

Fire Island National Seashore

THREATENED & ENDANGERED SPECIES MONITORING PROGRAM 2007 SUMMARY



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ABSTRACT

The status for six threatened and endangered (T&E) species was observed in 2007 as part of the threatened & endangered species monitoring effort conducted at Fire Island National Seashore (FIIS), New York. Through daily monitoring and a collaborative park effort, a total of 25 piping plover (*Charadrius melodus*) nests, 12 seabeach amaranth (*Amaranthus pumilus*) plants, and 66 seabeach knotweed (*Polygonum glaucum*) plants were recorded along the national seashore. With a total of 18 successful piping plover fledglings, nesting productivity reached an average of 0.72 piping plover chicks fledged per nest site. Annual population surveys for least tern (*Sterna antillarum*), common tern (*Sterna hirundo*) and roseate tern (*Sterna dougallii*) species resulted in a total count of 32, 7, and 0 respectively. Persistent educational and outreach efforts directed towards park visitors, island residents, and cooperating agencies is one of several strategies critical for the continued success of this program.

INTRODUCTION

Fire Island National Seashore was established as a unit of the National Park Service on September 11, 1964, as authorized by United States Congress (Public Law 88-587). Fire Island is a 32 mile-long barrier island located off the south shore of Long Island, N.Y. (Figure 1). Fire Island National Seashore occupies 26 miles of this barrier island that consists of 17 communities predominately on the western part of the island, and 6 miles of a county park on the eastern end of Fire Island. The Otis Pike Fire Island High Dune Wilderness (OPWA) is a seven-mile stretch located on the eastern half of the national seashore and is the only federally designated wilderness area in New York State. FIIS staff and volunteers monitor 20 miles of the island.

Sections of Fire Island National Seashore provide suitable breeding/germination habitat for a number of federal and state listed threatened and endangered species. Protected avian species observed on FIIS are the piping plover, least tern, common tern and roseate tern. Protected vegetative species include seabeach amaranth and seabeach knotweed.

Of the six species observed, the piping plover constitutes a large portion of the monitoring program effort. Listed as a federally-threatened species in 1986, FIIS has worked extensively toward the piping plover recovery effort. In order to do so, the recovery plan objective is to ensure the long-term viability of the Atlantic Coast piping plover population in the wild, thereby allowing removal of this population from the Federal List of Endangered and Threatened Wildlife and Plants (FWS 1995). One of five recovery criteria for the piping plover will be attained when 2,000 breeding pairs can be successfully monitored and maintained for five consecutive years. Of the two thousand, 575 of those must be located within the states of New York and New Jersey. In the previous monitoring year, 2006, a total of 422 nesting piping plover pairs were found on Long Island and 1,743 pairs were found on the Atlantic Coast (Janssen 2007).

Other important delisting criteria for the piping plover shorebird species include achieving a five-year average productivity of 1.5 fledged chicks per nest and instituting long term agreements among cooperating agencies, landowners, and conservation organizations in order to maintain population and productivity. Prior to the listing of the piping plover, the least tern was listed federally endangered in 1985 and is also a state listed threatened species in New York. The roseate tern was listed in 1987 as endangered both federally and state wide. According to the US Fish and Wildlife Service (USFWS), once the northeast nesting populations of roseate terns reach 5,000 in at least six large colonies with high productivity, they will be removed from the endangered species list.

Encompassing FIIS threatened and endangered vegetative species are seabeach amaranth (amaranth) and seabeach knotweed (knotweed). Amaranth was believed to have been extirpated from New York for over three decades, until the early 1990s, when populations began to exist on Long Island. Listed as federally threatened in 1993, amaranth has since been on its way to recovery. Knotweed is on the New York State species of concern list.

OBJECTIVE

It is the objective of Fire Island National Seashore to follow the management goals set forth in the Endangered Species Habitat Management Plan (1998), Endangered Species Act (1973), and the US Fish & Wildlife Recovery Plan (1996) for the protection and productivity of nesting threatened and endangered species. These guidelines include monitoring breeding/germination populations, documenting productivity, limiting human disturbance to areas with suitable habitat, protecting listed species from potential predators, and educating the public. The purpose of this report is to present the results of the 2007 T&E species program conducted on Fire Island National Seashore and discuss areas of improvement for the upcoming field season.

PROTECTION PROTOCOL METHODS

In accordance with USFWS guidelines, pre-season habitat fencing (symbolic fencing) is erected for the purpose of protecting potential vegetative species habitat and avian species nesting habitat. In 2007, symbolic fencing was constructed and established in early April, prior to the onset of the breeding season. Areas to be fenced were determined through the compilation of nest/plant data collected from previous years and through visual assessments. All symbolic fencing on FIIS was constructed using 5.5 ft Carsonite™ fiberglass posts. Carsonite™ posts' light weight offers an efficient alternative to steel posts used in years past. Posts are placed approximately 12 paces apart and are connected using twine; strips of fluorescent flagging are secured along the twine to visibly identify symbolic fencing. For every fourth post, an informative 'plover habitat' sign provided by the USFWS is posted, notifying the public of the reason for symbolic fencing. Larger interpretive signs were situated at public access entrances to inform beachgoers about the piping plover.

Throughout sections of FIIS, restrictions and/or beach vehicle closures are implemented regarding vehicular access and pets. While some beaches on Fire Island are open to driving, the OPWA is closed to vehicular traffic from March through September due to the piping plover breeding season. Closures to ORV areas occur due to the documented negative effects they have on the nesting success of breeding shorebirds, as well as the germination of threatened/endangered plants. As with driving, dogs have also proven harmful to the success of threatened and endangered shorebirds and are thereby ordered to be restrained on a leash

which shall not exceed six feet in length (36 CFR2.15) on the beaches of a national seashore. Pets are entirely prohibited from areas of beach with piping plovers chicks present.

