

# Piping Plover Nesting Results in New Jersey:2023

Prepared by

Emily Heiser and Christina Davis

New Jersey DEP Fish and Wildlife

Endangered and Nongame Species Program



*Photo by Susan Allen*

## SUMMARY OF FINDINGS:

One hundred and eighteen (118) pairs of Piping Plovers nested in New Jersey in 2023, the same population size as 2022. The 2023 population is slightly above the statewide long-term average (117 pairs) but below the state's peak population of 144 pairs in 2003. Statewide productivity in 2023 (0.53 fledglings/pair) was below the long-term average (1.02 fledglings/pair) and below the federal recovery goal (1.50 fledglings/pair). Productivity in 2023 was the second lowest recorded in the state since intensive monitoring began in 1987 (0.39 fledglings/pair in 1997).

The total number of adults recorded for the entire nesting season (248 adults) was higher than the total number of adults recorded during the date-restricted Atlantic Coast census survey conducted June 1-9 (224 adults). Likewise, the number of pairs tallied during the date-restricted census (105 pairs) increased 12% by the end of the nesting season (118 pairs). Twelve unpaired adults were recorded this season. It is possible that some of these unpaired adults nested and went undetected. Additionally, the surplus of adults in 2023 would likely have been higher had it not been for notable adult mortalities at many sites in 2023. Unpaired adults may have bred with adults that lost their original mates.

The Holgate and Little Beach units of E.B. Forsythe National Wildlife Refuge remained the stronghold of the state's population with the largest percentage of pairs (54 pairs or 46%). When combined as a region with the state's North Brigantine Natural Area, these sites comprise a large portion of New Jersey's undeveloped coastline and play a critical role in the recovery of this species in the state (55 pairs or 47%). The northern Monmouth County region maintained a fair portion of the state's population (38 pairs or 32%). The region of southern Monmouth County and central Ocean County accounted for 9% of the statewide total population (11 pairs). Southern Atlantic County and Cape May County accounted for 12% of the statewide total (14 pairs).

Looking at individual sites, slight declines and increases were noted but largely remained stagnant when compared to 2022. Although Sandy Hook increased by one pair (33 pairs in 2022, 34 in 2023), the site is well-below its peak (53 pairs in 2015) and continues a worrisome trend for the northern region of the state. A slight decline was noted at Island Beach State Park (3 pairs in 2022, 2 pairs in 2023) with pairs spread between the two Natural Areas in the Park this year. A slight increase was noted at Barnegat Light (7 pairs in 2022, 8 pairs in 2023). Little Beach saw an 83% decline in pair numbers (6 in 2022, 1 in 2023) while Holgate increased 10% (48 pairs in 2022, 53 in 2023), recording its highest pair number since intensive monitoring began in 1987. In the southern portion of the state, declines were also noted at Ocean City – North (4 pairs in 2022, 3 pairs in 2023) and Strathmere Natural Area (1 pair in 2022, 0 in 2023). Modest increases were observed at Ocean City –

Center (0 in 2022, 2 in 2023), Stone Harbor Point (2 in 2022, 3 in 2023) and Two-Mile Beach (comprised of Cape May National Wildlife Refuge and Coast Guard – Loran Support Unit) (0 in 2022, 2 in 2023).

Pairs nested at 24 sites statewide in 2023 with six sites gained and eight sites lost from 2022. The bulk of lost nesting sites (7 of 8 lost sites) occurred in Monmouth County. Notable sites gained in 2023 include Island Beach State Park – Southern Natural Area (last active in 2019) and Ocean City – Center (last active in 2011). New Jersey Fish and Wildlife (NJFW) monitored 12 active nesting sites (50% of the sites statewide), accounting for 28 nesting pairs (24% of the nesting pairs statewide). The percentage of statewide pairs at NJFW-monitored sites dropped in 2023 (31 pairs, 26% of the statewide total in 2022). Pair dispersal across these state and municipal beaches has maintained some consistency over the last six years but remains below the peak of 70 pairs in 2003. NJFW also regularly monitored 13 other potential breeding sites with historic nesting records and/or highly suitable habitat, as well as several other sites on a less frequent basis; however, none of those sites yielded nests. The majority of pairs remained on federal properties (90 pairs or 76% of the statewide total).

Statewide pair-nest success (the percentage of pairs that successfully hatch at least one nest) was considerably low this year (47%). This is well below the long-term average (69%) and is the second lowest recorded pair-nest success percentage since intensive monitoring began in the state (46% in 1997). Pair-nest success was down in every region of the state but particularly low in the northern Monmouth County (16% in 2023, 73% average 1987-2023). At NJFW-monitored sites, pair-nest success was the lowest recorded in the 36 years since monitoring began (43%). Predators, including issues with predator exclosures and associated adult mortalities, continue to strongly influence low pair-nest success.

The cause of nest failure was determined in 114 of the 137 failed nesting attempts statewide. Depredation was the leading cause of nest failure (58 or 42%) for the eleventh consecutive year. Of those depredated nests, over half (32 or 55%) were lost to mammals and the majority of those were lost to red fox (24 or 75%). The remainder of mammalian depredated nests were lost to opossum (6 or 19%) and undetermined mammalian species (2 or 6%). Avian depredation represented five nest losses in 2023 (5 or 9%) and one nest was depredated by ghost crab (1 or 2%). The remaining nests were depredated by undetermined predator species (20 or 34%). Nest abandonments were concerningly high (25 or 18%). Adult mortality is typically the cause behind nest abandonment, particularly if the nest has a predator exclosure. Over half of all exclosed nests were abandoned this year (18 or 51%). Flooding was responsible for 31 nest losses or 23% of nest failures. The remaining causes of nest failure could not be determined (23 or 17%).

