MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

Request for Certificate of Inclusion for Piping Plover Habitat Conservation Plan
MESA Review Checklist & Application Cover Page

Project Location:

Address/Location	Duxbury Beach, MA
City(ies)/Town(s)	Duxbury, MA and Plymouth, MA

Applicant:

Individual	Bradford Bower
Organization	Duxbury Beach Reservation, Inc.
Mailing address	P.O. Box 2593, Duxbury, MA, 02331
Phone & Email	(805) 807-4086; bradford@duxburybeachreservation.org

Property Owner(s) Information (if different from Applicant): **Provide separate sheet if multiple landowners*

Individual(s)	
Organization(s)	
Mailing address	
Phone & Email	

Representative (if any):

Individual	
Organization	
Mailing address	
Phone & Email	

Has this project previously been issued a NHESP Tracking Number (either by previous NOI Submittal or MESA Information Request Form)? Y/N If yes, Tracking no._____

Is coverage for Least Terns also being requested? (Y/N)	Yes			
List additional MESA-listed species in project area (if known):				

REQUESTED COVERED ACTIVITIES FOR PIPING PLOVER

Covered activity:	***Use of roads and parking lots in the vicinity of unfledged chicks***	***Recreation and beach operations***	***Oversand vehicle use in vicinity of unfledged chicks***	***Total****
*No. requested take exposures**	14	2	0	16
Max. % of total pairs at site to be exposed				40%
Acreage affected				2.2
Max. % of total nesting acreage affected for this species at site				0.4%

* The Total *No. requested take exposures* should be a maximum number of exposures for all Covered Activities combined in a given year (i.e., a not-to-exceed value). As beach operators may not be able to predict which Covered Activities will be implemented in a given year, a range of values or maximum value may be presented for each individual activity. For instance, requested exposures under each of the three activities might be 2 while the Total might be less than 6.

REQUESTED COVERED ACTIVITIES FOR LEAST TERN OR OTHER AVIAN SPECIES (identify species): _____

Covered activity:	***Use of roads and parking lots in the vicinity of unfledged chicks***	***Recreation and beach operations***	***Oversand vehicle use in vicinity of unfledged chicks***	***Total****
*No. requested take exposures**				
Max. % of total pairs at site to be exposed				
Acreage affected				
Max. % of total nesting acreage affected for this species at site				

* The Total *No. requested take exposures* should be a maximum number of exposures for all Covered Activities combined in a given year (i.e., a not-to-exceed value). As beach operators may not be able to predict which Covered Activities will be implemented in a given year, a range of values or maximum value may be presented for each individual activity. For instance, requested exposures under each of the three activities might be 2 while the Total might be less than 6.

REQUESTED SPECIFIC METHODS ASSOCIATED WITH IMPLEMENTING COVERED ACTIVITIES (check all that apply)

	Piping Plover	**Least Tern**	**Other (identify): _____**
Reduced proactive symbolic fencing	☑	☑	☐
Reduced fencing around the nest	☑	☑	☐
Beach raking	☐	☑	☐
Physical deterrents (coverboards, flagging, etc.)	☑	☑	☐
Chick herding	☑	☑	☐
Barriers	☑	☐	☐
Nest moving	☑	☑	☐
Other (briefly identify) _____	☐	☐	☐

PROPOSED PIPING PLOVER MITIGATION (Mitigation for other species should be proposed in the IAMP; see below.)

Type	**Y/N**	**Total amount**	**Pairs to benefit (credits)**
*Pay fee for offsite mitigation**	No	$ NA	NA
Applicant-implemented activities (in lieu of fee):			
· Selective predator management	Yes	Submit details in IAMP (see below)	
· Increased education & outreach	Yes		MassWildlife will determine value (credits) for these activities
· Increased law enforcement	Yes		
· Habitat management	Yes		
· Other	Yes		

* Mitigation ratios (mitigation credits:exposure) and fees (per pair, nest, brood, or territory) are: Use of Roads and Parking Lots (vehicular, 3:1 or $6,150; non-vehicular, 2.5:1 or $5,800); Recreation & Beach Operations, Oversand Vehicle Use (2.5:1 or $5,800)

OTHER REQUIRED ELEMENTS OF REQUEST FOR COI

*(Please attach. See a*dditional guidance available to applicants; contact coastal.waterbirds@mass.gov.)

- [x] Site map – showing parcel boundaries and provide proof of ownership
- [ ] Written assent of landowner(s) to request coverage, if applicant is not landowner
- [x] Site-specific Impact Avoidance and Minimization Plan (IAMP) in format specified by MassWildlife in available guidance
- [ ] Mitigation plan, including budget
- [ ] MA Endangered Species Act filing fee
  ($300 payable to "**Comm of MA – NHESP**"; https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review)
- [ ] Conservation and Management Permit fee
  ($600 payable to "**Comm of MA – NHESP**"; https://www.mass.gov/how-to/apply-for-a-conservation-management-permit)
- [ ] Draft Escrow/Mitigation Fund Agreement, with applicant-specific edits in TrackChanges/redline (if mitigation fee will be paid)
  Contact: Coastal.Waterbirds@mass.gov for template agreement.

SUBMITTAL

- [ ] Mail a hard copy of entire application (including signed cover sheet) with checks, to:
  Environmental Review-HCP, MassWildlife-NHESP, 1 Rabbit Hill Rd., Westborough, MA 01581.
- [x] Also email entire application to: **Coastal.Waterbirds@mass.gov**.

REQUIRED SIGNATURES

Provide separate sheet if multiple landowners

I hereby certify under the penalties of perjury that the foregoing HCP/MESA filing and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge.

Cristin Luttazi
Signature of Property Owner/Record Owner of Property Date 12/15/2022

Bradford Bower
Signature of Applicant (if different from Owner) Date 12/15/2022

GUIDANCE FOR REQUESTING A CERTIFICATE OF INCLUSION UNDER THE MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE'S HABITAT CONSERVATION PLAN FOR PIPING PLOVER

Massachusetts Division of Fisheries & Wildlife

December 2, 2022

The Massachusetts Statewide Habitat Conservation Plan (HCP) for Piping Plover is intended to contribute to achieving the long-term viability of a robust Massachusetts population of the Piping Plover (*Charadrius melodus*) while maintaining and improving the public access, recreational opportunities, and economic activity associated with the state's beaches.

The HCP describes covered activities that expose Piping Plovers to "take." In association with the HCP, such take was authorized by an incidental take permit (ITP) issued to the Massachusetts Division of Fisheries and Wildlife (Division) by the U.S. Fish and Wildlife Service. The HCP functions as an umbrella plan whereby incidental take coverage can be extended via Certificates of Inclusion (COI) to approved landowners and beach managers that (1) engage in the covered activities described in the HCP, (2) meet the eligibility and COI application requirements described in the HCP, and (3) agree to implement the HCP and required ITP conditions.

Applicants must be in compliance with all applicable state, Federal, or local laws and regulations before implementing covered activities. Additionally, the Division's expectation is that applicants' and COI-holders' activities are consistent with the State (*Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns and Their Habitats in Massachusetts*) and Federal (*Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act*) guidelines at sites throughout Massachusetts, or as otherwise approved by the Division in writing.

1. How do I apply for a Certificate of Inclusion (COI)?

Submit a Request for Coverage ("Request") with the following elements (also see HCP, p. 5-12):

a. Request for COI MESA Review Checklist & Application Cover Page
b. Site Map – showing boundaries and with proof of ownership or written assent of landowner(s) to request coverage
c. Site Specific Impact Avoidance and Minimization Plan (IAMP)
d. Mitigation Plan
e. MA Endangered Species Act filing fee ($300; https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review) and Conservation and Management Permit fee ($600; https://www.mass.gov/how-to/apply-for-a-conservation-management-permit)

The Request must have the title,

(*Organization Name*) Request for Certificate of Inclusion on (*Site Name*), (*Year*)

where (*Year*) is the expected first year of implementation.

See below for more information on the IAMP and Mitigation Plan.

2. What is the first step?

Although an applicant could elect simply to submit all the required materials to the Division for review, this approach is strongly discouraged. As much in advance of the beach season as possible (preferably no later than November 1), we strongly recommend: (1) contacting us to initiate a pre-filing consultation; and (2) submitting an information request to identify whether any other state-listed species may be present at your site. The Division will contact you to identify information needs and provide assistance to help you develop the draft IAMP and Mitigation Plan prior to submitting a final Request. This approach typically results in a more efficient permitting process by proactively identifying information needs and key measures that will help to avoid, minimize, and mitigate impacts to state-listed species. To initiate a pre-filing consultation and request information on other state-listed species that may be pertinent to your site, please submit an Information Request Form (https://www.mass.gov/doc/state-listed-species-information-request-form/download) along with a brief project description (requesting inclusion in the HCP program and which covered activities you anticipate requesting coverage for), map of the property, and $50 fee to the address listed in the form. To speed up the consultation process, also email your form to Coastal.Waterbirds@mass.gov.

Then we recommend developing the draft IAMP and Mitigation Plan in consultation with the Division prior to submitting a final Request. To initiate a pre-filing consultation, contact Coastal.Waterbirds@mass.gov.

3. What is the Request for COI deadline?

Final Requests for COI are due on **December 15.**

Impact Avoidance & Minimization Plan (IAMP)

This section provides a template for preparing an IAMP. Covered activities and required elements of an IAMP are described in HCP section 3.2. Potential avoidance and minimization measures are summarized in HCP section 4.3.1. The Division's "*Developing a Beach Management Plan that Protects Piping Plovers and Terns in Massachusetts*" provides additional guidance on information requested and conformance with the Guidelines.

I. Site description
    a. Acreage
    b. Infrastructure (roads, buildings, parking lots, etc.)
    c. Access points
    d. Types of habitat and key natural features
    e. Map with parcel boundaries and landmarks clearly labelled
    f. Supporting photographs, if appropriate

II. Ownership and management entity(ies); other related departments or groups typically accessing the site (e.g., police departments at municipal beaches, conservation commissions, recreation, public works, etc.)

III. Responsible staff. List names and describe credentials of technical staff responsible for preparing, implementing, and updating the HCP plan. Describe roles and responsibilities of each key staff person, as well as their typical schedules, including hours/week.

IV. Piping Plovers – Focus on the last 5 years, highlighting earlier major population, habitat, or management changes as necessary
    a. Mapped distribution at the site
    b. Population size
    c. Reproductive success
    d. Threats at the site (predation, overwash, etc.)
    e. Other background information of significance

V. Least Terns and other rare species, if applicable – Provide information similar to that outlined for Piping Plovers, above.

VI. Beach operations and management – This section should be concise but detailed enough to demonstrate compliance with Guidelines for plovers and terns. For each item, provide a description, location, timing, frequency, policies, and other relevant details. Explicitly address how compliance with Guidelines will be accomplished for each activity (excepting covered activities). Focus should be on the April 1 - September 30 timeframe, when nesting or staging birds may be present.
    a. Hours beach is open to public throughout the year
    b. Recreational activities (swimming; sunbathing; picnicking; volleyball, kite-boarding, and other organized and non-organized land- and water-based sports; biking; horse riding; campfires/bonfires; boating; hunting; fishing; shellfishing; camping; kite and drone use; etc.)
    c. Parking and roads
    d. Beach rules and regulations, including dog/pet policies and leash laws
    e. Fencing and signage
    f. Compliance and law enforcement
    g. Commercial/vendor activities (weddings, rental kiosks, restaurants and food kiosks, tours, vendor deliveries, portable toilets, etc.)
    h. Events (weddings, tournaments, festivals, fundraisers, fireworks, beach clean-ups, etc.)

i. Maintenance
j. Seasonal installation of lifeguard stands, stairs, ADA boardwalks, roll-out mats, portable toilets, speed bumps, kiosks, etc.
k. Beach grooming
l. Trash management
m. Management of wrack/seaweed
n. Sand redistributions and beach grading
o. Recreational and essential vehicle use, including vehicle permitting systems

VII. Bird management and monitoring
a. Management history
b. Entity currently conducting plover and tern management and monitoring
    i. Agreements or contracts with other entities to provide monitoring services
c. Management techniques (fencing, signage, vegetation management, predator control, exclosures, etc.)
d. Numbers of bird monitors, qualifications, and duties
e. Seasonal staff start and end dates, hours/week, daily schedules and weekly coverage of the beach during the nesting season
f. Training and oversight of monitors
g. Data collection and recording protocols
h. Data reporting
i. Public education and outreach

VIII. Covered Activities – If applicable, this section must also include consideration of Least Tern or other state-listed species on site and describe how Take will be avoided or how a net benefit will be provided to these species.
a. List covered activities that are proposed and number of pairs/broods/nests/territories to be exposed. As beach operators may not be able to predict precisely which combination of covered activities may be carried out in a given year, the list may include contingencies such as reduced fencing buffer *or* nest moving depending on circumstances in a given season.
b. Detailed protocols for implementing required impact minimization measures when carrying out each covered activity. Guidance on preparing the site-specific impact minimization protocols for each covered activity can be found in the Chapter 3 of the HCP.
c. Monitoring plan for covered activities
    i. Compliance monitoring. Compliance monitoring tracks the status of Plan implementation and documents that all requirements of the Plan are being met. Compliance monitoring verifies that Plan participants are carrying out the terms of the Plan in accordance with their COIs.
        1. Provide logs, datasheets, or NestStory screenshots to demonstrate that you are prepared to document required staffing, scheduling, hours of escorted vehicle operation, number of vehicles, raking locations and dates, brood location checks, etc.
    ii. Effectiveness monitoring. Effectiveness monitoring assesses the biological success of the Plan and includes both status and trends monitoring and effects of management monitoring.
        1. Demonstrate that you have the specific data collection protocols in place to 1) document impacts of covered activities, and 2) fulfill monitoring objectives. (*e.g.*, sufficient staffing, protocols, and datasheets to document

events such as nest abandonment or adult disturbance in response to reduced symbolic fencing buffers, chick loss and potential causes, etc.)

2. Detail the measurable objectives of the monitoring

d. Describe how your staffing with participation in the HCP differs from your staffing absent participation in the HCP. Compare numbers and roles of staff, hiring dates and durations, scheduling, weekly hours, etc.

IX. Budget

a. Approved annual budget covering all site management and staffing needs associated with implementation of the IAMP. If the annual budget cycle does not allow pre-approval of the budget, a draft to be approved later is adequate. However, final annual budget must be approved/authorized prior to implementation of covered activities in a given beach season)

b. Provide a budget breakdown to outline how your budget with participation in the HCP differs from your budget absent participation in the HCP. Provide supporting text.

Mitigation Plan

Options (See HCP sections 4.3.2 and 4.3.3):

I. Provide funding to the Division to implement selective predator management, educational outreach, and increased law enforcement ("off-site")
    a. DFW will set the amount of funding required to implement mitigation for each territory/pair/nest/brood exposed to covered activities
    b. Applicant will make payment into a dedicated mitigation fund or place funds in escrow prior to carrying out covered activities. After year 1 of your permit, the Division will set an earlier due date for payment of funds to ensure that mitigation can be carried out in advance of covered activities.

II. Participant implements mitigation on one or more sites under participant's control ("on-site" or "internal")
    a. Submit a detailed mitigation plan to the Division that includes:
        i. A detailed description of proposed mitigation activities, including who will implement them and that entity's qualifications to do so
        ii. A description of how the mitigation will benefit Piping Plovers, including a quantitative assessment if possible
        iii. A monitoring plan including specific criteria to assess effectiveness
        iv. An itemization of costs for implementing the mitigation program

Note: Your mitigation plan must address Take of Least Terns and/or other state-listed species if applicable. For these species, the Division will determine mitigation ratios and/or mitigation funding appropriate for the covered activity and type of mitigation proposed.

Massachusetts Habitat Conservation Plan for Piping Plover

Request for Amended Certificate of Inclusion

Prepared for submission to:

Massachusetts Division of Fisheries & Wildlife
Natural Heritage & Endangered Species Program
1 Rabbit Hill Road
Westborough, MA 01581

Prepared by:

Duxbury Beach Reservation, Inc.
P.O. Box 2593
Duxbury, MA 02331

December 2020

Contents

Introduction and Overview

The following is a request by Duxbury Beach Reservation, Inc. for an amended Certificate of Inclusion (COI) in the statewide Habitat Conservation Plan (HCP) for Piping Plover for the 2021-2023 nesting seasons on Duxbury Beach. The request includes four covered activities: Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks and Least Tern Chicks; Recreation and Beach Operations Associated with Reduced Symbolic Fencing Around Nests; Recreation and Beach Operations Associated with Reduced Proactive Symbolic Fencing of Piping Plover and Least Tern Habitat; and Recreation and Beach Operations at Piping Plover and Least Tern Nest Sites with Nest Moving. Review of the past three years of nesting on Duxbury Beach has determined that 162 piping plover broods and 25 least tern pairs may be impacted. The area affected will be length of Gurnet Road from the north edge of the property (Northern Lot formally known as the Lagerstedt Lot) to the Gurnet Guardhouse in the south covering 7.2 kilometers (4.5 miles) of improved gravel roadway. The area may be reduced for some covered activities if recreational activity (driving) is restricted.

The Reservation is proposing that mitigation will be in the form of self-funding to implement selective predator management on-site, increased education and law enforcement efforts, and activities related to habitat enhancement. A suite of mitigation measures is presented in Section 6.1.