At the beginning of the nesting season, added preventative measures are implemented for the protection of the piping plovers. In order to protect piping plovers from avian and mammalian predators, nest enclosures are erected and placed around the piping plover nest site. Nest enclosures are ten feet in diameter and are constructed using 2X4 inch galvanized welded mesh fencing. The fence is then buried approximately 8 to 10 inches deep and supported by 4 Carsonite™ posts which are buried and attached to the fencing using zip ties. In order to deter avian predators, a ¾ inch nylon mesh is placed over the top of the enclosure and tied down using multi-purpose zip-ties.

SHOREBIRD POPULATION MONITORING

Piping plover migration to FIIS occurs in between late February and March, with tern species arriving later in the season in late April and early May. OPWA, which in years past has yielded the highest piping plover productivity, was monitored closely beginning in late March. By mid-April, monitoring was conducted at least five times a week by foot throughout the OPWA location. Possible piping plover activity along Sailors Haven beach and the Lighthouse beach were also closely monitored. All-terrain vehicles (ATV) and off-road vehicles (ORV) were utilized as a means of transportation to these areas.

Daily monitoring surveys and biological data were conducted and collected by qualified field biologists walking parallel to symbolic fencing. Before nesting occurred, observations of individual or pairs of piping plovers were recorded. Information recorded included: time/date, weather conditions, number of birds and displayed behaviors, and geographic coordinates using a handheld Global Positioning System (GPS) unit. This continued until the beginning of May when the nesting season began with the first nest (1A-07) enclosed on May 4, 2007 at OPWA overwash area (Map 1). Breeding pairs of plovers were identified using binoculars and observed for specific courtship and nesting behaviors. These behaviors include (but are not limited to) aerial displays, scraping, broken-wing display, vocalization and territoriality.

SHOREBIRD INCUBATION MONITORING

Piping plovers generally lay one egg every other day until they reach a complete clutch size of 4 eggs, though in some instances a nest may contain 3 eggs. The latter are typically re-nests; of recent nests considered lost. Regardless of nest location along FIIS, all plover nests were enclosed and protected within symbolic fencing borders, creating a buffer zone of no less than then 50 meters on each side. In areas that were heavily populated by beachgoers, the buffer zone was enlarged in order to decrease the amount of human disturbance towards the nest and allow for greater habitat area and protection.

Upon a nest discovery, an alphanumeric system was used to identify each nest. A two-digit nest number and year were assigned chronologically, using an “A” for first nesting attempt, “B” for second, and so on (eg.1A-07). Universal Transverse Mercator (UTM) North American Datum (NAD) 83 coordinates were recorded for each nest site using a Garmin™ Global Positioning System (GPS) unit and extracted onto an ArcGIS™ (Geographic Information System) aerial image of Fire Island for monitoring and data management purposes.

Heightened awareness towards piping plovers nesting activity began after copulation was observed. Field biologists lead intensive daily monitoring observations for the purpose of immediately identifying and enclosing a full-clutch nest site. This effort helped ensure minimal disturbance towards breeding pairs. An average hatch date of 27 days would be determined utilizing a 'hatch and fledge date' chart produced by New York State Department of Environmental Conservation (NYSDEC). Each day, a nest would be carefully observed from a distance no less than 50 meters. Daily nest site observation information was recorded on individual data sheets for each nest then transferred to an Excel spreadsheet template.

SHOREBIRD BROOD MONITORING

Daily brood monitoring was initiated after the first piping plover nest egg had hatched. Cautious attention was given to all plover chicks, since piping plover chicks are unable to fly and most vulnerable to predation throughout their first few weeks after hatching. Data collected for each brood consisted of: number of adults and chicks observed, location specification, and behavior observed. In areas of coexisting nest sites, careful efforts were made to properly distinguish amongst chicks; age of chicks was the primary factor in differentiating amongst pairs. During instances of missing chicks, field biologists would closely scan the vicinity of the nest site for those unaccounted for, for a period of five days in accordance with USFWS guidelines. In accordance with USFWS recovery plan guidelines (1996), a plover chick was considered fledged at 25 days or when a sustained flight of 15 meters was observed. In instances where a nest was situated near a vehicle beach access route, a fledge date of 35 days was implemented to ensure the safety of the species.

VEGETATION POPULATION MONITORING

Amaranth and knotweed began to germinate on FIIS during late June to early July. Generally, these species tend to grow in large clusters, but isolated plants have been observed as well. Not all plants were protected behind symbolic fencing, although areas which possessed densely populated vegetation were protected with a buffer zone of 25 meters. Field biologists conducted vegetation monitoring sweep counts throughout sections of FIIS, either on foot or through the use of an ATV, traveling parallel to the toe of the dune. A Garmin™ GPS unit was used to collect data points for the location of specified vegetative species. This data was then transferred to a computer, corrected, and displayed on an ArcGIS™ aerial image of Fire Island. Sweep counts for amaranth and knotweed continued throughout August and early September. These efforts continued until plant growth ceased and reproduction was deemed successful.