The statewide fledgling rate was 0.53 fledglings/pair, the second lowest recorded since monitoring efforts began in 1987. Productivity dropped well below the range-wide threshold for population maintenance (1.245 fledglings/pair) and the range-wide productivity goal (1.50 fledglings/pair) established in the USFWS Recovery Plan for Atlantic Coast Piping Plovers. The statewide productivity rate fell below the long-term state average (1.02 fledglings/pair 1987-2023). NJFW-monitored sites recorded their lowest productivity since monitoring began (0.36 fledglings/pair).

Productivity declined at every site and region statewide. Sites struggled with low to no hatch success and nests that did hatch were unable to produce robust numbers of fledglings. Fledge rates in Northern Monmouth County declined 61% when compared to 2022 (0.74 fledglings/pair in 2022, 0.29 fledglings/pair in 2023). While low pair number and zero productivity at municipal sites such as Sea Bright and Monmouth Beach account for some of this decline, Sandy Hook suffered its lowest year of productivity (0.32 fledglings/pairs) since monitoring began. Southern Monmouth County and Ocean County saw additional declines in productivity, most notably at Barnegat Light (0.88 fledglings/pair in 2023). Outside of the federal properties, Barnegat Light produced the most fledglings per site but compared to prior years (1.29 fledglings/pair in 2022, 1.50 fledglings/pair in 2021) it underperformed. While productivity declined at Holgate (1.02 fledglings/pair in 2022, 0.79 fledglings/pair in

2023), the site produced 67% of the chicks fledged in the state. In Southern Atlantic County and Cape May County productivity was very low (0.14 fledglings/pair).

## **DISCUSSION**

The statewide Piping Plover population remained unchanged from 2022 to 2023 (118 pairs). Considering poor productivity in 2022 (0.85 fledglings/pair) and historic norms that attribute population declines to poor productivity, managers were surprised at this plateau. Pair numbers declined in nearly every region, but some individual sites saw small gains. This is mostly attributed to pairs shifting from traditional nesting areas where habitat has greatly degraded. One example is the Holgate and Little Beach Units at E.B. Forsythe National Wildlife Refuge where Little Beach continued to drop in pair numbers (93% over the last three years) and Holgate continued to increase (10% from 2022). This pattern can likely be explained by the poor habitat conditions at Little Beach and the better conditions at nearby Holgate. Declines continued in northern Monmouth County, which held a record 63 pairs or 55% of the statewide population less than a decade ago (versus 38 pairs or 33% in 2023). Marked birds from Delaware and New York were noted, particularly at Holgate and TwoMile Beach, indicating the state's ability to recruit new birds and partially explaining the static 2023 pair number, despite low 2022 productivity. However, New Jersey has long struggled to maintain consistent pair numbers and considering the poor productivity of 2023, it is unlikely that the pair number will not decline in 2024.

The last three breeding seasons have yielded poor productivity and have failed to meet both the productivity (1.50 fledglings/pair) and the population maintenance (1.245 fledglings/pair) goals established in the USFWS Recovery Plan for Piping Plover. The 38% decline in productivity between 2022 (0.85 fledglings/pair) and 2023 (0.53 fledglings/pair) is a worrisome trend for New Jersey, as 2021-2022 already represented a drop in productivity from recent years (see Figure 1). Over the period of time since monitoring and management began, the state has struggled to consistently fledge chicks and maintain robust pair numbers. Years resulting in gains have seemingly sustained a viable, but not a recovering, population. Periods in the early 2000's were similarly situated to current productivity levels and the population did not fully rebound to previous levels. For example, the period of low productivity between 2004-2008 brought population levels down below 120 pairs and only reached or exceeded 120 pairs in two of the last fourteen years. Prior to 2004, pair numbers were routinely above 120 pairs (13 of the prior 21 years). This latest period of poor productivity could have lasting impacts on New Jersey's population of Piping Plovers.

Statewide chick survival was particularly low in 2023. Of the 187 chicks that hatched, only 63 chicks (or 34%) survived to fledge, the lowest rate recorded in 15 years. Factors contributing to chick mortality remain difficult to identify as scant evidence typically remains. Exposure to the elements and depredation are believed to be the leading causes of chick mortality. Pairs from sites that have often had success in fledging chicks (due to high quality foraging and low human disturbance), such as Holgate and the Barnegat Light Restoration Area, struggled to produce high rates of fledglings in 2023. Fledglings from these sites have been documented to have higher survival and return rates than fledglings from sites where foraging quality is low and human disturbance is high (Stantial 2020). While productivity was lower at these sites than previous seasons, it was still higher than other sites in the state, leaving managers optimistic that these fledglings will return to breed.

In addition to poor productivity and low chick survival, the state saw an unprecedented number of abandonments at exclosed nests. Abandonments at exclosed nests accounted for 18 or 51% of exclosed nest failures (typical rates from 2008-2021 were 3%-16%). Managers have struggled with the use of predator exclosures over the last decade. While exclosed nests generally hatch at a higher rate than unexclosed nests in New Jersey, predators such as Peregrine Falcon, Great-Horned Owl, and red fox exploit them to hunt incubating adults. It is suspected that in some instances of abandonments both adults are taken. This appeared to be the case in at least one instance this year when four chicks were left orphaned. Managers decided to attempt a short

rehabilitation followed by a fostering event, which was unsuccessful. Prior evidence collected at the site of abandonments (game camera images and remains) have suggested that avian predators (peregrines and owls) were the greatest threat. This year NJFW utilized pigeon spikes on top of exclosures to mitigate for peregrines and owls. In 2023, game cameras on NJFW nest exclosures revealed that most of the abandonments were caused by red fox.

