

# SUMMARY OF THE 2016 MASSACHUSETTS PIPING PLOVER CENSUS

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MASSWILDLIFE

**ABSTRACT**

This report summarizes data on abundance, distribution, and reproductive success of Piping Plovers (*Charadrius melodus*) in Massachusetts during the 2016 breeding season. Observers reported breeding pairs of Piping Plovers present at 144 sites; 169 additional sites were surveyed at least once, but no breeding pairs were detected at them. The population decreased 6.6% relative to 2015. The ***Index Count*** (statewide census conducted 1-9 June) was **622 pairs**, and the ***Adjusted Total Count*** (estimated total number of breeding pairs statewide for the entire 2016 breeding season) was **641.5 pairs**. A total of 912 chicks were reported fledged in 2016, for an overall productivity of **1.46 fledglings per pair**, based on data from 97.5% of pairs.

Prepared by: Natural Heritage & Endangered Species Program  
Massachusetts Division of Fisheries & Wildlife

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## INTRODUCTION

Piping Plovers are small, sand-colored shorebirds that nest on sandy beaches and dunes along the Atlantic Coast from North Carolina to Newfoundland. The U.S. Atlantic Coast population of Piping Plovers has been federally listed as *Threatened*, pursuant to the U.S. Endangered Species Act, since 1986. The species is also listed as *Threatened* by the Massachusetts Division of Fisheries and Wildlife pursuant to Massachusetts' Endangered Species Act.

Population monitoring is an integral part of recovery efforts for Atlantic Coast Piping Plovers (U.S. Fish and Wildlife Service 1996, Hecht and Melvin 2009a, b). It allows wildlife managers to identify limiting factors, assess effects of management actions and regulatory protection, and track progress toward recovery. In this report, we summarize data on abundance, distribution, and reproductive success of Piping Plovers breeding in Massachusetts in 2016, as observed and reported by a coast-wide network of cooperators.

## METHODS

Monitoring and management of Piping Plovers and other coastal waterbirds in Massachusetts is carried out by wildlife biologists, seasonal shorebird monitors, beach managers, researchers, and volunteers affiliated with over 30 federal and state agencies, local municipalities, local and regional land trusts, private conservation organizations, and universities. Cooperators monitored 318 sites in Massachusetts in 2016 for the presence of breeding Piping Plovers.

### Abundance

We measure abundance of Piping Plovers in terms of breeding pairs, defined as pairs observed with either a nest or unfledged chicks or that exhibited site tenacity and evidence of pair bonding and territoriality for at least two weeks. We report three different measures of abundance: the *Index Count*, *Unadjusted Total Count*, and *Adjusted Total Count*. The *Index Count*, as reported since 1990, is the total number of pairs tallied statewide each year during a 9-day count period in late May and early June, standardized each year for the entire Atlantic Coast. In 2016, the *Index Count* period was 1-9 June. The objective of the *Index Count* is to estimate population size with minimal double-counting of pairs that may move between or within sites, thereby providing an index to population trends that is likely to be more precise than counts based on observations made over the entire breeding season. The *Index Count* likely minimizes double-counting because it occurs over such a short time period. However, it probably underestimates the actual number of breeding pairs because it does not include pairs that leave the state before, arrive after, or are present but simply go undetected during the 9-day *Index Count* period.

For sites for which “0” is reported for the *Index Count* but “nd” is reported for the *Total Count*, this indicates that the site was surveyed during the *Index Count* period (1-9 June) and no breeding pairs were detected, but during the rest of the breeding season, it was either not surveyed or was surveyed too infrequently during May and June to confidently conclude that no pairs were present for at least 2 weeks.

Since 2000, we have reported two different “Total Counts”. The *Unadjusted Total Count* is simply a tally of the total number of pairs reported for all sites over the course of the entire nesting season, with limited effort made to adjust for any pairs that may have been double-counted if they nested unsuccessfully at one location and then re-nested at another. We then derive an *Adjusted Total Count* by calculating the average of the *Index Count* and the *Unadjusted Total Count*, rounded to the nearest whole number of pairs.

The *Unadjusted Total Count* likely overestimates the actual population by double-counting pairs that establish nesting territories at more than one location in a given year. Without color-banded birds, however, it is impossible to accurately determine whether late-nesting pairs may have nested earlier at a different site, or simply did not arrive or begin breeding activities until June. It is too subjective, and likely inaccurate, to try to adjust the *Total Count* of pairs each year by not tallying late-nesting pairs (*i.e.*, pairs reported as “new” pairs that nested after the first week in

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June), based on the assumption that these birds were probably already counted earlier in the season. We believe that the *Adjusted Total Count* is the most accurate estimate of the actual number of breeding pairs in Massachusetts because it falls midway between the *Index Count* and *Unadjusted Total Count*, which we suspect slightly underestimate and overestimate, respectively, the actual breeding population.

### Reproductive success

The primary measure of reproductive success that we report is *Productivity*, measured as number of chicks fledged per pair. The denominator of this ratio is the number of breeding pairs for which fledging data were reported; this includes not only pairs that successfully fledged chicks, but also pairs that cooperators believed did not nest, pairs that nested unsuccessfully (eggs did not survive to hatch), and pairs whose chicks failed to fledge. Since 2000, we have reported two different estimates of *Number of pairs with fledge data*. As with counts of breeding pairs, estimates of the number of pairs for which fledging data are reported will be biased if double-counting of pairs occurs. Double-counting will overestimate the number of pairs in the denominator of the productivity ratio, and thereby will underestimate actual productivity. To reduce the potential bias associated with double-counting, we multiply the *Unadjusted number of pairs with fledge data* (a tally of the total number of pairs with fledge data reported for all sites, with limited effort made to adjust for pairs that may have been double-counted) by the ratio of the *Adjusted Total Count* to the *Unadjusted Total Count* to arrive at the *Adjusted number of pairs with fledge data*.

### Data reporting and quality control

All data were reported by cooperators who filled out a standard Massachusetts Piping Plover Census Form for each site monitored, in most cases using Piping Plover Online Data Entry System ([PIPLODES](#)). These forms are used to report data on number of breeding pairs (*Index Count* and *Total Count*); frequency of site visits; design(s) and installation dates of predator exclosures; dates of nest discovery, completion, and hatching or failure; number of eggs on the date the nest was discovered; total numbers of eggs laid, eggs hatched, and chicks fledged; reasons for egg and chick loss, if determined; and comments regarding census results, limiting factors, and management needs. Maps of sites showing the locations of all nests were submitted with census forms. After reviewing census forms, if necessary, we contacted cooperators to obtain missing or incomplete data, resolve inconsistencies, and clarify ambiguities. When we could not obtain the needed information, we used best professional judgment to assign final values or noted data as preliminary; any such instances are noted in Table 1.