1.0 Site Description

Duxbury Beach is a barrier beach that consists of a peninsula, 12 kilometers (7.5 miles) long, extending from the Town of Duxbury at the northern end to the communities of Gurnet and Saquish (hereafter referred to as "Gurnet-Saquish") at the southernmost end (Town of Plymouth). Duxbury Beach Reservation, Inc. (the Reservation), a 501 (c)(3) charitable corporation, owns 7.2 kilometers (4.5 miles) of Duxbury Beach, including the portion leased by the Town of Duxbury, Duxbury Beach Park, and the far northern section of the beach that the Reservation reserves for public access. The property is an average of 60 meters (67 yards) wide – ranging from 46 meters (50 yards) to 168 meters (183 yards) and covering approximately 550 acres. Duxbury and Kingston Bays, as well as the northerly part of Plymouth Bay, lie west of the beach. The beach is owned and managed by Duxbury Beach Reservation, with the exception of the extreme southerly end of the beach (Gurnet-Saquish), which contains approximately 205 homes, mostly occupied by summer residents.

Duxbury Beach Reservation consists of several parcels of property in both Duxbury and Plymouth. These parcels span from the northern end of Duxbury Beach Park in Duxbury to the Gurnet Guardhouse in Plymouth. Several partners manage portions of the beach and oversee aspects of the day to day operations, particularly in regard to human-use and enforcement. The Town of Duxbury leases the portion of Duxbury Beach from the northern end of the town parking lot (referred to as the Resident Parking Lot) south to the Gurnet Guardhouse in Plymouth. Duxbury Beach Park, also known as "Blakeman's", "The Bathhouse", and "The Pavilion" interchangeably, is under contract with Dana Battista. Duxbury Beach Park is managed as a parking area, restaurant, and recreational beach.

1.1 Physical Description of the Property

Duxbury Beach is a barrier beach located in the towns of Duxbury and Plymouth, Massachusetts. It connects to the mainland at a kame (a small, circular hill of glacial drift) in Duxbury, approximately 1.6 kilometers (1 mile) south of Green Harbor, Marshfield, and extends southeast along Gurnet Road into Plymouth (Appendix 1, Maps 1-4). Duxbury Beach ends at the drumlin of Gurnet Point in Plymouth. Between these two glacially formed

anchor points at the northern and southern ends is a third point, at a section of the beach referred to as High Pines, which is glacial till covered by sand dunes. Duxbury Beach was formed due to the erosion of glacial landforms as sand and gravel began to accumulate, protruding from these three anchor points and eventually joining to create Duxbury Beach.

On its western side, Duxbury Beach protects tidal flats; salt marsh; and Duxbury, Kingston, and the northerly part of Plymouth bays. In addition, valuable shellfishing activity is conducted in these areas. Coastal dune and coastal beach span much of the length of Duxbury Beach. The beach is a combination of sand, pebble, and cobble substrate. Due to shoreline armoring efforts by the towns of Scituate and Marshfield, sediment reaching Duxbury Beach has greatly diminished, leaving cobble exposed on Duxbury Beach for longer portions of the year when sand would historically build up during the summer. In order to maintain the barrier beach, the Reservation has made extensive efforts to prevent breaches, including dune reconstruction, beach nourishment, berm creation, and vegetation management.

Extensive vegetation management by the Reservation, including beach grass and woody shrub plantings and annual fertilizer placement, have helped to maintain and recolonize vegetated areas in an effort to stabilize the barrier beach. Vegetation management occurs with consideration of maintaining shorebird nesting habitat and with approval from the Massachusetts Natural Heritage and Endangered Species Program (NHESP). Dunes and marsh are vegetated with American beach grass (*Ammophila breviligulata*), Eastern red cedar (*Juniperus virginiana*), beach plum (*Prunus maritima*), beach rose (*Rosa rugosa* and *Rosa virginiana*), bayberry (*Myrica pensylvanica*), goldenrod (*Solidago sempervirens*), poison ivy (*Rhus radicans*), common mullein (*Verbascum thapsus*), sea lavender (*Limonium carolinianum*), saltmarsh cordgrass (*Spartina alterniflora*), etc.

Although much of the length of the barrier is narrow with low lying coastal dunes, the anchor points mentioned above are areas of diverse coastal habitats. The northern part of the beach protects saltmarsh habitat which extends to the mainland. The glacial till at High Pines is covered with tall woody vegetation and protects a small area of saltmarsh. Extending north from Gurnet Point is Plum Hills, an area of higher coastal dunes and dense woody vegetation. Westward of Plum Hills is saltmarsh extending to Saquish, a barrier beach anchored at Gurnet Point and extending southwest. The entirety of Duxbury Beach is mapped by NHESP as Priority Habitats of Rare Species and Estimated Habitats of Rare Wildlife. Piping plover (*Charadrius melodus*) and least tern (*Sternula antillarum*) nest on Duxbury Beach, on the eastern and western sides of the beach. A large number of other shorebirds use Duxbury Beach for staging and as a stopover during migration. During the winter, snowy owls (*Bubo scandiacus*), captured at Logan Airport are released on Duxbury Beach. While many of the snowy owls continue south, some remain on Duxbury Beach for several months.

Duxbury Beach is accessible via Marshfield along Gurnet Road, to the Beach roadway at the north end of the Reservation property in Duxbury and from the west in Duxbury via the Powder Point Bridge, which extends from the mainland at Powder Point to the Beach, merging with the Beach roadway at the southern end of a series of parking lots. Gurnet Road continues the length of the Beach in Duxbury, becoming King Arthur Road as it crosses the Plymouth town line before reaching Gurnet Point. The roadway is paved in small sections from the north and again in and near the parking lots, but is primarily an improved gravel road (as defined by the HCP) composed primarily of processed gravel. There is a court-protected right of way for land owners of Gurnet/Saquish (and their visitors) from Marshfield to Plymouth over the roadway. The roadway also provides access for Duxbury residents and non-residents with current over-sand vehicle (OSV) permits to the beach, and access to tidal flats for vehicles with over-sand vehicle permits with separately-licensed fishing or shellfishing.

Shellfishing access points are located intermittently on the west side of the roadway for access to the bayside beach. Limited OSV permit holders access the oceanside beach designated via three vehicle crossovers. Crossovers 1 and 2 are located south of the town parking lots and north of High Pines, and Crossover 3 is located

to the south of High Pines. Vehicle use on the oceanside beach is restricted by a series of posts running perpendicular to the beach to the north of Crossover 1 and to the south of Crossover 3, referred to as the North Poles and South Poles.

Four areas provide parking options for non-OSV visitors to Duxbury Beach: the Northern Lot (east of Gurnet Road and north of Duxbury Beach Park), Duxbury Beach Park lots (east and west of Gurnet Road to the north and east of the road to the south, known as the "Caterers' lot"), and the Duxbury Beach town resident lots (east and west of Gurnet Road north of the Powder Point Bridge and west of the road to the south), and the West End Lot (west end of Powder Point Bridge, not on Reservation property). Eleven "pull-offs" exist south of the bridge on the east and west side of the road and are usable by those with over-sand permits, unless closed due to protected species nesting.

Pedestrians are able to access the oceanside and bayside beach via walkways at the parking lots, including handicap accessible ramps oceanside at the town resident parking lot and Duxbury Beach Park and bayside at the Powder Point Bridge Guardhouse. Two pedestrian-only paths cross the dunes to the oceanside beach from Gurnet Road just south of the town resident lots. In addition, OSV access points on oceanside and bayside (three crossovers and shellfishing access roads) provide paths for pedestrians between the beach and Gurnet Road.

Duxbury Beach offers two lifeguarded beaches from Memorial Day through Labor Day. One lifeguarded beach is located on the town-leased portion of the oceanside beach in front of the resident parking lot, consisting of an area 91 meters (100 yards) on either side of a stationary lifeguard chair. A second lifeguarded beach is located at Duxbury Beach Park.

Four buildings are located on Duxbury Beach, consisting of the following (north to south): McLaughlin Cottage, the Pavilion, Powder Point Bridge Guardhouse, and High Pines Cottage. The McLaughlin Cottage is owned by a private individual for personal use, but it sits on Reservation-owned land. The cottage is located between the Northern Lot and Duxbury Beach Park. The remaining three buildings are owned by Duxbury Beach Reservation. The Pavilion building consists of a restaurant, snack bar, and upstairs loft operated by Duxbury Beach Park. The Powder Point Bridge Guardhouse is located at the east end of the Powder Point Bridge. Town of Duxbury Beach Operations Beach Rangers or Police Officers staff the guardhouse. High Pines Cottage is a garage structure with a second floor. It is located at High Pines, and Reservation personnel use it for storage, meetings, and monitor trainings.

1.2 Piping Plover Nesting

Piping Plover Nesting Habitat

Piping plover nesting occurs on Duxbury Beach annually from March through August, primarily south of Duxbury Beach Park. Nesting, foraging, and chick-rearing take place both east and west of Gurnet Road. Proactive symbolic fencing is placed around the potential nesting habitat, which includes: oceanside beach from Duxbury Beach Park to the end of the driving beach south of Crossover 3, from the path at the Gurnet Guardhouse north to Plum Hills, and around the bayside replicated habitats (further discussion of symbolic fencing on page 24~~0~~). Maps of recent symbolic fencing coverage are included in Appendix 1. The areas of oceanside habitat are fairly narrow with a sand-cobble substrate and sparse vegetation. Nests are typically located on the slope or toe of the dune or seaward as vegetation at the crest of the dune is fairly dense and dunes are steeply scarped along parts of the front beach. Along the restored section of dune between Crossovers 1 and 2, nesting habitat is available at the crest of the dune and the back slope of the dune.

Replicated habitat construction and maintenance has occurred on Duxbury Beach via several methods since 1999. Habitat areas are 400 to 1000 square meters (478 to 1196 square yards) in size and are level with the surrounding beach, typically 0.3 meters (1 foot) above the extreme high tide. All former and current areas are located on the west side (bayside) of Duxbury Beach between High Pines and Plum Hill. These areas were chosen as they reduced the likelihood of broods crossing the road. In addition, these areas provide easy access to the bayside foraging habitat. Five habitat areas were most recently maintained in February 2019 and parts of each remain suitable for nesting in 2022~~1~~, though no further maintenance work of the areas is proposed.

Piping Plover Abundance and Productivity

Historically, less than 20 piping plover pairs have nested on Duxbury Beach. However, beginning in 2014, the number of nesting pairs has ranged from 23 to 28. Similarly, the number of chicks fledged has increased, apart from 2017. The Reservation strives to maintain a fledge rate above 1.24 chicks fledged/pair, and has been successful during 5~~83~~% of nesting seasons since 1989. In recent years, productivity has peaked at 1.94 chicks fledged/pair in 2013, 1.83 chicks fledged/pair in 2016 and 2022 and 2.32 chicks fledged/pair in 2020.

Abundance and productivity of the piping plover population on Duxbury Beach for the years 2010 through 2022~~0~~ are as follows.

Table 1-1. Piping plover abundance and productivity 2010 through 2022~~0~~.

Year	Pairs	Chicks fledged	Productivity (chicks fledged/pair)
2010	11	16	1.45
2011	12	19	1.58
2012	14	13	0.93
2013	17	33	1.94
2014	26.5	24	0.91
2015	25	30	1.20
2016	23	42	1.83
2017	28	11	0.39
2018	24	24	1
2019	28	46	1.64
2020	25	58	2.32
2021	31	46	1.48
2022	40	73	1.83

Piping Plover Egg Loss

The primary causes of egg loss on Duxbury Beach are predation and overwash. Major predators on the site are Eastern Coyote, American Crow, Common Grackle, and Red Fox. In 2020~~18~~, ~~57~~50% of nest losses (14 ~~of~~ 27) were attributed to predation, and in 2021~~19~~, 16~~25~~% of nest losses (4 of 25~~16~~) were suspected or likely due to predation. Sixty~~Fifty~~ percent of nest losses (7~~1~~ of 11~~2~~) were attributed to predation in 2022~~0~~.

Table 1-2. Piping plover egg loss due to predation 2011 through 2022~~20~~.

Year	Nests laid	Nests lost to predation (of total nests lost)	Percentage Loss
2011	23	8 (of 14)	57%
2012	22	3 (of 11)	27%
2013	19	2 (of 2)	100%
2014	30	5 (of 8)	62%
2015	28	3 (of 6)	50%
2016	29	5 (of 10)	50%
2017	46	24 (of 39)	62%
2018	24	4 (of 7)	57%
2019	38	4 (of 16)	25%
2020	27	1 (of 2)	50%
2021	49	4 (of 25)	16%
2022	43	7 (of 11)	63%

The Reservation instituted a lethal predator management program in 2010, carried out by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service Wildlife Services (APHIS WS). Predator presence and impact has been variable since predator management was first instituted on Duxbury Beach. Crow predation has been low since crow removal began, with the exception of 2012, at zero to one instances of piping plover nest loss to crow predation each season (Table 1-3).

The inclusion of eastern coyote in the predator management program beginning in 2011 was based on the increase of suspected and known coyote predation on both plover and tern nesting, as well as the increase in tracks and sightings. Following this change to predator management in 2011, out of the 83 plover eggs laid by 12 pairs, 19 chicks fledged, resulting in a fledge rate of 1.58. This number is higher than the previous year's rate of 1.45 and well over the rate of 1.24 required to sustain the species. Coyote impact on nesting birds has remained high on Duxbury Beach since 2014 (Table 1.3).

While red fox impact on nesting birds was low from 2011 to 2016, there was a drastic increase in nest loss for both plovers and terns due to fox depredation in 2017 (Table 1-3). At the recommendation of APHIS WS, the Reservation voted to commence fox management in June of 2017. The Reservation plans to continue fox management efforts based on the high levels of loss in 2017.

From 2011 to 2022~~20~~, there have been three instances of known nest predation events not caused by the three listed above. Common grackle was deemed responsible for one nest failure in 2015 and suspected of the failure of one nest in 2020, and in 2017 one nest was lost to skunk depredation. These three events account for three of the 70~~59~~ nest losses attributed to known predators from 2011 to 2022~~20~~. In 2019, common grackle was observed predating piping plover chicks. Due to the levels of predation and number of grackle on-site, common grackle predator management was instituted during the 2019 season and was continued ~~in the 2020~~each year through the 2022 season.

Table 1-3. Total piping plover nests lost (% of total lost to known causes) to American crow, eastern coyote, and red fox, 2011-2020.

Year	Total piping plover nests lost (% of total lost to known causes) to American crow	Total piping plover nests lost (% of total lost to known causes) to eastern coyote	Total piping plover nests lost (% of total lost to known causes) to red fox
2011	5 (33%)	2 (13%)	2 (13%)
2012	0	1 (10%)	1 (10%)
2013	1 (50%)	1? (50%)*	1? (50%)*
2014	0	4 (57%)	0
2015	1 (20%)	0	0
2016	0	5 (56%)	0
2017	2 (5.8%)	9 (26%)	12 (35%)
2018	0	0	4 (57%)
2019	0	3-4* (19%)	0-1*
2020	0-1^	0	0
2021	0	4**	0
2022	0	7 (64%)	0

*Unknown if predation was due to fox or coyote – track indeterminate
**Three likely, one suspected
^ Unknown if predation was due to crow, grackle, or RWBL – suspected grackle; insufficient data to confirm

Due to the narrow nesting habitat on the oceanside beach, overwash during storms and monthly high tides does occur. During 2019, Duxbury Beach experienced extremely high monthly tides, particularly during the incubation period in mid-May. The monthly high tide occurred concurrently with a mild storm with east winds. The high surf during this event served to overwash six nests. All six pairs renested and, of these six, five pairs successfully hatched chicks. In 2022~~0~~, ~~no nests were~~one nest was lost to overwash.

In 2020, only one piping plover nest was lost to predation, markedly different from the previous three years. In 2019, a total of four piping plover nests were lost due to mammalian predation. Three nests were confirmed depredated by coyote, with another nest lost due to an undetermined canid. The tracks surrounding this nest loss were indeterminable due to weather conditions. This rate of predation is similar compared to 2018 though fox predation decreased while coyote predation increased. This was a substantial decrease compared to 2017 when 24 nests were lost to predators (Table 1-2). In addition, 14 chicks were believed predated by grackle, coyote, and fox. Coyote and fox tracks were common along the toe of the oceanside dune, traveling through the intertidal, and crossing over to the bayside beach. Flocks of common grackles were a regular presence on

the beach and were observed harassing piping plover broods on numerous occasions. Common grackle predation on piping plover chicks was observed at least once in 2019. It is possible the full impact of predator activity on piping plover chicks in the 2020 season is an underestimate, as 27 chicks were lost due to unknown causes.

1.3 Other State-Listed Species

In addition to piping plover, state-listed least tern (*Sternula antillarum*) nest on Duxbury Beach from May to August each year. Least tern typically nest on the oceanside of the site in distinct sub-colonies. From 2010-2022~~2~~0, least tern have typically nested in six~~five~~ areas of Duxbury Beach. This includes: the pedestrian boardwalk to the south end of the pedestrian beach; between Crossovers 1 and 2; south of High Pines to the north end of Plum Hills; and south of Plum Hills to the Gurnet Guardhouse. In addition to these four areas, in 2014 and 2022 terns nested north of the Pavilion. Beginning in 2018, least terns have also nested north of the boardwalk on the pedestrian beach to the south end of the Caterers' Lot at Duxbury Beach Park.

Ideal least tern habitat location is similar to that of the piping plover nesting habitat on Duxbury Beach: (1) oceanside beach from Duxbury Beach Park to the end of the driving beach south of the Crossover 3, and (2) south of Plum Hills to the Gurnet Guardhouse. Typically, at least one piping plover pair will nest within each least tern colony. The areas of oceanside habitat are fairly narrow with a sand-cobble substrate and sparse vegetation. The colonies are typically located below the crest of the dune due to the dense vegetation. In 2019, least tern were observing utilizing the dune crest and back dune area of the restored dune between Crossovers 1 and 2. least tern have not typically established colonies on the bayside of the site; however, it is believed that the artificial habitats for piping plovers may also create suitable nesting habitat for a small least tern colony, and some least tern courtship behaviors were observed within the artificial habitats in 2020.