Research has shown that exclosures are likely limiting population growth in New Jersey (Stantial 2020) and their use should be carefully examined. Managers on federal, state, and municipal properties have made changes in their use. When looking at exclosure use from 2022 to 2023, the number of nesting attempts on which they were used was cut in half (70 in 2022, 35 in 2023). This was mostly attributed to Sandy Hook's thoughtful decision to discontinue their use for a time considering their high abandonment rate in 2022. E.B. Forsythe National Wildlife Refuge managers have ceased the use of exclosures at Little Beach and Holgate, and NJFW has greatly decreased the use of exclosures at state and municipal sites. However, unexclosed nests generally hatch at much lower rates. At NJFW-monitored sites, unexclosed nests had a 16% hatch rate whereas exclosed nests had a 53% hatch rate. This can be site-specific as Holgate, which ceased exclosure use, maintained a 66% hatch rate. Looking ahead, managers must face decisions regarding ceasing the use of exclosures and risking little to no hatch success. There is potential to modify exclosures to offset predation events but further research looking at design and effectiveness is needed. Additional research should also be considered for alternative methods of predation management to reduce reliance on exclosures, such as fladry and apex predator urine deterrents.

Over the last decade, federal lands such as Gateway National Recreation Area's Sandy Hook Unit and E.B. Forsythe National Wildlife Refuge's Holgate and Little Beach Units have maintained the majority of the state's population (76%). Holgate was one of few sites in 2023 to see an increase in pair number which is likely explained by the decline of pairs at Little Beach. Thanks to the overwash formed during Superstorm Sandy in 2012 and the refuge's ability to seasonally close the entire area to the public, Holgate has provided optimal habitat conditions and plays a critical role in recovery in New Jersey. Unfortunately, natural processes such as vegetation encroachment and dune accretion are becoming limiting factors for this site. The loss of this habitat could prove highly detrimental to New Jersey's population. Between high levels of recreation, heavily manicured beachfronts, and the generally negative public perception of completely forgoing these areas for the benefit of wildlife, state and municipal sites have a much harder time hosting and maintaining significant pair numbers. For recovery to be achieved, the population must be more evenly dispersed across the state, and managers must take more aggressive actions to address key issues, whether they be disturbance, depredation or vegetation control, to support a thriving population of Piping Plovers.

Managers in the state have attempted to mimic the prime nesting and foraging conditions at federal properties through habitat restoration efforts. The Barnegat Light Restoration Area project remains a model for restoration efforts when considering consistent years of reproductive success for established adults and recruitment of new breeding adults to the site. This year the site was plagued with persistent predator issues, mainly red foxes and was less productive than prior years. However, the chicks that did hatch were observed utilizing the alternative foraging features in 90% of all recorded observations within the Restoration Area. This was the highest percentage use since the project was completed in 2019. Challenges to keep the habitat open for nesting by limiting vegetation encroachment remain but project partners are committed to securing funding for long-term maintenance.

Limiting disturbance at all sites remains difficult, particularly on publicly recreated lands. For the first time since 2011, Piping Plovers nested in the center of Ocean City. One of two nests hatched but the chicks spent most of their time in the upper dunes (where there is less prey available) due to intense levels of recreation and made trips back and forth over ten blocks in search of better foraging opportunities. The state must strive to

identify areas similar to Barnegat Light and replicate that effort elsewhere in the state for recovery on state and municipal lands to be feasible.

## **CONCLUSION**

It was a challenging season facing insurmountable predator pressure, exclosure abandonments, low hatch success, strong weather events and some of the lowest fledgling rates recorded since 1987. It is difficult to remain hopeful that this species will rebound in New Jersey, and worrisome that the state is following similarly inexplicable declining trends that the Southern Recovery Unit (particularly Maryland, Virginia, and North Carolina) is facing. The last decade of management has been defined by a population in flux, with sharp increases and decreases that do not appear to be closely correlated with productivity rates. Managers must continue to consider the role of exclosure use and its impact on adult survival. However, they must also closely consider the tradeoff between eliminating their use and low hatch success, in turn producing low fledgling numbers. The exploration of novel management techniques when it comes to predators and exclosures should be further explored. While costly, habitat restoration should be more widely utilized, and vegetation control should be implemented at sites that are struggling to maintain open habitat for this species. Recovery appears a distant goal, but NJFW remains committed to working with partners on the state, federal, non-profit, and academic levels to overcome challenges and support projects promoting a healthy population of Piping Plovers.

## **LITERATURE CITED:**

Stantial, Michelle. *"Factors Limiting Abundance and Productivity of Piping Plovers (Charadrius melodus) in New Jersey"* Diss. State University of New York College of Environmental Science and Forestry, 2020.

U.S. Fish & Wildlife Service. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, MA. 258 pp.

