Massachusetts Habitat Conservation Plan for Piping Plover

2019 Annual Report

Bill Byrne/MassWildlife

MASSWILDLIFE

May 2020

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

Table of Contents

I. Executive Summary……1

II. Annual Report Requirements……..2

Appendices

A. Nauset Beach, Orleans 2019 HCP Annual Report

B. Plymouth Long Beach, Plymouth 2019 HCP Annual Report

C. Sandy Neck Beach Park 2019 HCP Annual Report

D. North (Nauset) Beach, Chatham 2019 HCP Annual Report

E. East Beach and Leland Beach, Martha's Vineyard 2019 HCP Annual Report

F. Coskata-Coatue Wildlife Refuge, Nantucket 2019 HCP Annual Report

G. Revere Beach Reservation, Revere and Winthrop Shore Reservation, Winthrop 2019 HCP Annual Report

H. Duxbury Beach, Duxbury 2019 HCP Annual Report

I. Horseneck Beach State Reservation, Westport 2019 HCP Annual Report

J. Crane Beach 2019 Mitigation Report

K. Allen's Pond 2019 Mitigation Report

L. BiodiversityWorks 2019 Mitigation Report

M. USDA Selective Predator Management 2019 Summary

N. SUNY Predator Removal Efficacy Report

O. Nauset Beach, Orleans 2019 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

P. Plymouth Long Beach 2019 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

Q. Sandy Neck Beach Park 2017 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

R. North (Nauset) Beach, Chatham 2017 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

S. Revere Beach Reservation, Revere and Winthrop Shore Reservation, Winthrop 2017 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

T. Duxbury Beach, Duxbury 2018 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

U. Horseneck Beach State Reservation, Westport 2018 Certificate of Inclusion (COI), Conservation & Management Permit, COI Request, and other supporting documents

V. North (Nauset) Beach 2019 Emergency Amendments

W. Duxbury Beach 2019 Emergency Amendments

X. MassWildlife FY 2020 Funding Assurance Letter

I. Executive Summary

On July 8, 2016 the United States Fish and Wildlife Service (USFWS) issued a 25-year Incidental Take Permit (ITP) to the Massachusetts Division of Fisheries and Wildlife (MassWildlife) in accordance with Section 10(a) (1) (B) of the Endangered Species Act of 1973 (ESA), as amended, 16 U.S.C. 1539 (a) (1) (B). Pursuant to the ITP, MassWildlife is responsible for administering the Massachusetts Statewide Habitat Conservation Plan (HCP). The HCP identifies covered activities that are authorized by the ITP that could expose Piping Plovers (*Charadrius melodus)* to "take." Incidental Take coverage can be extended by MassWildlife to approved landowners and beach managers through Certificates of Inclusion (COIs). During the 2019 beach season, seven beach operators held valid COIs encompassing ten distinct beaches. Covered activities were carried out at eight beaches: Duxbury Beach, Duxbury; East/Leland Beach, Edgartown; Horseneck Beach State Reservation, Westport; Nauset Beach, Orleans; North (Nauset) Beach, Chatham; Plymouth Long Beach, Plymouth; Revere Beach Reservation, Revere; and Sandy Neck Beach Park, Barnstable. Statewide, 19 pairs of Piping Plovers were exposed to covered activities: 11 broods to the operation of a road, 5 broods to escorted recreational oversand vehicle use, and 3 pairs to reduced proactive symbolic fencing. Intensive impact avoidance and minimization measures were implemented by COI holders. Required HCP compliance and effectiveness monitoring were carried out by both MassWildlife and COI holders.

The 19 pairs exposed to covered activities had excellent productivity, fledging 37 chicks (1.95 chicks per pair). Of the 11 broods exposed to use of roads and parking lots, all but two fledged at least one chick for a total of 25 fledglings. Each of the three brood exposed to oversand vehicle use fledged one or more chicks, totaling 12 fledglings. Of the three pairs subject to reduced proactive symbolic fencing, two departed the site without nesting, and the other nested nearby but failed to fledge any chicks.

Participation in the HCP expanded recreational opportunities at all eight beaches. There was recreational vehicle access at Plymouth Long Beach for 47 days when it might otherwise have been limited by the presence of unfledged plover chicks. Duxbury Beach operated roads and parking lots over a period exceeding two months. Nauset Beach allowed 1,263 self-escorted oversand vehicles past chicks for 16 days when access would otherwise have been restricted, while North (Nauset) Beach allowed 157 self-escorted oversand vehicles past chicks over the course of an additional seven days. On East/Leland Beach, The Trustees of Reservations operated tour vehicles on the beach for an additional seven days, allowing access for 133 adults and 43 children. As a result of reduced proactive symbolic fencing, Revere Beach maintained unimpeded access to its bathhouse and lifeguard equipment, Horseneck Beach maintained a major access point, and Sandy Neck kept its groomed "Recreation Zone" open to oversand vehicles for the entire season.