Table 1-4 Least tern abundance and productivity 2010 through 2020.

Year	Pairs	Chicks fledged	Productivity Estimate*
2010	107	-	Poor to Fair/Good
2011	53	0	None
2012	217	0	None
2013	133	-	Poor to Excellent
2014	57	-	Poor
2015	205	-	Fair
2016	151	31	Poor to Fair/Good
2017	196	0	None
2018	152	65	None to Good
2019	129	134	Fair to Excellent
2020	299	211	Fair to Excellent
2021	475	24	None to Poor
2022	316	137	Poor to Good

*Classifications defined by MA NHESP

Threats to least tern eggs and chicks are similar to that of nesting piping plovers on Duxbury Beach. According to the Mass Audubon 2017 Beach Nesting Summary Report, the largest causes of egg and chick loss for least

tern in 2017 on Duxbury Beach were fox predation and overwash. Coyote and fox tracks were observed in the colony areas throughout the 2019 season, including tracks around recently lost nests and egg shells apparently depredated by crows. Coyote tracks were observed in the colony areas frequently throughout the 2020 season.

Predator activity appeared to impact the least tern colonies on Duxbury Beach in 2018. Least tern pair numbers increased in mid-late June at five of the six colonies, possibly due to the decreased coyote and fox activity. However, an increase in coyote, fox, crow activity at the north end of the beach beginning in mid-July likely caused high losses of eggs and chicks and resulted in zero productivity. Increased coyote and fox activity within the Second Crossover colony and Third Crossover colony also resulted in lower productivity, though still fair to good. The primary cause of least tern egg and chick loss in 2019 was predation by coyote, red fox, and peregrine falcon. Peregrine falcons were observed frequenting the tern colonies between Crossover 1 and 2, and between High Pines and Crossover 3. The peregrines were mainly observed depredating recently fledged tern chicks. In 2020, the most common cause of least tern egg and chick loss was predation by coyote, gull, and peregrine falcon. As in 2019, peregrine falcons often hunted in the tern colonies between Crossover 1 and 2, and between High Pines and Crossover 3 in 2020, and largely went after recently fledged chicks. Great black-backed gulls and herring gulls were observed depredating tern chicks frequently near the end of the 2020 least tern breeding season as colonies began to dissolve. It is likely that the least tern colonies on Duxbury Beach have also benefited from the predator management program instituted since 2010.

2.0 Responsible Staff

Duxbury Beach is a unique beach in many ways from its ownership to its management. As owners of Duxbury Beach, the Duxbury Beach Reservation has overall responsibility to ensure that the Endangered Species Program, within the Coastal Ecology Program, is a sound and well executed program. The Reservation works with the Town of Duxbury-Beach Operations Division to implement the program. The oversight of Beach Operations has fallen under the supervision of several Town departments over the years, most recently the Police Department (2019-2020). There is a proposal to move Beach Operations to the Town of Duxbury Recreation Department. As this decision will not be finalized until the Town meeting in March 2021, two management structures are laid out below to explain the potential responsible parties under the Town of Duxbury. The roles and qualifications of each group are outlined below.

1. Duxbury Beach Reservation

    a. Executive Director, Cris Luttazi

        Ms. Luttazi holds a BS in Marine and Freshwater Biology, as well as, a BS in Finance from Kingston University, London, England and Bridgewater State College, respectively. Ms. Luttazi is the Reservation's first appointed Executive Director and has held the position since June 2017. Prior to her current appointment, Ms. Luttazi was employed with Mass Audubon Coastal Waterbird Program for six years and the Woods Hole Oceanographic Institution. Ms. Luttazi is the chief operating officer and controller of the corporation and reports to the Reservation's President and the Board of Directors. Included in the duties and responsibilities of the Executive Director are leadership and management of the Reservation, inclusive of the Endangered Species Program.

    ~~b. Assistant Director, Brynna McGlathery~~

~~Ms. McGlathery holds a BS in Biology and Environmental Science from Tufts University. Prior to joining the Reservation as the Reservation Coordinator, Brynna worked as the Field Coordinator for the Mass Audubon Coastal Waterbird Program, as a shorebird technician for the Massachusetts Trustees of Reservations, and with the Rachel Carson National Wildlife Refuge in Wells, Maine, focusing on piping plover and least tern protection. Ms. McGlathery is responsible for the oversight of all facets of the Endangered Species Program on Duxbury Beach, coordinating the efforts of the Duxbury Beach Coastal Ecology Program and communicating with the Town of Duxbury Beach Operations Division. Ms. McGlathery is responsible for reporting to the Duxbury Conservation Commission as it relates to beach operations under Order SE 18-1198.~~

~~c. Chairman of the Duxbury Beach Reservation Technical Committee, Alan Vautrinot~~

~~Mr. Vautrinot is the chairman of the Duxbury Beach Reservation Technical Committee and has supported the Reservation by managing regulations related to shorebird management since 1991. Mr. Vautrinot holds a Massachusetts surveyors license and is partner of Vautrinot Land Surveying, Inc.~~

~~d.~~b. Coastal Ecology Program (CEP) Coordinator, Bradford Bower

Mr. Bower holds a BS in Ecology, Evolution, and Behavior from the University of New Hampshire and a Masters in Environmental GIS from Unity College. Prior to working with the Reservation, Bradford worked as the Lead Monitor Supervisor of the Duxbury Beach Endangered Species Program under the Town of Duxbury. Previously, Bradford worked in coastal waterbird monitoring and protection for USFWS at Maine Coastal Islands NWR in Maine and for the Mass Audubon Coastal Waterbird Program. Mr. Bower is responsible for the oversight of all facets of the Endangered Species Program and communicating with the Town of Duxbury Beach Opersations Division. ~~The CEP Coordinator reports directly to the Assistant Director and is required to communicate routinely with the Town of Duxbury Beach Operations Division. The CEP Coordinator is responsible for the daily operation of the Duxbury Beach Endangered Species Program, including overseeing the Shorebird Monitors, Monitor Supervisors, and Field Technicians.~~

c. Brynna McGlathery

Ms. McGlathery holds a BS in Biology and Environmental Science from Tufts University. Prior to joining the Reservation as the Reservation Coordinator, Brynna worked as the Field Coordinator for the Mass Audubon Coastal Waterbird Program, as a shorebird technician for the Massachusetts Trustees of Reservations, and with the Rachel Carson National Wildlife Refuge in Wells, Maine, focusing on piping plover and least tern protection. Ms. McGlathery was responsible for the oversight of all facets of the Endangered Species Program on Duxbury Beach, coordinating the efforts of the Duxbury Beach Coastal Ecology Program and communicating with the Town of Duxbury Beach Operations Division from 2019-2021 and continues to participate in the programs implementation.

d. Field Coordinator

The Reservation plans to hire a year-round field coordinator for the 2023 and future seasons. The field coordinator will be responsible for the daily operations of the Duxbury Beach Endangered Species Program, including overseeing the Shorebird Monitors, Field Technicians, and Monitor Supervisors. The field coordinator will report directly to the CEP Coordinator and will be required to routinely communicate with Town of Duxbury Beach Operations Division.

e. Field Technicians (3)

Three seasonal Field Technicians are employed by the Reservation from late March through August to implement monitoring, data collection, and reporting for nesting protected coastal waterbirds, including piping plover and least tern, on Duxbury Beach. Field Technicians are responsible for locating and identifying protected species nesting and foraging areas; collecting nesting data, including spatial data; monitoring pair, clutch, and brood status; communicating changes in location or behavior of protected species as necessary to CEP Coordinator, Shorebird Monitors/Monitor Supervisors, and Assistant Director; working with Shorebird Monitors to ensure that fencing and signage provide adequate protection for nests and chicks; assisting in the training of Shorebird Monitors; locating clutches and chicks prior to the opening of the beach to non-essential vehicles; interacting with the public to provide education about the protected species nesting on Duxbury Beach; and submitting nesting summary data to NHESP.

The Field Technicians reports directly to the CEP Coordinator and are required to communicate routinely with the Monitor Supervisors, Assistant Director, and Beach Operations staff. One field technician will be identified as the lead and will be responsible for the daily oversight of the field technician team, reporting directly to the CEP Coordinator.

f. Monitor Supervisor (3 positions)

The Reservation employs three Monitor Supervisors from late April through August to perform supervisory and administrative work in the management of the Endangered Species Program. The Monitor Supervisors assist the CEP Coordinator in initial and continued training of Shorebird Monitors. In addition, the Monitor Supervisors work to schedule and place monitors for protection of piping plover and least tern chicks. The Monitor Supervisors assist as needed in locating clutches and chicks prior to opening the beach and help Shorebird Monitors locate broods as necessary throughout the day. As necessary, the Monitor Supervisors communicate with Town of Duxbury Beach Operations staff and the public regarding motor vehicle, pedestrian, or dog closure areas on Duxbury Beach.

The Supervisors reports directly to the CEP Coordinator and are required to communicate routinely with the Field Technicians, Assistant Director, and Beach Operations staff. One monitor supervisor will be identified as the lead and will be responsible for the daily oversight of the monitor supervisor team, reporting directly to the CEP Coordinator.

g. Shorebird Monitors

Approximately 30-40 Shorebird Monitors are employed from May through August by the Reservation to assist in the protection of the listed shorebird species nesting on Duxbury Beach, including piping plover and least tern. Monitors are responsible for collecting behavioral data on chicks and broods, including location and movement of listed shorebird species. In cases where a monitor is deemed to have adequate experience and has a proven track record of being a qualified shorebird monitor, the Monitor Supervisors may use such monitors to confirm chick

location and number prior to opening the beach. Monitors are also responsible for observing and recording environmental data, predator presence, and avian community composition. Monitors interact with the public to provide information about beach rules and regulations and to answer questions as necessary in a polite and professional manner. Shorebird Monitors report directly to the Monitor Supervisors. Monitors are required to communicate routinely with the Field Technicians and the CEP Coordinator. Monitors are required to attend a training held by the Reservation at the commencement of the monitoring season. This training includes plover and tern nesting biology and conservation efforts, chick monitoring protocols, data collection, beach rules and regulations, public interaction protocols, focal species and predator tracking, and special projects. In addition, the monitors receive ongoing in-field training to ensure classroom instruction is carried out correctly. Throughout the summer, monitors receive additional classroom training as needed as well as informal support while on the beach.

2. Town of Duxbury Beach Operations

Recreation Department Management

~~It is the intention of the Town of Duxbury to move responsibility for Beach Operations from the Police Department to the Recreation Department. This change will be subject to a positive vote at Annual Town meeting in March of 2021.~~

~~As the below paragraphs indicate the three employees discussed have a combined 84 years of experience in their full-time positions. Mr. Cushing has worked at the beach in one role or another for 41 years.~~

~~In addition, it is the intention of the Town to hire a fulltime management level Beach Operations Administrator as well as a Lead Beach Ranger. These are newly proposed positions and will be subject to funding approval at Annual Town Meeting of March of 2021.~~

~~a. Recreation Director, Gordon H. Cushing~~

~~Mr. Cushing has held the position for 31 years. Attended UMASS Amherst. Employed at Duxbury High School for five years. 36 years of total employment with the Town of Duxbury. Former Duxbury High School history teacher and coach. Retired Duxbury High School baseball coach – 30+ years' service and current Duxbury High School basketball coach 36 years.~~

~~Mr. Cushing began working on Duxbury Beach in 1979 as a conservation officer/special police officer and performed that function for five years. He then was employed as a special police officer for the Town of Plymouth in his role as Gurnet/Saquish security officer, a position he held over four summers.~~

~~In his role as Recreation Director Mr. Cushing has hired, trained and managed the lifeguarding staff at Duxbury Beach for the past 31 years.~~

b. ~~Assistant~~ Recreation Director, Steven Studley

Mr. Studley ~~has~~ held the position of Assistant Recreation Director for 21 years before becoming Recreation Director in 2022. Attended Castleton State College. Duxbury High School 5 years prior as a teacher, for 26 years total of employment with the Town of Duxbury. Mr. Studley has

been the head baseball coach for Wentworth Institute of Technology in Boston, for 17 years and was at Stonehill College for four years prior.

Mr. Studley has executive responsibility for the Duxbury Recreation Department and, in conjunction with the Police Department, will be responsible for the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach.

c. Department Assistant, Loretta Doyle

Ms. Doyle has held the position for 22 years. Attended Kutztown University. Ms. Doyle works with all divisions of the Department and will provide necessary assistance as required for Beach Operations.

d. Beach Operations Administrator

This position is responsible for the daily operation and management of Duxbury Beach, the promotion of all related public access, liaising with DBR on all listed species limitations (parking, space, cars, people, etc.) and maintaining essential partnerships with the public, DBR, Harbor, Police, Recreation, Public Works, Conservation, Town Manager departments and others as necessary). This position is also responsible for the supervision of the Lead Beach Ranger and Beach Ranger positions. The Beach Operations Administrator has training and experience in applicable federal, state and local laws, bylaws, regulations, beach law enforcement, beach management, and environmental fisheries/wildlife law enforcement and management.

The Beach Operations Administrator will also be responsible for the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach.

e. Lead Beach Ranger

The Lead Beach Ranger will work seasonally to support the Beach Operations Administrator. This will include liaising with DBR on all listed species limitations (parking, space, cars, people, etc.) and maintaining essential partnerships with the public, DBR, Harbor, Police, Recreation, Public Works, Conservation, and Town Manager departments and others as necessary. This position will assist in the supervision of the Beach Ranger position. The Lead Beach Rangers will receive training in applicable federal, state, and local laws, bylaws, regulations, beach law enforcement, beach management, and environmental fisheries/wildlife law enforcement and management.

The Lead Beach Ranger will also be responsible for the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach under the direction of the Beach Operations Administrator.

f. Beach Rangers

Beach Rangers are present on the beach during operating hours to control access, oversee parking, and enforce beach rules and regulations. The Beach Rangers will receive training related to Endangered Species management and will assist in outreach, informing visitors of

rules and regulations related to nesting birds, and answering questions related to bird activity and management.

Beach Rangers will also be responsible for the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach under the direction of the Lead Beach Ranger, as may be required. The beach ranger roles remain consistent with previous seasons regardless of whether it is managed by the Recreation Department or Police Department.

~~**Alternative Management:**~~ **Duxbury Police Department**

a. The Duxbury Police Department has full-time and seasonal staff that are responsible for managing the safety of the public on Duxbury Beach and supporting and upholding the rules and regulations of the Duxbury Beach Endangered Species Program. Chief of Police Stephen McDonald and Deputy Chief Michael Carbone have executive responsibility for the Duxbury Police Department including the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach.

~~b. Lt. Lewis Chubb is the Administrative Supervisor for the Beach Operations Supervisor and participates in policy and operational decisions relative to the Beach Operations Division.~~

~~c. Beach Operations Supervisor, Sergeant Friend S. Weiler Jr.~~

~~Sgt. Friend Weiler holds a Master's Degree in Criminal Justice from Northeastern University, as well as, a BA in Sociology from Connecticut College. He has been with the Duxbury Police Department since 1995. Sgt. Weiler has held many positions within the department including Juvenile Detective, Traffic Safety Coordinator and School Resource Officer. He is currently the Professional Standards and Training supervisor, the Firearms Licensing Officer and Beach Operations Supervisor.~~

d. Police Officers

The Police Officers assigned to Duxbury Beach are responsible for patrolling the beach and enforcing the conditions and regulations of the Endangered Species Program, including supporting the Shorebird Monitors and Monitor Supervisors during road crossings. These Officers report directly to the Beach Operations Supervisor.

~~e. Beach Rangers~~

~~Beach Rangers are present on the beach during operating hours to control access, oversee parking, and enforce beach rules and regulations. The Beach Rangers will receive training related to Endangered Species management and will assist in outreach, informing visitors of rules and regulations related to nesting birds, and answering questions related to bird activity and management.~~

3.0 Beach Management Plan

Duxbury Beach offers a variety of activities related to conservation and recreation, and beach goers have at times disparate expectations that require oversight from two organizations, Duxbury Beach Reservation and Town of Duxbury Beach Operations Division. In addition, the variety of uses means that visitors are spread throughout the site, and thus intensive and well-founded management is critical.

3.1 Recreational Activities

Over Sand Vehicles (OSV)

Over-sand vehicle use is permitted on Duxbury Beach year-round with the purchase of an over-sand driving permit from the Town of Duxbury. Driving on the beach is restricted to certain areas and to particular times of day and year, depending on protected species nesting and other factors, such as maximum number of vehicles allowed or unusually high tides. The over-sand permit use hours are dependent on the time of year and were adjusted in 2019 (Figure 3-1).

Table 3-1. Over-sand permit use hours on Duxbury Beach for the 2020 season.

Time of Year	Crossover 1	Crossover 2	Beach Hours
Summer Season (Memorial Day Weekend-Labor Day Weekend)	Open	Open	8:00-22:00 Sunday-Thursday 8:00-23:00 Friday-Saturday (Holiday Sundays/Holidays)
Early Fall Season (Tuesday after Labor Day-September 30)	Open	Open	8:30-21:00
Late Fall Season (October 1-October 31)	Open	Closed	8:30-15:30 (Sun-Thurs) 8:30-19:30 (Fri-Sat)
Winter Season (November 1-March 31)	Open	Closed	8:30-15:30
Early Spring Season (April 1-April 30)	Open	Closed	8:30-15:30 (Sun-Thurs) 8:30-19:30 (Fri-Sat)
Late Spring Season (May 1-Thursday before Memorial Day)	Open	Open	8:30-21:00

Further restrictions may be required for access management or public safety. While unfledged piping plovers are present, Crossovers 2 and 3 are closed at 20:00 (if open prior). If no unfledged piping plover chicks remain on the beach, Crossover 1 may be open until 22:00/23:00.