## **ACKNOWLEDGEMENTS:**

New Jersey's Piping Plover Project would not be possible without the support of many biologists, technicians, and volunteers throughout the state. We specifically would like to thank: T. Pover, A. Breed, M. Heine, B. Magner, J. Heine, E. Gill, F. Jennings, E. Levari, Z. Bohm, B. Maslo, C. Crosby, L. Tedesco, L. Ferguson, S. Collins, M. Kolk, C. Albrecht, V. Rettig, V. Turner, J. Smith, R. Brown, E. Casper, C. Abramowitz, A. Kopec, D. Bell, G. Canale, M. Phillips, A. Randazzo, P. Rafferty, E. Hame, N. Buckley, Z. Basile, N. Martin, C. O'Brien, A. Smigelsky, E. Schradling, W. Walsh, R. Conover, M. Lyon, G. Garbaravage, A. Guikema, C. Boggs, S. Perry, D. Noe, E. Louriev, A. Calkins, M. Yovankin, E. Hendrickson, J. Westphal, V. Bonica, P. Manzelmann, J. Clayton, C. Welch, K. Scott, H. Hanlon, T. Dupont-Andrew, M. Mulvaney, W. McBride, S. Tirgrath, K. Clark, T. Nichols, J. Verhagen, W. Reinert, M. Shanahan, E. McGee, The Loder-VanWingerden Family, J. King, D. Rivel and the Strathmere Plover Project, the Strathmere Improvement Association, A. Previte, R. Previte, T. Bowers, R. DeRousse, P. Lang, and J. Corrigan.

**Table 1. Number of pairs of Piping Plovers at New Jersey nesting sites: 2014-2023**

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Sandy Hook NRA	47	53	51	40	38	41	40	37	33	34
<i>Coast Guard</i>	4	3	5	3	3	3	2	2	1	2
<i>North Beach</i>	14	15	14	13	11	10	11	11	10	13
<i>North Beach Recreational</i>	0	0	1	1	1	3	2	1	0	4
<i>North Gunnison</i>	8	10	8	6	6	8	8	10	7	6
<i>South Gunnison</i>	9	8	7	5	3	3	4	4	4	3
<i>D-Lot</i>	0	0	0	0	0	0	0	0	1	0
<i>E-Lot</i>	0	0	0	0	0	1 <sup>1</sup>	0	0	0	1
<i>Visitor Center</i>	0	0	1	0	0	1 <sup>1</sup>	0	0	0	0
<i>Critical Zone</i>	4	7	6	5	6	6	6	3	5	4
<i>Hidden Beach</i>	4	4	4	3	3	1	0	1	1	0
<i>B-Lot</i>	0	0	0	0	0	1 <sup>1</sup>	0	0	0	0
<i>Fee Beach</i>	4	6	4	3	3	5 <sup>1</sup>	4	3	3	0
<i>South Fee Beach</i>	0	0	1	1	2	1	3	2	1	1
Sea Bright - North	0	1	6	10	10	10	6	7 <sup>1</sup>	1	2
Monmouth Beach - North <sup>2</sup>	1	1 <sup>1</sup>	5	3	3	4 <sup>1</sup>	2	5 <sup>1</sup>	3	2
Monmouth Beach - South	0	0	0	0	1	0	0	0	0	0
Seven Presidents Park	1	1 <sup>1</sup>	1	1	0	2 <sup>1</sup>	0	0	0	0
Long Branch	0	0	0	0	0	0	0	0	1	0
Deal	0	0	0	0	0	0	0	0	1	0
<b>Region 2 subtotal</b>	<b>49</b>	<b>55</b>	<b>63</b>	<b>54</b>	<b>52</b>	<b>56</b>	<b>48</b>	<b>48</b>	<b>39</b>	<b>38</b>
Belmar – Shark River Inlet	1	0	0	0	1	1	0	0	0	0
Sea Girt – Wreck Pond	0	0	0	0	0	1 <sup>1</sup>	0	1	1	0
Sea Girt – NGTC	0	0	0	0	0	2 <sup>1</sup>	1	1	1	0
Mantoloking	0	0	0	0	0	0	0	1 <sup>1</sup>	0	0
Seaside Park	0	0	0	0	0	0	0	2 <sup>1</sup>	1	1
Island Beach SP NNA	0	0	0	0	4	4	4	2	3	1
Island Beach SP SNA	0	0	1	1	0	1 <sup>1</sup>	0	0	0	1
Barneгат Light	1	1	3	5	3	3 <sup>1</sup>	2	6	7	8
Loveladies	0	0	0	0	0	1	0	0	0	0
<b>Region 3 subtotal</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>11</b>	<b>7</b>	<b>12</b>	<b>13</b>	<b>11</b>
Long Beach Township	0	0	0	1 <sup>1</sup>	0	0	0	0	0	0
EB Forsythe NWR	26	38	37	37	31	40	39	59	54	54
<i>Holgate</i>	12	24	25	22 <sup>1</sup>	18	29 <sup>1</sup>	29	46	48	53
<i>Little Beach</i>	14	14	12	15	13	12 <sup>1</sup>	10	13 <sup>1</sup>	6	1
North Brigantine NA	3	5	5	4	2	2	2	3 <sup>1</sup>	1	1
<b>Region 4 subtotal</b>	<b>29</b>	<b>43</b>	<b>42</b>	<b>41</b>	<b>33</b>	<b>42</b>	<b>41</b>	<b>61</b>	<b>55</b>	<b>55</b>
Seaview Harbor Marina	0	1 <sup>1</sup>	0	0	0	0	0	0	0	0
Malibu WMA	1	1 <sup>1</sup>	0	0	0	0	0	1	1	1
Ocean City – North	0	0	0	0	0	0	2	3 <sup>1</sup>	4	3
Ocean City - Center	0	0	0	0	0	0	0	0	0	2
<b>Region 5 subtotal</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>6</b>
Corson's Inlet SP	0	0	0	0	0	2	2	3 <sup>1</sup>	3	3
Strathmere NA	1	0	0	0	0	0	0	1	1	0
Strathmere (Upper Twp.)	2	0	0	0	0	0	0	1	0	0
Avalon - Dunes	3 <sup>1</sup>	2 <sup>1</sup>	1	1	0	0	0	0	0	0
<b>Region 6 subtotal</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>3</b>
Stone Harbor Point	4 <sup>1</sup>	6 <sup>1</sup>	5	3	3	3	2	6	2	3
N. Wildwood - Hereford	1	1	0	0	0	0	0	0	0	0
Two Mile Beach	0	0	0	0	0	0	0	2	0	2
<i>Cape May NWR</i>	0	0	0	0	0	0	0	1	0	1
<i>Coast Guard - LSU</i>	0	0	0	0	0	0	0	1	0	1
<i>Coast Guard - TRACEN</i>	0	0	0	0	0	0	1	0	0	0
<i>Cape May Meadows</i>	1	0	0	0	0	0	0	0	0	0
<i>The Nature Conservancy</i>	0	0	0	0	0	0	0	0	0	0
<i>Cape May Point SP</i>	1	0	0	0	0	0	0	0	0	0
<b>Region 7 subtotal</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>8</b>	<b>2</b>	<b>5</b>
<b>Total Pairs</b>	<b>92</b>	<b>108</b>	<b>115</b>	<b>105</b>	<b>96</b>	<b>114</b>	<b>103</b>	<b>137</b>	<b>118</b>	<b>118</b>
<b>Pairs at NJFW sites</b>	<b>19</b>	<b>17</b>	<b>27</b>	<b>29</b>	<b>27</b>	<b>33</b>	<b>24</b>	<b>41</b>	<b>31</b>	<b>28</b>