On- and off-site mitigation consisted of selective predator management designed to increase productivity and more than offset any harm resulting from exposure to the covered activities. In all, 175 breeding pairs of Piping Plovers benefited from selective predator management under the HCP, substantially more than the minimum benefit of 50.5 pairs required pursuant to the HCP. This report documents compliance with the HCP and provides information about other state-listed species, Least Terns and Diamond-backed Terrapins, exposed to potential take by the covered activities.

II. Annual Report Requirements

This annual report summarizes HCP implementation activities during 2018 and has been prepared by MassWildlife in accordance with the requirements of the HCP.

The goals of the annual report are as follows:

- To provide the information and data necessary for MassWildlife to demonstrate to the USFWS and the public that the HCP is being implemented properly.
- To disclose any problems with HCP implementation and the corrective measures planned or implemented to address the problems.
- To identify administrative or minor changes to HCP components required to increase the success of conservation actions.
- To identify the results and/or need for adaptive management and changed circumstances, and whether any HCP or ITP changes may be subsequently proposed as a result pursuant to Chapter 3.3.3. of the HCP.

A bulleted list of the required contents of the annual report is provided on page 5-9 of the HCP. To facilitate review by USFWS and the public, the remainder of this report systematically addresses each item on the list. Supporting documentation and data are included in the Appendices, which are available upon request.

II.1 Description of All Covered Activities Implemented During the Reporting Period by Activity Type and Location.

In total, 19 pairs of Piping Plovers were exposed to covered activities under the HCP. At Duxbury Beach, Duxbury, seven broods were subject to *Use of Roads and Parking Lots in Vicinity of Unfledged Chicks*, as were four broods at Plymouth Long Beach, Plymouth. Of the 24 chicks that crossed the road in the vicinity of recreational traffic at Duxbury Beach, 14 fledged, as did 9 of the 15 chicks in close proximity to roads and parking lots at Plymouth Long Beach. Least Terns were also subject to *Use of Roads and Parking Lots in Vicinity of Unfledged Chicks* at Plymouth Long Beach. (See Section II.22 for information about Least Terns.) Three pairs of plovers were exposed to *Reduced Proactive Fencing of Habitat*: one at Revere Beach, Revere, where the pair departed the site without nesting, one pair at Horseneck Beach Reservation, Westport, which also departed without nesting, and one at Sandy Neck Beach Park, Barnstable, where the pair nested alongside deterrent coverboards at the edge of the Recreation Zone. Least Terns were also impacted by reduced proactive fencing at Horseneck Beach. Five broods of plovers were subject to *Oversand Vehicle Use in Vicinity of Unfledged Chicks*. Two broods at Nauset Beach, Orleans fledged all six chicks, and two broods at North (Nauset) Beach, Chatham fledged all five chicks. One brood at East/Leland Beach, Edgartown was exposed to tour vehicles, although the brood quickly relocated away from the OSV corridor and ultimately fledged one chick. Least Terns were also subject to *Oversand Vehicle Use in the Vicinity of Unfledged Chicks* at Nauset (North) Beach and Duxbury Beach. Additional information about implementation at each site, including duration of covered activities and productivity of exposed pairs, is provided in Table 1. More detailed information, including figures showing the specific locations of the covered activities at each site, can be found in Appendices A-I.

Table 1. Piping Plover HCP Covered Activities Implemented in 2018

Location	Covered Activity	Description of Covered Activity Implementation	# Permitted Take Exposures	# Take Exposures Used; % of Total Pairs Exposed	Pair Identifier	# Chicks Exposed	# Fledged from Exposed Pairs	Start of Imple-menta-tion	End of Imple-menta-tion	# Days Pair/Brood Exposed to Covered Activity	Age of Chicks When First Exposed (Days)	Site Produc-tivity (Fledges/ pair)
Nauset Beach, Orleans	Oversand Vehicle (OSV) Use in the Vicinity of Unfledged Chicks, Reduced Symbolic Fencing Around Nests, Nest Moving	Oversand vehicles, self-escorted through a narrow corridor by passengers walking in front of each vehicle, were allowed past 2 broods of unfledged plover chicks.	2	2; 5% of pairs	RWM-A	3	3	July 24	July 31	8	20	2.6
					LPS-B	3	3	July 24	Aug 8	6	10	
Plymouth Long Beach, Plymouth	Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks	The covered area was along Ryder Way, which provides access to private residences at the north end of the barrier beach and recreational access to the beachfront. Multiple broods crossed or were in close proximity to roads and parking lots. IAMP included intensive brood monitoring, recreational traffic restriction when unfledged chicks were on or near the road, and escorted access for essential vehicles.	5	4; 13% of pairs	24A	3	2	June 24	July 24	31	0	1.7
					28A	4	3	June 29	July 30	32	0	
					17B	4	4	July 12	July 25	14	15	
					4B	4	0	July 16	July 22	7	0	