When OSVs became popular on the beach, the Reservation mapped out an area of the beach that could have supported over 1000 vehicles. The length of the beach deemed suitable for OSV use extends for approximately 3,322 meters (3,633 yards), starting near the first pedestrian crossover south of the Powder Point Bridge and extending to a location approximately 76 meters (83 yards) south of Crossover 3. However, in order to protect existing shorebird nesting habitat and the barrier beach system, the Reservation chose to restrict the maximum number of vehicles allowed on the beach to 500. The Reservation further decreed that half this number, or 250 spaces, would be reserved for non-resident OSVs. The number of OSVs allowed decreases equally for residents and non-residents as Restricted Areas for nesting birds increase.

No non-emergency vehicles are permitted within Restricted Areas (front beach and bayside), which are placed north and south of brood ranges and tern nursery areas (for further discussion of Restricted Areas see page 20). Non-emergency essential vehicles related to the Endangered Species Program may pass through Restricted Areas (front beach and Bayside) with an escort provided by Duxbury Beach Reservation staff.

Swimming

There are two lifeguarded beaches on Duxbury Beach – one located on the oceanside of Duxbury Beach Park and the second on the oceanside beach east of the Powder Point Bridge. Swimming outside of these areas is without lifeguard supervision.

Horseback Riding

Horseback riding in permitted on Duxbury Beach with a permit purchased from the Town of Duxbury. From October through April, riding is permitted daily from sunrise to sunset. During May through September, riding is permitted sunrise to 09:00 and 18:00 to sunset, weekdays only. Horseback riding is not allowed in Closed and Restricted Areas used by nesting piping plover adults and broods or in least tern nurseries. Shorebird Monitors and Beach Operations staff help to enforce this rule during patrols of the beach.

Horseback riders must respect vehicle speed limit restrictions, including those put in place for protected species crossings, and they must stop as directed by Beach Operations staff or Endangered Species Program staff if a crossing occurs.

Shellfishing

Shellfishing access is allowed on Duxbury Beach with a permit purchased from the Town of Duxbury. Motor vehicle access for this purpose must comply with all beach motor vehicle regulations. Shellfish access points are located along the bayside of Duxbury Beach and are accessible to permit holders at all times of day outside of the shorebird season. Bayside access is completely closed to all vehicles two days prior to the estimated first hatching date and remains closed until all plover and tern chicks have fledged. Chains are in place at vehicle entrances on the bayside. The Duxbury Harbormaster Department is responsible for sending out notification to all commercial and recreational shellfishermen on the bayside of Duxbury Beach. Duxbury Beach Operations staff are responsible for enforcing the closure.

Bike Riding

Bike riding is permitted on Gurnet Road without a beach permit year-round. Bicyclists must respect speed limit restrictions, including those put in place for protected species crossings, and they must stop as directed by beach staff if a crossing occurs. In order to cross a Restricted Area on the beach, bicyclists must dismount and walk bikes through the area below the fencing extending perpendicular to the shoreline and be guided around foraging broods if necessary by monitors. Beach staff help to enforce this rule during patrols of the beach.

Beach Walking

Beach walking is encouraged on Duxbury Beach and is permitted year-round. Walkers must stay out of all dune, vegetated, marsh grass, posted bird or wildlife, and fenced areas. Walkers are not permitted inside symbolically fenced Closed Areas. Closed areas are set up in March around piping plover and least tern nesting habitat and historic nesting areas and extended as needed to new areas in which pairs initiate nesting activity.

Walkers are allowed to cross through oceanside and bayside Restricted Areas, which are set up to prevent oversand vehicles from accessing the area in and around a brood's range on oceanside and to restrict other activities (boating, dog walking, biking~~, running~~, kite flying) on both oceanside and bayside. Walkers are asked to remain below the Restricted Area fence line when possible (walking along the water line) in order to reduce disturbance ~~and are not allowed to set up beach blankets in these zones (aka Restricted Areas)~~. When staff are present and broods are foraging or spending time near the waterline, staff may escort walkers around broods to reduce disturbance. ~~Walking may be allowed through Restricted Areas while the waterline is higher than the end of the Restricted fence line in areas where broods are not utilizing the Restricted Area on that side of the road.~~ Beach staff help to enforce this rule during patrols of the beach. When accessing the oceanside or bayside beach, walkers must use designated crossovers and pathways.

Kiteboarding

Kiteboarding is permitted off of Duxbury Beach on the bayside but outside of Restricted Areas and not within 200 meters (219 yards) of nesting piping plover adults or unfledged chicks. Kiteboarders use vehicle pull-offs to park and access the water and must have an over-sand driving permit. The primary access point is at High Pines. Pull-offs within Restricted Areas established due to chick locations are closed to all vehicles, including kiteboarders. Landing is not permitted within Restricted Areas or within 200 meters (219 yards) of any nesting activity.

Boating

Boating is not permitted within 46 meters (50 yards) of the oceanside beach except in designated vessel access areas. The designated area on the oceanside beach is located at the far southern end of the OSV parking area near Crossover 3. However, this area is closed to all vessels in the event of chick activity within 100 meters (109 yards). Beach staff help to enforce this rule during patrols of the beach. On the bayside, boating is not permitted within 46 meters (50 yards) north or south of the Powder Point Bridge or within any Restricted Areas. Vessels in designated areas may anchor and access is at steerage speed only. Vessels include motorboats, sailboats, sailboards, paddleboards, kayaks, jet skis, etc.

Kites and Drones

Use of kites is prohibited on the beach within 200 meters (219 yards) of territorial or nesting adult and unfledged juvenile piping plovers and least terns from April 1 until no unfledged chicks remain on the beach. Use of kites or drones is not permitted north of the North OSV poles from Memorial Day through Labor Day. The use of drones or unmanned aerial vehicles launched, operated, flown over, or retrieved on Duxbury Beach property is not permitted with the exception of flights specifically approved by Duxbury Beach Reservation, Inc., Town of Duxbury Beach Operations Division personnel, and the Marshfield Airport.

3.2 Parking and Roads

Parking Lots

Several parking lots are located on Duxbury Beach or adjacent to the beach and are available year-round or seasonally. Below is an overview of parking lots, north to south.

I. Northern Lot (Lagerstedt Lot): The Northern Lot is located on the east side of Gurnet Road at the northernmost end of Duxbury Beach. This gravel lot is kept gated when not in use for event parking or as overflow parking for non-resident OSV permit holders unable to access the front beach due to vehicle number restrictions. Overflow parking is managed by Town of Duxbury Beach Operations.

II. Duxbury Beach Park: Three parking lots are located at Duxbury Beach Park. A gravel parking lot is located on the west side of Gurnet Road to the north of the Pavilion building. Across the road from this lot is a paved parking area. A second gravel parking lot is located on the east side of the roadway south of the Pavilion, referred to as the "Caterers' Lot." These three parking lots are gated and locked from Columbus Day through Memorial Day, except for events. From Memorial Day through Labor Day, the operators of the Pavilion, manage the parking areas based on daily fees set by the Reservation for visitors without seasonal parking permits. In the event that the Northern Lot is unavailable for overflow non-residents, part of the Duxbury Beach Park western lot may be granted to the Town by DBR for this purpose, provided Beach Rangers are available. Access will occur via the northern gate.

III. Town Parking Lot: Town resident parking lots are located immediately north of the east end of Powder Point Bridge. The western lot is gravel and the eastern lot is paved. These parking lots are open year-round, dependent on weather and construction work. Parking in these lots is restricted to vehicles with a resident parking permit. Parking lots are managed by the Town of Duxbury Beach Operations staff. Lots are open 08:00 to sunset from May through August and 08:30 to 15:30 from September through April.

IV. South Resident Lot: A small, paved parking lot is located immediately south of the Powder Point Bridge Guardhouse on the west side of Gurnet Road. The South Lot is open 06:00 to 23:00 May through August and 06:00 to sunset September through April. This lot operates under the same rules as the larger town lots on the north side of the bridge.

V. West End Lot: A town parking lot (not on DBR property) is located on the west side of Powder Point Bridge. This lot is open year-round to all visitors. No restrictions apply.

Vehicle Pull-offs

Eleven vehicle pull-offs are located south of the Powder Point Bridge along Gurnet Road on the east and west side. The pull-offs provide space for vehicles to turn around and provide parking for 35 vehicles with over-sand parking permits year-round. If a pull-off falls within a Restricted Area, thee pull-off will beis closed off with a combination of sawhorses, symbolic fencing, cones, and signs ~~should a piping plover brood begin crossing through the pull-off ior i~~f the back roadway is closed to recreation in that area. Under the COI, some pull-offs within Restricted Areas may be left open for recreational parking, provided that DBR implements specific monitoring of the pull-offs and that broods are not using the pull-off as part of their crossing range. DBR Shorebird Monitors and Beach Operations staff will regularly check open pull-offs during beach patrols to ensure the broods are not impacted by recreational activities. ~~-~~In addition, while unfledged piping plover chicks are present ~~south of High pines~~, all vehicle ~~if a section of the roadway is closed to recreational vehicles, all pull-offs within the closed section are closed off with a combination of sawhorses, symbolic fencing, cones, and signs. While unfledged piping plover chicks are present south of High Pines, all vehicle~~ pull-offs between ~~Crossover 2~~the Duxbury-Plymouth town line and the southern property line are closed to recreational vehicles.

Roads

Gurnet Road runs from mainland Duxbury (immediately south of Marshfield) the length of the peninsula in Duxbury, becoming King Arthur Road in Plymouth before reaching Gurnet Point. The improved gravel roadway is paved in small sections near the Town of Duxbury resident parking lots but is primarily gravel. The roadway provides access for residents and visitors to Gurnet-Saquish, access for Duxbury residents and non-residents with OSV permits to the beach, and shellfishing access to tidal flats. Those without OSV or shellfish permits or those who are not a homeowner, visitor or have business at Gurnet-Saquish are not allowed south of the Powder Point Bridge Guardhouse at the east end of the Powder Point Bridge. Depending on piping plover chick activity, recreational vehicles (holding OSV permits to the beach) are not permitted to drive on certain sections of roadway. This is enforced by Town of Duxbury Beach Operations staff stationed at the Powder Point Bridge Guardhouse, Crossover 1, ~~and~~ Crossover 2, and/or Crossover 3 during open hours. In addition, notices are posted at the Guardhouse, on the Town website, and social media regarding roadway closures for recreational vehicles.

3.3 Beach Cleaning and Refuse Management

The Reservation strives to present a clean, well-run beach. To ensure public safety, avoid attracting predators, and minimize damage that large debris can cause to fencing, a thorough refuse management plan is utilized. As Duxbury Beach has several operators throughout the year responsible for distinctive areas, there is a multifaceted approach to refuse management on-site. The Reservation oversees all aspects of the Beach refuse program with the support of the Facilities and Technology Committee.

Regular refuse management on Duxbury Beach includes parking lots, roadways, and oceanside and bayside beaches. With respect to the town parking lot at the west end of the Powder Point Bridge and the intensively used town resident beach parking lots at the east end of the bridge, trash removal during the week is currently the responsibility of the Duxbury Department of Public Works (DPW) and weekend trash removal is performed by an independent contractor. These areas are equipped with large trash barrels that are serviced daily during the summer and as needed at other times. Signs direct that all trash be placed in the barrels. The Town of Duxbury may consider shifting to a pack-in, pack-out trash removal policy for the public in the future. This transition will include a plan for continued, decreasing trash removal in order to allow time to fully inform the public and facilitate the policy change.

Removal of small land and marine debris in the area of the Northern Lot and Crossovers 1, 2, and 3, including Gurnet Road, is performed by Reservation employees or contractors on a weekly basis from April through Labor Day and monthly during the rest of the year. Trash removal occurs outside of Closed and Restricted Areas.

The parking lots and food concession at Duxbury Beach Park are open to the general public. This area is also equipped with trash barrels and the operators remove all trash from both the concession area and the adjacent beach on a daily basis. They also remove trash in the vicinity of the town resident parking lots on the weekends when the DPW is not on duty.

In addition to daily and weekly refuse management protocols, the Reservation organizes two site-wide, volunteer-based clean-ups: the Duxbury Beach Coastal Sweep takes place during a weekend in September/October, post nesting season, each year and is managed by Reservation staff and volunteers. Prior to the nesting season, a Duxbury Beach "Spring Sweep" includes a site-wide clean-up run by Reservation staff and volunteers. The timing of the clean-up takes into account the arrival of nesting shorebirds and the possibility of spring storms that may bring in additional debris. Typically, the clean-up takes place during the second half of March. Volunteers are instructed on disturbance avoidance measures if plovers are on-site.

The Reservation employs a private Maintenance Team that works throughout the year. The Maintenance Team is responsible for a number of projects, including removal of large debris accumulated due to storms or degradation of equipment on the site (broken posts, fencing, etc.). Removal of large debris is dependent on location and time of year, taking into account shorebird nesting activity. Large debris that requires the use of a vehicle or is located within 100 meters (109 yards) of plover or tern activity (March 15 to September 15) is reported to the Assistant Director, who then seeks approval to remove from the NHESP.

Beach raking does not occur on Duxbury Beach regardless of season and location. Limited removal of wrack by hand may occur on the Resident Parking Beach and Duxbury Beach Park. In the event of excessive wrack public health officials may deem it necessary to clear wrack from the beach for public safety reasons. Paved parking lots are swept to decrease dust annually.

3.4 Rules and Regulations

The Duxbury Beach Rules and Regulations vary by section of the beach as well as time of year due to the presence of protected shorebird species and increased human use. Upon purchasing a beach permit through the Town of Duxbury, recreationalists are provided with a paper copy of the Duxbury Beach Guide and Rules. The Guide outlines all rules and regulations enforced on the beach. The Guide specifically discusses the Habitat Conservation Plan, piping plover behaviors, and how beachgoers must behave while operating vehicles to minimization potential risk to the birds. Duxbury Beach Guide and Rules provided in Attachment A.

<u>General</u>

1. All beach users must comply with all federal/state and local laws, terms, conditions, policies and the request or instructions of the patrolling Police Department personnel, Town of Duxbury Beach Operations Beach Rangers, Endangered Species personnel, or other authorized agencies or departments.

2. When endangered species are present on Duxbury Beach, no person, their animal, or their vehicle shall disturb or attempt to disturb the endangered species in any way and/or fail to adhere to the direction and instruction of the patrolling Police Department personnel, Town of Duxbury Beach Operations Beach Rangers or other authorized agencies or departments.

3. Drinking of alcoholic beverages is prohibited.

4. Dogs must be leashed and under the immediate and effective control of their handler at all times (see also Dog Regulations below).

5. No sand, stone, vegetation, salt marsh hay, seaweed or other material may be removed from Duxbury Beach. Erosion control fencing, access fencing and cabling or signs shall not be damaged or removed.

6. Store and discard trash, especially food scraps properly. All beach refuse must be removed by the beach user. Littering and dumping of household trash are prohibited. Glass containers are not allowed on beach property. Trash receptacles for incidental beach trash are available seasonally at the resident parking lot. Otherwise, beach policy is “carry-in, carry-out” at all times.

7. Bonfires and campfires are prohibited. Small cooking fires in a metal container are permitted but only on the ORV portion of the beach. No materials may be added to a fire within one hour prior to beach

closing. All fires must be extinguished with water within a half hour prior to closing, and all fire remnants must be removed from beach property by the beach user.

8. Overnight camping is prohibited. Unauthorized vehicles access is prohibited.

9. Fireworks are illegal and prohibited on beach property.

10. Loitering in the beach parking lots is prohibited after beach closing.

11. Beach functions or group gatherings of 20 or more persons, or any other special event or research, require a special permit from the Police Department and notification given to the Duxbury Beach Reservation. Applications for permits shall be received at least one week prior to the proposed function.

12. Public demonstrations on beach property are prohibited.

Motor Vehicle Regulations

1. All vehicles on beach property must carry a current copy of the Duxbury Beach Guide and Rules.

2. All vehicles parked on Duxbury Beach property must visibly display a current Duxbury Beach sticker. Vehicles parked in any parking area at the east end of the Powder Point Bridge must visibly display a resident or rental resident beach lot sticker from Memorial Day to Labor Day. All vehicles driving in or parked in over-sand areas or parked in roadside pull-offs south of the Powder Point Bridge must visibly display a current resident or nonresident over-sand permit appropriate for year-round or off-season use. Parking permits shall be affixed to the windshield, below the rearview mirror, and never in a tinted area. Unauthorized parking in all roadways, fire lanes, or vehicle crossovers is prohibited at all times. There are three types of Duxbury Beach permits valid during the shorebird nesting season:

    a. Resident Beach Lot Permit for use of paved parking lots (valid April through March)

    b. Resident Over-sand Permit for four-wheel drive (4WD) vehicles in paved parking lots, over-sand areas, and roadside pull-offs, (valid April through March)

    c. Non-Resident Over-sand Permit 4WD vehicles in over-sand areas and roadside parking areas, (valid April through March)

3. Permits are valid only for the vehicle for which they were purchased. The permit registration number must match the vehicle registration. Permits are nontransferable. (Original permit must be returned in order to receive a replacement due to sale of vehicle, windshield replacement, etc.)

4. All other vehicles are prohibited, including motorcycles, minibikes, minicars, snowmobiles, paraglides, ATVs and ATCs (except when necessary for official use). No airplanes or helicopters are permitted to land on Duxbury Beach except in an emergency.

5. All parking is on a first come, first served basis. When parking capacities are reached, vehicle access restrictions will be imposed. Further restrictions may be imposed on the number of vehicles permitted on the beach properties at one time for public safety, access management and/or protected species management.