<sup>1</sup> The same pair nested at two nearby sites. Therefore “subtotals” and “totals” are less than sum of individual sites.

<sup>2</sup> This site includes Sea Bright – South and Monmouth Beach – North

**Table 2. New Jersey Piping Plover window census results: June 1-9, 2023**

	State Census Count			Final Season Count		
	# Pairs	# Unpaired Adults <sup>1</sup>	# Total Adults	# Pairs	# Unpaired Adults <sup>1</sup>	# Total Adults
Sandy Hook Coast Guard	2	0	4	2	0	4
Sandy Hook North Beach	7	1	15	13	0	26
Sandy Hook North Beach Recreational	3	0	6	4	0	8
Sandy Hook North Gunnison	4	1	9	6	0	12
Sandy Hook Gunnison Recreational	0	0	0	0	0	0
Sandy Hook South Gunnison	3	0	6	3	0	6
Sandy Hook E-Lot	1	0	2	1	0	2
Sandy Hook Visitor Center	0	0	0	0	0	0
Sandy Hook D-Lot	0	0	0	0	0	0
Sandy Hook Critical Zone	4	0	8	4	0	8
Sandy Hook Hidden Beach	0	2	2	0	0	0
Sandy Hook B-Lot	0	0	0	0	0	0
Sandy Hook Fee Beach	0	2	2	0	0	0
Sandy Hook South Fee Beach	1	0	2	1	0	2
Sea Bright North	0	0	0	2	0	4
Monmouth Beach North <sup>1</sup>	2	0	4	2	1	5
Monmouth Beach South	0	0	0	0	0	0
Seven Presidents Park	0	0	0	0	0	0
Long Branch	0	0	0	0	0	0
Deal	0	0	0	0	0	0
<b>Region 2 subtotal</b>	<b>27</b>	<b>6</b>	<b>60</b>	<b>38</b>	<b>0</b>	<b>76</b>
Avon-by-the-Sea	0	0	0	0	0	0
Belmar - Shark River Inlet	0	0	0	0	0	0
Sea Girt - Wreck Pond	0	0	0	0	0	0
Sea Girt - NGTC	0	1	1	0	0	0
Mantoloking	0	0	0	0	0	0
Seaside Park	1	0	2	1	0	2
Island Beach SP – Northern NA	1	0	2	1	4	6
Island Beach SP – Southern NA	0	0	0	1	0	2
Barneгат Light	6	0	12	8	1	17
Loveladies	0	0	0	0	0	0
<b>Region 3 subtotal</b>	<b>8</b>	<b>1</b>	<b>17</b>	<b>11</b>	<b>5</b>	<b>27</b>
Long Beach Township	0	0	0	0	0	0
Holgate	53	2	108	53	1	107
Little Beach	1	4	6	1	4	6
North Brigantine NA	1	2	4	1	1	3
<b>Region 4 subtotal</b>	<b>55</b>	<b>8</b>	<b>118</b>	<b>55</b>	<b>6</b>	<b>116</b>
Brigantine Beach	0	0	0	0	0	0
Brigantine - Inlet (Cove)	0	0	0	0	0	0
Seaview Harbor Marina	0	0	0	0	0	0
Malibu WMA	1	0	2	1	0	3 <sup>2</sup>
Ocean City - North	3	0	6	3	0	7 <sup>2</sup>
Ocean City - Center	1	0	2	2	0	3 <sup>2</sup>
<b>Region 5 subtotal</b>	<b>6</b>	<b>0</b>	<b>11</b>	<b>6</b>	<b>0</b>	<b>12</b>
Corson's Inlet SP	3	0	6	3	1	7
Strathmere Natural Area	0	0	0	0	0	0
Strathmere (Upper Twp.)	0	0	0	0	0	0
Whale Beach	0	0	0	0	0	0
Townsend's Inlet	0	0	0	0	0	0
Sea Isle	0	0	0	0	0	0
Avalon - North	0	0	0	0	0	0
Avalon - Dunes	0	0	0	0	0	0
Stone Harbor - Oceanfront	0	0	0	0	0	0
<b>Region 6 subtotal</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>7</b>
Stone Harbor Point	3	0	6	3	0	6
N. Wildwood - Hereford Inlet	1	0	2	0	0	0
2-Mile Beach - USFWS	1	0	2	1	0	2
2-Mile Beach - LSU	1	0	2	1	0	2
Coast Guard - TRACEN	0	0	0	0	0	0
Cape May City	0	0	0	0	0	0
Cape May Meadows - TNC	0	0	0	0	0	0
Cape May Meadows - CMPSP	0	0	0	0	0	0
Cape May Point Borough	0	0	0	0	0	0
<b>Region 7 subtotal</b>	<b>7</b>	<b>0</b>	<b>14</b>	<b>5</b>	<b>0</b>	<b>10</b>
<b>Total</b>	<b>105</b>	<b>15</b>	<b>224</b>	<b>118</b>	<b>12</b>	<b>248</b>

