				3 \ 0	
Seagull		1 \ 1	1 \ 0						
Redwinged Black Bird		7 \ 0	13 \ 0						2 \ 0
Grackle			12 \ 0						
Robin									7 \ 0
Great Egret									1 \ 0
Morning Dove	3 \ 0		10 \ 0	2 \ 0					1 \ 0
Spotted Sandpiper			1 \ 0						
Sparrow			5 \ 0						3 \ 0
Unk. Black Bird		3 \ 0	6 \ 0						
Rabbit					35 \ 22	3 \ 0	1 \ 3	6 \ 19	32 \ 4
Deer	2 \ 0				1 \ 0				
Skunk	0 \ 1	0 \ 2	0 \ 2						
Fox	0 \ 1								
Coyote			0 \ 1						
Raccoon			0 \ 1						
Mink			0 \ 3						
Med. Unk.*	0 \ 5			0 \ 2	0 \ 1				
Sm. Unk.*			0 \ 1		0 \ 2				

Table 8 summarizes the total animals photographed by game cameras at four sites at Goosewing Beach, and five sites at Briggs Beach (see maps for precise locations). Number of days cameras were in place at each site is in parentheses. For each species, first number is daytime occurrences, second number is nighttime occurrences. Animals in red are known or potential predators.

*based on overall observations, medium and small unknown animals at Goosewing are potentially predators, while those at Briggs are probably rabbits.

VII. Results of Least Terns at each of observed sites

Least Terns (*Sterna antillarum*) at Goosewing Beach Preserve

The Least Tern nesting season at Goosewing was a failure this year due to high depredation of nests. At least eight nests were found from an estimated 34 pairs present, but no chicks hatched from any of the nests. On May 5, several Common Terns arrived at Goosewing Beach. The first Least Tern sighting was May 14, when two were observed flying over the town beach. By May 18, more pairs had arrived at the breach and began courtship displays and were observed copulating. On May 19, a flock of twelve Least Terns were very vocal at the breach. The symbolic fencing was modified on May 29 to enclose several Least Tern scrapes which were found 20 feet outside the fence. The numbers of the colony quickly increased, and by the end of May there were over 30 terns present at Goosewing. The colony was most active at the east side of the beach toward the beach front, but they also were observed scraping and defending territory farther east down the beach, east of plover nest 6 location. On June 16, a cracked Least Tern egg was found from an unknown nest which was probably depredated. On June 18, a census count of adult terns was conducted, resulting in an extrapolated count of 34 pairs (43 adults x 0.8, as per MA Tern Census procedures). The first Least Tern nest was not found until June 24, later than expected given the activity of the terns to this date. A two-egg nest was discovered on the east side of the breach in the front section of fencing. This nest was washed out by the high tide on July 1. On this date, coyote tracks were observed parallel to the high tide line about 20 feet behind the fencing. More nests were probably lost to washout and/or predation around the same time.

On July 14, a more systematic count of remaining tern nests was conducted at Goosewing, by observing where the terns were landing and then carefully approaching the area to check for a nest. Eight nests were found on the beachfront east of the breach to Nest 6 location. No nests were found east of Nest 6. The nests were marked with a short piece of reed in the sand and a clam shell piece with a number marked on it placed at the base of the stick. This method allowed easy identification of the nests from a distance with binoculars or spotting scope, yet remained discrete to the naked eye. The nests each had two eggs or less. These nests were monitored over the next three weeks. By July 21, half of these nests were depredated. At one nest, the empty egg fragments were found partially buried at the nest site. The holes in the egg fragments were punched inward, suggesting an avian predator. On July 23, another nest was found depredated, with partially cracked (3/4 intact) egg shell fragments 4" from the nest. Coyote tracks were observed two feet in front of the nest. A game camera was set up at one of the nests on July 25. One of the remaining nests was depredated on July 29 by an unknown predator. Material in the nest appeared to be dried scat or a dead chick. The game camera photographed an unknown mammalian predator consuming one of the last remaining nests on July 30 at 4:30 AM. The last Least Tern nest was depredated by the beginning of August. See Appendix D, fig. 9.

Fledgling Least Terns were observed in July feeding at the breach, presumably from neighboring properties. Large numbers of Common Terns also arrived at Goosewing in late

July, and were observed feeding at the breach. On July 26, fifty-five fledgling Common Terns and about twenty adults were counted. On the first of August, the Tuniper's Pond breach (adjacent to the town beach) opened and about fifteen Common Terns were observed aggressively feeding on the outflow of small fish from Tuniper's Pond. Although Goosewing Beach did not support any successfully nesting Least Terns this year, it continues to provide ample feeding habitat for Common Terns moving through from other sites.

Least Terns (*Sterna antillarum*) at Briggs Beach

The habitat available for Least Terns at Briggs Beach was limited due to the pond level and the breach remaining closed for most of the season. After the heavy rain the last few days of April, the mudflats were completely covered and remained covered until the breach opened August 11. A small flock of eight Least Terns was first observed at Briggs on May 22, at the west end of the beach. On June 19, a census count for Least Terns was conducted. No Least Terns were counted at Briggs on this date. However, the terns continued to utilize Briggs for feeding. On June 26, four adults were observed west of the breach, and the day after there were six adults and two fledglings. On June 15, one Least Tern nest was found on the west shore of the breach, close to the beachfront and about 12 feet behind the fencing, with 2 eggs. The tern continued to incubate this nest, until it was abandoned around July 29 when the eggs were discovered partially buried. On August 1 one of the eggs was dissected and found to be fertilized.

Least Tern Activity at other sites monitored

Least Terns did not nest at Richmond Pond, Elephant Rock or Acoaxet Beach. Occasionally, Least Terns were observed flying over Elephant Rock Beach. Least Terns were reported to have been observed at Seapowet Marsh off of Route 77 in Tiverton, but the site was not monitored by TNC staff.

Table 9: Least Tern Nesting Results for Goosewing and Briggs Beaches, 1992-2008

	Goosewing				Briggs Beach				TOTAL			
Year	Pairs	Chicks Hatched	Chicks Fledged	Fledged per Pair	Pairs	Chicks Hatched	Chicks Fledged	Fledged per Pair	Pairs	Chicks Hatched	Chicks Fledged	Fledged per Pair
1992	35		?	?	0	0	0	0.00	35	0	0	0.00
1993	35+		10	0.29	0	0	0	0.00	35+	0	10	0.29
1994	40-45	15	6-8	0.13-0.20	9	0	0	0.00	49-54	15	6-8	0.13-0.20
1995	30	3	0	0.00	1	0	0	0.00	31	3	0	0.00
1996	25	5	1	0.04	17	6	2	0.12	42	11	3	0.07
1997	31	8	6	0.19	3	0	0	0.00	34	8	6	0.19
1998	19	8	5	0.26	6	5	2	0.33	25	13	7	0.28
1999	20	4	3	0.15	4	0	0	0.00	24	4	3	0.13
2000	35	2	2	0.06	0	0	0	n/a	35	2	2	0.06
2001	25	10+	10+	0.40	0	0	0	n/a	25	10+	10+	0.40
2002	27	~19	~6	0.22	3	4	1	0.33	30	~23	~7	0.23
2003	34	13	~7	0.21	56	17	~10	0.18	90	30	~17	0.19
2004	29	?	1	0.03	15	?	1	0.07	44	?	2	0.05
2005	22	1	0	0.00	15	?	1	0.07	37	2	1	0.03
2006	13	?	11	0.85	1	0	0	0.00	14	?	11	0.79
2007	25	?	8	0.32	4	0	0	0.00	29	?	8	0.28
2008	34	0	0	0.00	1	0	0	0.00	35	0	0	0.00

VIII. Conclusions and Management Recommendations

Despite the poor productivity of Piping Plovers at Goosewing this year, The Nature Conservancy's successful management of the habitat (including the use of symbolic fencing and exclosures) allowed eight pairs to successfully nest and hatch chicks. In addition, The Nature Conservancy was able to maintain a greater visibility at Goosewing with the continuation of two additional staff positions, a Shorebird Preserve Assistant and an Education Coordinator, which resulted in improved visitor awareness of the Piping Plover managing efforts. Several recommendations made in 2007 were fulfilled this season, including:

- √ Continued funding of the Shorebird Preserve Assistant and Education/Outreach Coordinator
- √ Predator removal at Goosewing and Briggs Beach
- √ Use of game cameras to document predator presence at Goosewing and Briggs
- √ Continued relationship with Bank of America volunteers
- √ Extention of the symbolic fencing farther east at Goosewing Beach to protect possible habitat and limit disturbance from the Westport end. The fencing this year extended to the Westport line.
- √ Closure of the breach at Briggs Beach with symbolic fencing. The fencing was put up across the mouth of the pond on April 18, connecting the west and east sides of fencing. This closure limited human and dog activity at the mouth of the pond, providing ample feeding area for the two broods that hatched nearby (nests 1 and 3).
- √ An updated letter was sent to Little Compton dog owners which emphasized last year's success.
- √ A volunteer program was established which included publicity ideas, a training program and manual

<u>Recommendations for the 2009 season are as follows:</u>

- Continue to fully staff the plover monitoring and education program with a Shorebird Preserve Manager, Shorebird Preserve Assistant, and an Education Coordinator/Naturalist. These positions are necessary for appropriate and successful plover and beach management, and educating visitors.

- Construct a new storage shed with education room. The present storage shed is in poor condition, leaks rainfall, and is infested with mice. It also has been an easy target for vandals, as there have been many break-ins. It is also a safety hazard, since there are large holes in the roof.

- Continue use of TNC staff uniform (shirts with logo). Consider purchase of long sleeve shirts from another vendor (L.L. Bean's Tropic wear shirts is a good option).

- Evaluate exclosure design and consider burying the wire to a depth of six inches to one foot to discourage predators from digging under the wire and depredating eggs. One such case occurred at Goosewing this year (nest 8).

- Consider not exclosing nests in thick grass – over the years at Goosewing and Briggs, nests in thick vegetation have been abandoned – look up this info in past reports and document these occurrences.