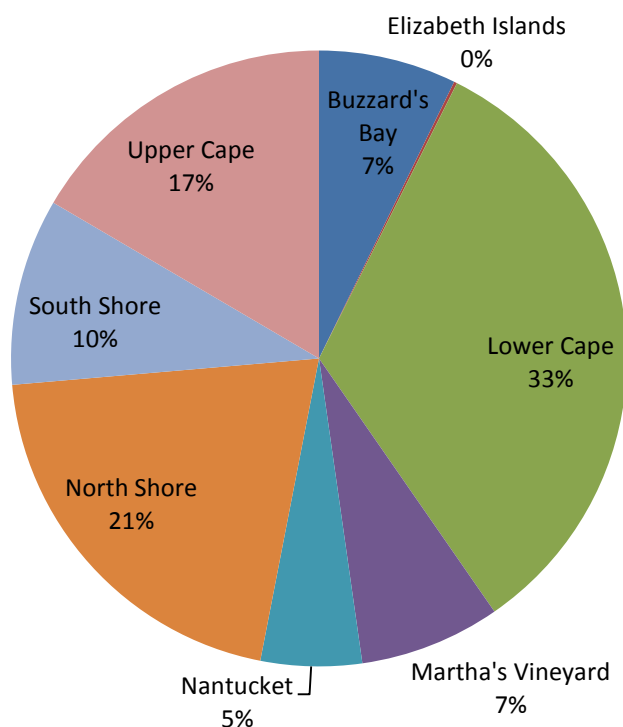
## RESULTS

Observers reported breeding Piping Plovers at 144 sites in Massachusetts in 2016. An additional 169 sites were surveyed one or more times during May and June, but no breeding pairs were detected at them (**Table 1**). The *Adjusted Total Count* in 2016 was **641.5 pairs**, a 6.6% decrease over 2015 (687 pairs). The *Index Count* in 2016 was **622 pairs** (vs. 663 pairs in 2015), or 97.5% of the *Adjusted Total Count* (**Table 1**).

Distribution of breeding pairs by region (**Figure 1**) was very similar to 2015, with a modest increase on the North Shore (17% in 2014). This is consistent with a longer-term shift in the population towards the North and South Shores during the past five years, relative to Cape Cod (which accounted for approximately 61% of the breeding population in 2011 versus 50% today; Melvin 2013). Fourteen sites with ten or more breeding pairs accounted for 50.3% of the Massachusetts breeding population, while 97 sites with three or fewer pairs accounted for 22.0%.

**Figure 1.** Distribution of Piping Plover breeding pairs by Massachusetts region in 2016, based on *Adjusted Total Counts* for each region.

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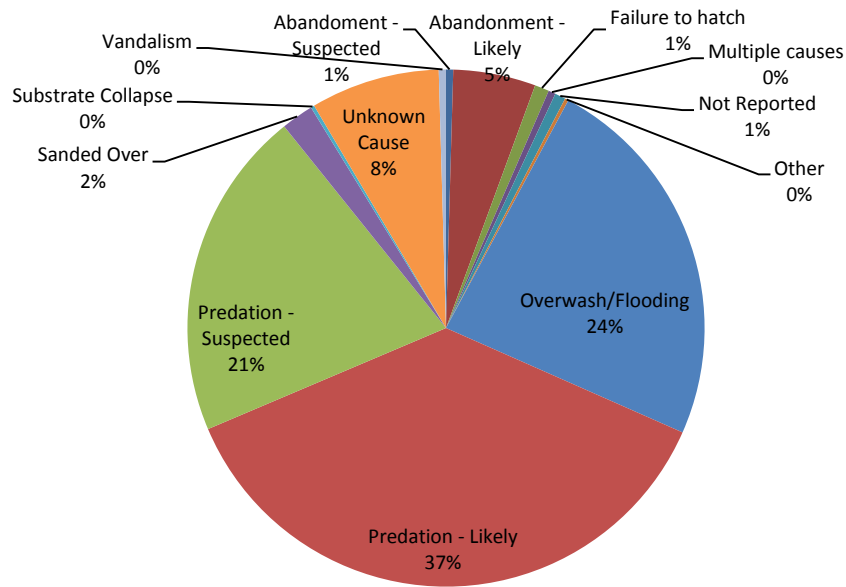
In total, 912 chicks were reported fledged in 2016, resulting in overall productivity of **1.46 fledglings/pair**, based on data from 626 of 641.5 pairs (97.5%; the *adjusted number of pairs with fledge data*) (**Table 1**).<sup>1</sup> This represents a 12.4% increase in productivity relative to 2015 (1.29 fledglings/pair). Productivity varied by region, ranging from 1.86 and 2.24 in Buzzards Bay and the South Shore, respectively, down to 0.99 and 0.85 in Nantucket and Martha's Vineyard, respectively. The North Shore (1.40), Upper Cape (1.24), and Lower Cape (1.49) exhibited intermediate productivity.

Causes of nest loss are shown in **Figure 2**. The pattern of nest loss by cause is similar to 2015, with the exception of Overwash/Flooding, which increased by 45% (58 nests in 2015 vs. 106 nests in 2016). **Figure 3** shows suspected predator type for nests likely and suspected to have been lost to predation.

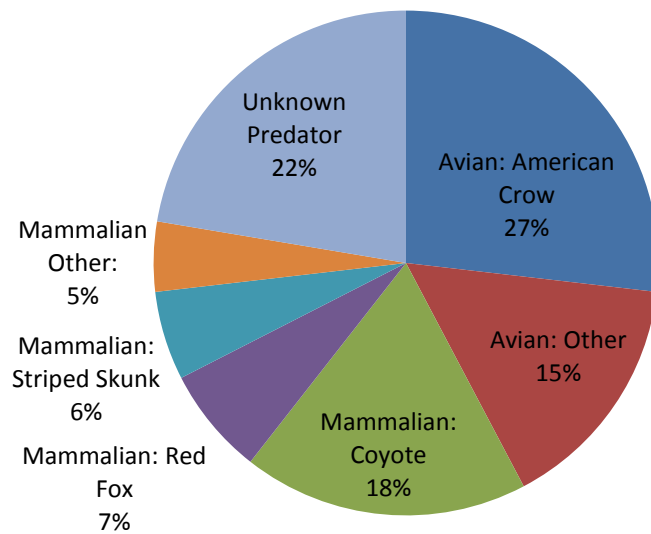
<sup>1</sup> The *unadjusted number of pairs with fledge data* was 652.5 (out of 668.5; 97.6 %).