<sup>1</sup>This site includes Sea Bright – South and Monmouth Beach – North

<sup>2</sup>Adults nested at same site with different mates during season or same adults bred at different sites; Therefore “subtotals” and “totals” may be less than the sum of individual sites.

**Table 3. New Jersey Piping Plover nesting summary by sites: 2023**

SITE	Pairs	Pairs Hatched	Chicks Fledged	Pair Success	Fledge Rate	SP Fledge Rate
Sandy Hook NRA	34	6	11	0.18	0.32	1.83
<i>Coast Guard</i>	2	0	0	0.00	0.00	0.00
<i>North Beach</i>	13	2	4	0.15	0.31	2.00
<i>North Beach Recreational</i>	4	1	2	0.25	0.50	2.00
<i>North Gunnison</i>	6	0	0	0.00	0.00	0.00
<i>South Gunnison</i>	3	2	3	0.67	1.00	1.50
<i>E-Lot</i>	1	0	0	0.00	0.00	0.00
<i>Critical Zone</i>	4	0	0	0.00	0.00	0.00
<i>South Fee Beach</i>	1	1	2	1.00	2.00	2.00
Sea Bright - North	2	0	0	0.00	0.00	0.00
Monmouth Beach – North <sup>1</sup>	2	0	0	0.00	0.00	0.00
<b>Region 2 Subtotal</b>	<b>38</b>	<b>6</b>	<b>11</b>	<b>0.16</b>	<b>0.29</b>	<b>1.83</b>
Seaside Park	1	0	0	0.00	0.00	0.00
Island Beach SP NNA	1	1	1	1.00	1.00	1.00
Island Beach SP SNA	1	0	0	0.00	0.00	0.00
Barnegat Light <sup>2</sup>	8	5	7	0.63	0.88	1.40
<b>Region 3 Subtotal</b>	<b>11</b>	<b>6</b>	<b>8</b>	<b>0.55</b>	<b>0.73</b>	<b>1.33</b>
EB Forsythe NWR	54	35	42	0.65	0.78	1.20
<i>Holgate</i>	53	35	42	0.66	0.79	1.20
<i>Little Beach</i>	1	0	0	0.00	0.00	0.00
North Brigantine NA	1	1	0	1.00	0.00	0.00
<b>Region 4 Subtotal</b>	<b>55</b>	<b>36</b>	<b>42</b>	<b>0.65</b>	<b>0.76</b>	<b>1.17</b>
Malibu Beach WMA	1	1	0	1.00	0.00	0.00
Ocean City - North	3	0	0	0.00	0.00	0.00
Ocean City - Center	2	1	0	0.50	0.00	0.00
<b>Region 5 Subtotal</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0.33</b>	<b>0.00</b>	<b>0.00</b>
Corson's Inlet SP	3	3	2	1.00	0.67	0.67
<b>Region 6 Subtotal</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1.00</b>	<b>0.67</b>	<b>0.67</b>
Stone Harbor Point	3	0	0	0.00	0.00	0.00
Two Mile Beach	2	2	0	1.00	0.00	0.00
<i>Cape May NWR</i>	1	1	0	1.00	0.00	0.00
<i>Coast Guard (LSU)</i>	1	1	0	1.00	0.00	0.00
<b>Region 7 Subtotal</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>0.40</b>	<b>0.00</b>	<b>0.00</b>
<b>NJFW sites TOTAL</b>	<b>28</b>	<b>12</b>	<b>10</b>	<b>0.43</b>	<b>0.36</b>	<b>0.83</b>
<b>All NJ sites TOTAL</b>	<b>118</b>	<b>55</b>	<b>63</b>	<b>0.47</b>	<b>0.53</b>	<b>1.15</b>
<b># Active Sites</b>	<b>24</b>					

<sup>1</sup>This site includes Sea Bright – South and Monmouth Beach – North

<sup>2</sup> This site includes Borough of Barnegat Light and Barnegat Light Restoration Area (BLRA). BLRA fledge rate was 0.50 fledglings/pair