MONITORING RESULTS

Piping Plovers

Monitoring for the piping plover season on FIIS began when the first piping plovers were observed on March 15th and continued until the last chicks fledged on August 18th. In the months of May and June piping plover nests were being discovered and documented throughout FIIS; a total number of 25 nesting pairs were discovered. From those 25 pairs there came a total of 35 nesting attempts (Table 1) in which 24 nests were lost. The lost nests were either due to abandonment, predation, overwash, or failure to successfully hatch (Table 2). There were 8 pairs that re-nested, resulting in a total of 4 re-nests that hatched and 3 chicks that successfully fledged from the re-nests (Table 2).

Out of the 35 total nesting attempts there was a total of 129 eggs laid, 45 of which

successfully hatched, though only 18 chicks fledged with productivity at 0.72 (Table 2). A breakdown of the number of eggs that hatched and their surviving time is displayed in a bar graph (Fig. 2) showing that out of the 40 that survived past a day only half of those lived past 2 weeks. The eggs that did not hatch were analyzed and the percentage is displayed of abandonment, predation, overwash, and failed eggs (Fig. 3). Of those four accounts almost half of the total number of eggs that did not hatch, at 48%, was due to abandonment.

Chicks fledged per pair as well as chicks fledged per nest for the 2007 season was lower than in previous years since 1997 (Table 1). Figure 4 displays the trend of the number of fledglings and the number of nests throughout a span of seven years. It illustrates that the total number of nests has been steadily increasing; however, the total number of fledglings since 2005 has taken a sharp decline.

In OPWA there were a total number of 9 nesting attempts located in the overwash area. This is a sandy, flat area which was overwashed by a Nor'easter event in 2005 (Maps 1 & 2). The Nor'easter event on April 16, 2007 further widened the overwash in many areas. Due to the lack of available updated aerial photos, the figure does not reflect the current overwash area. It expands to about 1.5 miles in length with a 0.25 mile width, the southern edge is roughly 25 meters from the shore, with a slight incline which is directly in front of its southern edge with a slight decline in elevation towards the back of the overwash. Situated in the front of the overwash five of the nests (1A, 1B, 1C, 1D, and 13A) had less of a distance to the shore than the 4 nests located in the back of the overwash (15A, 15B, 17A, and 21A). The first nesting pair of the season (1A-07) was found located at the overwash area on May 1st. Nesting pair 1A was the only pair that re-nested more than once with a total of 3 re-nests resulting with a nest 1D. Unfortunately, all four of these nests were lost (Table 2). In fact, all nests in the overwash, except for one (15B), were lost due to abandonment, predation, or by being overwashed. Of these nests 1A, 1D, 15A, 17A, and 21A were abandoned, nests 1C and 13A were overwashed by a storm event on June 4, 2007, and 1B was the only nest observed as predated (Table 2). The only nest to be successful (15B) fledged 2 chicks, the last chicks to fledge, on August 18, 2007.

Just west of the overwash and Old Inlet, there were 3 nests (19A, 3A, and 14A) (Map 3). Nest 19A was on top of a dune and approximately 30 yards from 3A with nest 14A being 35 yards north of 3A. As of June 30th nest 3A had fledged 2 chicks and on July 19th a single chick had fledged from 14A (Table 2). On June 25th a willet was observed perched on top of the enclosure of 19A for a time exceeding 5 minutes, other observations of willets were made on June 28th and 29th. An egg was recorded broken on July 2nd and again on the 3rd with no adult plovers in the area of 19A. On July 4th, 19A was documented to have 2-3 egg shells hatched in the scrape with one egg shell outside of the scrape; one dead chick was found inside of the enclosure covered with ants and another dead chick found outside of the enclosure also covered with ants. Only one adult piping plover was found in front of the nest and it was determined to be a failed nest (Table 2).

Located on Map 4, in the area east of Bellport Beach, there were six nest attempts (8A, 9A, 9B, 2A, 2B, 23A) all which were unsuccessful (Table 2). First discovered on May 1st with one egg completing its clutch with 4 eggs on May 7th, 2A was positioned at the toe of the dune, it hatched 2 chicks observed still lying in the scrape on June 3rd and no chicks nor plovers seen on June 5th or after when a storm the previous night washed out the area. All the other nests in this area were positioned on top of the dunes (2B, 9A, 9B, 23A), or on the side of the dune (8A). When field biologists returned to nest 9A on May 25th to enclose the nest, there were no longer any eggs and it was documented as predated (Table 2). The remaining nests (2B, 8A, 9B, 23A) were determined abandoned from several documented observations of no incubation which indicated an abandoned nest (Table 2). Nest 2B was expected to hatch on July 11th, in accordance with the 27 day incubating period from the date the clutch was complete, however on the dates of the 12th, 13th, and 14th there were observations of adult piping plovers but none incubating and after the 15th there were no plovers seen in the area. The first observation of no incubation for nest 9B was documented on July 4th, followed by recordings on the 7th, 9th, 12th, and then on the July 13th, when the eggs were expected to hatch, they never did.

Between Bellport and Watch Hill, an average distance of 3.5 miles (Maps 5 & 6), there were 6 pairs that nested throughout this area with a total of 8 nesting attempts (6A, 6B, 11A, 10A, 10B, 24A, 22A, 12A). After failed attempts, nest 6A (which was overwashed by a storm event on June 4th) and 10A were determined predated. Both nesting pairs re-nested and hatched eggs. Nest 6B successfully hatched two eggs, while the other two remained un-hatched and fledged only one chick. Nest 10B hatched two eggs, but lost one chick the day after a storm event on July 23rd (two days after hatching). Since the one remaining chick was last observed on August 7th (eight days before its intended fledge date), it was unable to be considered fledged and therefore determined as predated. A similar occurrence happened with 24A, when the chick for this nest was last observed 11 days before its expected fledge date on August 13th and later determined as a failed nest. Losing 3 of its eggs, washed out by the same storm event as nest 6A, nest 12A continued to incubate the last egg until that egg was considered predated and no re-nest attempt was made. In addition to the one chick fledged (6B) there were an additional 2 chicks (11A) and 3 more chicks (22A) that fledged in that area (Table 2).