- Consider using 2" x 2" exclosure wire (instead of 2" x 4") on some nests to prevent small animals such as mink and skunk from entering exclosures.

- Consider additional predator removal at Goosewing Beach, and Briggs Beach if necessary.

- Draft a plan for predator removal and evaluation of long term effectiveness, using the data from the past two years.

- Increase education at Elephant Rock Beach to enable hatch success. Education was not initiated this year because no plovers attempted to nest here.

- Create a permanent educational display at Goosewing, which highlights the ecosystem and describes plant and biotic zones, as well as the nesting shorebirds.

- Place more public emphasis on overall barrier beach conservation, instead of focusing primarily on one or two species. This would not entail a significant shift in management practices, but would involved such things as more signs including rare plants and overall dune/barrier health, in addition to threatened shorebirds, as reasons for fenced-off areas, more public discussion of the importance of the overall beach and saltpond ecosystem for biodiversity in general rather than emphasizing individual species. From experiences with people that use the beach preserve and other monitored sites, there is a strong appreciation for the importance of beach management generally, whereas the Conservancy's public focus on Piping Plover conservation allows for an easy scapegoat to vent frustrations with management-related restrictions. Furthermore, such a shift in public focus would be more in line with the stated goals of The Nature Conservancy.

- Visit the potential new plover habitats in Little Compton at Chase Point and Tappin's Beach. These sites should be visited in early spring to check for territorial plovers. Contact the landowners at Tappen's Beach to discuss and/or request permission to put up symbolic fencing at the area where a plover nest was reported to have been found and hatched or depredated this year. (See Discussion for detail).

- Consider designing a new "No Dog" sign. Despite the clear language on the present sign, confusion persisted with some visitors, i.e. they thought that the dogs were allowed at the water on a leash, and read the sign to refer to the fenced off areas higher along the dune. The sign should include language such as "No Dogs permitted anywhere on Goosewing Beach Nature Preserve, Leashed or Unleashed"

Education Programs at Goosewing Beach Preserve and Sakonnet Landscape
Summer 2008, Little Compton, Rhode Island

Report prepared by Polly Turner, Education Coordinator and Naturalist
Goosewing Beach Preserve, The Nature Conservancy

Staffing

The Nature Conservancy in Rhode Island was able to staff Goosewing Beach Preserve with a seasonal Education Coordinator/Naturalist (Polly Turner) for the second summer season, with the goals of reaching out to and educating as many locals and visitors as possible about the current management of the Piping Plovers and also the Least Terns. The position also included creating and presenting a special series of education programs for philanthropic events (donors and fundraising).

This was a 25-40 hours/week position and was supported by the two other staffed positions at Goosewing Beach, the Shorebird Preserve Manager (Hilary Hartlaub) and the Shorebird Preserve Assistant (Niels Hobbs). The position ran from early March until early September.

Programs: General Information

The programming in the Sakonnet area consisted of two different types of programs: *public programs*, (any advertised programs that were open for general sign-up), and *philanthropy programs* (designed for special invitation to a specific group).

Marketing of Public Programs

Newspapers

Press releases were written for East Bay Newspapers, which runs several local newspapers, of which "Sakonnet Times" and "Westport Shorelines" were specifically advertised in. These are weekly local newspapers that currently get distributed on Thursdays. (This was particularly handy for weekend programs to be advertised.) Usually, the blurbs were run in a section called "Around Town" which informs of community events and news. There is also a section called "South Coast Life" that prints in all of the East Bay Newspapers, and Goosewing and other public events were placed in the calendar of that section. **See Appendix "Education A" for press release examples.**
The contacts for the newspapers were Lynda Rego (lrego@eastbaynewspapers.com) and for the "South Coast Life" section, (life@eastbaynewspapers.com).

Flyer Posting

Flyers for most of the programs were made and posted in various places in Little Compton, Westport and Tiverton. The flyers were mostly regular letter-size (8.5in x 11in) sheets of colorful paper (yellows, pinks, oranges, and greens), all displaying The Nature Conservancy logo (**See Appendix "Education B" for flyer examples**). The majority of the flyers were placed on community bulletin boards in these places:

Town of Little Compton

- Wilbur Store

- Little Compton Library
- Little Compton Community Center
- Little Compton Town Hall

Goosewing Beach
- PT Marvell Preserve Kiosk
- South Shore Beach entrance station

Westport
- Lees Market
- Westport Public Library

Tiverton
- Coastal Roasters coffee shop

Website

All programs were also advertised on the www.nature.org/rhodeisland website under the heading of "Nature Walks". These were sent to Cheryl Wiitala (cwiitala@tnc.org) and were then sent on to the web designer.

Marketing Data

At most of the programs, participants were polled about how they heard about the programs. About 1/2 of the attendees read about the programs in the newspapers. About 1/4 of the people saw a flyer (mainly at the Little Compton Library or Wilbur Store). The rest of the participants heard on the internet or by word-of-mouth (had been to an earlier program, had heard from staff on the beach, or had heard from a friend who knew or had attended).

Recommendation for Future Marketing

The newspapers are vital for advertising programs. Secondary to newspaper press releases would be posting flyers around the towns of Little Compton, Westport and Tiverton. In the future, it is recommended that flyers are also placed in the campground/RV park that adjoins South Shore Beach. It is also recommended that flyers on outdoor boards are checked frequently (Wilbur Store) as rain, wind, and other posters can obscure their view.

Public Programs:

Public Education Programs in Sakonnet Landscape Summer, 2008				
Program	Date	Length	Description	# Attended
Vernal Pools Program	April 5	1.5 hr	Partnered with Tiverton Land Trust who advertised at Tiv elementary schools with flyer. Started with two games, and then small groups explored vernal pools with Polly, Hilary and Garry Plunkett.	32
Plover Slide Program	May 21 June 19	1 hr	Intro to season, plover biology and mgmt. and future education; at LC Comm. Center	2 6
Lifeguard Programs (Goosewing Beach)	May 31	1 hr	Educate lifeguards about rules and reasons behind rules; give them ownership as stewards	15
Wilbour Woods Day (First Leave No Child Inside event)	June 1	2 hr	Partnered with LC Garden Club and Tree Committee, who helped with advertising and logistics. I designed program for families and children to visit 6 Exploration Stations, fill out Nature Passports, receive stamps, and earn special patch at end.	52
Saturday Morning Walks (Goosewing Beach)	June 28 July 5 July 12 July 19 July 26 Aug 2 Aug 9	1.5-2 hr	Beach stroll with major focus the biology and mgmt of Piping Plovers. Also taught general barrier beach ecology, other living things on beach, tides, geology, etc.	3 4 10 22 12 8 6
Sunset Beach Walk (Goosewing Beach)	June 17	1.5 hr	Evening program of beach ecology, plover viewing, tides/moons, quotes, stories; during sunset/full moon rise	14
Volunteer Training (Plover Steward Program)	June 17	1.5 hr	Advertised for summer volunteers to walk beach and educate. This program trained volunteer to carry out these responsibilities	1
Goosewing Family Day (second Leave No Child Inside prog)	June 28	2.5 hr	Families and children visit 6 Exploration Stations, fill out Nature Passports, receive stamps, and earn special patch at end.	105
Briggs Beach Walks	Aug 1 Aug 8	2 hr	Beach stroll with major focus the biology and mgmt of Piping Plovers; specific to Briggs/Philippi Beach	11 5
Total (17 Programs)				328

Philanthropy Programs in Sakonnet Landscape Summer, 2008				
Program	Date	Length	Description	# Attended
Pocasset Ridge Hike	May 31	2 hr	Introduced people (mainly Sakonnet Campaign Committee members) to land north of Weetamoo Woods/Pardon Gray to highlight importance of conserving this crucial bit of wilderness.	4
Laurelmead presentation	July 2	1.5 hr	"Natural History Mysteries" slide program to entertain people in retirement community.	30
Sunset Beach Walk (Goosewing Beach)	July 17	2 hr	Evening program of beach ecology, plover viewing, tides/moons, quotes- during sunset/full moon rise. Ended at Acebes' farm for cocktails and historic home tour.	55
Quicksand Kayak Tour	July 19	3 hr	Kayak tour of Quicksand Pond from Becks' home. Paddled to pond "gut"/beach and back. Education about plovers and marine creatures. Cocktails and dinner at Becks'.	40
Coastal Conversation	July 31	1.5 hr	Cocktails at Linders' home with brief talk called "Nature is Dynamic" and discussion of preservation vs. conservation. Observed birds and other nature from deck.	30
Bird Banding with Scott Comings	Aug 15/16	1.5 hr each	Cancelled due to inclement weather forecast	
Total (5 Programs)				159

Informal Contacts:

Many hours throughout the summer were spent "patrolling" the beach, educating about rules and teaching about beach nature. "Informal Contacts" is defined as any contact the three staff members had with a beach-goer letting them know something about what we do at Goosewing Beach: anything from brief plover updates to educating about our "no dogs" rule to a lengthy discussion and bird viewing.
Total Number of Informal Contacts: 750

Total number of attendees at summer educational programs:
Public Programs: 328
Philanthropy Programs: 159
Informal Contacts: 750
Total Educational Contacts for Summer 2008: 1,237

Summer 2008 Highlight: No Child Left Inside Programs

A special series of programs was conducted this summer to show The Nature Conservancy's support for a new development that has caught fire: the No Child Left Inside movement.

This movement began (in earnest and with this name) in 2005 with the publication of a book called "Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder" by Richard Louv (Algonquin Books, April, 2005). In this book, Louv compiled numerous research findings that prove that kids are going outside much less than they used to, and the consequences of this fact are very detrimental to individuals and our society.

Because of the conclusion that kids are connecting less with their natural surroundings (which amounts to less environmental stewardship), two programs were created to specifically get kids and families outside into natural places and to teach them new ways to connect with their surroundings when they are out there.