Location	Covered Activity	Description of Covered Activity Implementation	# Permitted Take Exposures	# Take Exposures Used; % of Total Pairs Exposed	Pair Identifier	# Chicks Exposed	# Fledged from Exposed Pairs	Start of Imple-menta-tion	End of Imple-menta-tion	# Days Pair/Brood Exposed to Covered Activity	Age of Chicks When First Exposed (Days)	Site Produc-tivity (Fledges/ pair)
Sandy Neck Beach Park, Barnstable	Reduced Proactive Symbolic Fencing of Habitat	Proactive symbolic fencing was reduced throughout the Recreation Zone, impacting 1.2 acres of potential habitat. Fencing was limited to a narrow 5-10 foot-wide strip to protect the base of the dune over a stretch of approximately 835 linear feet. Beach raking (11 times) and coverboards (3 times) were used to deter 1 pair attempting to nest in the Recreation Zone. The pair ultimately nested alongside deterrent coverboards at the edge of the recreation zone.	1	1; 3% of pairs	26	0 (although pair hatched 2 chicks)	0	April 4	May 20	47	N/A	0.7
Nauset Beach (North Beach), Chatham	Reduced Proactive Symbolic Fencing of Habitat, Reduced Fencing Around Nests, Oversand (OSV) use in the Vicinity of Unfledged Chicks.	Oversand vehicles, self-escorted through a narrow corridor by passengers walking in front of each vehicle, were allowed past 2 broods of unfledged plover chicks.	2	2;14% of pairs	PP3	1	1	Aug 3	Aug 9	7	22	1.8
					PP15	4	4	Aug 3	Aug 9	7	20	

Location	Covered Activity	Description of Covered Activity Implementation	# Permitted Take Exposures	# Take Exposures Used; % of Total Pairs Exposed	Pair Identifier	# Chicks Exposed	# Fledged from Exposed Pairs	Start of Imple-menta-tion	End of Imple-menta-tion	# Days Pair/Brood Exposed to Covered Activity	Age of Chicks When First Exposed (Days)	Site Produc-tivity (Fledges/ pair)
East Beach and Leland Beach, Edgartown (TTOR)	Use of Oversand (OSV) Vehicles in the Vicinity of Unfledged Chicks	One brood was exposed to oversand vehicle use consisting of 20 tour vehicles operated by the beach manager.	2	1; 7% of pairs	7a	4	1	June 22	June 28	7	0	0.5
Coskata-Coatue, Nantucket (TTOR)	Use of Oversand (OSV) Vehicles in the Vicinity of Unfledged Chicks	No covered activities were implemented in 2019.	1	0; N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
Revere Beach Reservation, Revere and Winthrop Shore Reservation, Winthrop (DCR)	Reduced Proactive Symbolic Fencing of Habitat	Proactive symbolic fencing was reduced in a 0.6 acre area in front of the Shirley Ave bath house, which also provides emergency vehicle access. Beach raking was implemented to deter 1 pair of Piping Plovers scraping in the area. The female of the pair left within one day of implementation, although the male persisted until mid-June.	4	1; 5% of pairs	Non-nesting pair at Revere Beach - South	N/A	N/A	May 24	mid-June (when the male left the site; raking continued into August)	Female left within 1 day; male remained territorial for ~3 weeks	N/A	1.5

Location	Covered Activity	Description of Covered Activity Implementation	# Permitted Take Exposures	# Take Exposures Used; % of Total Pairs Exposed	Pair Identifier	# Chicks Exposed	# Fledged from Exposed Pairs	Start of Imple-menta-tion	End of Imple-menta-tion	# Days Pair/Brood Exposed to Covered Activity	Age of Chicks When First Exposed (Days)	Site Produc-tivity (Fledges/ pair)
Duxbury Beach, Duxbury (Duxbury Beach Reservation)	Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks	The covered area included Gurnet Road, which provides access to private residences at the south end of the barrier beach and recreational access to the beachfront. Multiple broods crossed between the beachfront and bayside of the road, 7 of which were exposed to recreational vehicle traffic. IAMP included intensive brood monitoring and traffic restriction when chicks were on or near the road.	19	7; 25% of pairs	1A	3	2	May 28	June 4	28	3	
					2A	4	0	May 31	May 31	39	3	
					3A	4	3	May 30	May 6	1	3	
					5B	2	1	Aug 12	Aug 20	5	25	
					7A	4	2	June 3	June 29	1	2	
					13A	4	3	June 7	June 14	1	4	
					15B	3	3	July 15	July 16	21	1	
Horseneck Beach Reservation, Westport (DCR)	Reduced Proactive Symbolic Fencing of Habitat, Reduced Symbolic Fencing Around Nests, Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks	Proactive symbolic fencing was reduced in a 0.3 acre area near a primary access point. The area was hand-raked every time scrapes were detected, and the pair departed the site without nesting.	3	1; 8% of pairs	Non-nesting pair	N/A	N/A	June 5	Aug 12	Raking of the area continued until all nesting plovers departed	0	0.8
Statewide	**See above**	**See above**	**39**	**19**	**N/A**	**47**	**39**	**N/A**	**N/A**	**N/A**	**N/A**	**1.5**

II.2 Summary of annual take exposure.