The beach by the Watch Hill area (Map 6 & 7) had two nests washed out (5A, 16A), one failed nest (5B), and two nests that fledged (4A, 16B) each only one chick (Table 2). Washed out by a high tide on May 19th, nest 5A re-nested (5B) at a higher elevation, but had an unsuccessful hatching with no surviving chicks. Other high tide events occurred after a storm on June 4th, washing out nest 16A. However, this nesting pair re-nested and successfully hatched. There were only two chicks that fledged from the two successful nests in the Watch Hill area (4A, 16B).

Further west of Watch Hill there were four remaining nests at Talisman/Barrett Beach, Sailors Haven and Lighthouse beach. At Talisman/Barrett Beach (Map 8) nest 25A was discovered with four chicks on July 6, 2007. One chick fledged from this brood. At Sailors Haven (Maps 9 & 10) there were two nests. Nest 18A was located just west of the Cherry Grove dune crossing.

Only three eggs were laid in this nest and two of the chicks fledged. Nest 20A was located just west of the Oakleyville dune crossing. The chicks moved towards the Point O' Woods community. Two chicks fledged from this brood. At Lighthouse Beach (Map 11) nest 7A laid four eggs. The expected hatch date was on June 19th, but the last date that an adult piping plover was observed incubating was the 15th, and no plovers were seen in the area after June 18th.

Seabeach Amaranth and Seabeach Knotweed

In a continual digression the total numbers of seabeach amaranth and seabeach knotweed has decreased drastically from 2003 to 2007 (Fig. 5). The only seabeach knotweed found east of Bellport is shown on Map 4. Six seabeach knotweed plants and only one seabeach amaranth were located in the whole of OPWA (Maps 4 & 6). Between Watch Hill and Sailors Haven (Maps 7, 8, 9, & 10) a total of 13 knotweed plants were found and 3 amaranth. The lighthouse beach was the most abundant area with 40 knotweed plants and 6 amaranth plants (Map 11). Seven more seabeach knotweed plants and two more amaranth plants were located between Point O' Woods and Kismet. For FIIS in 2007 the total amount of seabeach knotweed reached 66 and seabeach amaranth was counted at only 12.

Water bird colonies

In June 2007, resource management staff participated in the NYS-DEC's Long Island Colonial Waterbird Survey (LICWS) population count across various areas of FIIS. In total 6 different areas were surveyed throughout the month-long effort. Annual population surveys for least tern, common tern, and roseate tern species resulted in a total estimated count of 32, 7, and 0 respectively. Efforts were made to conduct the colonial waterbird surveys, unfortunately not all areas were surveyed due to various circumstances such as weather events, motorboat activity and remoteness of location.

DISCUSSION

The 2007 T&E species monitoring program was exceedingly different to any year prior due to a variety of circumstances. The productivity was the lowest in recent years, while the nesting pairs and nest attempts was the highest observed to this date. There were many factors and events this season that could have contributed this unexpected outcome. It was documented that weather conditions greatly affected the monitoring program. The severe Nor'easter at the beginning of the season made it necessary to replace most of the symbolic fencing. Storm and rain events also made it difficult to monitor the nests on the scheduled days. This season there were several nests in recreational areas and near dune crossings, which made it necessary to enforce the various recovery effort guidelines. As in previous years nest disturbances were an issue due to both human interactions and wildlife interactions.

Climate/Weather Issues

This season the Nor'easter coincided with the period that the plovers were arriving to Fire Island National Seashore and it is possible that this altered the plovers' regular migration and nesting behaviors. Other weather events that affected the plover productivity were two high tide events that caused several nests to be washed out. The Nor'easter and storm events also changed the shape of the shoreline. This could have influenced the plovers to nest on top of the grass covered dunes in a higher frequency than in previous years. This made it difficult to locate plovers and their nests. With limited staff it was difficult to survey both the dunes and the shoreline. In addition there were pairs that nested on the dunes that were noted to hit the enclosure when they were trying to fly off the nest (19A, 9B). It is possible that this occurred because the plovers were startled as they did not see the observers as they were approaching the nest from below the dune.

Regulation Issues

Several nests were located in frequently used recreational areas (4A, 6A, 6B, 7A, 16A, 16B, 18A, 20A, 25A). As in previous years, nests were subject to more disturbance in these areas due to human (*Homo sapiens*) and domestic dog (*Canis lupus familiaris*) activity. On July 7, 2007 there was an incident at Talisman/Barrett Beach where beachgoers were flying two kites close to the pair and their chicks (25A-07). In response to the kite activity the pair was peeping, demonstrating broken wing display and flying towards the kites. People were also observed to be very close to nests. At nest 6A-07 a group beachgoers were playing close to the symbolic fencing and a Frisbee went into the fencing. One of them had no hesitation to go behind the fencing and retrieve the Frisbee. This action did not seem to disturb the nesting plover, but it demonstrates difficulty with enforcing regulations. Dogs were frequently seen off their leash or in areas that were prohibited to dogs. At Watch Hill there were two dogs within 2 meters of the chicks (16A-07). Law enforcement was called to assist in enforcing the no dog regulations.