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**Figure 2.** Causes of Piping Plover nest loss in Massachusetts, 2015 (n=446 nest attempts).



**Figure 3.** Percentages of nests lost to various predator types for nests suspected and likely to have been lost to predators in Massachusetts, 2016 (n=246).

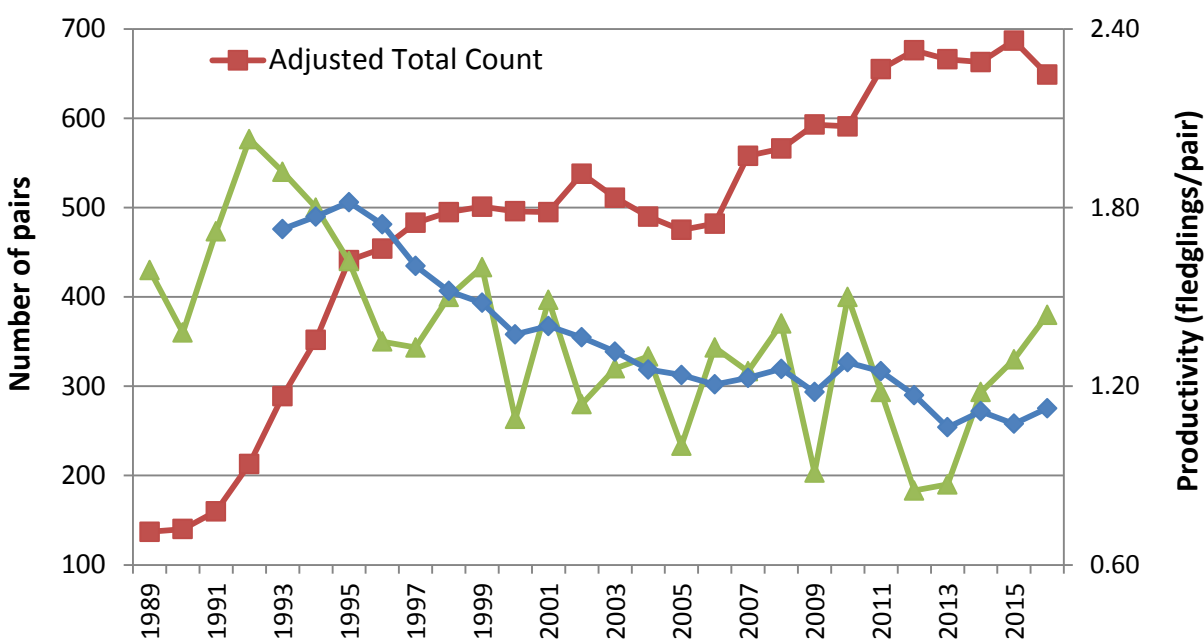


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Hatch rates were similar in 2015 (50.4%; n=941) and 2016 (51.3%; n=888), with an average of 1.4 observed nesting attempts per pair in both years (based on Adjusted Total Count). Hatch rates in 2016 for exclosed and unexclosed nests were 87.2% (n=94) and 47.5% (n=794), respectively, as compared to 71.4% (n=98) and 48.0% (n=841) in 2015. Nest abandonment rate for exclosed nests in 2016 was 5.3% (5 of 94) representing a 72% decrease in abandonment relative to 2015 (18.4%; 18 of 98 nests). Estimated abandonment rates for unexclosed nests were similar in 2015 (2.7%; 23 of 841) and 2016 (2.8%; 22 of 794).

Long term trends in breeding population size and productivity are shown in **Figure 4**. The five year running average of productivity is also shown in the figure, and may be useful to compare against the approximately 1.2 fledglings per pair thought to be necessary to maintain a stable population (Melvin & Gibbs 1996).<sup>2</sup> Interestingly, there is no evidence of significant population declines following the particularly low productivity years of 2009, 2012, and 2013).

**Figure 4.** Piping Plover abundance (Adjusted Total Count) and productivity (fledglings/pair) in Massachusetts, by year, 1989–2016.



<sup>2</sup> Melvin and Gibbs (1996) suggest that the actual fecundity needed to maintain a stable population may be slightly lower than the estimate derived from their model. Other researchers have also suggested that early estimates of fecundity needed for a stable population may have been high (e.g. Catlin et al. 2015).

## ACKNOWLEDGEMENTS

This report was prepared by Patricia Levasseur, with assistance from Amanda Veinotte, Jennifer Longsdorf and Jon Regosin. We extend our sincere thanks to the many biologists, seasonal shorebird monitors, beach managers, landowners, and volunteers who participated in conservation efforts on behalf of Piping Plovers and other coastal waterbirds in Massachusetts in 2016. We also thank the more than 30 state and federal agencies, local municipalities and county government, local and regional land trusts, private conservation organizations, and universities that supported their efforts. We especially thank all the individuals who participated in population monitoring and submitted the data that are summarized in this report.

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<b>NORTH SHORE</b>						
West Beach, Beverly	0	ND	ND	0	ECGA	
Lovell's Island, Boston	1	1	0	1	MAS	
Rainsford Island, Boston	0	ND	ND	0	MAS	
L Street Bathhouse, Dorchester	0	ND	ND	0	MAS	
Constitution beach, East Boston	0	ND	ND	0	MAS	
Coffins Beach - Bradford, Gloucester	1	1	4	1	ECGA	
Coffins Beach - Castles, Gloucester	1	1	2	1	ECGA	
Coffins Beach - East End, Gloucester	1	1	0	1	ECGA	
Good Harbor Beach, Gloucester	1	1	0	1	ECGA	
Two Penny Loaf, Gloucester	1	1	3	1	ECGA	
Crane Beach, Ipswich	30	32	32	32	TTOR	
Sandy Point State Reservation Beach, Ipswich	11	11	13	11	MAS	
Nahant State Beach, Nahant	1	1	2	1	DCR	
Parker River NWR, Newbury/Rowley	47	47	77	47	USFWS	
Newburyport Town Beach , Newburyport	3	3	5	3	MAS	
Point of Pines (Private), Revere	2	2	2	2	MAS	
Revere Beach-North, Revere	10	9	17	9	DCR	1 pair observed during census window but was present <2 weeks and therefore not included in the Total Count.
Revere Beach-South, Revere	6	6	1	6	DCR	
Salisbury Beach State Reservation-North, Salisbury	1	1	1	1	MAS	
Salisbury Beach State Reservation-South, Salisbury	1	1	0	1	MAS	

