

Piping Plover Nesting Results in New Jersey:2019

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Photo Courtesy of Jesse Amesbury

SUMMARY OF FINDINGS:

One hundred fourteen pairs of piping plovers nested in New Jersey in 2019, a 19% increase compared to 2018 (96 pairs, the third lowest since federal listing in 1986). The 2019 population is slightly below the long-term average (117 pairs) and well below the peak of 144 pairs in 2003. State-wide productivity (1.24 fledglings/pair) remained above the long-term average (1.03 fledglings/pair) for the sixth consecutive season but falls short of the federal recovery goal (1.50 fledglings/pair) and below last season's record high productivity (1.51 fledglings/pair).

The total number of adults recorded for the entire nesting season (239) was moderately higher than the number of adults recorded during the date-restricted Atlantic Coast census survey conducted June 1-9 (231). The final number of pairs for the season (114) was only a slight increase to the pair number tallied during the date-restricted census (110). Additionally, an unusually high number of unpaired adults were recorded this season (10) compared to 2018 (three).

The northern Monmouth County region remained the stronghold of the state's population with the largest percentage of pairs (56 pairs or 49% of the statewide total). Sandy Hook maintained the highest number of pairs per site (41) in the state and showed a small increase in pair number for the first time in three years. Sea Bright maintained the highest number of pairs per municipal beach in the state (10) for the fourth year in a row. The region consisting of southern Monmouth County and central Ocean County accounted for 10% of the statewide total (11 pairs) and saw the revival of three historic nesting sites. The Holgate and Little Beach units of E.B. Forsythe National Wildlife Refuge, combined with the state's North Brigantine Natural Area, maintained a significant portion of the statewide total (42 pairs or 37%). Cape May County, the regions consisting of Ocean City to Cape May, saw a small increase this season (five pairs in 2019, three pairs in 2018) but is still well below its peak of 43 pairs in 2002. Pair numbers increased in nearly every region in the state in 2019.

Looking at individual sites, the most significant shift in 2019 occurred at the Holgate Unit of E.B. Forsythe NWR. Pair number increased 61% compared to 2018 (29 in 2019, 18 in 2018) and was the highest recorded pair number at Holgate since federal listing in 1986. Slight gains and losses were made elsewhere in the state and several historic nesting sites were revived. Notable nesting sites include Seven President's Park (last active in 2017), Sea Girt – Wreck Pond (last active in 2012), Sea Girt – National Guard Training Center (last active in 2007), Loveladies (last active in 1996), and Corson's Inlet State Park (last active in 2009).

Pairs nested at 27 sites statewide in 2019 with nine sites gained and one site lost. Up significantly from just 19 sites in 2018, it also reverses a decade-long trend of hovering in the mid-to-low 20's. New Jersey Division of Fish and Wildlife (NJDFW) monitored 13 of the active nesting sites (48% of the sites statewide). NJDFW-monitored sites accounted for 33 nesting pairs (29% of the nesting pairs statewide). This is up slightly from 27 pairs in 2018 but is well-below the peak of 70 pairs monitored by NJDFW in 2003. Although pair numbers at state and municipal beaches appear to be on the rise, the majority (71%) of the state's population remains on federal property.

Pair-nest success (the percentage of pairs that successfully hatch at least one nest) across the state was high this year (83%) but did drop considerably from 2018 (91%) which was the highest recorded since federal listing. Statewide pair-nest success also remained above the long-term average (69%). At NJDFW-monitored sites, pair-nest success (73%) was also down from 2018 (96%) but remained above the long-term average (66%).

The cause of nest failure was determined in 53 of the 65 failed nest attempts statewide (82%). Depredation remains the leading cause of nest failure (29 or 45%) in the state for the seventh consecutive year. Of the depredated nests, more than half (17 or 58%) were lost to mammals and the majority of those (13 or 76%) were lost to red fox. The remainder of mammalian depredated nests were lost to opossum (one or 6%), American mink (two or 12%) and raccoon (one or 6%). Avian depredation by crow and gull was found to be the cause of four nest losses (14%). The remaining depredated nests were lost to ghost crab (two or 7%) or unknown predator species (six or 21%). Flooding (11 or 17%) and nest abandonment (10 or 15%) contributed to about equal nest loss statewide. Nest abandonment was markedly higher this season than in previous years and is typically attributed to an adult mortality at a nest enclosure. Nest loss due to eggs being blown over contributed to three failures (5%). The cause of nest failure could not be determined in 12 (18%) nest losses. Identifying factors contributing to chick mortality remains difficult as chicks are precocial and scant evidence is typically left behind.