There was also concern with full sized vehicles on the beach. There were four nests that were near dune crossings and these areas were closely watched. When the expected hatch dates arrived, dune crossings were closed and driving was prohibited in the areas. Nest 25A was discovered on July 6, 2007 with four chicks at Talisman/Barrett Beach where vehicles are allowed to drive on the beach. Immediate actions were taken to close the beach to driving. Driving on the beach was not officially closed until July 9, 2007. During the period when the nest was discovered to when the beach was closed volunteers were stationed at the nest site to escort vehicles through from 8am to 4pm. For the 2007 season there was no documentation of direct disturbance of nests due to vehicular traffic, but vehicles were observed driving through areas that were closed.

Nest Disturbance Issues

In addition to human and dog disturbance towards nests, additional predators that were witnessed by field biologists included: great black-back gulls (*Larus marinus*), herring gulls (*Larus argentatus*), willets (*Catoptrophorus semipalmata*), American oystercatchers (*Haematopus palliatus*), and crows (*Corvus spp.*). Avian predators were often seen disrupting piping plover broods. A willet was observed disturbing nest 19A-07 by perching on the enclosure a few days before the expectant hatch date. The nest resulted in an unsuccessful hatching.

On numerous accounts there were large groupings of gulls, American oystercatchers, and terns perched along the berm of the beach, in turn flushing the parents from their nests. On July 8, 2007, adult piping plovers from nest 25A chased away a group of gulls from chicks at Talisman/Barrett beach, and on July 13, there was an adult piping plover from nest 22A defending 3 chicks from 2 American oystercatchers and several great black-back gulls. Other instances of avian predator disturbance include on July 12, 2007 when 4 American oystercatchers were observed near the adult piping plovers (nest 10B) and on July 28, 2007 when common and least terns, great black-back gulls, and American oystercatchers were observed in the overwash area east of Old Inlet and near nest 15B. In all of these recorded events, the adult piping plovers were reacting defensively to the presence of shorebirds near their nests and brood.

Of the non-avian predators, red fox (*Vulpes vulpes*), raccoons (*Procyon lotor*), and feral cat tracks were recorded inside the symbolic fencing and at times circling the enclosures. White-tailed deer (*Odocoileus virginianus*) tracks and droppings were often seen on the beach near nesting areas. A red fox was observed in the overwash area of OPWA, east of 1D-07 on June 29, 2007. Two feral cats and several raccoon tracks were observed by Law Enforcement rangers in the area east of Old Inlet. The presence of these predators in the overwash area may be accountable for the high occurrences of nest abandonment in this stretch of beach. Many studies including one on piping plover productivity on Assateague Island (Patterson *et al.* 1991) and another on plover predator exclosure techniques on Cape Cod, Massachusetts (Melvin *et al.* 1992), document predation as being a major cause for nest failure. Among some of the common predators were red foxes, and raccoons. In another study, Loegering and Fraser (1995), found conflicting and inconclusive evidence on the role of the red fox in unsuccessful plover nesting. This study showed a high density of fox tracks in areas of beach where chick survival was highest as well as where survival was lowest. Although the connection between common non-avian piping plover predators and nest abandonment is unclear, it is vital to look at trends in disturbance and failed nest attempts in future breeding seasons on Fire Island.

Another continuing trend is the observance of ghost crabs (*Ocypode quadrata*) near areas of piping plover nesting activity. A study by Wolcott and Wolcott, 1999, conducted on a beach known for high ghost crab abundance showed an indirect correlation between ghost crab presence and piping plover mortality. The study also showed that even though the ghost crabs do not usually pose a direct threat to plover chicks or eggs, the adult piping plovers still see the crabs as potential predators and exhibit displays against the crabs. While monitoring nest 4A in OPWA on June 6, 2007, biologists observed 2 adult piping plovers heavily defending 1 newly hatched chick from ghost crabs. Two un-hatched eggs remained in the scrape and were not being incubated. Ghost crab burrows were observed all around the nesting site and within the enclosure. Along with the energetic cost to the piping plovers that results from investigating crab burrows and chasing crabs away from chicks, these activities can also cause the adult plovers to lead chicks away from productive shoreline foraging areas, as well as potentially attract other more threatening plover predators to the site (Wolcott and Wolcott 1999, Loegering and Fraser 1995). Though no direct predation was observed, future monitoring efforts will closely monitor ghost crab activity and proximity to nests.

RECOMMENDATIONS

The 2007 T&E season was one of the least productive in the past several years. This section is provided to highlight specific suggestions and concerns pertaining to the Threatened and Endangered Species Recovery Plan. Pre-season activities are the most critical time period for the program. Establishing an efficient and organized pre-season protocol sets the foundation for the upcoming year. The most important of these protocols is the construction of pre-season fencing.

The essential purpose of symbolic fencing is to preserve suitable habitat, as well as, to provide safe breeding/germination grounds for all threatened and endangered species. Given that beach closures occur during March, it is suggested that pre-season fencing be erected prior to this date. However, if circumstances such as inclement weather and lack of habitat do not facilitate fencing, materials should be stowed in designated areas throughout the OPWA. These materials should consist of posts, string, flagging, and all public awareness signs. Fencing material should also be stored for any adjustments that need to be made throughout the season.

It is anticipated that the abundance of shorebird activity for the 2008 season will continue to increase and additional fencing will be essential. In conjunction with the extra fencing, increased monitoring will also be required. Incorporating volunteer assistance and increased inter-division cooperation should suffice in preparing for a possible increase in T&E species. Increased efforts will be made to better monitor colonial waterbird activity throughout the boundaries of the park.