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Carson Beach, South Boston	0	ND	ND	0	MAS	
Winthrop Beach, Winthrop	8	8	16	8	DCR	
Yirrell Beach, Winthrop	2	2	5	2	Winthrop	
<b>SOUTH SHORE</b>						
Sagamore Beach - Bourne, Bourne	0	1	0	1	MAS	
Duxbury Beach, Duxbury	21	22	42	22	MAS	There were 2 unpaired males during Index Count and scraping/territorial for >2 weeks. These unpaired adults were not counted in the statewide totals.
Nantasket Beach , Hull	4	4	14	4	MAS	1 pair with a banded male Pink Flag #26 had first nest attempt at this site, failed, then moved to Third Cliff. Pair is counted in Index and Total Counts on Third Cliff.
Green Harbor , Marshfield	0	ND	ND	0	MAS	
Rexhame Beach, Marshfield	0	0	0	0	MAS	
Ellisville Harbor State Park , Plymouth	0	0	0	0	MAS	
Ellisville Shifting Lots Preserve , Plymouth	1	1	3	1	MAS	
Plymouth Long Beach, Plymouth	22	22	58	22	Plymouth	
Sagamore - Plymouth, Plymouth	0	ND	ND	0	MAS	
Saquish, Plymouth	2	2	3	2	MAS	
Sagamore Beach - Sandwich , Sandwich	4	4	3	4	MAS	
Scusset Beach State Reservation, Sandwich	0	0	0	0	MAS	
Fourth Cliff, Scituate	1	1	1	1	MAS	
Humarock, Scituate	0	ND	ND	0	MAS	
The Glades, Scituate	0	ND	ND	0	MAS	
Third Cliff, Scituate	5	5	14	5	MAS	
<b>UPPER CAPE</b>						

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Bone Hill Road, Barnstable	0	ND	ND	0	MAS	
Craigville Beach, Barnstable	1	1	3	1	MAS	Pair and brood located on Long Beach during Index count but counted on Craigville form due to nest location. This pair highly suspected to have re-nested on Long Beach after chicks fledged (See Long Beach).
Dead Neck Sampsons Island, Barnstable	7	7	6	7	MAS	
Dowses Beach, Barnstable	1	1	0	1	Barnstable	
Fortes Beach, Barnstable	0	ND	ND	0	MAS	
Kalmus Beach, Barnstable	4	4	2	4	Barnstable	
Long Beach, Barnstable	2	2	4	2	MAS	High confidence by MA Audubon staff that pair 01 from Craigville Beach double clutched after fledging chicks and nested on Long Beach. As a result, this pair is not counted on this site (See Craigville Beach).
Memorial Beach/Covell's, Barnstable	0	ND	ND	0	MAS	
Mussel Point, Barnstable	0	ND	ND	0	MAS	
Rushy Marsh Pond Beach, Barnstable	0	ND	ND	0	MAS	
Sandy Neck Beach Park, Barnstable	31	34	25	34	Barnstable	
Sea St./ Keyes Beach, Barnstable	0	ND	ND	0	MAS	
Squaw Is. Road / Causeway, Barnstable	0	0	0	0	MAS	
Squaw Island, Barnstable	4	5	11	5	MAS	
Bassetts Island, Bourne	0	ND	ND	0	MAS	
Mashnee Dike, Bourne	0	0	0	0	USACOE, MAS	
Breakwater Beach, Brewster	0	ND	ND	0	MAS	
Crosby Landing Beach, Brewster	1	1	3	1	MAS	
Linnell Landing Beach, Brewster	0	ND	ND	0	MAS	

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Mants Landing, Brewster	0	ND	ND	0	MAS	
Paine's Creek, Brewster	0	ND	ND	0	MAS	
Point of Rocks Landing, Brewster	0	ND	ND	0	MAS	
Robin's Hill Beach, Brewster	0	ND	ND	0	MAS	
Wings Island, Brewster	1	ND	ND	0	MAS	
Bayview, Dennis	0	0	0	0	Dennis	
Bayview Ave/Howe's Beach (private), Dennis	1	1	4	1	MAS	
Chapin Beach, Dennis	3	4	3	4	Dennis	
Cold Storage Beach, Dennis	0	0	0	0	Dennis	
Corporation Beach, Dennis	0	0	0	0	Dennis	
Crowes Pasture (Cole's Pond) / Quivett Neck, Dennis	2	2	2	2	Dennis	
Depot Street, Dennis	0	ND	ND	0	Dennis	
Dr. Botero, Dennis	0	0	0	0	MAS	
Glendon Beach, Dennis	0	0	0	0	Dennis	
Haigis to Inman Rd., Dennis	0	0	0	0	Dennis	
Harbor View, Dennis	0	ND	ND	0	Dennis	
Howe's St. Beach, Dennis	0	0	0	0	Dennis	
Inman Beach, Dennis	0	0	0	0	Dennis	
Mayflower Beach, Dennis	0	0	0	0	Dennis	
Metcalf Memorial, Dennis	0	0	0	0	Dennis	
Miramar Beach (Swan River), Dennis	0	0	0	0	MAS	Pair is counted in the Total Count on South Village Beach where it is believed the pair moved to that site after nest loss on 5/6.
Raycroft Beach, Dennis	0	0	0	0	Dennis	
Sea Street (West Dennis), Dennis	0	0	0	0	Dennis	
Sea Street Beach, Dennis	0	0	0	0	Dennis	

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Sesuit Harbor Beach, Dennis	0	0	0	0	Dennis	
South Village Beach, Dennis	0	1	3	1	Dennis	This pair's nest was never found on South Village Beach and is believed to have nested on a private beach nearby. The pair is counted in the Total Count.
West Dennis Beach, Dennis	3	3	1	3	Dennis	
Acapesket Beach, Falmouth	0	ND	ND	0	MAS	
Black Beach, Falmouth	3	3	0	3	MAS	
Chappaquoit Beach, Falmouth	0	ND	ND	0	MAS	
Falmouth Heights, Falmouth	ND	ND	ND	0	MAS	
Little Island Beach, Falmouth	0	ND	ND	0	MAS	One male observed flying around, then foraging on beach, then leaving. This adult is not counted in the statewide totals.
Menauhant Beach, Falmouth	0	ND	ND	0	MAS	
Old Silver Beach, Falmouth	0	ND	ND	0	MAS	
Sippewisset, Falmouth	1	1	0	1	MAS	
Trunk River, Falmouth	1	1	1	1	MAS	
Washburn Island, Falmouth	3	5	7	5	MAS	2 pairs present after Index window and were territorial >2 weeks but did not nest. Both pairs counted in Total Count only.
Woodneck Beach, Falmouth	0	0	0	0	MAS	
Allens Harbor, Harwich	0	0	0	0	MAS	
Belmont Condos, Harwich	0	ND	ND	0	MAS	
Grey Neck Road Beach, Harwich	0	0	0	0	MAS	
Inn on the Beach-Winstead Inn, Harwich	0	0	0	0	MAS	
Red River Beach, Harwich	0.	0.	0	0.	MAS	One unpaired male observed scraping for > 2 weeks. This adult was not counted in the statewide totals.
Saquatucket Beach, Harwich	0	0	0	0	MAS	