The statewide fledgling rate, which includes data collected and provided by all state cooperators, was 1.24 fledglings/pair. Compared to 2018 (1.51 fledglings/pair), productivity dropped significantly and was below the productivity recovery goal (1.50 fledglings/pair) established by the USFWS Recovery Plan for Atlantic Coast Piping Plovers. Additionally, 2019 productivity was the lowest recorded in the last six years. Looking at long-term trends, statewide productivity was much higher in 2019 than in previous seasons and remains well above the long-term average since listing (1.03 fledglings/pair). Statewide productivity fell in line with the 1.245 fledglings/pair range-wide threshold for population maintenance also established in the Recovery Plan. NJDFW-monitored sites fell well below 2018 (1.59 fledglings/pair) with a productivity of 1.09 fledglings/pair but remains above the long-term average (0.94 fledglings/pair).

Productivity varied considerably by individual site and region. Monmouth County produced 1.23 fledglings/pair and contributed to 49% of the total chicks fledged this season. Sandy Hook's productivity decreased this season (1.29 fledglings/pair in 2019 versus 1.55 fledglings/pair in 2018) as was similar in almost all the Monmouth County sites this season. Sea Bright continues to maintain the highest number of pairs per municipal beach (10 pairs) but struggled to meet the site's prior high productivity levels (1.30 fledglings/pair in 2019 versus 1.86 fledglings/pair in 2018 and 2.60 fledglings/pair in 2017). Ocean County municipal and state properties (Island Beach State Park, Barnegat Light, and Loveladies) had the highest productivity statewide this season with 1.63 fledglings/pair. The Holgate, Little Beach, and North Brigantine Natural Area region fell slightly in productivity this season (1.29 fledglings/pair versus 1.42 fledglings/pair in 2018) but had a significant 27% increase in pair numbers (42 pairs in 2019 versus 33 pairs in 2018) attributed almost exclusively to increases at Holgate. Cape May County observed a small decrease in productivity (0.60 in 2019 versus 0.67 in 2018) but did revive a historic nesting site that had not been active since 2009. Pair numbers

continue to be depressed in the southern portion of the state and productivity was again well below the long-term statewide average of 1.03 fledglings/pair.

DISCUSSION and CONCLUSION:

New Jersey's statewide piping plover breeding population saw a dramatic 19% increase in pair number in 2019 (114 pairs) compared to 2018 (92 pairs). Historic norms have attributed population increases to high productivity and this is likely no exception as 2018 was a record year for productivity. However, statewide productivity was also relatively high for five years prior to that but pair numbers continued to plateau or decrease. While it is encouraging that pair numbers increased in 2019, the unexplained declines are still cause for concern. Additionally, even with relatively high productivity, the statewide pair number has remained well below the peak of 144 pairs in 2003. Identifying and addressing factors contributing to habitat suitability and pair recruitment must be forefront for New Jersey to move towards recovery.

The state recorded its sixth consecutive year of moderate to high productivity at 1.24 fledglings/pair. This is a 21% decrease from 2018's productivity but remains well-above the statewide average of 1.03 fledglings/ pair. When compared to historic productivity numbers (0.64 in 2008, 0.67 in 2007, 0.84 in 2006, 0.77 in 2005, 0.61 in 2004), productivity has remained high over the last several years. This, however, is likely the byproduct of lower recruitment to the area and the concentration of pairs to federally protected lands.

Gateway National Recreation Area's Sandy Hook Unit and E.B. Forsythe National Wildlife Refuge's Holgate and Little Beach Units maintain 71% of the statewide population. The importance of these federal lands in New Jersey is paramount. They provide the state's premiere nesting and foraging habitats and recreational use can be better managed than elsewhere in New Jersey. However, recovery can only be achieved when pairs are equally distributed throughout the state because federal sites at full capacity are still not enough to create a stable population. Suitable habitat *does* exist outside of federal lands throughout the state. These sites are much more susceptible to human disturbance, stabilization efforts, and beach grooming. Through beach management plans, portions of municipal and state beaches are being managed to mimic natural conditions as much as possible, encouraging current pairs to remain fidelic to them and laying the groundwork for future colonization.