No Child Left Inside Program Curriculum

When participants arrived at these events, they signed up and were given a "Nature Passport" booklet that had directions, a map and six activity pages that matched with each of six Exploration Stations. They traveled from station to station (where a volunteer "Station Expert" was to help out) and completed various activities. When they were done at each station, the volunteer stamped their Nature Passport with a nature-related ink stamp (in the proper box), and they moved on to the next station. When they completed all six stations (or less if they were younger), they went back to the entrance table and collected a special "Connect to Nature" patch (each one created especially for each venue).

Wilbour Woods Day: June 1, 2008, 1-3pm

This event was in collaboration with the Little Compton Garden Club (Kathy Wattles and Betty Ann Crowell) and Tree Committee (Hope Taylor). I created and ran the program, and the other folks handled much of the other logistics (advertising, entrance table set-up and staffing, snacks, etc.). They also organized an adult tree walk with a tree expert. The Little Compton Grange organized the parking. There were about 10 volunteers on the logistics end, and the program needed six to eight helpers.

About 52 people attended this event, and there is hope to do more of these in the future.

Exploration Stations:
Special Spot: Find a semi-private spot to sit and observe for five minutes and answer a couple questions (name of spot, smells, why it's special) and draw a small picture (something interesting).
Fairy Homes: Build a home for a fairy or gnome or other imaginary creature using all natural products. Answer a couple questions and draw a picture of your creature.

Meet-A-Tree: Approach tagged and named trees and answer a question about each. Then play a game with a partner where one is blindfolded, led to a tree, uses senses to remember the tree, led away, then un-blindfolded to try to go back and find the tree.
Critter Crawl: Collect a critter (insect, worm, spider, etc.), draw it and answer questions.
Magnification Station: Do a "micro-hike" by laying out a string for a mini-trail and "hike" along it using a magnifying glass. Draw three interesting things along the way.
Seek-and-Find: Scavenger hunt specific to certain spot- check off boxes when found.

Goosewing Family Day: June 28, 2008, 9-11:30am

This event was carried out solely by The Nature Conservancy staff and volunteers. I completed all advertising, which consisted of newspaper blurbs and colorful flyers. One volunteer handed out small flyers at the entrance station to drum up business (about 70 mini-flyers in about one hour). We set up a tent over the entrance table, which was next to the Goosewing Beach Preserve sign. The six Exploration Stations were on the way to and near and around the Quicksand Pond breach area. There were about 12 volunteers/helpers.

About 105 people attended this event.

Exploration Stations:
Beachfront Scavenger Hunt: Various items to find and check off list.
Beach Fairy Homes: Same as above (Wilbour Woods) but in sand on beach front.
Dune Vegetation Station: Approach tagged and named dune plants, read a fun fact from booklet and do quick activity for each (smell, use as wind vane, find flower, etc.).
Pond Play: Use seine net (with help of 2-3 volunteers) and sifting trays to collect creatures. Draw two creatures and identify similarities and differences.
For the Birds: Look through spotting scopes at Least Tern nest and look for Piping Plover fledglings. Watch for five minutes and answer a couple questions.
The Sand Trap: Look at sand with a magnifying glass and answer a couple questions about what is seen. Then look for magnetite in sand with a magnet.

"Plover Steward" Program

Beach education lends itself straightforwardly to volunteers being involved. Many folks walk the beach and enjoy what they learn about the plovers and other beach ecology and are willing to pass that on to others. So, a "Plover Steward" program was begun this summer to try to harness this volunteer power.

Press releases went out in the Providence Journal and in the East Bay Newspapers in April and May. There was very little response (two calls), but out of these efforts one excellent volunteer was recruited who came all the way from Pawtucket about once per week to walk the beach and talk with visitors about the preserve. A handbook was created with information and instruction, and a two-hour training session was conducted, and the introduction was the slide show that is presented at the Little Compton Community Center each spring.

A Plover Steward t-shirt was created so that the volunteer was recognizable as an official Nature Conservancy volunteer, and she carried a bag of teaching tools to help her interact with the public (laminated photos, pamphlets, etc.). This one volunteer was able to give about 20 hours (about two hours per visit) to this endeavor, and she contacted over 50 beach-goers in her time volunteering. Each time she went out, she filled out a special steward form to record data of time and contacts and other special occurrences.

It is recommended that this program continue in the future with heavier recruitment (in the campground/RV park) and a wider breadth of volunteers (high school kids doing community service, scout troops, churches, etc.).

Future Recommendations

Besides continuing the programs that were conducted at/for Goosewing Beach Preserve and for the philanthropy team this summer of 2008, I make these future recommendations for the education program with The Nature Conservancy in the Sakonnet Landscape of Rhode Island. Some of these recommendations are new ideas and some are suggestions that I found to be successful and hope to pass on to future educators.

- More Clear Boundaries- Whereas research shows that people do not tend to read signs with thoroughness, I recommend that there be more clear signs and/or maps to let people know that they are on a nature preserve and where the general boundaries are. I spoke with numerous people this summer who did not know they had crossed over to a private preserve, and they may behave differently if they know this.

- Continue and Expand Volunteer Program- See info above in volunteer section.

- More Interpretive Signage- This is a very busy beach. Staff cannot possibly reach out to everyone, so the opportunity to educate people with interpretive signs may be invaluable. This also may aid in encouraging a "nature preserve" mindset rather than just beach recreation.

- Social Research- Record more data on people- not just birds. I recommend knowing how many visitors on average there are per day or per summer and what this means to the birds. I also recommend more research about how education changes attitudes and behaviors. This may be a before/after survey (for specific programs) or an early summer vs. late summer survey to compare general awareness. This is potentially a great project for a masters thesis.

- Conduct a Campground/RV Park Program- The people that spend their summers at the adjoining campground/RV park make great stewards. Some folks have been coming for over 20 years and already care a lot about the beach. I tried very hard, without success, to do an evening outdoor slide program (bring-your-own-lawnchair) plus a morning field experience to view the plovers and really connect them with this beach creature. Unfortunately, the man who manages the park (Jeff Griffin) said he would ask permission of the owners and call me. I went back, in person, since he didn't return phone calls, three

different times to say the owners were too busy to talk, or that they hadn't called him back, etc. I gave up at the beginning of July, when the plovers had fledged anyway. I advise trying this again- these folks would make great stewards.

- Include the Lifeguards Even More- A great, energetic group of young adults run the South Shore Beach in the summer (with the amazing Jim Farrell as their leader). I recommend keeping them in the loop even more to keep them excited about the plovers and keep up their energy for protecting them.

- Make/Use a Plover Education Kit- I made and carried a bag that had many interpretive tools for teaching folks about Piping Plovers in a hands-on way. This consisted of various pictures of plovers, a box of eggs (they were quail eggs that I used because they are almost identical to plover eggs- visitors were informed of this), magnets (for educating about sand), a variety of shells and other beach treasures, a map showing the plover's winter and summer territories, a beach field guide, a bird book, a zip-lock with cotton or cloth to simulate a plover's weight, extra binoculars, plover propaganda (hand-outs) and of course a first-aid kit.

- Uses a Spotting Scope…Always- Scopes attract people. It's a great way to get visitors' attention and start a conversation, even if you don't plan to use it.

- Carry a Card- Create a card with contact information so people can set up separate programs with you and check the website for programs. Also have little hand-outs about upcoming programs.

Appendix "Education A": Press Release Examples

Wanted: Beachwalkers

If you like to walk on the beach and are interested in learning and sharing about the local wildlife, becoming a Plover Steward at Goosewing Beach Preserve may be just what you need for the summer. An introduction slideshow takes place on Wednesday, May 21 at 7:00pm at Little Compton Community Center. Call Polly Turner with The Nature Conservancy for more details (401)529-1786.

Second Connect to Nature Program at Goosewing Beach Planned

Following the widely acclaimed Wilbour Woods Day held on June 1, The Nature Conservancy in Rhode Island will host the next in a series of events at Goosewing Beach Preserve in Little Compton on Saturday, June 28 from 9:00 to 11:30am. These programs, inspired by the No Child Left Inside national movement, are designed to get kids and families outside more. All are welcome!

The Goosewing event will build on the fun and excitement that more than 50 kids, parents and grandparents enjoyed last week at Wilbour Woods. The program featured Exploration Stations led by local naturalists, and each stop was marked by a unique passport stamp. Everyone received a special "Connect to Nature" patch.

Special thanks to The Nature Conservancy, Little Compton Garden Club, Tree Committee and Grange and all volunteers for making this program such a success. See you at Goosewing Beach. Call Polly Turner with TNC for questions (401)529-1786.

Appendix "Education B": Program Flyer Example

Beach Walks

At Goosewing Beach Preserve-
Summer '08

Saturday mornings at 8:30am
From June 21 to August 9

Join naturalist Polly Turner for a 1.5 hour walk to learn about Piping Plovers and the dynamic ecology of a barrier beach.

Meet at the east end of South Shore Beach parking lot in Little Compton, Rhode Island.

Call Polly to register @ (401)529-1786

Program is free. There is a parking fee.

www.nature.org/rhodeisland for info and directions

Goosewing Beach soars with plovers and terns during summer

Nature Conservancy, plovers, least terns and more at preserved beach

BY TOM KILLIN DALGLISH
tdalglish@eastbaynewspapers.com

LITTLE COMPTON —Summer has arrived at Goosewing Beach. Piping plovers, least terns, and The Nature Conservancy can be found along the nearly mile-long stretch of sand that the organization owns and manages at the southeastern tip of the state.

Polly Turner, an educator and naturalist, coordinates the summer program for the organization with the assistance of staff members Hilary Hartlaub and Niels Hobbes.

Every day one or more of the three, notable in their light blue polo shirts and tan caps, sometimes with volunteer "plover stewards," are out along the shore, monitoring the welfare of the protected plovers and least terns, and available to answer questions from beachwalkers.

To Ms. Turner's knowledge, and that of John Berg, the Sakonnet Landscape Manager for the Conservancy, the Goosewing beach education program is the only one of its kind in the state.