During five instances in the 2007 field season, vehicle dune crossing routes had to be closed due to the close proximity of piping plover young; as mentioned in the USFWS recovery effort guidelines for managing recreational activities in piping plover breeding habitat. It will be beneficial to continue the effort to give prior warning to vehicle route closures allowed for less confusion and complication as in this season. It will continue to be critical that early season efforts are made to warn island residents, essential service agencies, local police, and park staff of upcoming vehicle route closures. Although proper warning was given, enforcement of closures was still an issue this season. Future enforcement measures should be considered.

Visitor & Resource Protection Rangers play a crucial role in educating and informing visitors, residents, and others about their responsibilities with regard to protection of threatened and endangered species. Because the OPWA is a secluded 7-mile stretch of beach, it is understandable that V&RP Ranger attendance may be minimal. It is suggested, that for the safety of the field biologists, that they conduct surveys in pairs. If driving should commence, it is suggested that vehicle types be reduced to only quads, and/or ATV's, permits only be approved for NPS and emergency vehicles, speed regulations be set at five miles per hour especially during chick season, and all staff be trained in identifying shorebirds. Cooperation with concessions also plays a crucial role in informing the public of regulations. It is important for visitors to know about pet regulations before coming to Fire Island National Seashore and the Ferry concessions are often times the first contact with people and their pets. Also, at Watch Hill marina the dockmasters should let boaters know about pet regulations as they check in.

All driving regulations would need to follow USFWS guidelines for essential vehicles. It is recommended that vehicular activity throughout the OPWA be incorporated into the T&E monitoring effort.

Experience over the last ten years has shown that Threatened and Endangered Species populations can increase dramatically in response to intensive protection efforts. These efforts are time-consuming, costly, and sometimes require temporary restrictions on off-road vehicles, and/or recreational activities, nevertheless they are highly effective and extremely rewarding.

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Table 1: Historic Productivity of Piping Plover species on FIIS

<u>Year</u>	<u>Breeding Pairs</u>	<u>Nest Attempts</u>	<u>Productive Pairs</u>	<u>Eggs Hatched</u>	<u>Hatchlings per Breeding Pair</u>	<u>Chicks Fledged</u>	<u>Chicks Fledged per Nest Attempt</u>	<u>Chicks Fledged per Pair</u>
1993	7	7	0	0	0	0	0	0.0
1994	3	4	0	0	0	0	0	0.0
1995	9	2	1	N/A ¹	N/A	2	1	0.2
1996	2	1	1	N/A	N/A	1	1	0.5
1997	1	1	0	0	0	0	0	0.0
1998	1	1	1	N/A	N/A	1	1	1.0
1999	3	2	2	N/A	N/A	5	2.5	1.7
2000	3	3	3	N/A	N/A	9	3	3.0
2001	4	4	4	N/A	N/A	11	2.8	2.8
2002	10	11	9	33	3.3	28	2.6	2.8
2003	20	22	15	64	3.2	35	1.6	1.8
2004	17	18	15	57	3.4	37	2.1	2.2
2005	17	20	14	54	3.2	40	2	2.4
2006	21	26	15	46	2.2	32	1.23	1.5
2007	25	35	11	45	1.8	18	0.5	0.7
Average	9.5	10.5	6.1	N/A	N/A	14.6	1.4	1.4
2006 Avg.	8.4	8.7	5.7	N/A	N/A	14.4	1.5	1.4
2005 Avg.	7.5	7.5	5	N/A	N/A	13	1.5	1.4
2004 Avg.	6.7	6.3	4.3	N/A	N/A	10.8	1.5	1.3
2003 Avg.	5.7	5.3	3.3	N/A	N/A	8.4	1.4	1.2

¹Data from previous nesting seasons are incomplete

Table 2: FIIS 2007 Overall Piping Plover species productivity

Nest #	Location	# Eggs Layed	# Chicks Hatched	# Chicks		Product
					Fledged	
1A	OPWA ¹ -east	4	0	0	0	Abandoned
1B	OPWA ¹ -east	3	0	0	0	Predated
1C	OPWA ¹ -east	1	0	0	0	Overwashed
1D	OPWA ¹ -east	4	0	0	0	Abandoned
2A	OPWA ¹ -east	4	0	0	0	Overwashed
2B	OPWA ¹ -east	4	0	0	0	Abandoned
3A	OPWA ¹ -east	4	4	2	2	FLEDGED
4A	OPWA ¹ -east	4	3	1	1	FLEDGED
5A	OPWA ¹ -west	4	0	0	0	Overwashed
5B	OPWA ¹ -west	4	0	0	0	Failed
6A	OPWA ¹ -west	4	0	0	0	Overwashed
6B	OPWA ¹ -west	4	2	1	1	FLEDGED
	Lighthouse					
7A	Beach	4	0	0	0	Abandoned
8A	OPWA ¹ -east	4	0	0	0	Abandoned
9A	OPWA ¹ -east	2	0	0	0	Predated
9B	OPWA ¹ -east	4	0	0	0	Abandoned
10A	OPWA ¹ -west	4	0	0	0	Predated
10B	OPWA ¹ -west	4	3	0	0	Predated
11A	OPWA ¹ -west	4	4	2	2	FLEDGED
12A	OPWA ¹ -west	4	0	0	0	Overwashed(3)/Predated(1)
13A	OPWA ¹ -east	4	0	0	0	Overwashed
14A	OPWA ¹ -east	3	3	1	1	FLEDGED
15A	OPWA ¹ -east	4	0	0	0	Abandoned
15B	OPWA ¹ -east	3	3	2	2	FLEDGED
16A	OPWA ¹ -west	2	0	0	0	Overwashed
16B	OPWA ¹ -west	4	4	1	1	FLEDGED
17A	OPWA ¹ -east	4	0	0	0	Abandoned
	Sailors Haven-					
18A	east	3	3	2	2	FLEDGED
19A	OPWA ¹ -east	4	2	0	0	Failed
	Sailors Haven-					
20A	west	4	3	2	2	FLEDGED
21A	OPWA ¹ -east	4	0	0	0	Abandoned
22A	OPWA ¹ -west	4	4	3	3	FLEDGED
23A	OPWA ¹ -east	4	0	0	0	Abandoned
24A	OPWA ¹ -west	4	3	0	0	Failed
	Talisman/Barrett					
25A	Beach	4	4	1	1	FLEDGED