A mark-recapture study of banded plovers in New Jersey has allowed researchers to track individuals that are recolonizing historic breeding sites in the state and have highlighted the importance of federal lands as a springboard for dispersal from natal sites. Sites such as Sea Bright, National Guard Training Center, Wreck Pond, Island Beach State Park, and Corson's Inlet State Park have benefited from successes on federal lands tracked through marked individuals. The federal sites are not only carrying the majority of the state's pairs, they are also playing a critical role in pair increases observed elsewhere in the state. It is through this dispersal that a more even distribution of the state's population, and thus increases to pair numbers, will be achieved.

The 2019 breeding season showed an alarming 67% increase in abandonments and many of those were attributed to an adult mortality at a nest enclosure. Predator enclosures have been an important and effective tool in the recovery of piping plovers across all populations in the United States and Canada, providing a refuge for a nest from ground and avian predators. From 2008-2012, New Jersey enclosed approximately 70% of all nest attempts. In 2013, the depredated remains of at least one marked adult were found on a nest enclosure. Raptors and other avian predators (such as owls and crows) and even keen mammals (such as red fox) are quick to key into enclosures as an easy and reliable food source. NJDFW-monitored sites, along with E.B. Forsythe NWR, have been reducing enclosure use over the last several years while increasing focused predation management. However, sites that had not experienced issues with adult mortalities continued their use. Unfortunately, it is impossible to predict when an issue may arise, and such was the case in 2019 with several Monmouth County sites plagued by persistent red fox. At least one adult was confirmed killed at an enclosure this year and it is suspected that an additional three adults were killed or left the breeding site. The decision to

use exclosures to increase a nest hatch success versus the potential loss of a breeding adult continues to plague species managers throughout the state and is perhaps, the most difficult decision that is made on a regular basis.

Strong partnerships on the state, federal, non-profit and university levels continue to lead to effective and efficient species management throughout the state. Sustained productivity over the last six years is partly attributed to species managers working together and thinking outside the box in the protection of this species. Many uncertainties remain in the recovery of piping plovers in New Jersey including whether the increase in pair number will be sustainable over time. While it is encouraging to see a small distribution shift to a few sites, species managers remain cautious as the impact of many other factors such as sea-level rise, habitat loss, human alteration of the coastline, and human subsidized predators continue to accelerate. Addressing these issues in a dynamic coastal system while managing habitat suitability and increasing pair recruitment will continue to challenge species managers. Despite these challenges, NJDFW is confident that a sustainable population may be achieved through a strong foundation of partnerships on which research, management, and monitoring needs are met.

LITERATURE CITED:

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

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Table 1. Number of pairs of piping plovers at New Jersey nesting sites: 2009-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Sandy Hook NRA	45	49	50	43	47	53	51	40	38	41
<i>Coast Guard</i>	5	4	4	3	4	3	5	3	3	3
<i>North Beach</i>	13	14	14	13	14	15	14	13	11	10
<i>North Beach Recreational</i>	0	0	0	0	0	0	1	1	1	3
<i>North Gunnison</i>	9	9	13	8	8	10	8	6	6	8
<i>South Gunnison</i>	5	4	5	7	9	8	7	5	3	3
<i>E-Lot</i>	0	0	0	0	0	0	0	0	0	1 ¹
<i>Visitor Center</i>	0	0	0	0	0	0	1	0	0	1 ¹
<i>D-Lot</i>	0	1	0	0	0	0	0	0	0	0
<i>Skeleton Hill Island</i>	0	1	0	0	0	0	0	0	0	0
<i>Critical Zone</i>	6	5	6	5	4	7	6	5	6	6
<i>Hidden Beach</i>	3	5	4	3	4	4	4	3	3	1
<i>B-Lot</i>	0	0	0	0	0	0	0	0	0	1 ¹
<i>Fee Beach</i>	3	5	3	4	4	6	4	3	3	5 ¹
<i>South Fee Beach</i>	1	1	1	0	0	0	1	1	2	1
Sea Bright - North	3	2	2	0	0	1	6	10	10	10
Monmouth Beach - North ²	2	0	0	2	1	1 ¹	5	3	3	4 ¹
Monmouth Beach - South	0	0	0	0	0	0	0	0	1	0
Seven Presidents Park	2	2	0	0	1	1 ¹	1	1	0	2 ¹
Region 2 subtotal	52	53	52	45	49	55	63	54	52	56
Belmar – Shark River Inlet	0	0	0	0	1	0	0	0	1	1
Sea Girt - Wreck Pond	0	0	1	0	0	0	0	0	0	1 ¹
Sea Girt – NGTC	0	0	0	0	0	0	0	0	0	2 ¹
Island Beach SP SNA	0	0	0	0	0	0	1	1	0	1 ¹
Island Beach SP NNA	0	0	0	0	0	0	0	0	4	4
Barnegat Light	3	3	1	2	1	1	3	5	3	3 ¹
Loveladies	0	0	0	0	0	0	0	0	0	1
Region 3 subtotal	3	3	2	2	2	1	4	6	8	11
Long Beach Township	0	0	0	0	0	0	0	1 ¹	0	0
EB Forsythe NWR	23	23	32	35	26	38	37	37	31	40
<i>Holgate</i>	10	6	14	12	12	24	25	22 ¹	18	29 ¹
<i>Little Beach</i>	13	17	18	23	14	14	12	15	13	12 ¹
North Brigantine NA	3	5	8	6	3	5	5	4	2	2
Region 4 subtotal	26	28	40	41	29	43	42	41	33	42
Seaview Harbor Marina	0	1	1	1	0	1 ¹	0	0	0	0
Malibu WMA	0	0	0	0	1	1 ¹	0	0	0	0
Ocean City - Center	0	1	0	0	0	0	0	0	0	0
Region 5 subtotal	0	2	1	1	1	1	0	0	0	0
Corson's Inlet SP	0	0	0	0	0	0	0	0	0	2
Strathmere NA	1	1	1	2 ¹	1	0	0	0	0	0
Strathmere (Upper Twp.)	1	2	2	4 ¹	2	0	0	0	0	0
Avalon - Dunes	5	5	5	3	3 ¹	2 ¹	1	1	0	0
Region 6 subtotal	7	8	8	8	6	2	1	1	0	2
Stone Harbor Point	9	10	9	6	4 ¹	6 ¹	5	3	3	3
N. Wildwood - Hereford	2	1	1	1	1	1	0	0	0	0
Two-Mile Beach	1	0	0	0	0	0	0	0	0	0
<i>Coast Guard - LSU</i>	1	0	0	0	0	0	0	0	0	0
Coast Guard - TRACEN	0	0	2	1 ¹	0	0	0	0	0	0
Cape May City	0	0	0	1 ¹	0	0	0	0	0	0
Cape May Meadows	8	6	6	3	1	0	0	0	0	0
<i>The Nature Conservancy</i>	5	4	3	1	0	0	0	0	0	0
<i>Cape May Point SP</i>	3	2	3	2	1	0	0	0	0	0
Region 7 subtotal	20	17	18	11	6	6	5	3	3	3
Total Pairs	108	111	121	108	92	108	115	105	96	114
Pairs at NJDFW sites	34	35	36	29	19	17	27	29	27	33