Plovers and terns

"We have 10 nesting pairs of plovers this year," Ms. Turner said, "but one nest was abandoned, we don't know why, and one was predated, we think maybe by a skunk. One was seen, but we're not sure."

She said that of the eight active nests, six nests have hatched, typically four eggs to the nest. She said her staff believe there are 22 chicks around, though "only 10 have been counted."

"With the heat they may be hunkered down," she said.

"They are precocial birds," she said. "They feed themselves and are on the go within an hour of hatching." She said that potentially there may be two additional pairs of plovers ready to nest and hatch.

As for the least terns that breed communally, Ms. Turner said they are exhibiting breeding behavior but haven't yet started nesting or hatching.

"They're very loud," she said. "The males are now exhibiting breeding behavior. They go out and catch a small fish or eel and bring it back and wave it back and forth in front of the female."

She said last year there were 20 or 30 pairs of least terns at the beach, but she can't say how many there are this year.

Beach etiquette

Predators and people present risks to the plovers and least terns, she said, which is why the educators are present every day at the beach.

"There've been crows, which are definite predators, and we're concerned with the heat, which brings more people and pressure on the chicks."

TNC Naturalist Polly Turner explains the behaviors of nesting piping plovers.

Dogs, leashed or unleashed, also present a risk to nesting birds, said Ms. Turner. "No dogs are allowed on the beach between April 1 and Sept. 1," she said.

"The birds perceive them as predators, and can't tell the difference between a fox, a four-legged predator, or a little Scottie," she said. "Dogs and people approaching too close cause the birds to leave their nests, exposing the eggs to the hot sun and sand, which can bake the eggs in minutes," she said. The birds may also abandon their nests or chicks if they feel threatened.

'Nature deficit disorder'

Ms. Turner has planned a special event at the beach on June 28 billed as "Goosewing Family Day." The idea, she says, is to get kids outside and to attack what she calls "nature deficit disorder."

It is based on a book by Richard Louv, "Last Child in the Woods," and is based on the notion that children in a plugged-in age are not only forgetting about nature and the outside, but don't experience it to begin with.

Ms. Turner said kids will be given a "Nature Passport" and a map and will have to visit "Exploration Stations" scattered along the beach.

They will "learn some fun exploration techniques and nature information while filling out and collecting stamps for their passport. When complete, they'll get a prize," she said.

The Conservancy is also sponsoring educational beachwalks every Saturday morning at 8:30 a.m. through Aug. 9.

Best times at the beach

Asked her favorite time of day at the beach, Ms. Turner said, "I always think the evening is pretty magical. It's quieter. The osprey come closer. It's more active. The living creatures kind of wake up. The light hits the shorebirds beautifully."

Dawn is a great bird watching time, she said. "It's similar to evening, when animals become active. That's when you're more likely to see wildlife — deer, foxes, mink, coyotes, raccoons."

Ms. Turner, who has undergraduate training in biology, and a masters degree in education, and who has spent many weeks at Goosewing, said, "I think there's something special about Goosewing. It's always changing. It has such a neat dynamic feel to it. There's something special about going to a beach that's a preserve, that will stay that way forever."

The beach is owned by The Nature Conservancy, which acquired it for a little over $3.1 million in 1988 from the 69 heirs of Dr. Philomen E. Truesdale, a Fall River surgeon, after the family decided it didn't want the area developed. The beach together with contiguous parcels that total 140 acres is under a variety of conservation easements and protective devices.

"Goosewing Beach is a perfect classroom for everyone. It's a wonderland for kids and adults to explore. Adults come for the panoramic view. Kids can't take all that in, they come for what's at their feet. They want hands on; they'll be down on their hands and knees, collecting treasures,

A piping plover guards the area around its nest of eggs on Goosewing Beach in Little Compton.

PHOTOS BY CHRISTINE HOCHKEPPEL

Goosewing activities

The Nature Conservancy has booked a number of beach-related programs for the summer.

- Saturday morning beachwalks at Goosewing are at 8:30 a.m. every week through Aug. 9.
- Goosewing Family Day, Saturday, June 28, from 9 to 11:30 a.m. Part of "No Child Left Inside"-movement. Involves the full beach, and includes Nature Passports to be filled out, and exploration stations. There is a charge to park at the beach.

Goosewing stats

- Cobbly barrier beach .9 miles (1,531 yards) long, backed on shore side by Juniper's and Quicksand ponds, running from Little Compton's South Shore Beach to state line.
- Exposed, with constant surf mostly from the southeast, and with frequent riptides.
- Seventy-five acres of beach, sand, grass, and salt-pond mud-flat habitat, making it one of the region's prime locations for the piping plover, a federally and state protected species, and the least tern, which is state-protected.

X. Literature Cited

Goldin, Meryl R., et.al. 1994. Piping Plover Monitoring Program Staff Handbook. The Nature Conservancy.

Pereira, John. Management of the Piping Plover (*Charadrius melodus*) and Least Tern (*Sterna antillarum*). 2006 Report. The Nature Conservancy.

Moultrie Game Spy I40 Digital Game Camera manual

U.S. Fish and Wildlife Service. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, MA.

XI. Appendices

Appendix A - 2008 Piping Plover Nest Data

Site Name: Goosewing Beach
Pair Number: 1
Nest Location: east side of breach, post 0.5E
Habitat: in front of grass line in cobble/sand mix

Nest	**A**
Date Found	4/26/08
Eggs when found	1
Date Clutch Complete	5/02/08
Clutch size	4
Hatch date	5/30/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	One chick lost around 6/08, two lost by 6/14. cause unknown.
Fledge date	6/29/08
Chicks fledged	1

Exclosure Information

Nest	**A**
Date exclosed	4/30/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	18 min.
Time to resume incubating	pipl did not return in 55 min. incubating 5/01/08
Exclosure design	Circular 2" x 4"

Comments: After a heavy rain on 4/29, the pond level rose and the water was within 8 feet of the nest. Pond breached on 5/02 and the water receded to about 150 feet from the nest. After 6/14 the one remaining chick was often observed in a mixed brood with two smaller chicks (probably nest 5 brood) on the east side of the breach.

Site Name: Goosewing Beach
Pair Number: 2
Nest Location: east side of breach, 2.5 E
Habitat: cobble/sand mix ~ 8' in front of dune line

Nest	**A**
Date Found	4/27/08
Eggs when found	1
Date Clutch Complete	5/03/08
Clutch size	4
Hatch date	5/31/08
Eggs hatched	2
Date/cause of nest failure	1 egg gone from nest 5/24 (see note below). 2nd egg is cracked at time of hatching.
Date/cause of chick loss	Two chicks lost around 6/26; cause unknown
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	5/01/08
Clutch size when exclosed	2 eggs
Time to erect exclosure	15 min.
Time to resume incubating	10 min.
Exclosure design	Circular 2" x 4"

Comments: on 5/24 1 egg is gone from the nest and a small stone is in its place; 3 eggs remain. Pipl is observed removing material from the nest and depositing it outside exclosure. Pipl is agitated and not incubating. Possible vandalism?
5/26 the stone is gone (presumably the pipl removed it) one egg appears "tapped" with a small crack in it.
5/28 we repaired a small tear in the netting.
5/29 the crack in egg is more visible; pipl still incubating

Site Name: Goosewing Beach
Pair Number: 3
Nest Location: east side of breach, 4.5 E
Habitat: cobble/sand mix in front of dune line

Nest	**A**
Date Found	4/30/08
Eggs when found	1
Date Clutch Complete	5/08/08?
Clutch size	4
Hatch date	6/04/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	6/05 3 chicks lost. Rain 6/04-6/06 may have weakened the chicks.
Fledge date	7/04
Chicks fledged	1

Exclosure Information

Nest	**A**
Date exclosed	5/05/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	21 min.
Time to resume incubating	15 min.
Exclosure design	Circular 2" x 4"

Comments: 5/28 we repaired a tear in the netting (probably resulting from netting pulled too tight over exclosure)

Site Name: Goosewing Beach
Pair Number: 4
Nest Location: west side of breach, ~ 100' from pond
Habitat: cobble/sand mix ~5' in front of dune line

Nest	**A**
Date Found	4/30/08
Eggs when found	1
Date Clutch Complete	5/06/08
Clutch size	4
Hatch date	6/01/08, 6 pm
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	6/03 one chick gone- possible gull predation. 6/07- 3 remaining chicks lost, possible crow predation. (see notes below)
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	5/05/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	24 min.
Time to resume incubating	3 min.
Exclosure design	Circular 2" x 4"

Comments: 6/02- 4 chicks are found. 6/03- 3 chicks found. Gull in the area, pipl chasing it out. Possible predator. Adults display territorial behavior with a 3rd pipl (probably nest 1 adult), engaging in a contact fight while the 3 chicks feed nearby. Move to far west end of beach. Movement of the brood made them more susceptible to predators. On 6/05 2 adult pipl are observed chasing off a crow at west end of beach. 6/07- 3 crows observed at the breach. Chicks not found after 6/08.

Site Name: Goosewing
Pair Number: 5
Nest Location: 1.4E, ~50' east of nest 1
Habitat: sand/cobble mix

Nest	**A**
Date Found	5/01/08
Eggs when found	2
Date Clutch Complete	5/04/08
Clutch size	4
Hatch date	6/01/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	1 chick lost 6/04, cause unknown. 2nd chick lost around 6/14, cause unknown
Fledge date	7/01/08
Chicks fledged	2

Exclosure Information

Nest	**A**
Date exclosed	5/01/08
Clutch size when exclosed	2 eggs
Time to erect exclosure	15 min.
Time to resume incubating	9 min.- both pipl enter exclosure
Exclosure design	Circular 2" x 4"

Comments: After 6/14 the 2 remaining chicks are often seen in a mixed brood, with a larger chick (probably nest 1 chick). On 6/14 the two broods are seen on the east side of the breach, inland, with 4 adults, 2 of the adults doing a parallel run display (supporting idea that they are two broods together).