6. All off-road vehicles must have 4WD and the proper tire pressure for beach conditions (15PSI). All off-road vehicles must be properly equipped before they are permitted on the beach, and. All OSVs must be properly equipped before they are permitted on the beach.

Vehicles may be inspected for the following equipment at any time. Vehicles lacking this equipment or tire pressure may be cited and/or refused entry for any missing items:

a. Shovel

b. Tow rope, tow strap, or chain

c. Spare tire, jack, and 18 inches square plywood support pad

d. Tires that are properly pressurized for beach conditions

7. Resident Parking Area hours (weather permitting) are:

   - North Lot: 08:00 to Sunset (Seasonal) September through April 08:30 to 15:30 (Off-Season)
   - South Lot: 06:00 to 23:00 September through April 06:00 to sunset (Off-Season)

8. The over-sand permit use hours vary depending on season (Table 3-1). Further restrictions may be required for access management or public safety. During May through September, Crossovers 2 and 3 are closed at 20:00 (if open prior) while unfledged piping plover chicks are present or least tern chicks are within 100 meters.

9. Driving must be confined to designated routes and never in the water and never on or over dunes, vegetated areas, marsh grass, posted areas, or fenced areas. Vehicles shall travel in established tracks. Vehicles shall park perpendicular to water's edge in an organized fashion in a manner that will not interfere with the established track or traffic flow. Parked vehicles must move if instructed by Town of Duxbury Beach Operations Division personnel at any time. Vehicles driving off the beach shall have the right of way. Vehicles are not allowed in pedestrian, mudflat/shellfish, or wildlife areas. No vehicle shall travel or park within 3 meters (10 feet) of a sand fence or symbolic string fence on the ocean side of the beach.

10. All vehicles must be operated for the safety and regard of the operator, vehicle occupants, pedestrians, protected species and wildlife, and beach resources. Maximum speed on the Powder Point Bridge, vehicle turnarounds, paved parking areas, vehicle crossovers, and in designated over-sand areas is 10 mph, conditions permitting; on Gurnet Road, the maximum speed is 15 mph, conditions permitting. In any protected species area, the maximum speed shall be reduced to 5 mph, and traffic may be further restricted or stopped by the Town of Duxbury Beach Operations Division personnel or Duxbury Beach Reservation personnel for listed species protection and management.

11. All persons must ride within the confines of any motor vehicle and must be seated. Riding on fenders, tailgate, or roof, or standing in the vehicle is prohibited.

12. The roadway over the leased portion of the beach (Gurnet Road) to Gurnet Gate is for use by OSVs only. All Gurnet-Saquish traffic must use the roadway.

Any dog on beach property must be leashed at all times and under immediate and effective control of its handler. NOTE:

Dog Regulations

From September 15 through April 1, dogs are permitted as listed under the Town of Duxbury dog regulations. Dog walking is not permitted in vegetated areas or fenced areas year-round.

The following rules shall be in effect on Duxbury Beach properties from April 1 to September 15.

1. Dogs are prohibited from the front beach, known as the Resident Beach, south to the poles delineating the start of the over-sand beach, April 1 to September 15.

2. Dogs are prohibited from the bayside beach north of the Powder Point Bridge adjacent to the Resident Parking Lot from April 1 to September 15.

3. Dogs and their handlers are prohibited from all dunes, vegetation, marsh grass, posted bird or wildlife areas, and all Restricted Areas.

4. Dogs and their handlers are prohibited from disturbing any endangered species or wildlife on Duxbury Beach. Dogs are not permitted to pass through Restricted Areas on the oceanside or bayside beach or dunes.

5. A dog on Duxbury Beach properties shall be at all times leashed and under immediate and effective control of its handler. NOTE: “Immediate and effective control” is determined by Town of Duxbury Beach Operations Division personnel.

6. Any person wishing to take a dog onto Duxbury Beach properties shall register with the Town of Duxbury and obtain a permit. Registration and permits will be available at the Duxbury Town Hall. The permit must be carried by the handler of that dog at all times while the dog is on Duxbury Beach properties.

7. If in accordance with all rules and regulations, dogs are allowed on the Duxbury Beach properties between the hours of 08:00 and sunset, unless these hours are amended by action of the Town of Duxbury Beach Operations Division. Dogs are prohibited on Duxbury Beach properties between the hours of sunset and 08:00.

8. Unless specifically amended by these rules or, if applicable, by action of the Town of Duxbury Beach Operations Division, all other Duxbury, state or federal Dog Control Regulations shall continue to apply. These include regulations under the "Special Dog Regulations Contained within the General Beach and Motor Vehicle Regulations" pamphlet, Section 7.1 of the General By-laws of the Town of Duxbury, and Article 37 of the 2002 Duxbury Annual Town Meeting.

9. Dog handlers are required at all times of the year to remove droppings from the Powder Point Bridge, beach parking lots, and all beach areas and dispose of droppings in provided trash receptacles or otherwise remove them from beach property.

10. Any violation of these Rules and Regulations or Duxbury General By-Laws or other federal/state laws may result in non-criminal and/or criminal process or provisions found in the Duxbury General By-Laws involving the revocation of the dog permit for the remainder of the season. If a dog permit is revoked, such revocation shall be recorded at the Duxbury Town Hall, and the owner’s immediate family will not be eligible to re-apply for another permit until the following year.

<u>Duxbury Beach Park</u>

The following are not permitted on Duxbury Beach Park:

1. Drinking of alcoholic beverages is prohibited.
2. Fires of any type are prohibited.
3. Horses are not permitted.
4. Dogs are not permitted from Memorial Day through Labor Day.
5. Vehicles are not permitted off of the parking lot or roadway.

3.5 Law Enforcement

The Town of Duxbury employs Beach Operations staff who are responsible for enforcing Duxbury Beach rules and regulations (including dog rules, speeding, keeping the road closed during crossings, managing access at the guardhouse, people in fenced off areas, harassment of birds, Restricted Area rules, kite and drone use, etc.), as well as documenting and reporting violations of the federal and state Endangered Species Acts to the appropriate enforcement agency. They are responsible for enforcing traffic regulations on-site, including parking, speed limits, OSV beach use and access, and traffic restrictions during brood crossings. They are responsible for stopping OSVs from queuing on the back roadway prior to the beach opening and escorting OSVs to the open Crossovers upon opening. Duxbury Beach is patrolled 12 months a year. On weekends a maximum of seven Beach Operations staff are present on the beach, and on weekdays a minimum of four are present.

Duxbury Beach rules (as outlined in this document and the Duxbury Beach Pamphlet) will continue to be enforced by the Town of Duxbury. The Duxbury Police Department will respond in the event that escalation is required, and a beach visitor refuses to comply/abide with Beach Operations personnel requests. Beach Operations will continue to have the ability to remove people from the beach and/or revoke stickers in the case of severe non-compliance.

Beach Operations staff patrols on Duxbury Beach are as follows throughout the year:

- May through September *
    - Monday through Thursday 07:00-22:30
    - Friday through Sunday 07:00-23:30
- October
    - Monday through Thursday 08:30-16:00
    - Friday through Sunday 08:00-20:00
- November through January 08:00-16:00
- February 08:00-16:00
- March 08:00-16:00
- April 08:00-16:00

*During the height of the season when OSV's are expected to begin queuing prior to 07:00 Beach Operations will use regular patrol staff to regulate the queue and prevent OSV's from traveling unescorted south of Powder Point Bridge prior to the opening of the beach.

The team of four to seven personnel is responsible for patrolling the beach. During the season, Crossover 1 is open until 22:00/23:00 and Crossover 2 closes at 20:00. Beach Operations staff and Rangers are responsible for ensuring that OSV operators have access to Crossover 1 (that is, they do not have to cross a Restricted Area) beginning at 20:00 when Crossovers 2 and 3 are closed. A Beach Ranger is stationed at Crossover 1 from 20:00 to 22:00/23:00 to stop non-essential traffic traveling south. From October through April, Town of Duxbury are responsible for patrolling the beach and opening and closing the gates to the front beach. Weather and tide dependent, the beach is open to vehicles daily from 08:00 to 15:30 via Crossover 1.

Due to the unique geographical location of Saquish and Gurnet Point, the Plymouth Police Department often seeks mutual aid from the Duxbury Police Department when responding to calls for service there. Essential vehicles have the right to access Gurnet-Saquish properties and include vehicles carrying property owners, their guests and invitees, service and repair personnel, fire, police, and other emergency vehicles. Duxbury Police Units will respond under mutual aid to Gurnet-Saquish upon the lawful request of Plymouth Police Department. Duxbury Police Units will respond to Gurnet-Saquish in cases of reported life-threatening medical emergencies upon the request of Plymouth emergency personnel.

3.6 Other Operations

Beach functions or gatherings of 20 or more persons, or any other special event or research, require a special permit from the Town of Duxbury. After receiving the permit application, the town is responsible for submitting event information to Duxbury Beach Reservation for approval by the Executive Director. Applications for permits shall be received at least one week prior to the proposed function. Those attending a function must follow the rules and regulations of the beach, including vehicle rules. They must also respect all protected species signage and closed and Restricted Area fencing. Any groups or individuals holding an event must work with the Town of Duxbury and Duxbury Beach Reservation staff to ensure event details are in compliance with all federal, state and local law, terms, conditions, policies and the request or instructions of the patrolling Beach Operations personnel, Endangered Species personnel, or other authorized agencies or departments.

Fireworks are illegal and not permitted on Duxbury Beach and do not take place on the beach year-round. Once a year, a Town of Duxbury-sponsored bonfire celebration may take place on the oceanside beach at a point between the resident parking lot and north to Duxbury Beach Park after the close of the shorebird season. A limited number of private events may occur at Duxbury Beach Park during the year. Locations and scheduling vary based on plover and tern activity. Events may take place in the "Caterers Lot", the Duxbury Beach Park parking lot or the Duxbury Beach Park overflow lot on the west side of Gurnet Road. All events during the nesting season occur in the western lot to ensure no disturbance to nesting activity. Event organizers are informed prior to booking that events may be moved or cancelled depending on bird activity. All event operations are performed in conjunction with Duxbury Beach Reservation to ensure appropriate protocols are followed.

In addition, in May and June educational programming, typically for schools, takes place on the ocean and bayside beaches near the resident parking lot. Camp programs also visit the site occasionally during the summer season.

3.7 Listed Species Monitoring and Management

Fencing and signage

Fencing on Duxbury Beach is extensive and varied depending on purpose and audience (vehicle versus pedestrian). Protection efforts are flexible and responsive to ensure that as nesting locations shift and brood range moves or expands, protection adapts accordingly. Signage notifying beachgoers of protected areas and certain beach rules (such as dogs and speed limits) are plentiful and enforced by the presence of enforcement and monitoring staff.

Permanent "symbolic fencing" is in place on the beach year-round, consisting of wooden posts approximately 10 inches in diameter and 4 feet above ground are placed every 15 meters (16 yards) parallel to the dune to protect the dune and vegetation from vehicles and as a visual deterrent to people. Sand fencing exists along much of the beach to limit pedestrian and vehicle incursion on dunes. Sturdy drift fence serves a similar purpose. Although both are possible to climb over, they serve as a visual deterrent to entering the dunes, and in some cases, shorebird nesting habitat. Sand fencing is also used along vehicle and pedestrian crossovers over the dune and restricts movement of vehicles and pedestrians into vegetation and nesting habitat. Post and cable fence, sand fence, split rail fence, and boulders are placed along roadways and parking lots to prevent pedestrians and vehicles from walking or driving over dunes, thus protecting the dunes, vegetation, and nesting. This fencing serves to physically prevent vehicles from driving over shorebird habitat and sensitive dune areas.

Seasonal symbolic fencing, consisting of rebar posts and orange twine, is erected the last week of March each season to proactively protect potential habitat (Figure 3-1). Proactively fenced areas are located along the oceanside beach from Duxbury Beach Park to the end of the driving beach south of Crossover 3, from the path at Gurnet Guardhouse north to Plum Hills, and around the bayside artificial habitats. As Field Technicians identify new plover or tern nesting areas, they erect new areas of symbolic or extend existing fencing. Fencing is also extended when nests are laid close to the fence line to provide a larger buffer from disturbance. This wider buffer extends 50 meters (54 yards) north and south of the nest. Closed Area signs are placed on every other post, and speed limit signs are placed every 15 meters (16 yards). These symbolically fenced areas are referred to as "Closed Areas." Closed Areas may also be erected in areas of high recreational use in case of brood use and for dune protection. Closed Areas are expanded if deemed necessary due to evidence of adult plover disturbance, or the need for additional cover or foraging opportunities for plover chicks.

In addition to Closed Areas that provide protection for nests and incubating adults, signage is put in place to prevent parking within 50 meters (55 yards) north and south as well as seaward of active nests. "Restricted Area" fencing is erected one to two days prior to the estimated hatch date to expand the protected areas for chicks. Restricted Areas are placed north and south of the brood range and include the entire side east to west (oceanside to bayside beach), provided that, vegetation or topography of the beach makes habitat east to west accessible. If a brood is adjacent to an OSV area, the Restricted Area is set at 200 meters north and south of the brood range for the first week after hatching as brood activity has not been established. The same is true for broods that are found post hatching when the nest was not identified. Following the first week of observation, Restricted Area fencing may be reduced to 100 meters (109 yards) adjacent to the OSV area. Restricted Areas within the pedestrian only zone will be placed in areas of high use to reduce disturbance.

The primary purpose of Restricted Areas is to prevent OSV use within specified distances of chicks based on brood range and age. The size of such Restricted Areas may vary depending on brood range and location on the beach. However, additional rules are in place within Restricted Areas to further reduce disturbance, including not allowing pets, kites/kiteboarding/drones, boating, ~~running,~~ and biking, ~~and setting up of beach blankets~~. Specific rules for these activities are outlined in Section 3.1.

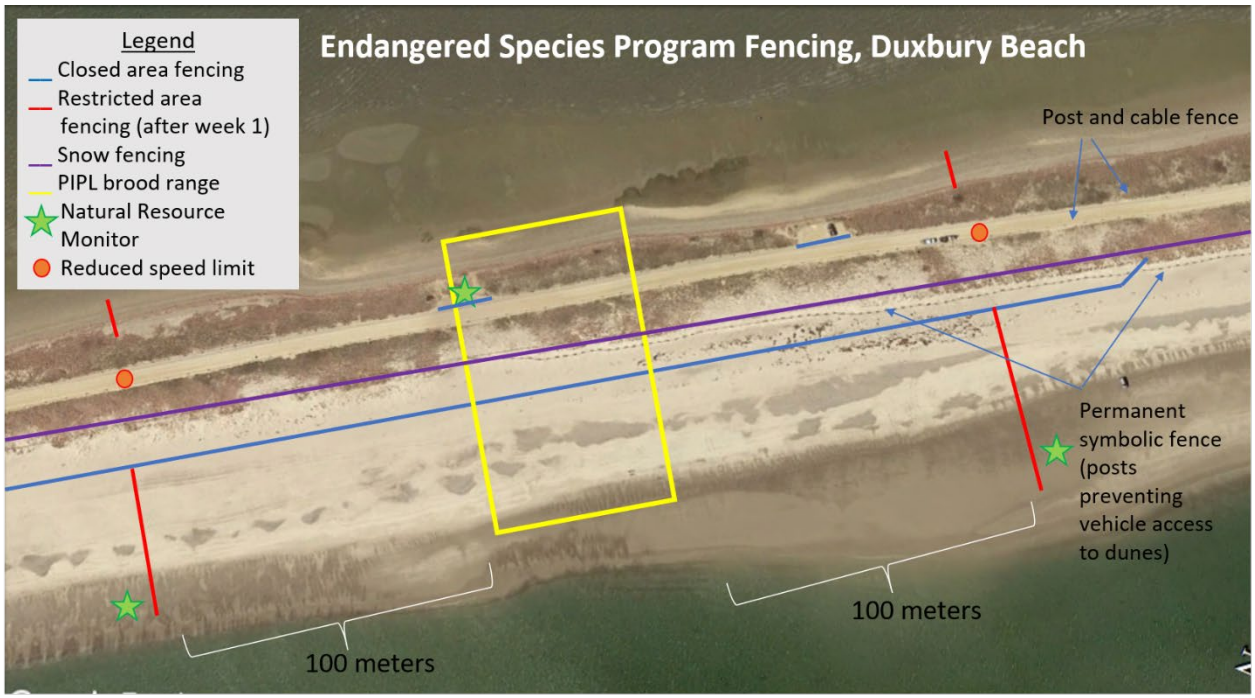
In cases where nests or brood ranges are within 1000 meters of Crossover 1 and Crossover 1 is open to OSV access, special distances apply in order to account for nighttime use (Attachment E). One to two days prior to the estimated hatch date, Restricted Area fencing is established 500 meters from the nest in the direction adjacent to the nighttime OSV area (the opposite side is established based on whether there is daytime OSV use or not). The 500-meter buffer is maintained for days 0-1 and increased if the brood ranges further than anticipated. From days 2 until fledging, the Restricted Area adjacent to the nighttime OSV use area is established 200 meters from the brood range. If the brood range is greater than 800 meters, the buffer increases to 300 meters. The brood range in relation to OSV Restricted Areas is defined as the total area on the oceanside and the roadway utilized by the brood within the last seven days. For example, if a brood shifts its range, the entire span would continue to be utilized when establishing the Restricted Area fencing for at least seven days before shifting the Restricted Area fencing. If a brood is observed from a nest that was undetected, a nighttime buffer of 1000 m from the brood's observed range will be established until the brood has been monitored over a 24-h period. A buffer of 500 m from the brood will be applied during the next 24-h period, unless the first day of monitoring indicates that this buffer could be insufficient to protect the brood. After the second 24-h period, the Restricted Area buffer will be reduced to 200 meters (or 300 meters depending on range size). In addition, on the day of hatching, a buffer of 500 (or more, as appropriate) will only be applied if the brood has received at least two checks spaced 3 hours apart, with the last being within 2 hours of sunset. Otherwise, a 1000 m buffer is established. In the case of nighttime use of the OSV, additional data is collected and reported to MADFW weekly (Appendix 2, Figure 3).