The total allowable take exposure for a given year is based on a three-year rolling average of the statewide Piping Plover breeding population (HCP, Table 3-1). The average breeding population size for 2016-2018 was 660 breeding pairs, based on Adjusted Total Count, resulting in an allowable exposure to covered activities of 7%, or a maximum of 46 broods, nests, and/or territories that could be exposed to covered activities statewide (MassWildlife 2016, 2017, 2018, Table 2). During 2019, 19 broods/nests/territories were exposed to covered activities, and exposure at each site was <15% of the breeding population size at that site, with the exception of Duxbury Beach (Table 1).

USFWS directly authorized Cape Cod National Seashore through 2020 to expose up to three pairs of Piping Plover to flexible management that could result in take exposure. Flexible management was not implemented, resulting in no additional Massachusetts take exposure (S. von Oettingen, personal communication). Although take exposure for recreational activities on federal properties is not associated with the Massachusetts Piping Plover HCP, MassWildlife is required to subtract these authorizations from the total allowable statewide take exposure available to HCP participants in a given year.

Table 2. Massachusetts Piping Plover Breeding Population, 2016-2018, and Actual and Allowable Take Exposure for 2018 under the Massachusetts Piping Plover HCP.

	YEAR		
	2016	**2017**	**2018**
MA Breeding Pairs (Adjusted Total Count)	641.5	650.5	688
Three-year average (2016 – 2018):	660		
Maximum Allowable 2019 Exposure (7%):	46 broods/nests/territories		
Actual 2019 Exposure:	19 broods/nests/territories		

II.3 Summary of the annual mitigation implemented, and any mitigation credits or deficits outstanding from previous years.

In 2019, MassWildlife provided $21,609 to three organizations for selective predator management. The New England Field Office of the USFWS approved all plans for the purpose of HCP mitigation. MassWildlife provided $8,770 The Trustees of Reservations, which contracted with USDA APHIS Wildlife Services for work on Crane Beachthat benefited 49 Piping Plover pairs, all of which were credited to the state (Table 3). MassWildlife also awarded $9,000 to Mass Audubon, which also contracted with USDA Wildlife Services for work at Allen's Pond Wildlife Sanctuary that benefited 19 pairs, all of which were credited to the state. MassWildlife also awarded $3,839 to BiodiversityWorks (84% cost share out of a total of $4,575 of effort). BiodiversityWorks conducted predator management efforts at key sites on Martha's Vineyard, benefitting 17 pairs, of which 14 were credited to the state. MassWildlife awarded BiodiversityWorks with additional funds to assess overwintering crow activity and departures to narrow down best timing for removal ($753) and to develop and print large interpretive signs ($595).

In addition, Duxbury Beach Reservation (DBR), the Town of Plymouth, and the Department of Conservation and Recreation (DCR) used their own resources to implement selective predator management at five sites (Duxbury Beach, Plymouth Long Beach, Sandy Point State Reservation,

Horseneck Beach Reservation, and Demarest Lloyd State Park) to mitigate for impacts associated with the covered activities included in their COIs. In all cases, USDA APHIS Wildlife Services carried out the work in accordance with plans approved by the New England Field Office of the USFWS for the purpose of HCP mitigation. This work was not cost-shared with MassWildlife. Duxbury Beach onsite selective predator management benefited 28 pairs of breeding Piping Plovers and Plymouth Long Beach onsite selective predator management benefited 30 breeding pairs. DCR implemented three selective predator management programs to mitigate for covered activities at two sites: a program at Sandy Point State Reservation mitigated for impacts at Revere Beach and Winthrop Shore Reservation; and programs at Horseneck Beach and Demarest Lloyd State Park mitigated for impacts at Horseneck Beach. Sandy Point selective predator management benefited 13 breeding pairs of Piping Plovers, while Horseneck Beach and Demarest Lloyd State Park selective predator management benefitted 19 breeding pairs.

MassWildlife and the COI holders implemented more than enough selective predator management to meet 2019 mitigation requirements. Therefore, there is a mitigation credit that carries forward (Table 3). At the mitigation ratios of 2.5:1 (OSV Use and Reduced Fencing) and 3:1 (Roads and Parking Lots), selective predator management was required to benefit 53 pairs in order to mitigate for exposures that occurred during 2019. In fact, selective predator management associated with the HCP benefitted 172.3 pairs (82.3 by state mitigation funds provided by COI holders and 90 directly by COI holders). Including credits carried forward from 2017 and 2018, there were 158.3 credits statewide and an additional 125.9 credits allocated to individual sites (*i.e.*, because the COI holder directly funded mitigation activities). However, some credits expired at the end of 2019. Tables 3 a-c provide additional detail.