Site Name: Goosewing
Pair Number: 6
Nest Location: 5.8 E
Habitat: in front of dune, sandy area with some vegetation (sea rocket)

Nest	**A**
Date Found	5/06/08
Eggs when found	2
Date Clutch Complete	5/09/08
Clutch size	4
Hatch date	6/05/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	6/05 1 chick lost, cause unknown.
Fledge date	7/05/08
Chicks fledged	3

Exclosure Information

Nest	**A**
Date exclosed	5/07/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	25 min.
Time to resume incubating	<1 min.
Exclosure design	Circular 2" x 4"

Comments: This brood moved over a large distance feeding, and was observed over about 100 meters on the east end of the beach front.

Site Name: Goosewing
Pair Number: 7
Nest Location: -2 E, east bank of the breach ~100 ft. from the water. Inland of nest 1 ~50 ft.
Habitat: sandy area beside the grass line, under a small clump of beachgrass. Near the rare plant *Honckenya peploides* (Seabeach sandwort)

Nest	**A**
Date Found	5/10/08
Eggs when found	1
Date Clutch Complete	5/17/08
Clutch size	4
Hatch date	na
Eggs hatched	na
Date/cause of nest failure	Nest abandoned on 5/19/08; cause unknown.
Date/cause of chick loss	na
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	5/14/08
Clutch size when exclosed	2
Time to erect exclosure	20 min.
Time to resume incubating	4 min.
Exclosure design	Circular 2" x 4"

Comments: Pair of pipl seen in the nest area after abandonment, but they did not renest. On 5/22 3 pipl are territorial in the area, one approaches the nest. On 5/28 one pipl walks right through nest 7 exclosure but does not resume incubating.

Site Name: Goosewing
Pair Number: 8
Nest Location: -4.5E, east side of breach, ~6’ behind grass line, 30’ behind the fencing
Habitat: sandy area in a clearing of beachgrass

Nest	**A**
Date Found	5/21/08
Eggs when found	1
Date Clutch Complete	5/28/08
Clutch size	4
Hatch date	na
Eggs hatched	na
Date/cause of nest failure	Depredated around 6/08. eggs gone and pipl feathers found inside exclosure. (See notes)
Date/cause of chick loss	na
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	5/26/08
Clutch size when exclosed	3
Time to erect exclosure	23 min.
Time to resume incubating	4 min.
Exclosure design	Circular 2" x 4"

Comments: The wire exclosure is tampered with on one side at the ground, appears as if a predator dug under to enter the exclousre. No clear tracks identified in the area.

Site Name: Goosewing
Pair Number: 9
Nest Location: far inland side of the east shore of breach, ~8' in front of *Phragmites* edge
Habitat: heavy cobble mix

Nest	**A**
Date Found	5/25/08
Eggs when found	2
Date Clutch Complete	5/28/08
Clutch size	3
Hatch date	6/24/08 11:30 am
Eggs hatched	2
Date/cause of nest failure	1 egg gone from the nest on 6/14; no visible entry into the exclosure
Date/cause of chick loss	1 chick lost 6/27; cause unknown.
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	5/26/08
Clutch size when exclosed	2
Time to erect exclosure	31 min. (including time to photograph the nest)
Time to resume incubating	45 min.
Exclosure design	Circular 2" x 4"

Comments: Observed ATV tire tracks within 1 ft. of the nest on the date it was found. (before symbolic fencing was installed). Heavy predator visitation in this area (see trail camera results, site x)- crows, raccoon, coyote, mink, skunk. On 6/27 4 Great Black-backed Gulls were observed at the breach, possible predator of chick. By 7/01 the one remaining chick had moved out to the east beach front and was consistently observed west of nest 3 for the next 12 days. The chick appeared healthy and active, often seen feeding voraciously. The chick was not found after 7/12 (18 days old).

Site Name: Goosewing
Pair Number: 10
Nest Location: far east end of the beach, 15.2 E
Habitat: open sand ~ 4' front of the dune

Nest	**A**
Date Found	6/02/08
Eggs when found	2
Date Clutch Complete	6/08/08
Clutch size	4
Hatch date	7/03/08
Eggs hatched	2
Date/cause of nest failure	2 eggs abandoned in the nest 7/06.
Date/cause of chick loss	1 chick gone 7/07. 2nd chick lost 7/09; cause unknown.
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	6/03/08
Clutch size when exclosed	3
Time to erect exclosure	18 min.
Time to resume incubating	15 min. pipl hesitant to enter the exclosure
Exclosure design	Circular 2" x 4"

Comments: Dog disturbance 7/07/08. Two dogs from crowds on Westport end wander 50 feet west of the "No Dog" sign, begin to chase the pipl adult from nest 10. Adult flew over to defend the chick. Heavy foot traffic (tracks) observed 7/10/08 east of nest 10 exclosure into the fenced area and over the dune through beachgrass clearing. Brood not observed 7/09-7/11, 2 adults in the area.

Site Name: Briggs Beach
Pair Number: 1
Nest Location: 3.75 E
Habitat: sand/cobble mix ~5' in front of dune line

Nest	**A**
Date Found	5/05/08
Eggs when found	3
Date Clutch Complete	5/07/08
Clutch size	4
Hatch date	6/06/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	6/07 1 chick found dead in the nest. 2nd chick lost 6/09
Fledge date	7/09/08
Chicks fledged	2

Exclosure Information

Nest	**A**
Date exclosed	5/06/08
Clutch size when exclosed	3
Time to erect exclosure	24 min.
Time to resume incubating	2 min.
Exclosure design	Circular 2" x 4"

Comments:

Site Name: Briggs Beach
Pair Number: 2
Nest Location: 18.1 E, far east end near end of fencing
Habitat: sand/cobble mix ~5 feet from dune line.

Nest	**A**
Date Found	5/05/08
Eggs when found	2
Date Clutch Complete	5/09/08
Clutch size	4
Hatch date	6/08/08 (30 days)
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	na
Fledge date	7/03/08
Chicks fledged	4

Exclosure Information

Nest	**A**
Date exclosed	5/06/08
Clutch size when exclosed	2
Time to erect exclosure	23 min.
Time to resume incubating	2 min.
Exclosure design	Circular 2" x 4"

Comments:

Site Name: Briggs Beach
Pair Number: 3
Nest Location: 2.25 W, 150 feet west of the breach
Habitat: sandy/cobble area 12 feet in front of the dune

Nest	**A**
Date Found	5/05/08
Eggs when found	3
Date Clutch Complete	5/09/08
Clutch size	4
Hatch date	6/03/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	2 chicks lost by 6/06; cause unknown
Fledge date	6/27/08 in flight at least 40 feet
Chicks fledged	2

Exclosure Information

Nest	**A**
Date exclosed	5/06/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	23 min.
Time to resume incubating	20 min.
Exclosure design	Circular 2" x 4"

Comments:

Site Name: Briggs Beach
Pair Number: 4
Nest Location: 13.25 E
Habitat: sandy area 3’ in front of grass line, nearby *Rosa rugosa* patch.

Nest	**A**
Date Found	5/22/08
Eggs when found	1
Date Clutch Complete	5/26/08
Clutch size	4
Hatch date	6/22/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	na
Fledge date	7/21/08 observed in flight
Chicks fledged	4

Exclosure Information

Nest	**A**
Date exclosed	5/26/08
Clutch size when exclosed	4
Time to erect exclosure	23 min.
Time to resume incubating	3 min.
Exclosure design	circular 2" x 4"

Comments:

Site Name: Richmond Pond
Pair Number: 1
Nest Location: west side of fenced section, west of breach and 10' from grass edge
Habitat: sand/cobble mix

Nest	**A**
Date Found	5/28/08
Eggs when found	1
Date Clutch Complete	6/04/08
Clutch size	3
Hatch date	7/01/08
Eggs hatched	3
Date/cause of nest failure	na
Date/cause of chick loss	1 chick lost 7/03, possibly to a gull which are seen regularly in the area
Fledge date	7/26/08
Chicks fledged	2

Exclosure Information

Nest	**A**
Date exclosed	5/30/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	Not recorded (<30 min.)
Time to resume incubating	Not recorded
Exclosure design	circular 2"x 4"

Comments: Unusual egg laying schedule: nest found 5/28 with 1 egg. 2nd egg on 6/02 (day 5), 3rd egg on 6/04.

Site Name: Richmond Pond
Pair Number: 2
Nest Location: east side of the breach
Habitat: open sand

Nest	**A**
Date Found	6/16/08
Eggs when found	2
Date Clutch Complete	6/19/08
Clutch size	4
Hatch date	7/15/08
Eggs hatched	4
Date/cause of nest failure	na
Date/cause of chick loss	2 chicks lost 7/16, 1 chick lost 7/17, adult observed chasing out a gull. 4th chick lost 7/20
Fledge date	na
Chicks fledged	0

Exclosure Information

Nest	**A**
Date exclosed	6/17/08
Clutch size when exclosed	3 eggs
Time to erect exclosure	27 min.
Time to resume incubating	3 min. both male and female pipl enter and leave the exclosure
Exclosure design	Circular 2" x 4"

Comments: On 7/17 the one chick remaining moved east with the adults to the rocks, where the adult was observed chasing a gull out of the area. There were a fair number of beach visitors on the beach east of the breach and their presence may have "pushed" the plovers east, away from feeding areas and made them more susceptible to predators.