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Stone Horse Yacht Club, Harwich	0	1	0	1	MAS	This pair was suspected to be from Merkel Beach and is counted in the Index Count on Merkel and counted in the Total Count at this site.
Wychmere-Merkel-Bank St, Harwich	2	1	0	1	MAS	The pair counted in Index Count was not present for >2 weeks and was suspected to be the pair later found at Stone Horse Yacht Club. This pair is counted in the Total Count for Stone Horse Yacht Club.
New Seabury (from Popponeset to Maushop Village), Mashpee	0	ND	ND	0	MAS	
New Seabury, Mashpee	3	4	6	4	MAS	1 territorial pair present during Index window and for > 2 weeks but did not nest, included in Index and Total Count. An additional territorial pair was observed from 6/25-7/14 but did not nest, included in Total Count only.
Popponeset Spit, Mashpee	4	4	4	4	MAS	
Rock Landing/Maushop Village, Mashpee	ND	ND	ND	0	MAS	
South Cape Beach, Mashpee	4	4	11	4	MAS	
East Sandwich, Sandwich	2	2	2	2	MAS	
Scorton Neck (Torrey), Sandwich	2	2	5	2	MAS	One unpaired adult present but not counted in the statewide totals.
Scorton Shores, Sandwich	1	1	2	1	MAS	
Spring Hill, Sandwich	5	4	6	4	MAS	Territorial pair was present during Index Count from 6/3-6/5 but was present for < 2 weeks, therefore not counted in Total Count.
Town Neck Beach, Sandwich	1	1	3	1	MAS	
Bass River Beach / Smuggler's, Yarmouth	0	ND	ND	0	MAS	
Grays Beach, Yarmouth	3	3	7	3	MAS	
Great Island Causeway, Yarmouth	1	2	2	2	MAS	
Great Island Beach Club - Smith Point, Yarmouth	2	2	0	2	MAS	

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Radio City Beach, Yarmouth	1	1	0	1	MAS	
Red Jacket Inn, Yarmouth	0	ND	ND	0	MAS	
Seagull Beach, Yarmouth	3	3	10	3	MAS	
Standish Way, Yarmouth	0	ND	ND	0	MAS	
<b>LOWER CAPE</b>						
Andrew Harding Way, Chatham	0	ND	ND	0	MAS	
Chatham Bars Inn, Chatham	0	ND	ND	0	MAS	
Chatharbor Lane (Mill Ck.), Chatham	0	1	0	1	MAS	Pair suspected to have first nested on Harding Shores then moved to this site for second nest attempt. Pair is only counted at this site.
Claflin Landing, Chatham	0	ND	ND	0	MAS	
Cockle Cove , Chatham	0	0	0	0	MAS	
Forest Beach, Chatham	2	3	7	3	MAS	Pair 3 nest failed before index count and pair did not return to site.
Harding Beach, Chatham	3	3	7	3	MAS	
Harding Shores, Chatham	0	0	0	0	MAS	Pair first sighted scraping on Ridgevale Beach then suspected to have moved and nested on Harding Shores. Nest failed on Harding Shores and pair suspected to have moved to Chatharbor for second nest attempt. Pair is only counted in Total Count on Chatharbor.
Linnell Lane, Chatham	0	ND	ND	0	MAS	
Minimoy Island, Chatham	1	1	1	1	USFWS	
Morris Island Dike/ Hardings Beach Point, Chatham	2	2	2	2	MAS	
Morris Island Dredge Spoil, Chatham	0	ND	ND	0	MAS	
North (Nauset) Beach, Chatham	11	11	25	11	Chatham	
North Beach Island, Chatham	26	29	10	18	Chatham	
North Monomoy Island, Chatham	2	2	1	2	USFWS	

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Site	Index Count <sup>a</sup> (no. pairs)	Total Count <sup>b</sup> (no. pairs)	No. chicks fledged <sup>c</sup>	No. pairs with fledge data <sup>c</sup>	Source <sup>d</sup>	Notes
Pleasant St. Beach, Chatham	0	0	0	0	MAS	
Ridgevale Beach, Chatham	0	0	0	0	MAS	Pair was present and scraping before index window from 4/27 to 5/25. Pair was not seen during or after index count and was suspected to be nesting pair from Harding Shores. Nest failed on Harding Shores and pair suspected to have moved to Chatharbor, nest failed. Counted in Total Count for Chatharbor on its second nest attempt.
South Beach (North of Break), Chatham	5	5	3	5	MAS	
South Beach (South of Break), Chatham	18	20	13	20	MAS	Two pairs observed scraping for > 2 weeks after the Index window but did not nest. Both pairs are included in Total Count only.
South Monomoy Island, Chatham	49	49	63	49	USFWS	
Tern Island, Chatham	1	2	4	2	MAS	
Boat Meadow, Eastham	0	ND	ND	0	MAS	
Campground Beach, Eastham	ND	ND	ND	0	MAS	
Coast Guard Beach, Eastham	9	9	18	9	NPS	
Cooks Beach, Eastham	ND	ND	ND	0	MAS	
First Encounter Beach, Eastham	0	0	0	0	MAS	
Nauset Light Beach, Eastham	0	0	0	0	NPS	
Rock Harbor (north and south sides), Eastham	ND	ND	ND	0	MAS	
South Sunken Meadow, Eastham	0	0	0	0	MAS	Pair nested in early May but lost nest. Pair had banded male that was tracked to Lieutenant Island Northwest where they are counted in Index Count and Total Count. The pair then moved to Lieutenant Island Southwest and is not counted at that site.
North Spit, Orleans	8	8	8	8	Orleans	One unpaired adult present and scraping prior to the Index Count period for >2 weeks. This adult was not counted in the statewide totals.