Restricted Areas on oceanside and bayside are delineated with symbolic fencing running perpendicular to the beach – extending from the Closed Area fencing to somewhere between the high tide mark and low water mark (dependent on depth and surf to ensure fencing is resilient). Perpendicular fencing on the bayside generally does not extend past the high tide mark so as to ensure that boats moving through the channel do not hit the rebar posts. Initially, the perpendicular fence lines are placed 200 meters on either side of plover nests, providing 400 meters of protected beach. Restricted Area fencing is placed around least tern colonies within or bordering the OSV area. Restricted Area fencing is placed 105~~10~~0 meters (109 yards) to either side of the outermost least tern nest in the colony two days before the projected hatch date. In some cases with intensive monitoring, the Restricted Area for a least tern nursery may be 50 meters (see section 4.1.1). Restricted Areas are adjusted as broods move throughout the site or tern chick nurseries shift to provide a 100-200 meter buffer from vehicles for PIPL broods and a 50-100~~-200~~ meter (depending on timing and range) buffer from vehicles for tern chick nurseries.

Pedestrians are able to walk through Restricted Areas below the end of the perpendicular fencing. Additional pedestrian only (no dog walking) access may be permitted depending on brood activity and recreation levels. Bikes must be walked through the area, and dogs, pets, horses, and non-essential vehicles are not permitted. Signs informing visitors of the restrictions are located on the perpendicular fences with arrows indicating that pedestrians must walk around the fencing rather than ducking under.

In places where vehicle pull-offs fall within the Restricted Area ~~with active crossing broods~~, these pull-offs are closed to all vehicles (not including enforcement and monitoring staff) unless monitoring is implemented allowing parking to continue. Pull-offs are closed with temporary symbolic fencing, "area closed" signage, and orange cones. Sections of roadway within a Restricted Area are delineated with orange barrels, orange sign posts and reduced speed limit signs (speed drops to 5 mph), which may be placed in the center of the roadway or on either side of the road (Figure 3-1, b). In addition, "End of Restricted Area" signs will be placed on the opposite sides of reduced speed limit signs in order to clarify the edges of Restricted Areas and indicate that the speed limit increases beyond that point. Visitors to the beach are informed of reduced speed limit areas by the attendants at the Powder Point Bridge Guardhouse.

a)



b) Figure 3-1. Example diagrams of fencing types and locations on Duxbury Beach for the purposes of nesting activity protection, including OSV access area and restrictions within specified distance of brood range (varies depending on time of day and age of brood).

The Duxbury Beach Guide and Rules containing beach rules and regulations and guidance related to driving near piping plover chicks are available at the Powder Point Bridge Guardhouse, and additional signage is in place at the beach entrance and parking lots regarding vehicle access, speed limits, and dog rules. Beach rules and regulations are also available to visitors online through the town and Reservation websites.

Other management

Predator Management: In 2009, the Reservation met with the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) to discuss recommendations and procedures for a possible predator management plan. In 2010, the Reservation's Board of Directors adopted a predator management plan and contracted with APHIS WS during the shorebird season to remove predators as appropriate and according to the approved plan. The plan's original focus was to manage American Crow (*Corvus brachyrhynchos*). American crow management was done through DRC-1339 COR treated brown chicken eggs placed in mock exclosures to target crows exhibiting nest predating behavior.

In 2011, the decision was made to expand the predator management program to include Eastern Coyote (*Canis latrans var.*). This policy enhancement was based on the increase of suspected and known coyote predation on both plover and tern nesting, as well as the increase in tracks and sightings. In 2011, out of the 83 plover eggs laid by 12 pairs, 19 chicks fledged, resulting in a fledge rate of 1.58 chicks fledged/pair. This number was higher than the previous year's rate of 1.45 and well over the rate of 1.24 required to sustain the species.

Predator management efforts remained consistent from 2011 through 2016, with the exception of 2014, when the Reservation suspended predator management efforts for mammalian predators and instead engaged Dr. Chris Bloch of Bridgewater State University to provide a study of the effectiveness of predator management on Duxbury Beach and other beaches. piping plover productivity decreased to 0.92 chicks fledged/pair that season, compared to 1.94 in 2013. Dr. Bloch concluded that crow and coyote management had significantly improved piping plover productivity, and to a lesser extent least tern productivity. He also concluded that coyote removal on Duxbury Beach has had a negligible effect on the overall coyote population.

Animal and Plant Health Inspection Service Wildlife Services reported Red Fox (*Vulpes vulpes*) presence on Duxbury Beach in early May 2017. In June 2017, the Reservation voted to implement Red Fox management. Red Fox management had occurred previously in 2012. Due to high numbers and observed and suspected predation events by Common Grackle (*Quiscalus quiscula*) in 2019, Grackle removal was initiated. It continued in 2020.

In the past, Reservation policy has required APHIS WS to survey the beach in late winter/early spring to determine the presence of predators and make recommendations to the Reservation. Beginning in 2017, the Reservation policy has been amended to allow coyote and crow removal in late winter without a survey. The goal of the new approach is to create a window of time when unfledged plover and tern chicks are present, and the predator population is somewhat diminished. Similar to coyote and crow management, fox management will begin in late winter to ensure there is a window of time with a diminished fox presence on the site. These changes to the predator management program will continue in 2020.

On December 4, 2020, the Reservation board voted to continue the predator management program for the duration of the COI (2021-2023), granting oversight to the DBR Executive Director unless major changes to the program need to be made. The Reservation will continue to evaluate the set of species approved for lethal removal annually and throughout the season based on predator presence and recommendations from APHIS WS. Based on gull activity in 2020 and predation of least tern chicks, the Reservation plans to evaluate the need for gull control on the beach in 2021.

To mitigate for the potential impacts of the covered activity on piping plovers, the Reservation self-funded a selective predator management plan in 2018-2020. The Reservation will continue this practice in 2021. The Reservation has contracted with the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service Wildlife Services (APHIS WS) to conduct on-site selective predator management of both avian and mammalian predators. The APHIS WS Proposal for FY21 will be submitted and approved by MADFW and USFWS. Between February and July, 2021, WS employees will make approximately 10 visits to Duxbury Beach

for the following activities: assessment, trapping, shooting, or DRC-1339 COR applications. Management beginning in 2020 deviated slightly from that in 2018 and 2019. The Reservation erected and managed pre-baited mock exclosures internally. In addition, WS visits were scheduled based on observations of predator activity made by Reservation staff. This helped to target visits to key problem times and areas. The number of visits may have increased had predator activity increased later in the season; however, this was not necessary in 2020. A similar practice will hold in 2021.

Habitat enhancement: Based on discussions with Dr. Scott Melvin (NHESP), the Reservation began creating artificial nesting habitat areas in 1999. The Reservation placed 1,300 cubic meters (1,700 cubic yards) of quarry sand on the bayside beach between High Pines and Crossover 3 to form a large rectangular area measuring approximately 91 meters by 45 meters (100 yards by 50 yards). Part of this area was veneered with natural beach sand to help determine if nesting pairs prefer natural beach sand to quarry sand. One pair of piping plover nested in this area in 1999, suggesting preference for natural beach sand and helping to determine territory size on Duxbury Beach.

The project continued in 2000 with two additional habitat areas, each 53 meters in diameter (58 yards), just south of High Pines. In these cases, natural sand was spread over the entire area of quarry sand placed over the vegetation. Two pairs nested on the three enhancement areas, fledging three chicks. Two additional areas were added south of High Pines in 2001, created in the same way as in 2000. No birds nested on the newly created areas, possibly because access for chick foraging was limited by the marsh. Lack of funding stalled the project in 2002, and vegetation regrew in the habitat enhancement areas – no plovers nested in these areas in 2002. An attempt was made to restore the areas in 2003 by rototilling the grass. This was deemed an ineffective method as the finished surface was rough with vegetation only partially buried. Again, no pairs nested in the habitat areas.

In 2005, DBR received a five-year permit from the Massachusetts Department of Environmental Protection to burn grass to create replicated habitat areas. This was first done in the fall of 2005 and in the spring of 2006, plovers nested on three of the five burned areas. Unfortunately, burning was deemed to be an unsuitable solution as the vegetation grew back too quickly. DBR then instituted the method of scraping replicated habitat areas using a small Bobcat skid steer in the early spring to scrape and bury vegetation. This method was deemed effective because while the grass grows back, it allows a window of no vegetation during egg laying and hatching. In 2010, at the recommendation of Mass Audubon Coastal Waterbird Program staff, DBR began to scrape areas to resemble a naturally occurring washover rather than the previously used 53 meters diameter circle (58 yards). Each area was approximately 279 and 371 square meters (334 and 444 square yards) and is level with the surrounding beach, typically 0.3 meters (1 foot) above the extreme high tide.

The “scraping” enhancement method continued in 2011, 2012, and 2013 with moderate success as at least one nesting pair used the areas each season. No maintenance work was performed at the habitat enhancement areas in 2014 and 2015 due to winter storms which either diverted DBR resources or prevented access to the areas. In 2016, three areas were scraped, and two pairs of plovers nested at the enhanced habitat areas, fledging three chicks.

In 2017, habitat enhancement occurred at three existing areas of replicated habitat and at three new locations on the west side (bayside) of the site. Three pairs of piping plover established territories and nested within three of the replicated habitat areas in 2017. Three chicks survived to fledge from the nests located in the enhanced habitat. Based on the work that occurred in 2017 and observations made over the previous 17 years,

habitat enhancement was deemed effective in attracting nesting pairs, providing suitable chick rearing habitat, and reducing interactions between endangered species conservation efforts and beachgoers on Duxbury Beach.

Work in 2018 was suspended due to the number and intensity of March storms which made access for work difficult to accomplish before Plover pairs returned. Despite the lack of maintenance, two pairs nested in the replicated habitats in 2018.

In 2019, maintenance was performed at the southern five replicated habitats from February 19-22. Work was performed during February to allow the habitats to "naturalize" prior to piping plover pair arrival. This allowed time for wind and precipitation to remove construction vehicle tracks and any ridges or other abnormalities from the habitats' surface. Due to the frequency of overwash, the Reservation did not maintain the most northern habitat.

Maintenance consisted of using an excavator to bury vegetation well below the surface, >2 feet in depth, in order to remove vegetation and expose native sand. Prior to initiating the work, the Reservation placed fiberglass rods around the perimeters of the habitat areas and entrances to guide maintenance work. The areas remained consistent with maintenance efforts done in 2017, except for habitat 5, where there was previously no entrance path from the bayside to the habitat area. Three pairs of piping plovers nested in the replicated habitats in 2019, two of which successfully hatched and one of which produced a fledgling.

Two pairs of piping plovers nested in the replicated habitats in 2020, both of which successfully hatched and produced a total of six fledglings. The Reservation did not perform maintenance prior to the 2020 season so as to allow the areas to completely revegetate as requested by NHESP.

Exclosures: Much of Duxbury Beach is unsuitable for exclosures due to the narrow width, slope, rocky substrate, and dense vegetation. These factors may increase the tendency for overwash or destruction of the exclosure and increase the likelihood of abandonment due to disturbance and limited visibility of predators. Clutches located in replicated habitat areas may be candidates for exclosures, as exclosures are primarily open, flat, sandy, and at less risk of overwash by being on the bayside of the site. The Reservation will determine where exclosures may be a viable option as territories are established and eggs are laid.

The Assistant Director for Duxbury Beach Reservation holds the exclosure permit for Duxbury Beach. Under the permit, the erection of exclosures will be completed by the Reservation. At least one of the Field Technicians must be present during construction of any predator exclosure to ensure there is complete knowledge of the nesting pair and the exclosure protocol. Any changes in procedure relating to exclosure placement, assembly, and current issues should be reviewed at a training session involving the Reservation's Assistant Director, Coastal Ecology Program Coordinator, Field Technicians, and Monitor Supervisors.

Vegetation management: Extensive effort has been made to establish and maintain beach grass and woody plants on Duxbury Beach to stabilize the dune and entire barrier beach system. Plantings occur each spring in areas where work has been performed or where vegetation has been destroyed by winter storms after approval from the NHESP. In order to maintain suitable nesting habitat - sparsely vegetated, sand-cobble areas - all plantings are spaced 36 inches (91 cm) on center). The Reservation applies maintenance-blend fertilizer to beach vegetation annually, primarily through the use of a helicopter. However, because placing fertilizer by hand is more effective, in areas where it is critical to control placement, the Reservation will fertilize by hand rather than by helicopter.

<u>Duxbury Beach Endangered Species Monitoring Program</u>

Monitoring of listed species on Duxbury Beach is multifaceted with in-field and reporting responsibility. A successful monitoring program requires strong communication among the individuals on the ground doing the monitoring as well as with the Assistant Director and Coastal Ecology Program Coordinator, which performs the overall maintenance and oversight of the beach year-round. In addition, the success of the program is reliant on clear communication and responsiveness from the Town of Duxbury Beach Operations staff. To ensure all parties are aware of concerns, current status of nesting and protection work, and ongoing training of staff, bi-weekly meetings occur among the Town Beach Operations staff and Reservation Endangered Species Program staff. The effort spent monitoring is extensive to ensure that adequate protection through fencing and signage is in place. Data capture occurs through several mediums to record staffing, covered activity implementation, nesting activity, nighttime driving protocols, management activity, and recreational activity (Appendix 2). Data collection transitioned from paper data sheets to online via NestStory and Google Drive in 2020. Staff scheduling and communication about schedules and needed coverage occur through the Homebase application (Appendix 2, Figure 5). Communications between Senior Staff (Program Coordinator, ~~Assistant Director,~~ Field Coordinator, ~~-~~Field Technicians, and Monitor Supervisors) occurs through Slack.

Field Technicians: A team of three Field Technicians begin monitoring Duxbury Beach the first week of April, with visits three to five times per week. In May, monitoring visits increase, with daily visits beginning shortly before the first plover nest is due to hatch. Field Technicians collect information on plovers and terns during each site visit, focusing on pair abundance, nest status and location, brood status and location, nest and chick loss, flight status, predator presence, and staging activity. During the course of monitoring, the Field Technicians inspect symbolic fencing and may either make fencing updates or work with the Monitor Supervisors to ensure Shorebird Monitors assigned to fencing work for that shift make the fixes.

In addition, Field Technicians are responsible for determining the location and status of broods according to their location on the beach. All broods within 1000 meters of the open OSV area are monitored every morning prior to the beach being open. This occurs from 06:00-08:00. After locating all broods in proximity to the OSV area, Field Technicians will locate all broods adjacent to parking lots or roadway that are accessible to recreational vehicles prior to 10:00. Broods in areas not adjacent to recreational access on parking lots or roadways and beyond 1000 meters from the OSV area will be monitored a minimum of every other day. Field Technicians work with Monitor Supervisors to determine necessary changes to closed or Restricted Area fencing and placement of Shorebird Monitors. Monitoring efforts by Field Technicians also serve to inform the Monitor Supervisors of the anticipated need for Shorebird Monitors day to day and over the course of the season by communicating hatch dates and helping to determine the north-south and east-west extent of Restricted Areas.

Field Technicians will be responsible for monitoring least tern colonies every other day. If a least tern colony is adjacent to the OSV area, the colony will be monitored daily to determine if any nesting activity has extended beyond the existing fencing or within close proximity of the OSV area (including extending Restricted Areas in response to tern nursery area expansion). Colony check data will be captured via NestStory, an electronic in-field data capture application used for piping plover and least tern monitoring.

Field Technicians assist the Monitor Supervisors in checking the mock exclosures and traps placed for avian predator management by APHIS WS, and records data on predator signs and uptake and communicates exclosure status and observations to APHIS WS and the Reservation's Assistant Director.

Field Technicians complete the NHESP short form and submit the preliminary data for Duxbury Beach each July under the supervision of the CEP Coordinator. The Technicians also complete annual census reports, and site maps for Duxbury Beach to be submitted to the state each September. These forms are completed based on the field book data and NestStory data captured during each site visit by each staff member.

Shorebird Monitors:

Shorebird Monitors (monitors) begin on the beach at least two days before the earliest plover nest is due to hatch. From this point, monitors are scheduled in three shifts per day with varying hours depending on nesting activity. Monitors will be present seven days per week while unfledged piping plover chicks are present in areas within 1000 meters of the OSV area and/or adjacent to parking lots or roadway accessible to recreational traffic. Monitor shifts can be classified as Morning, Daytime, and Evening. Morning and Evening shifts will generally consist of special least tern chick monitoring, fencing work, patrolling the back roadway, and piping plover brood location checks. The Daytime shift will entail more frequent and focused brood monitoring.

In the event that a least tern chick nursery area is directly adjacent to an OSV Crossover (within 100 meters) that would otherwise be open (does not fall within a piping plover brood range or Restricted Area) and the nursery does not span the Crossover, special monitoring will be employed to allow OSV access. Shorebird Monitors will be assigned to least tern colonies to implement this management with oversight from the Monitor Supervisors and Field Technicians. If least tern chicks are 30-100 meters from the crossover, the nursery area will be monitored at least once per hour from 08:00-20:00. If chicks are less than 30 meters from the crossover, the nursery area will be monitored constantly from 08:00-20:00. The Monitor will be responsible for herding the tern chicks away from the crossover if they come within 15 meters.