Appendix B

Campfire and Vandalism Log for Goosewing Beach Preserve

Date	Comment
March 4	Vehicle tracks along the dune on the beach front west of breach. (these tire tracks remained visible until the end of the season when we took down fencing.
25	Vehicle tracks noted over the dunes (tracks through the beach grass) on the east side of the breach.
31	Remains of a campfire at the beginning of the west dune trail.
April 9	Vehicle tracks along the beach, around the west bank at breach and onto the west dune trail.
14	Noted a piece of plywood pried off the east side window of the shed.
16	Shed break in. The locks were cut off and were found in the fire ring on the trail out to the beach. The trespassers put new locks on the hasps. Locks were stolen from the tool chest in the shed. Vehicle tracks (ATV and small motorbike?) down the front of the beach to the breach.
18	Vehicle tracks (small motorbike) down the beach past the breach, loop up towards the fencing.
19	Remnants of a fire near the lifeguard shed. Unused fire starter stick found.
21	"No Dog" sign on west end of beach is gone. Two posts at west end of fencing were knocked over.
22	Remnants of a campfire on the west end of the beach.
25	Corner post on west end of fencing is bent over and broken at the base.
May 7	Vehicle tracks (small motorbike or bicycle?) along the west beach.
18	"No Dog" sign at the east end is knocked over. Remnants of a campfire west of the snow fencing.
24	"No Dog" sign at the east end is ripped off the posts. Vehicle tracks (ATV)

from South Shore beach all the way down the beach to the Westport end, also along the east shore of the breach. Tracks run parallel to fencing, over the breachway, also extend up to the fencing in loops, with deep ruts.
Nest 2- one egg is gone from the nest and a stone is in its place. Egg beside the stone has a small crack. It appears that someone deliberately threw a rock into the nest. A small rip in the netting was repaired on 5/28.

June 4 East of the breach, between posts 3 and 3.5 E- the fencing twine is cut and footprints are in front, come out from over the dune. Brown paper bag found on the dune and a beer bottle discarded by the fencing. Signs on posts 8 W- 6 W are gone.

6 Remnants of a campfire on west side of the breach. Corner post on far east end of fencing is knocked down. "No Dog" sign is gone (possibly taken out by high tide)

9 Remnants of a fire at the breach end of the west dune trail in the clearing: trash, charred wood, clothing, bottles, and a fire grill. Cart tracks enter the fencing west of nest 4 exclosure on west beach and lead back to the path and to the clearing.

17 Shed break-in. The hasps are pried off. The tool box is stolen from shed.

18 Six posts are knocked down in front of nest 4 on west beach, 2 posts down at the path entrance west of breach, 1 at the corner of loop of fencing on east side of breach. Occurred after 9:30 pm 6/17. The hasps on the shed door are "reversed" and nailed into fresh wood. Shed broken into again. (3rd time this season)

19 "No Dog" sign at the west end is ripped off the posts.

July 1 "No Dog" sign at west end is ripped off the post on one side.

5 The trail camera on nest 9 at the breach (Goosewing cam 2, inside symbolic fencing) was dragged away from the site and left in the pond in 2' of water.

10 Heavy foot traffic (tracks) east of nest 10 exclosure inside symbolic fencing and over the dunes.

11 Campfire remains and trash at the clearing on the path to the shed.

14 Bicyclist riding at water's edge down the east beach.

23 One fence post knocked down on the west beach near the lifeguard chair.

25 Vehicle tracks (truck) down the beach (early a.m.), extend past the breach east

to about 200' from the Westport line (east of nest 10).

30 The plywood on the southwest corner window of the shed is pried off partially on the bottom. The TNC sign on the door was reposted on an angle.

Appendix C

Predator Removal Summary 2008
Goosewing and Briggs Beaches

Trapping Period: January 7 – February 27

Primary target species: fox, coyote, mink, skunk, raccoon

Results:

Goosewing – animals removed:
2 large male raccoon on 1/12
1 raccoon and 1 skunk on 2/7
1 skunk on 2/15
1 skunk on 2/25

Briggs – animals removed:
3 raccoon on 1/10
1 opossum on 1/18
1 raccoon on 1/23
1 red fox on 1/25
1 raccoon on 2/2
1 skunk on 2/6
1 raccoon on 2/14

Box/cage traps used for raccoon and skunk
Snare for mink
Foothold traps for coyote and fox

Scents were used as a lure at trap sites

Raccoon trapped at Briggs
February 2008

Briggs trap area on southeast shore of pond

Goosewing game trail and trap locations

Trapper sets a foothold trap for coyote at Goosewing

Goosewing Beach Trap Locations:

Briggs Beach Trap Locations:

Appendix D – Predator Monitoring Through Use of Game Cameras

Use of Digital Game Cameras to Document Predator Presence at Piping Plover Nesting Sites

Prepared by Niels Hobbs, The Nature Conservancy of Rhode Island
September 2008

Introduction

The two primary Piping Plover nesting sites monitored by The Nature Conservancy, Goosewing Beach and Briggs Beach in southeastern Rhode Island, have shown variable productivity rates over the 26 years for which there are reliable records. Without diligent and round-the-clock observation it can be difficult to say exactly what may cause egg, chick, or adult loss. While signs of negative weather events or depredation often remain, important details may prove elusive. Knowledge of specific causal factors, whether loss due to a particular predator, human interference, or tidal/storm washout, can prove critical for the development of effective management practices.

With the advent of automatic cameras designed to take photographs at any time of the day while human observers aren't around, more effective monitoring of wild animal populations of interest is now possible. Such game cameras (also called trail cameras) available today can be set to take high quality digital images whenever a laser beam is broken by movement, and can even take images in darkness using infrared flash, thus minimally disturbing subject animals. Variable shutter settings can allow for images to be taken repeatedly, and with different time settings in between images. This maximizes the information the camera can provide, particularly regarding behavior of subject animals. Additionally, game cameras now generally record useful physical information, such as date, time, temperature, and lunar phase with each image as well. Game cameras, in conjunction with standard human observation, are highly effective tools for monitoring subject animals and their respective habitat.

Methods

In 2007, The Nature Conservancy staff used a TrailMaster Trail Monitor camera system at Goosewing Beach to assess predator presence. The monitor was assembled at a mock exclosure near the site of the only depredated nest of the season. This type of camera set-up had a separate unit that triggers the camera in a nearby housing when a laser beam is broken. The camera was placed for four days at a spot along the breach near numerous animal tracks, and then another ten days by an abandoned nest at the western end of the eastern path behind the dunes. Despite the presence of animals as indicated by tracks, the unit only photographed a single skunk and a few rabbits at the nest site. Nonetheless, this did demonstrate value of a camera as a monitoring tool.

During the 2008 nesting season, we used game cameras more extensively to monitor predator activity at plover nest sites. After an initial trial at Briggs Beach in April, three separate camera units were employed at both Briggs and Goosewing Beach. We used Moultrie Game Spy I40 Digital Game Cameras, each triggered by a laser beam directed out the front of the camera itself, making these units more compact and practical than the set up used last year. This particular camera model was chosen for a number of features: its ability to take photos using an

infrared flash, which prevented unwanted disturbances to nesting plovers and terns; each photo was stamped with the date, time and temperature; photo quality; ease of use; its detection capability; long battery life; and price (about $200 per unit) which was reasonable for the features and quality of the camera. The cameras were locked inside protective metal housings which in turn could be secured to the ground. We locked cameras to the trunk of large shrubs, posts, and to lobster traps, which allowed for disguise and ease of placement near nests, but at the expense of some security. One such camera set-up (camera 3 at nest 9) was thrown into the breach waters by vandals, destroying the camera and the digital memory card inside. However, the valuable information gathered from the photos taken throughout the year made up for this loss.

A single camera set-up at Briggs (Figure 1) was employed for five separate periods at different locations for different numbers of days: camera 1 - a clearing just behind the dunes in the middle of the beach site for 12 days; camera 2 - hidden in a lobster trap that was placed next to plover nest #1 along the beach for 10 days; camera 3 and 4 - in a lobster trap facing toward and away from plover nest #4, respectively, for 2 and 15 days; and camera 5 - in the lobster trap on the side of a clearing behind the dunes near nest #4. At Goosewing (Figure 2), using two different cameras, four locations were covered; camera 1 - along the back trail behind the dunes on the eastern side of the beach preserve for 34 days; camera 2 - next to abandoned nest #7 near the east side of the breach for 26 days; camera 3 - next to active nest #9 at the top of the east side of the breach way by the saltpond for 27 days; and camera 4 - next to plover nest #3 facing a Least Tern nest along the beach on the east side of the breach for 13 days.

Results

The three game cameras were triggered 1,080 times all together, taking three images each time, for a total of 3,240 images taken at all sites for Goosewing and Briggs combined over a cumulative 144 days. This number doesn't include images that were triggered by us testing the detection capabilities, while moving or adjusting the camera, or changing its memory card. Excluding Piping Plovers and Least Terns, 146 individual animals at Briggs and 76 at Goosewing were photographed, counting only one animal per set of three images taken for each trigger.

At least 16 different species were recorded, including a number of potential mammalian and avian predators at Goosewing, and several different non-predatory birds at both sites. Rabbits at Briggs Beach predominated the results; of the 222 total animals photographed at both sites, 125 of them were rabbits at Briggs seen both night and day. Apart from three crows, no other predators were photographed at Briggs Beach, though some potential coyote and numerous dog tracks were seen around the nesting areas.

During the day, 167 animals were photographed, primarily birds at both sites and rabbits at Briggs. At night, 55 animals were photographed, 48 rabbits at Briggs, and 19 various mammalian predators and a single injured juvenile seagull (also a potential predator) at Goosewing. Several different bird species, including predators and non-predators, were photographed at both sites; with the exception of the injured seagull just mentioned, all were

photographed during the day at both sites. Table 1 summarizes the results of the animals photographed by the three cameras at both sites.

Discussion

Use of the three game camera set-ups proved to be invaluable for ascertaining predator presence at both Goosewing and Briggs beach sites. The difference in predator presence between the two sites is clear (Table 1). Goosewing Beach had many more photographed predators than Briggs, whereas Briggs photos were predominately of rabbits, a result itself indicating a significantly lower number of predators at that site. Interestingly, Briggs and Goosewing are only just over one mile apart, yet there is such a difference. This difference correlates directly with poor egg and chick survival at Goosewing, where the 2008 season had a low productivity rate of only 0.70 chicks fledged per pair. Conversely, Briggs beach, with its very low relative number of predators, had a very successful year with a productivity of 3.00 chicks fledged per pair. It would have been difficult to surmise the precise nature of this difference in productivity without the utilization of game cameras at these sites. The role of other factors that can also affect survival, such as human interference and extreme weather events, can be more proper weighed. From a management perspective, this information narrows the focus for planning the management of future breeding seasons.