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Rock Harbor, Orleans	0	ND	ND	0	MAS	
Skaket Beach, Orleans	0	ND	ND	0	MAS	
South Beach (Nauset), Orleans	9	11	28	11	Orleans	One unpaired adult present and territorial for >2 weeks before the Index period. This pair was not counted in the statewide totals.
New Island, Orleans, Eastham	1	1	4	1	NPS	Pair was monitored by the Town of Orleans.
Hatches Harbor, Provincetown	1	1	2	1	NPS	One unpaired adult present and territorial for >2 weeks. This adult was not counted in the statewide totals.
Herring Cove, Provincetown	0	0	0	0	NPS	
Race Point North, Provincetown	7	7	22	7	NPS	
Wood End/Long Point, Provincetown	4	4	9	4	NPS	
Race Point South, Provincetown, Truro	15	15	38	15	NPS	One pair had first nest attempt on Race Point North then moved to Race Point South for second attempt. Pair is counted in Index and Total for Race Point South only. One unpaired adult present and territorial for >2 weeks. This adult was not counted in the statewide totals.
Ballston Beach , Truro	3	3	4	3	NPS, MAS	
Beach Point, Truro	0	0	0	0	MAS	
Between Corn Hill Beach and Beach Point, Truro	0	ND	ND	0	MAS	
Coast Guard Truro, Truro	4	5	6	5	NPS	One pair nested prior to the census 5/6/16, was depredated on 5/13/16 and did not re-nest at this site.
Corn Hill Beach, Truro	1	1	2	1	MAS	
Fisher Beach, Truro	1	1	0	1	MAS	
Fisher Beach South, Truro	0	0	0	0	MAS	
Head of Meadow, Truro	0	ND	ND	0	MAS	
Head of the Meadow, Truro	1	1	0	1	NPS	

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High Head, Truro	1	1	2	1	NPS	
Longnook, Truro	0	0	0	0	NPS	
Ryder Beach, Truro	0	ND	ND	0	MAS	
Bound Brook, Wellfleet	1	0	0	0	NPS	It is suspected this pair moved to Duck Harbor after their nest failed. This pair is counted in the Total Count at Duck Harbor. One unpaired adult present and territorial for >2 weeks. This adult was not counted in the statewide totals.
Cahoon Hollow, Wellfleet	1	1	4	1	NPS	One unpaired adult present and territorial for > 2 weeks. This adult was not counted in the statewide totals.
Duck Harbor, Wellfleet	3	4	1	4	NPS	Suspect 4th pair came from Bound Brook after nest failed. This pair is counted in the Total Count at Duck Harbor and Index Count at Bound Brook.
Field Point /Fox Is. WMA, Wellfleet	0	ND	ND	0	MAS	
Great Is., Wellfleet	4	4	6	4	NPS	
Indian Neck, Wellfleet	0	ND	ND	0	MAS	
Jeremy Point, Wellfleet	3	3	3	3	NPS	
Lecount Hollow, Wellfleet	0	0	0	0	NPS	
Lieutenant Island - NW, Wellfleet	1	1	0	1	MAS	Pair was previously at South Sunken Meadow but nest failed in early May. Pair had a banded male that was tracked to Lieutenant Island NW. After this second nest failed they moved to Lieutenant Island Southwest. This pair is counted in the Index and Total Counts for Lieutenant Island NW site only.
Lieutenant Island - SW, Wellfleet	0	0	0	0	MAS	Pair was previously at South Sunken Meadow but nest failed in early May. Pair had a banded male that was tracked to Lieutenant Island NW. After this second nest failed they moved to this site. This pair is counted in the Index and Total Counts for Lieutenant Island Northwest only.

**SUMMARY OF THE 2016 MASSACHUSETTS PIPING PLOVER CENSUS**

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Lieutenant Island - The Hook, Wellfleet	0	ND	ND	0	MAS	
Marconi Beach, Wellfleet	4	4	4	4	NPS	
Marconi Station, Wellfleet	1	1	2	1	NPS	Three territorial unpaired adults were present during Index Count and for >2weeks. These three adults were not counted in the statewide totals.
Mouth of Herring River - Mayo Beach, Wellfleet	0	ND	ND	0	MAS	
Old Wharf, Wellfleet	0	ND	ND	0	MAS	
White Crest Beach, Wellfleet	0	0	0	0	NPS	
Newcomb Hollow, Wellfleet, Truro	2	2	0	2	NPS	
<b>BUZZARDS BAY - NORTHWEST</b>						
Barney's Joy/Little Beach, Dartmouth	16	17	35	17	MAS	
Demarest Lloyd State Park, Dartmouth	4	5	7	4	LCES	5th Pair in total count not actually observed but highly suspected due to scrapes observed for > 2 weeks in a non-overlapping territory with other PIPL pairs.
Nonquitt, Dartmouth	0	0	0	0	MAS	
Round Hill Beach, Dartmouth	0	0	0	0	MAS	
Salters Pond, Dartmouth	0	1	0	1	MAS	
Timmy's Rock, Dartmouth	0	0	0	0	MAS	
Long Island, Fairhaven	ND	ND	ND	0	DFW	
Round Is., Fairhaven	1*	ND	ND	0	DFW	*Site visited prior to Index window, data provided is for informational purposes only and is not included in the statewide Index Count tally.
South Shore Marshes, Fairhaven	1	1	0	1	DFW	
Ward's Rock, Fairhaven	ND	ND	ND	0	MAS	Site only visited in May.
West Island, Fairhaven	3	3	6	3	LCES	

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Winsegansett Heights, Fairhaven	2	2	1	2	LCES	
Haskell Island, Marion	0	ND	ND	0	MAS	
Meadow Island, Marion	0	ND	ND	0	MAS	
Planting Island, Marion	0	ND	ND	0	MAS	
Ram Is., Marion, Marion	0*	ND	ND	ND	DFW	* Site visited prior to Index window, data provided is for informational purposes only and is not included in the statewide Index Count tally.
Stewart's Island, Marion	0	ND	ND	0	MAS	
Brandt Island, Mattapoissett	0	0	0	0	DFW	
Pine Island (Angelica Point and Strawberry Point), Mattapoissett	2	2	2	1	DFW	One territorial pair present during the Index window and present for >2 weeks but did not nest. Pair is included in both Index and Total Count.
Ram Is., Mattapoissett, Mattapoissett	0	0	0	0	DFW	
Cedar Island, Wareham	0	ND	ND	0	MAS	
Cromeset, Wareham	0	0	0	0	MAS	
Little Harbor Beach, Wareham	1	1	3	1	MAS	
Long Beach Point, Wareham	1	2	3	2	MAS	
Stony Point Dike, Wareham	0	2	2	2	USACOE	
Swift's Beach, Wareham	0	ND	ND	0	MAS	
Acoaxet, Westport	0	ND	ND	0	MAS	
Bakers Beach / Westport Town Beach, Westport	3	3	0	3	MAS	
Cockeast Pond (Elephant Rock), Westport	ND	ND	ND	0	TNC	
East Beach, Westport	0	0	0	0	MAS	
Fishing Rock, Westport	0	ND	ND	0	MAS	
Gooseberry Neck, Westport	0	0	0	0	LCES	
Horseneck Beach State Reservation, Westport	10	10	24	10	LCES	