Morning: First-shift monitors arrive at 06:00 and assist with fencing modifications to the Restricted Areas based on upcoming estimated hatch dates, fledging, and changes to brood range. At 08:00 the monitors will be assigned to one of a variety of tasks depending on nesting activity. If least tern chicks are present in close proximity to an open Crossover (see below), monitors will be assigned to monitor the colony at the Crossover. Once all piping plover chicks have fledged, if least tern chicks remain on the beach in close proximity to a Crossover, monitoring continues 7 days per week from 7:00 or 7:30 (dependent on number of tern colonies). Other tasks assigned to monitors during the 08:00-10:00 timeframe will include patrolling the roadway for crossing events and implementing the crossing protocol, assisting Field Technicians in monitoring broods, and performing special projects (trash pick-up, knotweed removal, data entry).

Daytime: Monitors will be scheduled from 10:00 to 18:00, seven days per week while unfledged chicks proximal to recreational vehicle activity are present. This time frame was chosen based on typical over-sand vehicle activity. Monitors will be assigned to particular zones of the beach and will be responsible for patrolling territories within their assigned monitoring zone to check for brood location and activity. These territories will be confined to either the oceanside beach or the roadway. Should a brood move to the bayside beach, the monitor will be responsible for both roadway and bayside. Zones and territories may shift depending on nesting activity, but generally will be laid out as illustrated in Map 1. Each monitoring zone will have a minimum of 1 oceanside and 1 roadside monitor while broods are present. The exact number of monitors assigned to each side of the dune is dependent on the number of active broods in the area, propensity of broods to cross, historic rates of crossing activity, and the amount of recreational activity for the area. On average, Monitors will be responsible for two broods per territory, however actual responsibilities could range from one to five broods (with higher number of broods per monitor in areas without recreational activity). Monitor territories within their zone will be determined based on nesting locations, brood range extents, and proximity to recreational vehicle use. Monitors will be responsible for constant communication with other monitors in their zone, and if necessary, neighboring zones, to share current locations of broods and possible movement to the roadway or other zones. Monitors will be present along the beach and roadway throughout the day covering the three peaks in over-sand vehicle traffic, actively patrolling their territories to assist broods in roadway crossings as necessary. Monitor coverage will also be determined by special circumstances (such as broods crossing through parking lots) and mitigation efforts if and when the OSV is closed. In such situations, monitor shifts may be

added, and more monitors may be assigned to relevant zones than had been previously in order to ensure proper coverage.

In the event of rain or storm conditions, monitoring may be reduced because the broods seek shelter and searching for them could cause chick mortality. If broods cannot be monitored every three hours during the day, the OSV area will be closed or buffers will be expanded to 1000 meters.

The primary responsibility of the monitoring program is ensuring the protection of unfledged chicks from vehicles and that broods remain undisturbed. If the chicks are foraging at the water line, monitors may escort beachgoers around the brood to ensure chick safety or keep the area closed to pedestrians until the brood moves to a different area. Monitors also act as an additional deterrent (besides fencing and signage) for any vehicles approaching the Closed Areas on the oceanside beach. Monitors are instructed to stay below the high tide line and as far from the brood as possible to lessen any disturbance. In addition, monitors are trained in plover and tern behavior in order to recognize signs that the birds are being disturbed by monitor presence. Monitors do not access Closed Areas.

In areas where crossings are possible, monitors are responsible for identifying movement toward Gurnet Road and for then informing the monitor stationed on the roadway and the Monitor Supervisor on duty of the probable crossing. The Monitor Supervisor will inform the on-duty Beach Operations staff of the crossing for assistance in traffic management. This communication occurs as soon as the brood or adults begin moving away from the water line and toward the dune/vegetation so that the monitor and enforcement staff can be in place well before the chicks approach the roadway. The monitor located on the roadway stops traffic in both directions, including pedestrian traffic, once the brood reaches the sand fence or permanent symbolic fencing which is located at the toe of the dune or crest of the dune. The oceanside monitor maintains visual contact with the brood until the roadside/bayside monitor confirms that responsibility has shifted. Traffic remains stopped for as long as it takes the brood to cross the roadway and commit to the movement. Once off the road, the Reservation or Beach Ops staff maintains the closure while the monitor observes the brood to determine whether they are likely to stay on the present side or return to the original location. Typically, it is determined that the brood is going to stay at the current location once the chicks have reached the high tide line. In the case of a prolonged crossing, a “floater” Monitor, Supervisor, or Beach Ops staff will stay at the crossing while the original roadside Monitor resumes patrolling their territory for other crossing events. If a bayside or oceanside Monitor cannot locate one of their assigned broods, they will inform the other monitors in their zone and the Monitor Supervisor. They will perform a sweep of the roadway in case of a crossing, stopping traffic immediately if birds are observed.

Once on the bayside, the brood is monitored by the monitor stationed on Gurnet Road while the oceanside monitor remains at the oceanside Restricted Area. Pedestrian use of the bayside is much less and due to the topography and lack of structures (sand fence and sturdy drift fence), monitors stationed on the roadway are able to easily intercept pedestrians approaching Restricted Areas on the bayside beach. In addition, because the roadway is above the bayside beach, monitors are more easily able to locate chicks and record observations without causing unnecessary disturbance.

The exact placement of monitors and number of monitors assigned to a territory varies as there are countless scenarios that may occur on the site. Factors in these scenarios include original nest location (oceanside vs. bayside), presence on OSV or pedestrian beach, extent of habitat moving east or west (whether a crossing is feasible), number of chicks and number of broods, presence of least tern nests or chicks, and a multitude of other details. In an effort to anticipate need during the season, the Reservation Assistant Director, CEP Coordinator and Field Technicians may perform a walk-through of the oceanside, bayside, and roadway to map

potential crossing locations and other potential factors influencing management if there are significant changes during the off season.

Monitors carry tablets equipped with NestStory to record brood checks, brood locations, and crossing information (time and length of crossing, brood identification, and number of vehicles stopped). Monitors are responsible for checking broods at least once every two hours and recording information, including brood location and number of adults and chicks. Throughout shifts, monitors record predator presence or tracks, public interactions and information on special projects. Based on observations, the monitor informs the Monitor Supervisor if a brood moves within 100 meters (or greater depending on time of day and age) of an OSV area so that the Restricted Area boundary can be adjusted.

Map 3-1. Example monitoring "zones" established for 2020 monitoring efforts on Duxbury Beach. Zones are estimated based on historic nesting and recreational activity.

Evening: Evening shifts are utilized in the case of least tern chick activity within 100 meters of an open OSV crossover, parking within 50 meters of least terns, or in the case of Crossover 1 being open to nighttime OSV use while unfledged piping plover chicks are present within 1000 meters. In these instances, one to four monitors would be on-site until 20:00 to monitor least tern chick numbers in proximity to the crossovers and herd chicks that move within 15 meters and to monitor piping plover broods within 1000 meters of the nighttime OSV area. piping plover evening monitors would be responsible for locating broods between 18:00 and 20:00, adjusting Restricted Area fencing as necessary, patrolling the back roadway for crossing activity (focusing on the area between the Powder Point Bridge and Crossover 2), and monitoring the edge of the nighttime OSV zone prior to 20:00.

Monitors are equipped with tablets with NestStory to record least tern chick information in proximity to the crossovers, piping plover chick information and locations, and piping plover crossing activity. They will also record human disturbance, predator information, and other special observations.

Monitor Supervisor: The Monitor Supervisors are responsible for overseeing the monitoring and data collection work of the monitors. Supervisors work in two shifts per day once piping plover hatching begins – 06:00-14:00 and 12:00-20:00, in order to prepare, oversee, and close out all Monitor activities. In addition to this oversight role, the Monitor Supervisors assist the Field Technicians in checking the mock exclosures and traps placed for avian predator management by APHIS WS, and records data on predator sign and uptake and communicates exclosure status and observations to APHIS WS and the Reservation's Assistant Director. The Supervisors are

responsible for informing Beach Operations staff of changes to Restricted and Closed Areas when Field Technicians are not present.

Beach Operations Staff: Duxbury Beach Operations staff are stationed on Duxbury Beach from 08:00 – to close from May through Labor Day. Prior to May Beach Operations performs routine patrols of the beach during open hours. Throughout the year Beach Operations, Duxbury Police Department and Harbormaster Division patrol the parking lots on the beach during day and nighttime hours. The officers and beach rangers are responsible for enforcing all rules and regulations of Duxbury Beach, particularly traffic management. In addition, the officers respond to emergency situations on the beach.

Vehicles queue up in the resident parking lot prior to the beach opening at 08:00. This queue can begin well before 06:00. At 08:00 the vehicles queued up will be led down the back roadway by a Beach Operations staff, who will be on the lookout for crossing activity and respond accordingly. Typically, this caravan of vehicles will be situated on the beach by 08:30. If a crossing occurs during this time, the staff member will stop the caravan and call the Field Technicians or Monitors to assist in the crossing. Beach Operations staff are responsible for determining the number of vehicles allowed on the beach dependent on the amount of space required for the listed species, which is provided by Reservation staff. Beach Operations staff also monitor the number of vehicles on the beach and close beach access when the limit is reached (the maximum is 500 vehicles). Officers monitor for pedestrian and vehicle operator compliance with beach rules and regulations related to protected species. This is particularly important as it pertains to chick crossings. Beach Operations is alerted by the Monitor Supervisor of a potential crossing, and an officer is on-site to stop traffic and act as a show of force (uniform and truck).

Beach Operations staff man several vehicle access points on the beach and inform recreationalists of closures and restrictions. Staff are stationed at the Powder Point guardhouse to stop traffic coming over the bridge and coming from the north, at open OSV Crossovers, and at any open parking lots used by Town of Duxbury sticker holders. Staff will also patrol the beach and back roadway throughout the open hours.

The Beach Operations staff are responsible for recording emergency vehicle use within Restricted Areas, vehicle numbers on-site, and beach rule violations. They are responsible for completing an end of season report which includes the number of violation warnings (verbal and written) and citations given out over the course of the season.

4.0 Covered Activities

Duxbury Beach Reservation is requesting to implement the Covered Activities, Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks and Least Tern Chicks; Recreation and Beach Operations Associated with Reduced Symbolic Fencing Around Nests, Recreation and Beach Operations Associated with Reduced Proactive Symbolic Fencing of Piping Plover and Least Tern Habitat; and Recreation and Beach Operations at Piping Plover and Least Tern Nest Sites with Nest Moving, under the Massachusetts Habitat Conservation Plan (HCP). DBR is requesting coverage for up to 162 ~~2~~ pairs of piping plover per season, for the three-year life of COI (5047~~7~~% of the three-year average 2020~~2018~~-2022~~0~~).

Review of the piping plover activity on Duxbury Beach has determined that up to 15 piping plover broods (58% of the 25.67 on-site breeding pairs based on 2018-2020 average) could be impacted (Table 4-1) by use of the back road and parking lots if the full roadway remained open to recreational activity. The area affected includes the length of Gurnet Road from the north edge of the property (Northern Lot) to the Gurnet Guardhouse in the

south covering 7.3 kilometers (4.5 miles) of improved gravel roadway. Since Gurnet Road provides court-protected access for residents and visitors to Gurnet-Saquish, the roadway can only be closed temporarily to allow the crossing of listed species. However, the Reservation anticipates closing portions of the back roadway to recreational traffic while unfledged chicks are present to reduce the number of broods impacted by use of roadway and parking lots. As crossings are determined by pairs rather than beach management, anticipated exposure assumes all 16 pairs will fall under the category "use of roads and parking lots", though in reality this may not be true. Exposure encompasses the area of the maximum width of crossing area and the width of the roadway (25 feet) for a total of 162 piping plover broods. The approximate width of a single crossing area of a brood observed on Duxbury Beach is 10 meters (30 feet). Based on historic crossing activity, this equates to a total crossing area (exposure area) of 0.28 acres. The Reservation finances the employment of brood monitors to safeguard chick passage during roadway crossings. As mentioned previously, not all broods cross the roadway during the nesting season however each season there are crossing events. Some broods are frequent or daily crossers, whereas others may cross once during the season (Table 4-1).

Table 4-1. Piping plover brood crossing data on Duxbury Beach, 2011-2020.

		Overall crossing data			**# broods north of Crossover 1**			**# broods south of Crossover 1**			
Year	Total Pairs	# of broods that crossed	# of areas crossed	# of broods crossing north of crossover 1	Pavilion to north end of Resident lot	Resident lot to Guardhouse	Guardhouse to Crossover 1	Crossover 1 to Crossover 2	Crossover 2 to Crossover 3	Crossover 3 to Plum Hills	Plum Hills to Gurnet
2022											
2021											
2020	25	15	6	5	3	1	1	6	3	1	0
2019	28	12	5	4	3	0	1	3	3	0	2
2018	24	12	5	2	1	1	0	5	3	0	2
2017	28	3	2	0	0	0	1	2	0	0	0
2016	23	11	3	3	0	0	3	5	0	3	0
2015	25	11	3	3	3	0	0	4	0	4	0
2014	26.5	6	4	2	1	0	1	1	0	3	0
2013	17	2	1	0	0	0	0	0	0	2	0
2012	14	1	1	0	0	0	0	0	0	1	0
2011	12	4	2	0	0	0	0	3	0	1	0

Recreational activity on Duxbury Beach relies on access via pedestrian pathways and vehicle crossovers. On the oceanside, there are three vehicle crossovers which may be used for recreational access. In addition, there are

12 primary pedestrian access paths, four of which are handicap accessible, on the oceanside. The total shoreline distance impacted is 73.5 meters. However, many of these access paths are not vital for recreation. There are two vehicle crossovers and three pedestrian access paths that have a large impact on recreational access. Historically, piping plover nesting has not impacted these access ways, however, least tern nesting has encroached on both vehicle crossovers and may become an issue in the future. Should piping plover or least tern nesting occur at or on these access paths it would have considerable impact on recreation.

Inclusion of Least Terns

The Reservation is requesting to allow exposure of up to 25 pairs of least terns on Duxbury Beach as part of the Reservation's Conservation & Management Permit (CMP). The average pair number on Duxbury Beach over the past three seasons (20202018-202220) is 363194 pairs. The take exposures proposed would allow up to 713% of pairs to be impacted by covered activities during the 2021-2023 seasons. Reservation anticipates utilizing take exposures for least terns to implement the covered activity Use of Roads and Parking Lots in the Vicinity of Unfledged least tern Chicks to allow use of the 1st and 2nd crossovers in accordance with procedures outlined below. Eleven pairs were exposed in 2020 through this activity (3.6% of pairs present on the site in 2020).

This covered activity will be initiated if least tern chicks are observed within 100 meters of Crossovers 1, or 2, or 3 (provided the crossover is open) in order to allow vehicles to drive over the crossover within 100 meters of least tern chicks. The Reservation will employ intensive monitoring of least tern nests and chicks near the crossovers. Herding will be employed should any chicks come within 15 meters of the crossover. Due to the difficulty of determining whether least tern chicks are associated with the same nest, it is assumed that each chick is from a distinct nest when determining take exposures. This covered activity will also be initiated to allow parking of vehicles as close as 50 meters from least tern chicks. Doing so will require a monitor to be present the entire time vehicles are parked less than 100 meters from least tern chicks and require a barrier to be placed perpendicular to the beach to prevent tern chicks from moving within 50 meters of the parked vehicles.

Table 4-2. Unfledged least tern chicks observed within 100 yards of an open OSV crossover in 2020.

Date	Time Start	Time Off	Colony Code	# LETE Chicks within 100 meters
6/16/20	12:56	12:58	XO2-North	0
6/17/20	12:03	12:04	XO2-North	0
6/18/20	6:37	6:39	XO2-North	0
6/19/20	6:28	6:37	XO2-North	0
6/20/20	6:40	6:40	XO2-North	0
6/21/20	7:12	7:12	XO2-North	0
7/27/20	6:33	6:47	XO2-North	1
7/27/20	8:29	9:14	XO2-North	10
7/27/20	10:10	13:28	XO2-North	4
7/27/20	14:28	17:25	XO2-North	4
7/27/20	18:13	19:35	XO2-North	3
7/28/20	6:37	10:08	XO2-North	1
7/28/20	10:38	17:13	XO2-North	4

7/28/20	18:11	19:51	XO2-North	5
7/29/20	6:49	7:09	XO2-North	0
7/29/20	6:51	11:14	XO2-North	11
7/29/20	12:32	19:34	XO2-North	4
7/30/20	6:20	6:47	XO2-North	3
7/30/20	6:20	12:31	XO2-North	3
7/30/20	13:15	19:31	XO2-North	6
7/31/20	6:12	12:18	XO2-North	6
7/31/20	13:21	19:21	XO2-North	6
8/1/20	6:16	6:38	XO2-North	7
8/1/20	6:21	12:41	XO2-North	5
8/1/20	12:45	19:31	XO2-North	8
8/2/20	6:23	12:28	XO2-North	6
8/2/20	12:24	19:29	XO2-North	6
8/3/20	6:22	12:40	XO2-North	5
8/3/20	13:45	19:18	XO2-North	6
8/4/20	6:58	12:39	XO2-North	5
8/4/20	13:22	19:15	XO2-North	3
8/5/20	6:47	7:04	XO2-North	3
8/5/20	7:31	12:18	XO2-North	3
8/5/20	13:22	19:27	XO2-North	4
8/6/20	6:37	12:41	XO2-North	4
8/6/20	6:33	7:02	XO2-North	5
8/6/20	13:20	16:52	XO2-North	3
8/7/20	6:57	12:59	XO2-North	2
8/7/20	13:25	19:29	XO2-North	2
8/8/20	6:12	12:00	XO2-North	2
8/8/20	6:19	6:51	XO2-North	2
8/8/20	13:18	19:31	XO2-North	3
8/9/20	6:20	6:46	XO2-North	2
8/9/20	6:31	12:32	XO2-North	2
8/10/20	13:40	19:40	XO2-North	2

8/11/20	6:29	12:41	XO2-North	2
8/11/20	13:28	19:41	XO2-North	6
8/12/20	6:42	12:28	XO2-North	2

4.1 Initiation of Covered Activities

4.1.1 Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover and Least Tern Chicks

Gurnet Road is an improved gravel road that provides the only access to 205 private residences in the Town of Plymouth, of which fewer than 10 residences are occupied throughout the year. In addition, the Town of Duxbury has a mutual aid agreement with the Town of Plymouth to respond to fire, police, and other emergency calls utilizing Gurnet Road for access to assist property owners and their guests. Gurnet Road also provides access to recreational areas. Under the covered activity, the Reservation would provide unrestricted access for essential and non-essential vehicles in areas open to recreation.