While no photographs taken clearly show a predator eating a chick or egg, the correlation is hard to ignore. The last camera series, from location 4 at Goosewing does show a night-time shot of a medium-sized four-legged animal standing right over a Least Tern nest that was found the next day to be gone (fig. 9). Due to heavy fog, the species is not known, but it is possibly a raccoon. Nonetheless, this single image is enough to highlight the capabilities of these cameras, even if they don't clearly capture actual predation events.

Once cameras are used, in conjunction with other techniques such as direct observation of animals and tracks, management may require predator removal, if predator exclusion is not successful enough at protecting threatened species. Trapping has been used with some success to remove predators from both sites. In fact, trapping of mammalian predators in January and February of 2008 yielded three raccoons and three skunks at Goosewing Beach, and six raccoons, one fox, one skunk, and one opossum at Briggs Beach (summarized in Table 2). This indicated the potential for predator presence at both sites. This trapping may have shaped what predators were present at each site for the coming breeding season. Though both sites had predators removed, Briggs possibly had more removed from its total population than Goosewing, (in 2007, three coyote and one fox was removed from Briggs) easing the threat to nesting shorebirds enough to allow for a successful year. The success of future predator management practices can be measured by continued camera use at these sites.

The 2008 Piping Plover and Least Tern nesting season was one of mixed results across both sites; Briggs Beach had an unusually successful year, (compared to numerous years of low productivity) whereas Goosewing Beach had a very poor productivity. Normally, the cause of this difference would be largely open to speculation, making finding a solution difficult. However, given the well-developed picture of predator presence or absence that correlate with

differences in productivity, the use of game cameras is one unequivocally positive aspect of this year's beach management.

Suggestions for use of game cameras– Lessons learned

Site selection and positioning:

Naturally, the camera should be in a position where animals are known to pass. In addition to the plover nests that we wished to monitor, we placed our camera set-ups along nearby paths and sheltered clearings that had numerous animal tracks. This proved highly successful for recording many images of a wide variety of animals.

The camera should be placed above a cleared ground to get a more unobstructed field of view, while being low enough to still detect the passage of small animals. This allows for a better quality image of a target animal. At night, an unobstructed view is especially important because, much like a normal camera flash, the infrared strobe will reflect off of any ground vegetation or rocks and wash out the image, prematurely closing the shutter and creating a poor image. After some mistakes, we learned to place the camera to the side of, and facing into, a clearing where animals were likely to be present, clearing away any remaining debris or small grasses. Having a clear field of view also cuts down on the number of images triggered by wind-blown grass and the like.

Old lobster traps were used to affix cameras, particularly when cameras were placed in the open on the beach, to make them less noticeable to people (fig. 3). One camera was also locked to a wooden post that was anchored into the ground along a trail (fig. 4), and later moved to stand next to an abandoned exclosure (fig 5). Both methods appeared to be successful at animal monitoring. If set up near an exclosure, cameras were always faced to the side of the exclosure to have a greater field of view, particularly of the surrounding area to that side. A camera faced directly toward the exclosure would only take images of any movement between it and the exclosure, as the laser beam does not effectively pass through the fencing.

Interference with animal behavior:

Camera set-ups seemed to have no net impact on the nesting behavior of the Piping Plover. Many images, however, show other animals investigating, or in someway responding to, the camera set-up. Images of several rabbits and birds, one of three photos of a mink, and the one single photo of a coyote, all seem to show the animals looking at or exploring the camera (fig 6 – 8). The single image taken of a raccoon is of its legs standing up on the lobster trap housing. It seems unlikely that human smell is a factor, as the entire beach area is well-trafficked. The appearance of the camera, particularly in the lobster trap, may be enough to elicit curiosity or weariness. At night, the infrared flash emits a brief red illumination, and there is also a brief, quiet mechanical sound just before the camera takes the picture which may alert and interest the animals. Further study would have to be done to see how much the presence of a camera may affect animals.

Lag-time and shutter speed:

There is a slight delay between the laser beam being broken and camera shutter which can allow for a fast-moving animal to move past the field of view without its picture being taken. Camera images from this year included several shots of the tail-end of unidentifiable animals, and it is likely that some shots that appeared to be nothing more than wind-blown grass actually may have been triggered by running animals. It is possible that these were predators such as coyote and foxes, whose accurate detection is of great value. Other predators, such as skunks and crows, generally moved slow enough to be well within the frame when photographed. A camera with a faster trigger and less lag-time would be more accurate and dependable.

Additionally, once animal movement triggers the camera there is the likelihood that much activity goes undetected during the 15-seconds between each of the three frames, as well as during the minute of time before the camera resets for further movement detection. Animals could easily walk through the entire frame during these periods, possibly even prey upon a plover nest or adult, and avoid detection. Use of a camera that takes images quicker than every 15 seconds and doesn't have a one minute reset period (something our cameras could not do) would overcome this but at the expense of more false images triggered by wind-blown grass. The option of taking video instead of still photographs is available with some game cameras, including the Moultrie I40, which would provide more thorough documentation, but at the expense of stored memory. This also requires a lot more time and effort to thoroughly analyze.

Range and area of detection:

The Moultrie game cameras use a forward-directed narrow laser beam that detects movement passing through a relatively narrow front. This means that an animal could approach quite close to the front of the camera, well within the field of view, but not cross through the trip beam, and thus not be detected by photographic evidence. As there was no movement to trigger a set of images, it is difficult to say how often this has prevented us from photographing an animal in the area. We often tried to set off the camera by moving into the field of view ourselves, and there are enough instances of the camera not being triggered to suggest this is a factor to be considered. As before, the problem of photographing a fast-moving animal is enhanced as it only has half the field of view to pass through before the photo is taken. Again, this leads to images of unidentifiable animal tails at best, and the appearance of grass-blowing triggers at worse. Cameras are available that do have a much wider range of detection, but the additional monetary cost has to be weighed against the added benefit.

Table 1: Total number of animals photographed by game cameras at Goosewing Beach and Briggs Beach.

Game Cam results	**Goosewing**				**Briggs**				
Camera #	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**
Animal	(34d.)	(26d.)	(27d.)	(13d.)	(12d.)	(10d.)	(2d.)	(15d.)	(5d.)
Crow	4 \ 0	3 \ 0	6 \ 0	2 \ 0				3 \ 0	
Seagull		1 \ 1	1 \ 0						
Redwinged Black Bird		7 \ 0	13 \ 0						2 \ 0
Grackle			12 \ 0						
Robin									7 \ 0
Great Egret									1 \ 0
Morning Dove	3 \ 0		10 \ 0	2 \ 0					1 \ 0
Spotted Sandpiper			1 \ 0						
Sparrow			5 \ 0						3 \ 0
Unk. Black Bird		3 \ 0	6 \ 0						
Rabbit					35 \ 22	3 \ 0	1 \ 3	6 \ 19	32 \ 4
Deer	2 \ 0				1 \ 0				
Skunk	0 \ 1	0 \ 2	0 \ 2						
Fox	0 \ 1								
Coyote			0 \ 1						
Raccoon			0 \ 1						
Mink			0 \ 3						
Med. Unk.*	0 \ 5			0 \ 2	0 \ 1				
Sm. Unk.*			0 \ 1		0 \ 2				

Table 1 summarizes the total animals photographed by game cameras at 4 sites at Goosewing Beach, and 5 sites at Briggs Beach (see maps for precise locations). Number of days cameras were in place at each site is in parentheses. For each species, first number is daytime occurrences, second number is nighttime occurrences. Animals in red are known or potential predators.
*based on overall observations, medium and small unknown animals at Goosewing are potentially predators, while those at Briggs are probably rabbits.

Table 2:

2008 Predator Trapping Results

	Goosewing	**Briggs**
Skunk	3	1
Fox	.	1
Raccoon	3	6
Opossum	.	1

Table 2 summarizes the number or predators caught in January and February of 2008 at both Goosewing and Briggs beaches.

Figure 1: Game camera locations at Briggs Beach, 2008

Figure 1 shows the location of the five game camera locations at Briggs Beach, and their proximity to Piping Plover nests. The camera by nest #4 was positioned facing two different directions, and then moved to an adjacent clearing on the other side of the dunes.

Figure 2: Game camera locations at Goosewing Beach, 2008

Figure 2 shows the location of the four game camera locations on the east side of the breach at Goosewing Beach, and their proximity to Piping Plover nests.

Camera Setup

Figure 3: A photograph of the game camera (# 3) inside an old lobster trap, oriented toward the exclosure of Piping Plover nest 4 at Briggs Beach. Camera housing (black box) is on the left side of the trap, nearest the exclosure, as indicated by the red arrow.

Figure 4: camera # 1 at Goosewing Beach located along the trail behind the dunes

Figure 5: camera # 2 at Goosewing aimed at an abandoned nest (nest 7)

Camera #3 aimed at Goosewing Nest 9


Camera # 2 at Briggs Beach at Nest 1

Example images from this year:

A rabbit is photographed as it passes by the exclosure of Piping Plover nest #1. The two subsequent images in this series (not included here) show an adult plover outside of the exclosure in response to this perceived threat.

A blurred image of a fox moving along the trail behind the dunes on the east side of Goosewing Beach (camera #1). This was one of the few images where identification was relatively easy, as there was no over-night fog and the animal was moving relatively slowly.

Photos from camera #3 at Goosewing nest 9:

This image shows a grackle (red arrow) entering into the exclosure of Piping Plover nest #9 at Goosewing Beach two days prior to hatching. Note one of the plover adults (to the right of exclosure, indicated by yellow arrow) is energetically attempting to distract away this otherwise non-threatening species.

Figure 6 - An image of a Coyote is seen on the far right near Piping Plover nest #9, eight days before hatching. As with images of other animals, the Coyote appears to be reacting to the camera.

Mink at plover nest #9

A mink (on left of image) is seen facing directly toward Piping Plover nest #9, one day after hatching of two chicks. Note proximity to camera, which may indicate some curiosity about the unit on the part of the mink.