Totals: 129 45 18

Productivity (chicks fledged per pair) = 0.72

¹Otis Pike Wilderness Area. Nest designated East/West depending on there location from Bellport Beach

Figure 2: Bar graph of brood outcome for 2007 piping plover nests

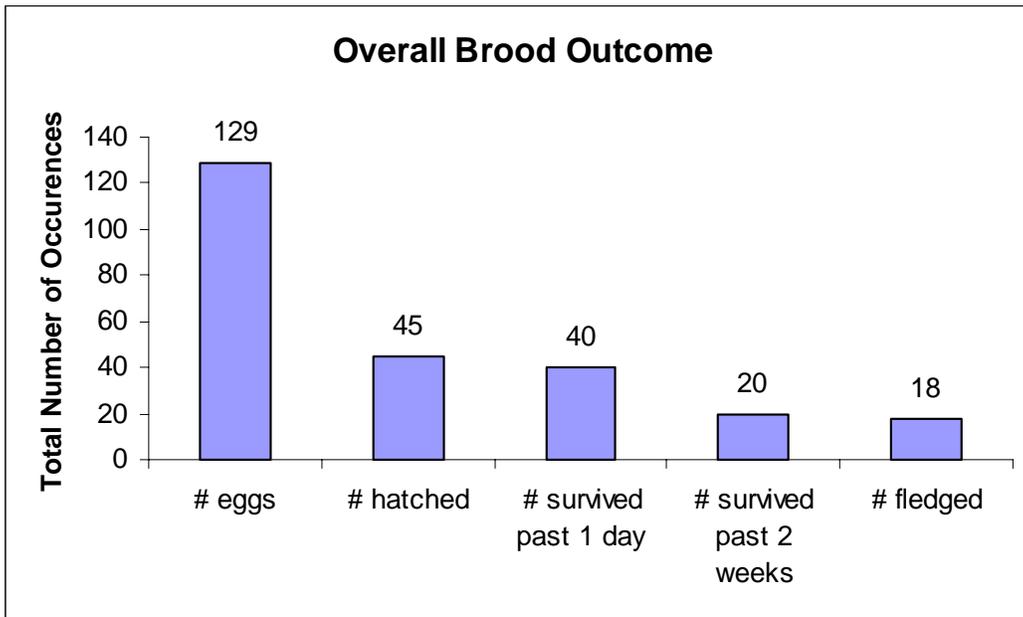


Figure 3: Pie graph displaying the outcome of all laid Piping Plover eggs

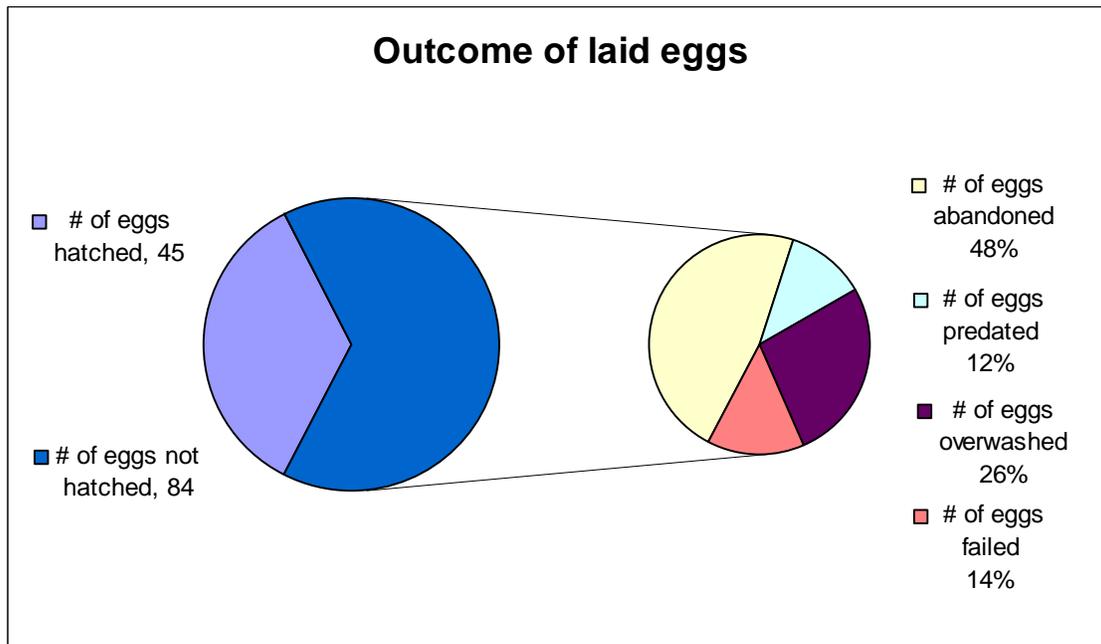


Figure 4: Chart displaying historical values for Piping Plover nests & fledglings on FIIS (2000-2007)