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Richmond Pond, Westport	2	2	3	2	TNC	
Speaking Rock, Westport	0	ND	ND	0	MAS	
<b>ELIZABETH ISLANDS</b>						
Cuttyhunk Island, Gosnold	1	1	ND	0	DFW	Site visited once on 6/14 with two 5-10 day old chicks and therefore pair was present during Index Count. A second pair may have been present but was not confirmed. Outcome of chicks and additional nesting pairs unknown.
Nashawena Island-Canapitsit, Gosnold	ND	ND	ND	0	DFW	
Nashawena Island-Quicks Hole, Gosnold	ND	ND	ND	0	DFW	
Naushon Is. - Tarpaulin Cove, Gosnold	ND	1	ND	0	DFW	Site visited on 6/18 and 7/2 only. 4 egg nest found on 7/2.
Naushon Is. - Crescent Beach, Gosnold	ND	ND	ND	0	DFW	
Naushon Is. - Kettle Cove, Gosnold	ND	ND	ND	0	DFW	
Naushon Is. – Robinson’s Hole, Gosnold	ND	ND	ND	0	DFW	
Naushon Is. - West Beach, Gosnold	ND	ND	ND	0	DFW	
Pasque Island-Cobbly, Gosnold	ND	ND	ND	0	DFW	
Pasque Island-Quicks Hole, Gosnold	ND	ND	ND	0	DFW	
Pasque Island-Robinson's Hole, Gosnold	ND	ND	ND	0	DFW	
Penikese Island, Gosnold	0	0	0	0	DFW	
<b>MARTHA’S VINEYARD</b>						
Dogfish Bar, Aquinnah	3	4	0	4	BW	
Lobsterville Beach, Aquinnah	0	1	0	1	MAS	

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Menemsha Neck Preserve, Aquinnah	0	ND	ND	0	MVLBC	
Moshup Beach, Aquinnah	0	0	0	0	MVLBC	
Philbin Beach, Aquinnah	0	ND	ND	0	BW	
Black Point Pond, Chilmark	1	1	0	1	BW	This PIPL pair lost nest on 6/24 and a new pair appeared at Chilmark pond, most likely this pair that moved. Counted at this site only.
Cape Higgon, Chilmark	0	0	0	0	BW	
Chilmark Pond, Chilmark	2	2	4	2	BW	Third PIPL pair came after census (around 6/28) and stayed for several weeks displaying territorial behavior. Suspect pair was from Black Point Pond counted pair on Black Point Pond only.
Chilmark Pond Preserve, Chilmark	0	0	0	0	MVLBC	
Edys Island, Chilmark	0	ND	ND	0	MAS	
Great Rock Bight Preserve, Chilmark	0	0	0	0	MVLBC	
Lucy Vincent Beach, Chilmark	2	2	4	2	BW	
Nomans Land Island NWR, Chilmark	0*	ND	ND	0	USFWS	*Site visited prior to Index window, data provided is for informational purposes only and is not included in the statewide Index Count tally.
Quansoo, Chilmark	3	4	0	4	MAS	
Spring Point, Chilmark	0	0	0	0	BW	
Squibnocket Beach/Long Beach, Chilmark	3	3	0	3	BW	
Stonewall Beach, Chilmark	0	0	0	0	BW	
Arruda's Point / The Jetties, Edgartown	0	0	0	0	TTOR	
Bend-in-the-Road Beach, Edgartown	0	0	0	0	MAS	
Caleb's Pond, Edgartown	0	ND	ND	0	BW	
Cape Pogue Elbow / The Narrows,	3	3	0	3	TTOR	

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Edgartown						
Chappaquiddick Point Beach, Edgartown	0	0	0	0	MVLBC	
Cove Meadow Preserve, Edgartown	0	0	0	0	MVLBC	
Cow Bay, Edgartown	0	1	0	1	MAS	
Cracktuxet Trust Beach, Edgartown	0	ND	ND	0	BW	
Edgartown Great Pond, Edgartown	0	0	0	0	MVLBC	
Edgartown Great Pond (Job's Neck), Edgartown	4	5	0	5	BW	
Haystack Island, Edgartown	0	0	0	0	MAS	
Leland / East Beach, Edgartown	5	6	6	6	TTOR	
Lighthouse Beach, Edgartown	0	0	0	0	BW	Territorial male was present scraping and calling from 5/10 - 6/12, but was never seen with a mate. This adult is not counted in the statewide totals.
Little Beach / Eel Pd., Edgartown	3	4	7	4	BW	
Little Neck, Edgartown	0	0	0	0	TTOR	
Norton Point Beach, Edgartown	8	8	14	8	TTOR	
Oyster Pond, Edgartown	0	0	0	0	BW	
Paqua Pond, Edgartown	ND	ND	ND	0	BW	
Pease's Pond, Edgartown	0	ND	ND	0	BW	
Quammox Preserve, Edgartown	0	ND	ND	0	MVLBC	
South Beach, Edgartown	0	ND	ND	0	BW	
Sylvia State Beach Edgartown , Edgartown	0	0	0	0	MAS	
Wasque, Edgartown	0	0	0	0	TTOR	
Yorke - Allen Point, Edgartown	0	0	0	0	MAS	
Big Gravel Island, Oak Bluffs	0	0	0	0	MAS	
Dougs Cove Preserve, Oak Bluffs	0	0	0	0	MVLBC	

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Eastville Beach, Oak Bluffs	0	0	0	0	MAS	
Harthaven, Oak Bluffs	1	0	0	0	MAS	Pair present during Index window and were courting/scraping for < 2 weeks but did not nest. Pair included in Index Count only.
Little Gravel Island, Oak Bluffs	0	0	0	0	MAS	
Sarsons Island, Oak Bluffs	0	0	0	0	MAS	
Sylvia State Beach Oak Bluffs, Oak Bluffs	0	1	0	1	MAS	
Beach Road Causeway, Tisbury	0	ND	ND	0	MAS	
East Tashmoo, Tisbury	0	0	0	0	MAS	
Grove Avenue , Tisbury	0	0	0	0	MAS	
Lagoon Pond-Maciel Marine/Ferry Boat Island, Tisbury	0	ND	ND	0	MAS	
Mink Meadows /West Chop, Tisbury	1	2	0	2	MAS	
West Tashmoo, Tisbury	2	2	1	2	BW	
Wilfrids Pond Preserve, Tisbury	0	ND	ND	0	MVLBC	
Cedar Tree Neck, West Tisbury	1	1	0	1	BW	
Lamberts Cove, West Tisbury	0	0	0	0	BW	
Long Point, West Tisbury	0	1	0	1	TTOR	
Paul's Point, West Tisbury	1	1	4	1	BW	
Sepiessa Point Reservation, West Tisbury	0	0	0	0	MVLBC	
Seven Gates, West Tisbury	0	0	0	0	BW	
Tisbury Great Pond, West Tisbury	0	0	0	0	MVLBC	Pairs nested off-site on Quansoo Beach Association property monitored by Mass Audubon. Counted in Index and Total counts for Quansoo
Watcha Pond, West Tisbury	3	3	3	3	BW	
<b>NANTUCKET</b>						