Table 3a. Predator Management Mitigation Requirements and Credits for COI holders under the Massachusetts Piping Plover HCP in 2019.

2019 COI Sites							
COI Site	**No. Authorized Exposures**	**No. Actual Exposures in 2019**	**Predator Control Mitigation Required**	**Site Credits Gained in 2019**	**2019 Annual Site Credit Balance[a]**	**Total Site Credit Balance at End of 2019[b]**	**Year Credits will Expire**
Orleans	2	2	5	5 (escrow)	0	0	2021
Plymouth	5	4	12	30	18	56[c]	2019
Barnstable	1	1	2.5	2.5 (escrow)	0	0[c]	2019
Chatham	2	2	5	2.5 (escrow)	0	0[c]	2019
Edgartown	2	1	2.5	0	-2.5	16.4[c]	2019
Nantucket	1	0	0	same as Edgartown	same as Edgartown	same as Edgartown	2019
Revere/Winthrop	4	1	2.5	13	10.5	26[c]	2019
Duxbury	19	7	21	28	7	-5[d]	2020
Horseneck	3	1	2.5	19	16.5	32.5	2020
TOTAL	**39**	**19**	**53**	**90**	**49.5**	**125.9**	**N/A**

[a] Annual site credit balance includes site credits and take exposures from 2019 only; it does not include credits or deficits from previous years
[b] Total site credit balance includes site credits or deficits from previous years in addition to the 2019 season
[c] Credits expired at end of the 2019 permit term
[d] Credit balance reflects predator management credits only; remaining balance has been addressed through other mitigation strategies accepted under MESA, including strategic education and outreach experimental habitat management

Table 3b. Predator Management Mitigation Programs and Credits under the Massachusetts Piping Plover HCP in 2019.

2019 Mitigation Sites									
Mitigation Site	**Total Cost**	**HCP Cost (Applicant)**	**HCP Cost (DFW)**	**HCP Cost Share (Applicant)**	**Actual Pairs Benefiting**	**Site Credits Gained**	**State Credits Gained**	**Site Credits Used**	**Location(s) of Credit Use**
Crane Beach	$8,770	$0	$8,770	0%	49	0	49	2.5	Edgartown, Nantucket
Plymouth	$11,808	$11,808	$0	100%	30	30	0	12	Plymouth
Sandy Point	$8,450	$8,450	$0	100%	13	13	0	2.5	Revere/ Winthrop
Duxbury	$18,951	$18,951	$0	100%	28	28	0	21	Duxbury
Horseneck/ Demarest Lloyd	$9,785	$9,785	$0	100%	19	19	0	2.5	Horseneck
Allen's Pond	**$9,000**	$0	$9,000	0%	19	N/A[a]	19	0	N/A
Various sites, Martha's Vineyard	**$4,575**	$736	$3,839	16%	17	N/A[a]	14.3	0	N/A
DFW Subtotal	**N/A**	**N/A**	**$21,609**	**N/A**	**N/A**	**10 (escrow)**	**72.3[b] (excludes 10 escrow credits)**	**12.5 (escrow)**	**Orleans, Barnstable, Chatham**
TOTAL	**$71,339**	**$49,730**	**$21,609**	**N/A**	**175**	**90**	**72.3**	**53**	**N/A**

[a] Non-COI holders do not accrue site credits

[b] Mitigation credits derived from escrow agreements are directed to the funding source (COI holder) rather than the state at a rate of 2.5 credits per $5,800

Table 3c. Statewide Predator Management Net Mitigation Credits under the Massachusetts Piping Plover HCP in 2019.

2019 Net Credits						
Credit Type	**Credits at End of 2018**	**Credits Gained 2019**	**Credits Used 2019**	**Net Credits at End of 2019**	**Credits Expiring 2019**	**Credits Carrying Forward to 2020**
Credits Allocated to Individual Sites (includes escrow credits)	96.8	92.1	53	125.9	98.4	27.5
Credits Available Statewide	86.1	28.9	0	158.3	42.2	116.1
TOTAL NET CREDITS	**182.9**	**121**	**53**	**182.9**	**140.6**	**143.6**

II.4 Summary of exceptions to the restrictions on the number or territories/nests/broods affected (15% vs. 75%) and habitat impacts (2 acres/10% vs. 4 acres/20%) employed for the covered activities (as provided for in the Plan).