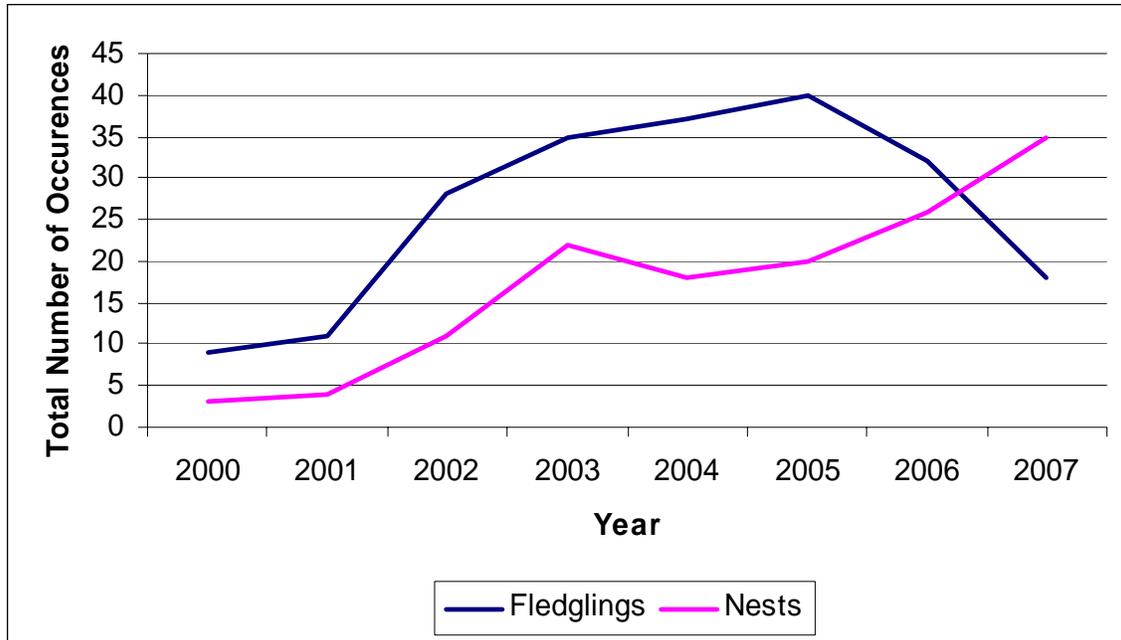
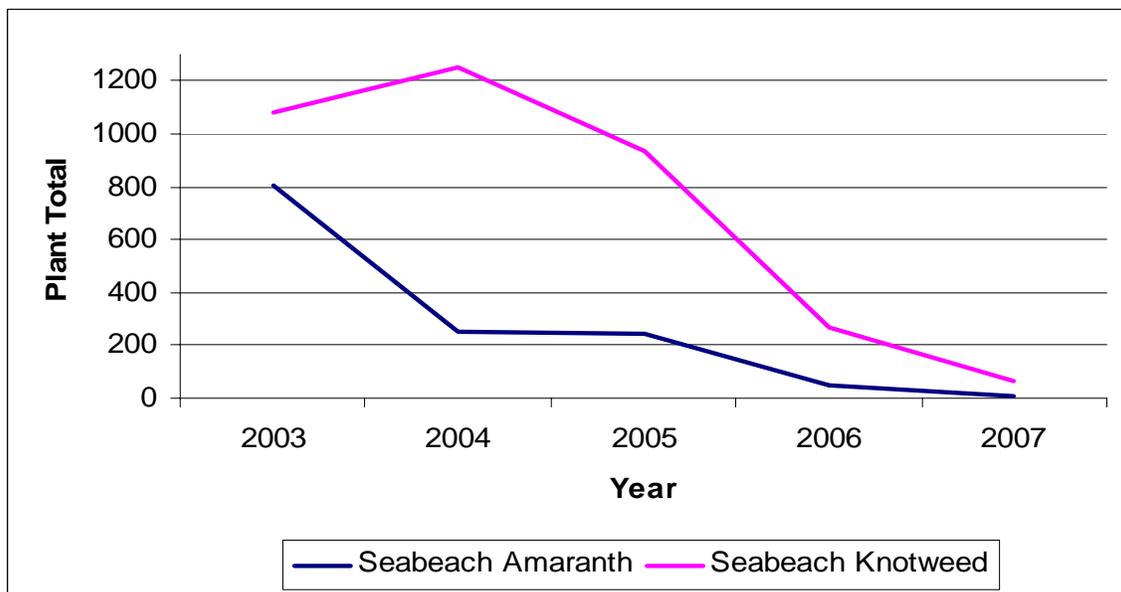


Figure 5: Chart displaying historical values for Seabeach Amaranth & Seabeach knotweed species on FIIS (2003-2007)



Map 1:

2007 Map of OPWA - East Overwash with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 2:

2007 Map of OPWA - West Overwash with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 3:

2007 Map of OPWA - Old Inlet with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 4:

2007 Map of OPWA - East Bellport Beach with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 5:

2007 Map of OPWA - West Bellport Beach with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 6:

2007 Map of OPWA - Long Cove with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 7:

2007 Map of Fire Island Watch Hill Beach with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 8:

2007 Map of Fire Island Talisman/Barrett Beach with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 9:

2007 Map of Fire Island East Sailors Haven with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 10:

2007 Map of Fire Island West Sailors Haven with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.

Map 11:

2007 Map of Fire Island Lighthouse Beach with all recorded occurrences of T&E species



2001 aerial photograph does not reflect current (2007) overwash areas or shoreline.