**Pair Success** equals the percentage of pairs that hatched young (at least one chick observed).

**Fledge Rate** equals the number of chicks fledged per pair.

**Successful Pair (SP) Fledge Rate** equals the number of chicks fledged per pair that successfully hatched young.



**Table 4. New Jersey Piping Plover nesting summary: 1987-2023**

Site	Pairs	Pairs Hatch	Chicks Fledge	Pair Success	Fledge Rate	SP Fldg Rate
Sandy Hook Coast Guard	4.84	3.65	6.86	0.77	1.41	1.80
Sandy Hook North Beach	10.46	7.81	13.81	0.74	1.32	1.80
Sandy Hook North Beach Recreational	1.63	1.25	1.38	0.78	0.88	1.06
Sandy Hook North Gunnison	6.10	4.68	7.23	0.73	1.09	1.37
Sandy Hook South Gunnison	4.38	3.09	4.88	0.68	1.05	1.40
Sandy Hook - E-Lot	0.40	0.20	0.20	0.33	0.33	0.33
Sandy Hook Visitor's Center	0.25	0.13	0.00	0.25	0.00	0.00
Sandy Hook D-Lot	0.25	0.13	0.25	0.33	0.67	0.67
Sandy Hook Skeleton Hill Island	0.13	0.00	0.00	0.00	0.00	0.00
Sandy Hook Critical Zone	4.19	3.10	3.68	0.73	0.89	1.20
Sandy Hook Hidden Beach	3.00	1.96	4.00	0.59	1.17	1.65
Sandy Hook - B-Lot	0.20	0.00	0.00	0.00	0.00	0.00
Sandy Hook Fee Beach	3.96	2.77	4.27	0.65	1.05	1.38
Sandy Hook South Fee Beach	1.29	1.00	2.18	0.83	1.82	2.09
Sea Bright North	5.21	3.42	6.67	0.54	1.07	1.63
Monmouth Beach North	2.60	1.80	3.12	0.74	1.26	1.57
Monmouth Beach South	0.40	0.40	1.20	0.67	2.00	1.71
Seven Presidents Park	1.21	0.95	1.74	0.67	1.25	1.28
Long Branch	0.25	0.13	0.13	0.33	0.33	0.33
Deal	0.17	0.00	0.00	0.00	0.00	0.00
<b>Region 2 Subtotal</b>	<b>39.70</b>	<b>28.95</b>	<b>49.11</b>	<b>0.73</b>	<b>1.24</b>	<b>1.73</b>
Belmar - Shark River Inlet	0.38	0.13	0.25	0.20	0.40	0.40
Sea Girt - Wreck Pond	0.69	0.46	0.77	0.50	1.13	1.13
Sea Girt - NGTC	0.78	0.67	0.89	0.67	1.17	0.50
Mantoloking	3.44	2.83	5.56	0.63	1.10	1.25
Seaside Park	0.57	0.43	1.14	0.67	2.00	2.00
Island Beach SP - Northern Natural Area	2.10	1.78	1.78	0.73	0.59	0.59
Island Beach SP - Southern Natural Area	0.50	0.25	0.38	0.40	0.60	0.60
Island Beach SP - Dike	0.70	0.20	0.30	0.17	0.23	0.60
Barnegat Light	4.08	2.89	4.81	0.76	1.37	1.82
Highbar	0.13	0.13	0.00	0.33	0.00	0.00
Loveladies	0.57	0.57	0.93	0.80	1.30	1.30
<b>Region 3 Subtotal</b>	<b>7.41</b>	<b>5.49</b>	<b>9.22</b>	<b>0.75</b>	<b>1.31</b>	<b>1.76</b>
Long Beach Township	0.14	0.14	0.57	0.33	1.33	1.33
Holgate	18.38	12.38	19.03	0.66	1.05	1.66
Little Beach	12.30	7.08	10.83	0.58	0.88	1.45
North Brigantine N. A.	5.69	3.56	6.94	0.62	1.16	1.36
<b>Region 4 Subtotal</b>	<b>35.57</b>	<b>22.38</b>	<b>35.68</b>	<b>0.62</b>	<b>1.00</b>	<b>1.59</b>
Brigantine Beach	5.00	3.39	3.33	0.49	0.48	0.62
Brigantine - Inlet (Cove)	1.06	0.81	1.44	0.66	1.39	1.60
Longport Sodbanks	0.33	0.11	0.33	0.13	0.38	0.75
Malibu Wildlife Management Area	0.67	0.67	0.67	1.00	1.00	1.00
Seaview Harbor Marina	0.22	0.22	0.44	0.50	1.00	1.00
Ocean City - North	2.78	1.87	2.52	0.67	0.81	1.16
Ocean City - Center	3.88	2.54	1.79	0.63	0.35	0.52
<b>Region 5 Subtotal</b>	<b>7.43</b>	<b>5.08</b>	<b>5.38</b>	<b>0.68</b>	<b>0.78</b>	<b>1.00</b>
Corson's Inlet State Park	3.10	2.24	2.31	0.75	0.94	0.94
Corson's Sodbank	0.13	0.13	0.00	0.33	0.00	0.00
Strathmere NA	0.71	0.43	0.71	0.55	0.95	1.00
Strathmere	2.20	1.36	1.00	0.64	0.45	0.62
Whale Beach	4.15	2.85	3.10	0.49	0.55	0.85
Sea Isle City - North	2.39	1.50	2.72	0.56	1.11	1.65
Sea Isle City - South	1.71	1.18	0.94	0.49	0.42	0.55
Townsend's Inlet	1.30	1.10	1.30	0.73	0.86	0.97
Avalon - North	1.48	1.33	1.71	0.84	1.03	1.07
Avalon - Dunes	3.35	2.08	2.30	0.60	0.77	1.01
<b>Region 6 Subtotal</b>	<b>13.24</b>	<b>9.11</b>	<b>10.16</b>	<b>0.73</b>	<b>0.83</b>	<b>1.09</b>
Stone Harbor Point	7.00	3.08	2.52	0.46	0.34	0.67
Champagne Island	0.54	0.23	0.31	0.25	0.50	0.57
N. Wildwood - Hereford Inlet	1.33	0.86	0.57	0.47	0.29	0.31
N. Wildwood - Oceanfront	1.60	1.13	0.40	0.55	0.17	0.23
Wildwood Crest	0.13	0.13	0.00	0.33	0.00	0.00
USFWS - Cape May NWR	0.38	0.38	0.13	0.75	0.25	0.25
Coast Guard - LSU	1.18	0.68	0.50	0.48	0.33	0.43
Coast Guard - TRACEN	2.45	1.65	2.10	0.59	0.80	1.06
Cape May	0.65	0.53	0.65	0.50	0.40	0.40
Cape May Meadows	4.03	3.44	3.78	0.76	0.89	1.06
The Nature Conservancy	3.21	2.71	2.88	0.81	0.91	0.96
Cape May Point SP	1.42	1.19	1.42	0.63	0.72	0.75
Higbee/Magnesite	0.13	0.13	0.00	0.33	0.00	0.00
Cape May Ferry	0.22	0.00	0.00	0.00	0.00	0.00
<b>Region 7 Subtotal</b>	<b>13.49</b>	<b>8.86</b>	<b>8.59</b>	<b>0.62</b>	<b>0.57</b>	<b>0.82</b>
<b>Total NJDFW only</b>	<b>48.78</b>	<b>32.57</b>	<b>43.95</b>	<b>0.67</b>	<b>0.94</b>	<b>1.37</b>
<b>Total State</b>	<b>116.70</b>	<b>79.86</b>	<b>118.14</b>	<b>0.69</b>	<b>1.02</b>	<b>1.47</b>