There was one exception to the restrictions on the number of territories/nests/broods affected (15% v. 75%). This exception was employed under the Duxbury Beach COI under the covered activity *Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks.* Following an emergency amendment, the COI allowed for take of up to 19 broods, although ultimately only 7 broods crossed the road in areas subject to recreational traffic.

II.5 Year-to-date cumulative summary (*i.e.*, from the start of the permit term) of temporary impacts to Piping Plover habitat resulting from covered activities.

Covered activities in 2016 were confined to existing roads, parking lots, and Oversand Vehicle (OSV) corridors, and therefore did not result in any additional impacts to habitat. Covered activities in 2017 included reduced proactive fencing and beach raking at two sites, resulting in temporary impacts to 0.6 acres of Piping Plover habitat at Winthrop Shore and 1.2 acres at Sandy Neck Beach Park. In 2018, covered activities impacted potential habitat at Sandy Neck Beach Park (1.2 acres), Revere Beach (0.96 acres), Winthrop Shore (0.44 acres affecting Least terns but not plovers), and Horseneck Beach (9.5 acres). As in 2017 and 2018, 1.2 acres of habitat at Sandy Neck Beach Park were subject to reduced proactive symbolic fencing in 2019, including use of beach raking and coverboards, in order to maintain a groomed "Recreation Zone" for OSV use. Approximately 0.6 acres of habitat at Revere Beach were subject to reduced proactive symbolic fencing and beach raking in front of the Shirley Ave bathhouse, where one pair of Piping Plovers attempted to nest. At Horseneck Beach, beach one pair of plovers was deterred by raking a 0.3 acre area near a major access point. Additional raking on the main beach affected 5.7 acres of least tern habitat.

II.6 Year-to-date and cumulative (*i.e.*, from the start of the permit term) quantification of exposure to incidental take of Piping Plover individuals for the purpose of demonstrating compliance with the authorized level of take on the ITP.

Table 4. Cumulative Quantification of Piping Plover Take Exposure under the Massachusetts Piping Plover HCP, 2016 – 2018.

Year	# of Broods/Nests/Territories Exposed	Total Statewide Allowable Take Exposures	% of Statewide Allowable Exposure
2016	3	47	6.4%
2017	5	46	10.9%
2018	19	46	38.8%
2019	19	46	38.8%

Three Piping Plover broods in 2016, five Piping Plover broods/nests/territories in 2017, and 19 broods/nests/territories in both 2018 and 2019 were exposed to covered activities; these equate to 6.4% (2016), 10.9% (2017), 38.8% (2018), and 38.8% (2019) of the statewide allowable exposure. The cumulative total equates to the exposure of 46 broods/nests/territories to covered activities over the first four years of the permit term.

II.7 Description of all experimental vegetation management actions implemented during the reporting period including a year-to-date and cumulative summary of the extent and location of land cover types enhanced through vegetation management.

To date, two experimental habitat management projects have been implemented, both in 2017. At Duxbury Beach, vegetation in five experimental plots was scraped or buried, creating and maintaining five areas of potential nesting habitat totaling approximately 0.77 acres. Two pairs nested in the replicated habitats in both 2017 and 2018. Duxbury Beach maintained these sites by burying vegetation in February 2019, and three pairs subsequently nested within the experimental plots. At Winthrop Shore Reservation, cobble was removed from the southern portion of the shorebird nesting area, where two pairs of Piping Plovers and 20-25 pairs of Least Terns nested in 2017. Plovers and terns continued to nest in this area in 2018 and 2019.

II.8 Assessment of the efficacy of vegetation management actions in achieving performance objectives and recommended changes to improve the efficacy of the methods.

Piping Plovers continued to nest in the experimental habitat areas at both Duxbury Beach and Winthrop Shore in 2019.

II.9 List of all plan participants and activities authorized for take coverage.

See Table 1.

II.10 Accounting of all mitigation funds collected from plan participants during the previous year, and any unspent funds from previous years.

Table 6. Accounting of Offsite Mitigation Funds

Statewide Mitigation Funds Balance	
Balance from Previous Years	
$ 10,085	Unspent 2018 Funds
Income	
$ 11,600.00	Orleans Escrow
$ 5,800.00	Barnstable Escrow
$ 5,800.00	Chatham Escrow
Expenses	
$ 8,770.00	USDA APHIS, Crane Beach Predator Management
$ 9,000.00	USDA APHIS, Allen's Pond Predator Management
$ 5,706.00	BiodiversityWorks, Predator Management and Education
Unspent Funds	
$ 9,809.00	Chatham deposited $5,800 following an emergency amendment in late July; funds will be retained for mitigation in future years

II.11 If appropriate, any updates to the mitigation fee as described under the adjustment process in Section 5.2.2.1 and an updated annual budget for DFW's plan implementation.

No adjustments to the mitigation fee or MassWildlife implementation budget are required at this time.

II.12 If available at the time of the annual report, evidence that DFW's needed funding has been assured for the coming year by the State legislature, and the funds have been earmarked or segregated for their intended purpose within DFW's accounting system.