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

² This site includes Sea Bright – South and Monmouth Beach – North

Table 2. New Jersey piping plover window census results: June 1-9 2019

	State Census Count			Final Season Count		
	# Pairs	# Unpaired Adults	# Total Adults	# Pairs	# Unpaired Adults	# Total Adults
Sandy Hook Coast Guard	3	0	6	3	0	6
Sandy Hook North Beach	10	0	20	10	0	20
Sandy Hook North Beach Recreational	3	0	6	3	0	6
Sandy Hook North Gunnison	8	0	16	8	0	16
Sandy Hook South Gunnison	3	0	6	3	0	6
Sandy Hook E-Lot	1	0	2	1 ¹	0	2
Sandy Hook Visitor Center	0	0	0	1 ¹	0	2
Sandy Hook Critical Zone	6	0	12	6	0	12
Sandy Hook Hidden Beach	1	0	2	1	0	2
Sandy Hook B-Lot	0	0	0	1 ¹	0	2
Sandy Hook Fee Beach	5	0	10	5 ¹	0	10
Sandy Hook South Fee Beach	1	1	3	1	0	2
Sea Bright North	10	1	21	10	1	21
Monmouth Beach North ²	4	0	8	4 ¹	0	9
Monmouth Beach South	0	0	0	0	0	0
Seven Presidents Park	1	0	2	2 ¹	0	4
Long Branch	0	0	0	0	0	0
Region 2 subtotal	56	2	114	56	1	114
Belmar - Shark River Inlet	0	1	1	1	0	2
Sea Girt - Wreck Pond	1	0	2	1 ¹	0	2
Sea Girt - NGTC	1	0	2	2 ¹	0	4
Island Beach SP – Northern NA	4	1	9	4	1	9
Island Beach SP – Southern NA	0	0	0	1 ¹	1	3
Barneгат Light	3	0	6	3 ¹	1	7
Loveladies	1	0	2	1	0	2
Region 3 subtotal	10	2	22	11	3	25
Long Beach Township	0	0	0	0	0	0
Holgate	27	2	56	29 ¹	1	59
Little Beach	11	0	22	12 ¹	0	24
North Brigantine NA	2	0	4	2	0	4
Region 4 subtotal	40	2	82	42	1	85
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	0	1	1	0	1	1
Ocean City - North	0	0	0	0	0	0
Ocean City - Center	0	0	0	0	0	0
Region 5 subtotal	0	1	1	0	1	1
Corson's Inlet SP	2	0	4	2	0	4
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
Region 6 subtotal	2	0	4	2	0	4
Stone Harbor Point	3	1	7	3	1	7
N. Wildwood - Hereford Inlet	0	0	0	0	0	0
2-Mile Beach - USFWS	0	0	0	0	0	0
2-Mile Beach - LSU	0	3	3	0	3	3
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
Region 7 subtotal	3	4	10	3	4	10
Total	111	11	233	114	10	238

¹ The same pair nested at two nearby sites. Therefore "subtotals" and "totals" are less than sum of individual sites.

² This site includes Sea Bright – South and Monmouth Beach – North

Table 3. New Jersey piping plover nesting summary by sites: 2019

SITE	2019					
	Pairs	Pairs Hatched	Chicks Fledged	Pair Success	Fledge Rate	SP Fledge Rate
Sandy Hook NRA	41	40	53	0.98	1.29	1.33
<i>Coast Guard</i>	3	3	3	1.00	1.00	1.00
<i>North Beach</i>	10	10	12	1.00	1.20	1.20
<i>North Beach Recreational</i>	3	3	3	1.00	1.00	1.00
<i>North Gunnison</i>	8	8	13	1.00	1.63	1.63
<i>South Gunnison</i>	3	3	5	1.00	1.67	1.67
<i>E-Lot</i>	1 ¹	1	1	1.00	1.00	1.00
<i>Visitor's Center</i>	1 ¹	0	0	0.00	0.00	0.00
<i>Critical Zone</i>	6	6	7	1.00	1.17	1.17
<i>Hidden Beach</i>	1	0	0	0.00	0.00	0.00
<i>B-Lot</i>	1 ¹	0	0	0.00	0.00	0.00
<i>Fee Beach</i>	5 ¹	5	6	1.00	1.20	1.20
<i>South Fee Beach</i>	1	1	3	1.00	3.00	3.00
Sea Bright - North	10	7	13	0.70	1.30	1.86
Monmouth Beach – North ²	4 ¹	1	2	0.25	0.50	2.00
7 Presidents Oceanfront Park	2 ¹	2	1	1.00	0.50	0.50
Region 2 Subtotal	56	50	69	0.89	1.23	1.38
Belmar - Shark River Inlet	1	0	0	0.00	0.00	0.00
Sea Girt – Wreck Pond	1 ¹	0	0	0.00	0.00	0.00
Sea Girt - NGTC	2 ¹	2	2	1.00	1.00	1.00
Island Beach SP NNA	4	4	6	1.00	1.50	1.50
Island Beach SP SNA	1 ¹	0	0	0.00	0.00	0.00
Barneгат Light	3 ¹	2	5	0.67	1.67	2.50
Loveladies	1	1	2	1.00	2.00	2.00
Region 3 Subtotal	11	9	15	0.82	1.37	1.67
EB Forsythe NWR	40	31	52	0.78	1.30	1.68
<i>Holgate</i>	29 ¹	21	38	0.72	1.31	1.81
<i>Little Beach</i>	12 ¹	10	14	0.83	1.17	1.40
North Brigantine NA	2	2	2	1.00	1.00	1.00
Region 4 Subtotal	42	33	54	0.79	1.29	1.64
Corson's Inlet SP	2	2	1	1.00	0.50	0.50
Region 6 Subtotal	2	2	1	1.00	0.50	0.50
Stone Harbor Point	3	1	2	0.33	0.67	2.00
Region 7 Subtotal	3	1	2	0.33	0.67	2.00
NJDFW sites TOTAL	33	24	36	0.73	1.09	1.50
All NJ sites TOTAL	114	95	141	0.83	1.24	1.48
# Active Sites	27					

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

² This site includes Sea Bright – South and Monmouth Beach – North

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.