**Figure 1. New Jersey Piping Plover population and productivity: 1987-2023**

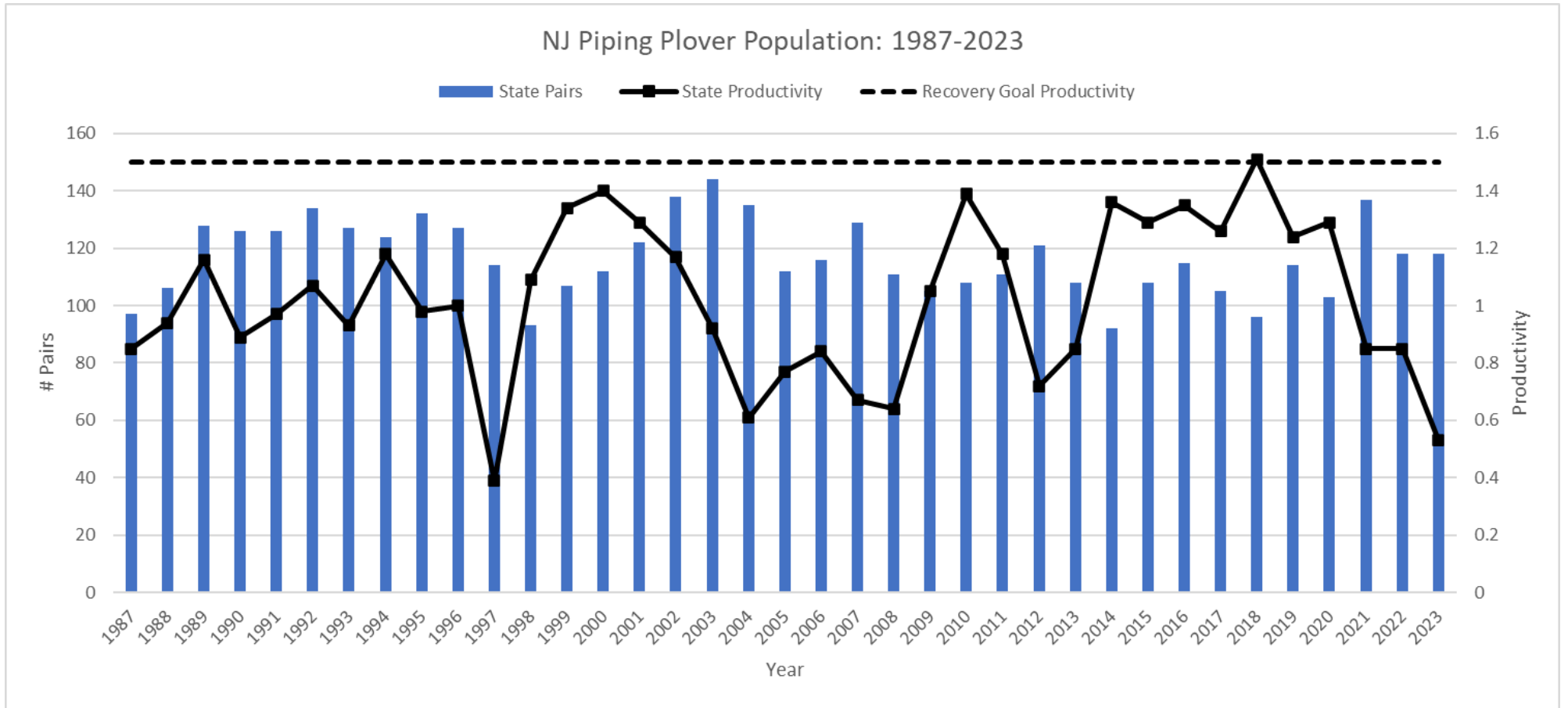


Figure 2. Causes of Piping Plover nest failure in New Jersey, all sites: 2023