Funding for Massachusetts Fiscal Year 2020 (ending June 30, 2020) has been secured (Appendix X). Funding for Fiscal Year 2021 has not yet been assured. As required by the HCP, MassWildlife will provide a funding assurance letter to USFWS in advance of any 2020 covered activities being implemented.

II.13 Accounting of the cost of all mitigation measures implemented in the previous fiscal year and the expected cost of mitigation measures in the upcoming fiscal year.

An accounting for the costs of all mitigation measures implemented in 2019 ($71,339) is provided in Table 3b. Additional information on off-site mitigation is provided in Table 6. Mitigation is expected to exceed $80,000 in 2020 of which approximately $25,000 will be for off-site mitigation, including selective predator management, experimental habitat management, and education and outreach.

II.14 Record of any grants and Plan implementation contracts awarded to plan participants, other landowners, or implementation partners.

Massachusetts Division of Fisheries and Wildlife (DFW) used off-site mitigation commitments to fund predator management through three contracts in 2019. The first contract of $8,770 funded USDA APHIS Wildlife Services at Crane Beach. The second contract of $9,000 funded USDA APHIS Wildlife Service at Allen's Pond, a site owned and managed by MassAudubon. A third contract of $5,706 funded BiodiversityWorks to conduct predator management, assess overwintering crows, and create interpretive signage at various sites on Martha's Vineyard (Table 6).

II.15 Description of the adaptive management process used during the reporting period, if applicable.

No adaptive management took place during the 2019 reporting period.

II.16 Summary for the reporting period of the monitoring program objectives, techniques, and protocols, including monitoring locations, variables measured, sampling frequency, timing and duration, and analysis methods.

The monitoring program documented implementation of covered activities, compliance with the Guidelines, and mitigation programs. COI holders kept required logs of initiation dates of covered activities; number of broods and chicks exposed; locations of exposed broods and any impacts to the broods associated with the covered activity; and monitoring frequency. MassWildlife was notified at least 24 hours in advance of implementing the covered activities and subsequently conducted COI compliance site visits at each site with a COI. Compliance with the impact avoidance and minimization protocols was documented in logs and summarized in the COI holder final reports. Final reports and invoices also document implementation of required mitigation, which was also reported by USDA APHIS.

The monitoring program also aimed to assess the impacts of covered activities and effectiveness of impact minimization measures and mitigation programs. Effectiveness monitoring consisted of documenting pair behavior, chick behavior, crossing frequency, and nesting and fledging success at the

covered activity implementation sites. Measures of reproductive success were also collected at the selective predator management implementation sites. Monitoring information was provided to MassWildlife in HCP final reports (Appendices A-I) and through the PIPLODES online database. MassWildlife coordinated the synthesis of 2019 Piping Plover data by cooperators, performed quality control, and finalized the 2019 index count, adjusted total count, and productivity of breeding Piping Plovers.

II.17 Assessment of the efficacy of the monitoring and research program and recommended changes to the program based on interpretation of monitoring results and research findings, if applicable.

Compliance monitoring occurred at each of the sites that implemented covered activities in 2019, and all sites appeared to be in compliance with the Guidelines. However, making inferences about the effectiveness of mitigation measures and impacts of covered activities on productivity is methodologically challenging and will require larger sample sizes and possibly other methods, such as establishment of predator management control sites. There are no recommended changes to the monitoring program at this time; however, DFW will continue to develop formal methods for assessing efficacy of predator management as required in the HCP.

II.18 Description of all Plan-directed studies undertaken during the reporting period; a summary of study results; and a description of integration with monitoring, assessment, and compliance elements.

DFW contracted with the State University of New York College of Environmental Science and Forestry (principal investigator Dr. Jonathan Cohen and investigator Michelle Stantial) to analyze retrospective Piping Plover productivity data and assess the efficacy of predator removal from Piping Plover nesting sites in Massachusetts. This work builds on a similar study conducted by Cohen and Stantial in 2018, in which they were unable to detect a statistically significant effect of predator management on nest or chick survival. Cohen and Stantial were again unable to detect a significant difference in nest predation and abandonment rates at sites with and without predator removal, although they noted that nest exclosures resulted in significantly lower nest predation rates but higher abandonment rates, which may be associated with adult mortality. To better assess the effects of predator removal in the future, Cohen and Stantial recommended a before/after study design along with recording nest status during every nest check. See Appendix N for the full report.

II.19 Description of any actions taken or expected regarding adaptive management and/or changed circumstances, including remedial actions resulting from any Plan or permit amendments granted in the prior years, if applicable.

No actions were taken or expected regarding adaptive management and/or changed circumstances in 2019.

II.20 Description of any unforeseen circumstances that arose and responses taken, if applicable.