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Capaum Pond, Nantucket	1	0	0	0	NCF	A pair was observed once during the census window then very sporadically over the season. It is not suspected they nested at this site.
Coatue, Nantucket	1	1	0	1	NCF	
Coskata-East Beach, Nantucket	0	0	0	0	TTOR	
Coskata-West Beach, Nantucket	1	0	0	0	TTOR	Pair re-nested on Great Point and is included in the Total Count on Great Point.
Dionis Beach, Nantucket	0	0	0	0	Nantucket	
East Hallowell Lane, Nantucket	0	ND	ND	0	MAS	
Eel Point, Nantucket	10	9	4	9	NCF	
Great Point, Nantucket	1	2	0	2	TTOR	
Hoicks Hallow, Nantucket	0	ND	ND	0	MAS	
Hummock and West Hummock Ponds, Nantucket	1	1	1	1	NCF	
Jetties Beach, Nantucket	3	4	5	4	Nantucket	
Little Neck, Nantucket	0	0	0	0	NCF	
Long Pond, Nantucket	0	0	0	0	NCF	
Low Beach , Nantucket	1	1	0	1	Nantucket	
Minimusk Is., Nantucket	ND	ND	ND	0	MAS	No date for when site was visited. Notes state "no activity"
Monomoy Creeks, Nantucket	0	0	0	0	NCF	
Muskeget Is., Nantucket	ND	1	ND	0	MAS	Site was not visited during census. Nest found 5/14 but unknown if hatched or fledged chicks as site was only visited twice.
Nantucket NWR (Great Point), Nantucket	2	2	4	2	USFWS	
Polpis Harbor (Medouie Creek and Pocomo Meadows), Nantucket	0	0	0	0	NCF	
Quaise Point, Nantucket	0	0	0	0	Nantucket	
Quidnet/Sesachacha Pond/Greenhills, Nantucket	3	3	4	3	MAS	

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Sheep Pond, Nantucket	0	0	0	0	NCF	
Smith Point / Esther Is., Nantucket	4	5	0	5	Nantucket	
Smith's Point, Nantucket	0	0	0	0	MAS	
South Pastures (Madequecham Valley to Tom Nevers), Nantucket	0	ND	ND	0	NCF	
Squam Pond, Nantucket	0	0	0	0	NCF, MAS	
Surfside/Western Ave, Nantucket	1	1	0	1	Nantucket	
The Galls, Nantucket	0	0	0	0	TTOR	
The Haulover, Nantucket	0	0	0	0	TTOR, NCF	
Tuckernuck Is. - Bigelow's Point, Nantucket	ND	ND	ND	0	TLT	
Tuckernuck Is. - East Pond, Nantucket	ND	ND	ND	0	TLT	
Tuckernuck Is. - North Pond, Nantucket	1	2	7	2	TLT	Counts presented here are based on the preliminary short form
Tuckernuck Is. - Whale Point, Nantucket	1	1	0	1	TLT	Counts presented here are based on the preliminary short form.
UMass Field Station, Nantucket	0	0	0	0	NCF	
Wauwinet, Nantucket	0	ND	ND	0	MAS	
Western Ave, Nantucket	2	2	8	2	MAS	
<b>UNADJUSTED TOTALS</b>	<b>628.5</b>	<b>668.5</b>	<b>912</b>	<b>652.5</b>		
<b>ADJUSTED TOTALS</b>		<b>649</b>		<b>633</b>		

<sup>a</sup> *Index Count* = number of pairs counted between 1-9 June 2016, the standardized *Index Count* period for the Atlantic Coast population.

## SUMMARY OF THE 2016 MASSACHUSETTS PIPING PLOVER CENSUS

<sup>b</sup> *Total Count* = total number of territorial or breeding pairs present at a site for at least 2 weeks during the breeding season.

<sup>c</sup> *Chicks fledged* are defined as chicks  $\geq 25$  days of age or observed in flight, whichever occurs first. Number of *Pairs with fledge data* includes all pairs for which number of *chicks fledged* was determined; this includes not only pairs that successfully fledged chicks, but also pairs for which no nests were found, pairs that nested unsuccessfully, and pairs whose chicks failed to fledge.

<sup>d</sup> Source = primary source(s) that provided monitoring data: Barnstable = Town of Barnstable, BW = BiodiversityWorks, Chatham = Town of Chatham, DCR = Department of Conservation and Recreation, Dennis = Town of Dennis, DFW = Massachusetts Division of Fisheries & Wildlife, ECGA = Essex County Greenbelt Association, LCES = Lloyd Center for Environmental Studies, MAS = Massachusetts Audubon Society, MVLBC = Martha's Vineyard Land Bank Coalition, Nantucket = Town of Nantucket, NCF = Nantucket Conservation Foundation, NPS = National Park Service, Orleans = Town of Orleans, Plymouth = Town of Plymouth, TLT = Tuckernuck Land Trust, TTOR = The Trustees of Reservations, USACOE = U.S. Army Corps of Engineers, USFWS = U.S. Fish & Wildlife Service, Winthrop = Town of Winthrop

### Erratum

An earlier version of this report incorrectly included unpaired adults in the Index and Total Counts and Pairs with fledge data. Unpaired adults are not counted as breeding pairs and as a result the totals were corrected (Total count 649 corrected to 641.5; Adjusted total 628.5 corrected to 622; Productivity 1.44 corrected to 1.46). The Productivity by Region (Figure 1) and Piping Plover abundance (Adjusted Total Count) and productivity (fledglings/pair) in Massachusetts, by year, 1989–2016 (Figure 4) was updated accordingly. The number of sites with breeding pairs and number of sites visited at least once with no breeding pairs detected at them were also corrected. Lastly, the number of sites with three or fewer pairs was updated by removing sites with zero pairs.