Figure 1. New Jersey piping plover population and productivity: 1987-2019

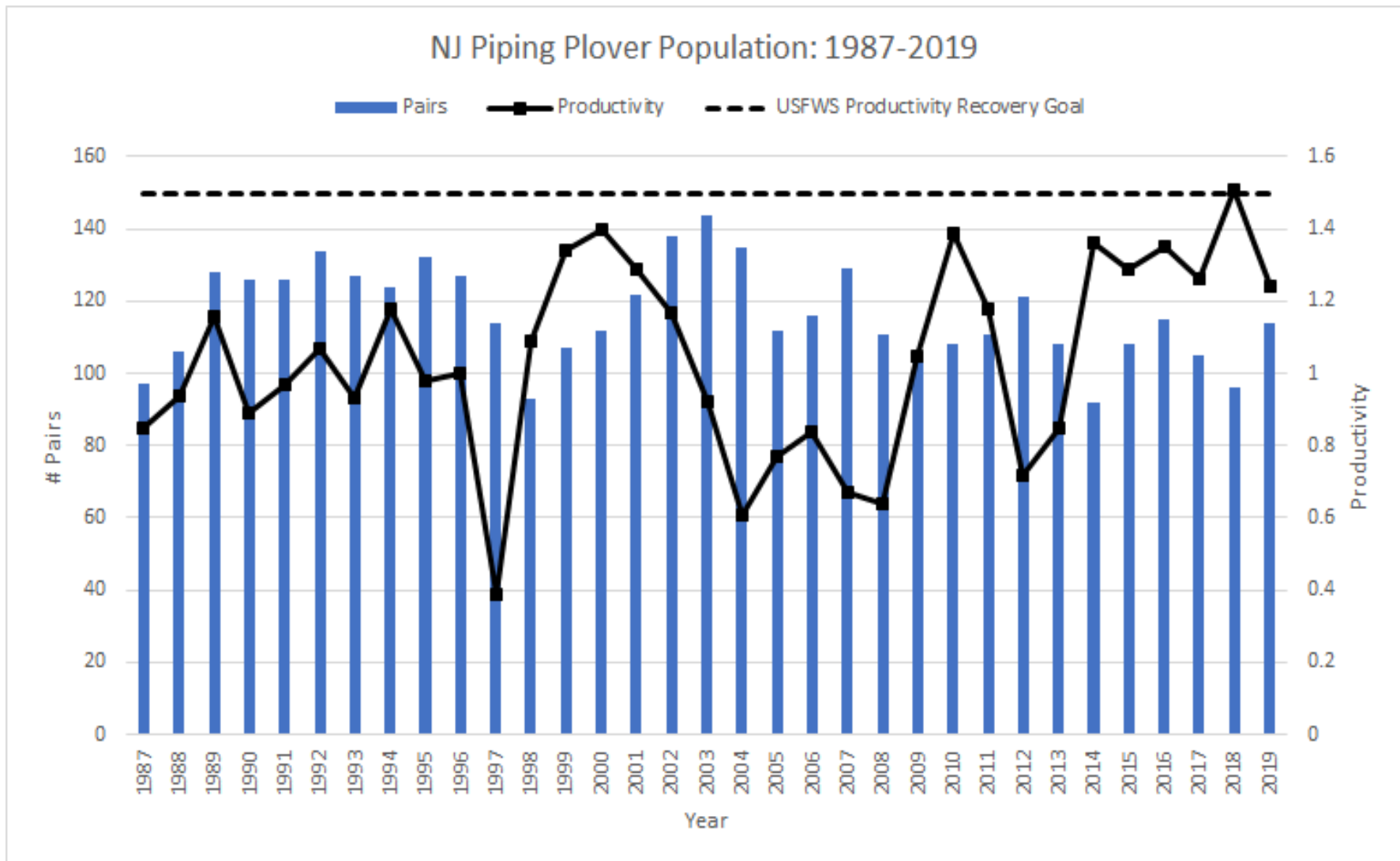


Figure 2. Causes of piping plover nest failure in New Jersey: 2019