Emergency amendments were issued to two COI holders in 2019. At Nauset (North) Beach, Chatham, an emergency amendment increased allowable take exposures from one to two (Appendix V). At Duxbury Beach, Duxbury, amendments increased allowable take exposures from 11 to 19, and expanded covered activities to include Least Terns (Appendix W).

II.21 Summary of any administrative changes, minor modifications, or major amendments proposed or approved during the reporting year (see Section 5.3.3, *Modifications to the Plan*). Any information about mitigation measures other than selective predator management, the associated funding, and monitoring is being provided for informational purposes only, as the USFWS has indicated that these activities do not count as mitigation to offset take associated with the ITP.

An amendment to the Plan was proposed in 2017 and approved by USFWS on June 28, 2019. The amendment allows take exposure of up to 75% of pairs at up to eight sites.

II.22 Other state or federally listed species affected by HCP implementation

Covered activities had the potential to result in take of state-listed Least Terns at Nauset Beach, Orleans; Plymouth Long Beach, Plymouth; Sandy Neck Beach Park, Barnstable; Nauset Beach (North Beach), Chatham; Winthrop Shore, Winthrop; Horseneck Beach, Westport; and Duxbury Beach, Duxbury. As a result, DCR, DBR, and the towns of Orleans, Plymouth, Barnstable, and Chatham developed impact minimization and mitigation plans for Least Terns and obtained Conservation and Management Permits to ensure Massachusetts Endangered Species Act (MESA) compliance. Least Terns were not exposed to take in Orleans, Barnstable, or Winthrop in 2019. Two Least Tern chicks were exposed to *Use of Oversand Vehicles in the Vicinity of Unfledged Chicks* in Chatham, which mitigated for take via escrow funding. The state-funded off-site mitigation for Least Terns benefitted 190 pairs at Crane Beach, approximately 26 pairs at Allen's Pond, and approximately 37 pairs on Martha's Vineyard. The other COI holders conducted on-site mitigation.

At Plymouth Long Beach, Least Tern chicks were exposed to *Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks* between June 24 and August 13. The Town of Plymouth installed a barrier to prevent unfledged Least Tern Chicks from entering the road. They carried out intensive monitoring as described in the IAMP and presented in their Final Report (Appendix B). Although it is challenging to monitor tern chicks, an estimated 34 chicks were exposed to the covered activity; no evidence of road-related mortality or injury was detected, although productivity was poor. On-site mitigation consisted of implementation of selective predator management benefitting an estimated 98 breeding pairs of Least Terns. At a mitigation ratio of 2:1 for Least Terns, Plymouth gained 30 credits in addition to the 67.2 credits carrying over from 2017. However, credits expired at the end of 2019.

At Horseneck Beach, an estimated five pairs of Least Terns were exposed to *Reduced Proactive Symbolic Fencing* (Appendix I). DCR conducted predator management on-site and at Demarest Lloyd, benefitting 42 pairs of Least Terns. At a mitigation ratio of 2:1, DCR has a Least Tern mitigation balance of 35 pairs entering 2020.

At Duxbury Beach, an estimated eight broods were exposed to *Use of Oversand Vehicles in the Vicinity of Unfledged Chicks*, although no chicks approached within 50m of the vehicle corridor, and no evidence of OSV-related mortality or injury was detected. On-site mitigation consisted of implementation of selective predator management benefitting an estimated 156 breeding pairs of Least Terns. At a mitigation ratio of 2:1 for Least Terns, Duxbury gained 140 credits, which will carry over into 2020.

Covered activities also had the potential to result in take of state-listed Diamond-backed Terrapins (*Malaclemys terrapin*) at Nauset Beach, Orleans and Sandy Neck Beach Park, Barnstable. The towns of

Barnstable and Orleans therefore developed impact minimization and mitigation measures, including nest protection, for Diamond-backed Terrapins with potential to be impacted by *Oversand Vehicle Use in the Vicinity of Unfledged Chicks* in their requests for COI. For this species, the benefits of nest protection are expected to outweigh the risk of mortality associated with the OSVs. The Nauset Beach Conservation and Management Permit (CMP) pursuant to MESA covered limited exposure of terrapins in Orleans because terrapins sometimes cross the OSV corridor to nest. Terrapin nests in close proximity to the OSV corridor were relocated to the "Pochet Overwash Turtle Garden," where they were exclosed by a trained staff member from Mass Audubon's Wellfleet Bay Sanctuary (Appendix A). In total, 53 of 70 terrapin eggs hatched, and the hatchlings were released along Pochet Creek. During implementation of the covered activity, there were no observed mortalities or negative impacts to adult or hatchling terrapins. The Sandy Neck CMP also covered limited exposure of terrapins at Sandy Neck because terrapins are sometimes found crossing or nesting within the Marsh Trail, which is used by essential vehicles and campers. However, no terrapins were exposed to take in 2019 (Appendix C).