Skunk at plover nest #9:

Figure 7 - This image is likely to be of a raccoon, which is standing over the lobster trap which houses the camera at nest 9 at Goosewing

Figure 8 - A curious rabbit looks at the camera at Briggs Beach camera # 1

Figure 9 - A foggy image showing depredation of one of the last Least Tern nests along the beach front at Goosewing Beach. Note the unknown predator just right of center (red arrow), its head and glowing eyes are directly over the nest. The following day there was no sign of either adult terns or the two eggs.

Photos from camera 2 (abandoned plover nest #7):

Skunk

Crows repeatedly investigate the exclosure in the next two photos…


64˚F
06/15/08 02:47 PM
GOOSEWNG 1


76˚F
06/21/08 08:16 AM
GOOSEWNG 1

An image of a Great Egret in the clearing behind nest #4 at Briggs Beach. This shot demonstrates the general value of game cameras, not just for monitoring predator presence at Piping Plover and Least Tern nest sites, but also for studying overall diversity at these sites.

Appendix E - Additional Projects

Osprey (*Pandion haliaetus*) Activity at Goosewing Beach Preserve

The nesting platform at Goosewing was not used by osprey this season, although the birds were observed regularly feeding over Quicksand Pond and Tuniper's Pond, as well as at neighboring Briggs Beach and Westport sites. The first sighting of a pair of ospreys was on April 10, and they were observed several times a week throughout the month. At the end of April, an osprey was seen flying near the nesting tower, but they never landed on it. In fact, the only bird seen on the nesting platform was a Great Egret, which landed on the tower and carried off nesting material on April 19. Ospreys were observed regularly feeding over Goosewing throughout the season. The site offers good feeding habitat for osprey even if they are not nesting here. The nesting platform had new vegetation growing over it by the end of the season. Maintenance of the platform may be necessary.

Plant Surveys:

Seabeach Knotweed (*Polygonum glaucum*)

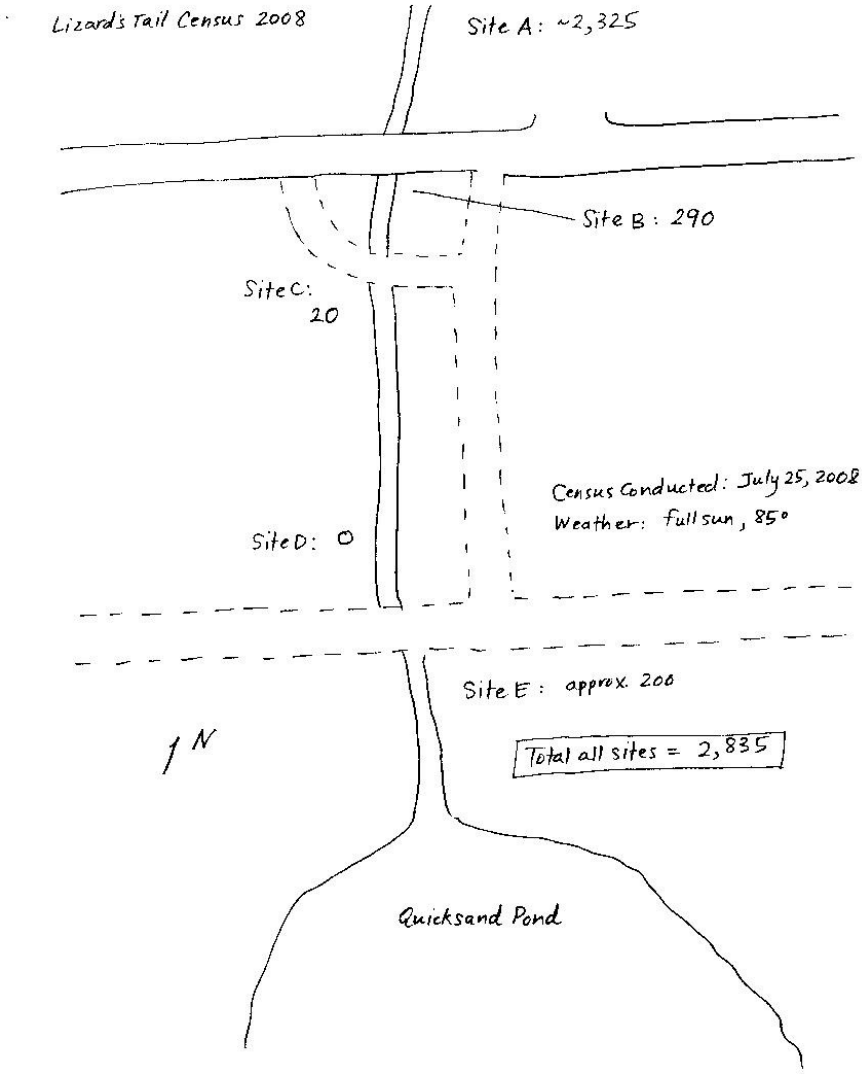
A survey for Seabeach Knotweed was performed on July 24 this season, about a month earlier than last year's count, when the flowers were in full bloom. The habitat along Quicksand Pond is the most ideal habitat for the plant. The banks of the shoreline where the *Phragmites* meets the sand were submerged in several feet of water until early May when the pond breached. This area on the east side of the breach and inland along the beach is historically where the majority of Seabeach Knotweed has been found. The survey method consisted of two people walking the beach area, starting inland and along the water, progressing out toward the beachfront. The survey time was one and a half hours and extended about sixty feet from the water's edge. A total of 4 plants were counted in this area. Three of these were in the large cobble mixture near the *Phragmites*, and one was along the grass. No plants were found on the west side of the breach. Two plants were found east of the lifeguard shed at the start of the preserve, and two in the cobble of the town beach parking lot near Tuniper's Pond breach. The total count on Goosewing Preserve was 8 plants, similar to last year's count of 11.

Seabeach Knotweed was not found at Briggs Beach. However, the conditions at Richmond Pond in Westport supported a healthy population of the species. A count on July 25 resulted in a total of 141 plants. They ranged in size from a sprig of one inch diameter to the most robust plants which were three feet in diameter and a height of five inches. All of these were located on the west side of the breach.

Lizard's Tail (*Saururus cernius*)

A survey for Lizard's Tail at sites in Little Compton off Pottersville Road and Quicksand Pond Road was conducted on July 25, 2008. This year's total count was an increase from last year's estimates, and may be due in part to the extent of the survey. The survey was extended north of Pottersville Road where the largest group of an estimated 2,250 plants thrived in a clearing receiving full sun. This year's survey involved two people searching for the plant. The area surveyed extended at least 50 feet into the stream bed at each of the described sites. At the time of the count, the Lizard's Tail were in full bloom and the flowering stem was readily identified. There is an abundance of the plant at the observed sites despite competition from a vine which grows over the Lizard's Tail. The formal count on July 25 totaled 2,835 plants, an increase from last year's count of 764. Figure 8 shows the distribution of count totals at each of the five sites, A-E. Separate counts were not made for flowering and non-flowering plants. Counts in 2006 and 2005 were 81 plants and 241 plants, respectively (Pereira, 2006). Procedures for counting Lizard's Tail should be standardized in order for successive year's counts to be meaningful. Standard procedures should specify a week to perform the count, description of plant morphology, and distance of streambed to be covered.

Figure 8:



Lizard's Tail Survey Locations – Little Compton, RI

Appendix F- Additional Wildlife Observations

Goosewing Beach Nature Preserve and Briggs Beach are diverse ecosytems that support multiple species. The following are observations of species other than plovers and terns. Such observations may prove noteworthy in future years, or when compared to other records.

Species	Date(s) Observed, Behavior Notes
Muskrat	Observed 4/07, 4/09 at breach. On 5/17 a muskrat dove off the west bank of the breach and swam across the breach.
Killdeer	4/03 in Truesdale's field. 5/21- 2 adults and 1 chick ~10 days old in field; field is being mowed. 5/22- 2 adlts, 2 chicks. 5/24 pair copulate near juniper clearing on east side of Goosewing. 2 Killdeer near nest 9 6/11. 4 at breach 6/24. 7/01 at breach, 7/04 at town breach.
Coyote	Tracks on beach 4/10 and regularly throughout the season, often seen parallel to dune or on beach front across the breach.
Great Egret	In town parking lot, taking food hand outs from person in car, 4/14. 6/24 at breach. 6/27 at town breach. 4 at breach 7/02, vocal calls. 3 at breach 7/05. Egret carries off nest material from osprey tower on 4/19.
Common Eider	Dead Eider found on east side dune 4/16. Immature at rocks on west end of Gswng 7/04.
Cormorant	Dead cormorant on west beach 4/25.
Kingfisher	Observed 4/30, 6/06.
American Kestrel	Attacks a killdeer on east dune path 5/10.
Red Knot	Banded Red Knot observed on mudflat 5/19. Left leg band A - - - (?)
Northern Harrier	Observed 5/24, 6/03
Deer	Tracks along east side of breach regularly. Observed 5/24.
Opossum	Tracks observed 5/24 on east side of breach.
Gulls	Mixed flock of about 100 Herring and Black-backed gulls in a feeding frenzy over the water.
Green Heron	2 observed on 6/03. one on South Shore Rd. telephone line on 6/24. 7/05 at breach.

Snapping Turtles	6/04 north of Seapowet Lane of Main Rd. (77). 6/09 Pottersville Rd. laying eggs, near 2007 site. 6/11 Westport Harbor Rd. baby snapper
American Oystercatcher	Observed 6/14, 6/27.
Red-winged Blackbirds	6/24 large flock
Black-crowned Night Heron	6/27 at town breach
Red-breasted Merganser	Injured or with oil on feathers, in breach at Richmond Pond 7/14
Glossy Ibis	7 at Richmond Pond on 7/14.
Swallows	Observed in large flocks of fledglings and adults, 7/23. At least 200. Cliff, Bank and Tree Swallows.
Seahorses	June/July- at least 6 different reports of Seahorses found in Quicksand Pond.