Gurnet Road is graded up to three times a year under OOC SE18-1198 to reduce ruts that may entice piping plover chicks to rest or hide. During grading of the roadway surface, care is taken to minimize the gravel windrow that builds up along the edge of the roadway. In piping plover habitat areas, the windrows are flattened a minimum of 1 meter (3 feet) wide and spaced every 15 meters (16 yards) along the roadway. These smoothed-out transition areas facilitate the passage of piping plover chicks crossing from east to west and back to access both the bayside and oceanside beach.

Impact Minimization Measures

Impact minimization measures will limit the number of takes by reducing exposure of adults and chicks to vehicles traveling on Gurnet Road. There are four impact minimization measures outlined in the HCP that may be implemented as a condition of the covered activity "Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks." All measures may be employed on Duxbury Beach include barriers, signage, staff training, and managing traffic, including herding. In addition, intensive monitoring will be required when chicks are near roads and parking lots, as mandated in the HCP, and described in detail above and in section 4.1.2, below.

<u>Barriers</u>
There are several areas of Duxbury Beach that do not provide piping plover habitat on the bayside. This primarily consists of saltmarsh but also includes the Powder Point Bridge with associated revetment and footings. In two sections these non-habitat areas border paved parking lots. This includes the length of the paved parking lot at Duxbury Beach Park and the main pedestrian path across from the Powder Point Bridge. In cases where a brood is using the area oceanside or exhibits behavior indicating an attempt to access the parking lots in these areas, a combination of herding (non-active: monitor stationed at pathway or active: monitors moving towards brood) and barriers will be utilized to discourage crossings in these areas. This will not prevent the brood from crossing to the bayside in other sections of the beach. If crossings occur in the parking lots, a combination of partial parking lot closure, additional barriers, and herding may be used following approval from NHESP to prevent the brood from utilizing portions of the parking lot not blocked to vehicle use. If staff numbers allow, a barrier with temporary inserts may be used to guide the brood through a parking lot crossing, while maximizing the number of parking spots that may remain open.

In special cases, barriers may be utilized for short durations (20:00-08:00) to discourage crossing activity overnight in specific parts of the beach where recreational vehicle use of the back road occurs. If a piping plover brood begins to cross the road utilizing on the pedestrian pathways north of Crossover 1, the Reservation Coastal Ecology Program and Town Beach Ops staff may place temporary barriers at night in these pathways. The Reservation plans to implement a barrier first during the daytime to assess adult and chick behavior and ensure that barriers do not increase risk to adults by causing them to land and stay in the road for long periods of time while encouraging chicks to cross.

In cases where a brood utilizes the road for long period of time without crossing or the brood approaches open pedestrian pathways bordering paved parking lots with no bayside habitat, the Reservation proposes to implement herding the brood according to the Duxbury Beach Reservation's Piping Plover Brood Herding Protocol (Attachment B). Barriers will be placed, monitored, and maintained according to the Reservation's Piping Plover Barrier Use Protocol (Attachment C). Barriers will be assessed daily, morning and evening, to check for entrapment hazards and will be fixed prior to 20:00 that same day if necessary. If repairs are not immediate, non-active or active herding will be implemented as necessary.

Use of barriers is documented within nest/brood checks and road crossing checks in NestStory. Any issues with these barriers are recorded and reported to supervisors so that fixes can be made. The monitoring allows field staff to determine whether barriers present any increased risk to birds, such as physical harm, drawing attention from predators, or continued impacts to behavior. For example, limited use of barriers to restrict access to one part of a parking lot will be evaluated to see whether a brood continues to access foraging via other areas. This information is captured in the brood crossing form.

Signage

Signage on Duxbury Beach is extensive and varied depending on purpose and audience (vehicle versus pedestrian). Signage notifying beachgoers of protected areas and certain beach rules (such as dogs and speed limits) are plentiful and enforced by the presence of enforcement and monitoring staff.

Seasonal symbolic fencing consisting of rebar posts and orange twine is erected the last week of March each season to proactively protect potential habitat. As the season progresses, symbolic fencing may be placed around new nesting areas or areas of recreational use as brood refuge and for dune protection. "Closed Area" signs are placed on every other post, and speed limit signs are placed every 15 meters (16 yards). These symbolically fenced areas are referred to as "Closed Areas." Signage is placed 50 meters (55 yards) north and south of active nests by Beach Operations to prevent OSV parking within the buffer zone as well as seaward of the nest.

Although Closed Areas provide protection for nests and incubating adults, additional fencing is erected one to two days prior to a brood's estimated hatch date to provide protected areas for the chicks. Restricted Areas extend 100 meters (109 yards) north and south of the brood range or tern nursery (adjusted as necessary) and include the entire site east to west (oceanside beach to bayside beach), provided that vegetation or topography of the beach makes habitat east to west accessible. If the brood is adjacent to an OSV area, the Restricted Area is located 200 meters (218 yards) on the vehicle adjacent side(s) during the first week after hatching. If the brood is within 1000 meters of the nighttime OSV use area, these Restricted Areas are expanded dependent on age and brood range (see details above). Restricted Areas on oceanside and bayside are delineated with symbolic fencing running perpendicular to the beach. Signs informing visitors of the restrictions are located on the perpendicular fences with arrows indicating that pedestrians must walk around fencing rather than ducking under. If there are established vehicle paths approaching a Restricted Area that create confusion for

approaching vehicles, sawhorses with “no vehicle access” signage are placed by Beach Operations in front of the perpendicular fencing to provide additional visual deterrents for OSV operators.

In cases where vehicle pull-offs fall within the Restricted Area with active crossing broods, these pull-offs are closed to all vehicles (not including enforcement and monitoring staff). Pull-offs are closed with some combination of temporary sawhorses, symbolic fencing, “area closed” signage, and orange cones. Sections of roadway within a Restricted Area are delineated with orange cones and reduced speed limit signs (speed drops to 5 mph) placed in the center of the road. These signs designate the Restricted Area on the roadway and thus are the location where vehicles are stopped where there is a crossing.

The Duxbury Beach Guide and Rules listing beach rules and regulations and detailing piping plover behaviors and use of vehicles is available at the Powder Point Guardhouse. The Guide is also available online and mailed to all Duxbury Beach sticker holders. Additional signage in in place at the beach entrance and parking lots regarding vehicle access, speed limits, and dog rules. Beach rules and regulations are available on-line via the Reservation and Town websites.

Shorebird Monitors and DBR staff record human disturbance in nesting areas via NestStory (Appendix 2, Figure 1). Monitoring of continued disturbance and impacts allows DBR to determine the effectiveness of signage on the beach and in the roadway. Staff record speeding, non-compliance with Restricted Area rules, etc.

Managing Traffic

Multiple parties are responsible for identifying the need for alterations to traffic flow on Duxbury Beach. In order to properly determine where vehicles are permitted on the site, DBR staff located each brood within 1000 meters of the OSV each morning from 06:00-08:00 once broods are present. If a brood is not located, then a full sweep of the OSV beach is performed prior to opening. Field Technicians are scheduled to be on the beach at 06:00 each day which serves to make it easier and quicker to locate broods before the beach is open to non-essential OSVs. Once the sweep is complete and any necessary adjustments are made to Restricted or Closed Areas, the Beach Rangers then open the appropriate crossovers to over-sand permit holders after 08:00. At the Powder Point Guardhouse, attendants remind all visitors that there are nesting shorebirds and all speed limits are strictly enforced throughout the reservation (on oceanside beach, as well as, Gurnet Road). Once the beach is closed, traffic to Gurnet-Saquish is limited to residents and authorized visitors.

There is flexibility to the management of vehicles on the oceanside beach based on shorebird activity as there are three vehicle crossovers available if nesting or brood locations make one or more inaccessible. In addition, the presence of enforcement staff means that the number of vehicles on the beach can be adjusted if protected areas expand.

Monitoring efforts by Field Technicians, Monitor Supervisors, and Shorebird Monitors prior to the beach opening and throughout the day determine the locations of Restricted Areas and allows Beach Operations to determine the location and number of vehicles permitted on the beach. The OSV corridors may be adjusted or closed if vehicle presence is deemed a disturbance to courting or incubating adults. Shorebird Monitors patrol brood ranges on the oceanside and roadway and are able to inform OSV operators of the closed-off areas and provide education about the protected species work.

Town of Duxbury Beach Operations staff are responsible for enforcing traffic regulations on the OSV beach, requesting that vehicles move if protected areas shift, and providing support for monitors. In addition, Beach Operations staff are responsible for calculating and monitoring vehicle numbers on the beach and closing beach access when the limit is reached (this varies depending on available space, though always a maximum of 500). Prior to monitor departure at 18:00, a final assessment of Restricted Area locations is performed to best ensure

that vehicle use areas do not overlap, or come within 100 meters (109 yards), of unfledged chicks and no parking can take place within 50 meters (55 yards) of active nests. All crossing brood locations are captured and reported (Appendix 2, Figure 4). After 20:00 while chicks are present on Duxbury Beach, a Beach Ranger is stationed at Crossover 1 to ensure that nonessential vehicles do not continue south of this point. In addition, if broods are present within 1000 meters of Crossover 1, Shorebird Monitors are assigned to check broods and patrol the beach and road from 18:00-20:00. If movement is detected, a Monitor Supervisor will inform Beach Operations staff and ensure fencing is moved appropriately. This action serves to enhance protection of unfledged plover and tern chicks at night.

Traffic along Gurnet Road is preemptively managed with decreased speed limits (5 mph), posted on orange posts and traffic barrels in the center of the road in Restricted Areas. Staff also cover permanent 15 mph speed limit signs present within Restricted Areas and replace with 5 mph speed limit signs. All visitors to the site are informed of reduced speed limit areas by the attendants at the Powder Point Guardhouse. Shorebird Monitors stationed with the brood are responsible for identifying movement toward Gurnet Road and informing the Monitor patrolling on the road and the Monitor Supervisor on duty that a brood is likely to cross. The Supervisor informs Beach Operations staff via radio or cell who then respond to the closure. This occurs as the brood begins moving toward the dune or vegetation. The monitor located on the road stops traffic in both directions, including pedestrian and bike traffic, once the brood reaches the sand fence or permanent symbolic fencing which is located at the toe of the dune or crest of the dune. The monitor will independently close the road if the Supervisor or Beach Operations staff has not arrived prior to the brood reaching the sand fence or permanent symbolic fencing. The oceanside monitor maintains visual contact with the brood until the roadside/bayside monitor confirms that responsibility has shifted. Traffic remains stopped for as long as it takes for the brood to cross the road and commit to the movement. Pedestrians will not be permitted to walk through a crossing on the roadway or bayside beach due to the narrowness and proximity of these areas. Presence of pedestrians amongst a crossing brood is likely to delay or prevent the crossing. Pedestrians will be permitted to turn around and access the nearest open access path to oceanside outside of the crossing area in order to continue their progress north or south on the oceanside beach. Additional details regarding monitoring during road crossings are discussed in section 3.7.

Shorebird Monitors track vehicles stopped and outcome of crossing activity via NestStory (Appendix 2, Figure 1, 3) to record the effectiveness of efforts. In addition, Supervisors and Field Technicians will record “unattended crossings” when broods are observed on the opposite side of the road from where previously observed without an associated crossing. The goal of this monitoring is to determine how many crossings are attended and traffic stopped. It serves to guide staffing and coverage in an area and shows whether broods with unattended crossings versus attended crossings have different levels of success.

Vehicle use occurs on two additional areas of Duxbury Beach – on vehicle pull-offs along Gurnet Road and the bayside beach. In order to prevent vehicles from parking within Restricted Areas along the road, all pull-offs within restricted areas are blocked with sawhorses or symbolic fencing and “Area Closed” signs as well as orange traffic cones. Pull-offs may be opened within Restricted Areas under the covered activity “use of roadways and parking lots” provided that intensive monitoring occurs and no broods are using the pull-off for crossing. Beach Operations staff monitor vehicle use on the Gurnet Road and enforce rules regarding parking, beach permits, and speed limits. Recreational driving is prohibited year-round on the bayside beach. In order to ensure that chicks are not harmed or disturbed from accessing this optimal foraging area, all shellfishermen traffic is stopped on the bayside beach two days prior to the first nest hatching and the area remains closed until all chicks have fledged.

Herding

During the 2019 season, four broods of piping plovers utilized the road for lengthy periods of time (>1 hour) for purposes other than access to bayside or oceanside habitat. These broods were observed brooding and attempting to forage on the processed gravel road between the Powder Point Bridge and Gurnet. In the case of two broods, these instances were singular, however, two of the broods repeatedly spent >1 hour in the road over the course of multiple days. It is possible the broods' behavior was due to poor weather, predator presence, or natural barriers to crossing once in the road (dense vegetation or lack of bayside habitat).

When a piping plover brood attempts to use the back road for lengthy periods of time (>1 hr), Duxbury Beach Reservation will implement its herding protocol (Attachment B). This includes herding the brood off the road or parking lot and escorting vehicles past the area after 15 minutes. If the brood consistently returns to the roadway or parking lot, then the brood will be herded at scheduled times during daylight hours. Outside of scheduled times, vehicles may have to wait to travel until the next scheduled escort time.

Herding is tracked via NestStory (Appendix 2) and Slack communications and broods involved are observed for negative impacts during and following herding to ensure normal behaviors resume (access to foraging, fledging success).

Staff Training

Duxbury Beach benefits from a team of professionals with wide-ranging experiences from both the Duxbury Beach Reservation and the Town of Duxbury Beach Operations Division. The result is a comprehensive monitoring program that provides both formal and informal trainings held both in the classroom and on-site throughout the season.

Year-round Town of Duxbury Beach Operations and Reservation employees serve to provide continuity season to season and therefore are able to train new or seasonal staff on protocols or updates to protocols. In the event of a transition of Beach Operations responsibility within the Town of Duxbury, DBR and other Town Departments will work cooperatively to train the new department.

The largest aspect of the training program is that provided for the Shorebird Monitors. Approximately 30-40 monitors are employed May through August by the Duxbury Beach Reservation to assist in the protection of the listed shorebird species nesting on Duxbury Beach, including piping plover and least tern. Monitors are required to attend a training held by the Duxbury Beach Reservation at the commencement of the monitoring season. Monitors in 2020 were required to attend a training held virtually by the Duxbury Beach Reservation (due to COVID-19 safety concerns and state regulations) at the commencement of the monitoring season. Training consisted of two segments, fourteen hours of classroom training over 5 days plus an additional four hours of socially distanced, small group in-field training. Training in future seasons will continue to be as robust while taking into account any necessary safety precautions as the COVID-19 pandemic continues. This training includes plover and tern nesting biology, coastal waterbird protection and conservation efforts, chick monitoring protocols, data collection, beach rules and regulations, public interaction protocols, focal species and predator tracking, and special projects. In addition, the monitors receive ongoing in-field training to ensure classroom instruction is carried out correctly. Throughout the summer, additional classroom training is held as the season progresses as part of a formal training program and informal support while on the beach.

Specifically related to crossings, monitors are trained on adult plover behavioral tendencies including the following: warning/alarm calls, foraging practices, prey habitats, tidal fluctuations, brooding characteristics, weather-induced behavioral traits, chick appearance (aging chart) and behaviors, habitat use, etc. As over 95% of chick crossings involve the adult flying into the road and then calling to chicks, becoming familiar with auditory cues is a focus of training. Monitors are trained to recognize signs of disturbance of plovers and terns

and proper techniques to limit disturbance to ensure that monitoring efforts do not impact bird activity and protection measures are adequate. In addition, monitors are trained to properly use provided equipment, including binoculars, the Homebase App (used for scheduling and monitor communication), NestStory App (used for electronic in-field data capture, Appendix 2), and any other equipment needed to complete specific tasks. Lastly, a thorough review of recording crossings in NestStory during classroom and in-field instruction is held to ensure that observations are crossing observations are collected accurately. In-field training includes a run through of a "mock crossing" so that monitors can simulate monitoring, traffic control, and communication protocols.

Initial in-field training focuses on familiarizing new employees on beach morphology and notable landmarks, fencing, and shorebird identification. Opportunities for in-field training are plentiful throughout the season, including answering questions from monitors as issues come up. The presence of three Monitor Supervisors working alternate shifts ensures that monitors always have someone on call for support or questions. In addition, Beach Operations staff are present each day to provide informal training on beach rules and regulations, and Field Technicians are available to provide additional information on current nesting activity and bird biology and behavior. The Duxbury Beach Reservation's CEP Coordinator and Assistant Director are on-site throughout the season to answer questions and ensure all communications run smoothly.

Additionally, Field Technicians and Monitor Supervisors are required to attend 18 hours of virtual classroom training across six days and twelve hours of socially-distanced, small group in-field training prior to the commencement of the monitoring season, and prior to the arrival of the monitors (supervisors assist in training the monitors). Trainings occur throughout April and the first half of May, as the three technicians and three supervisors have staggered start dates. This training includes the same topics as are later given to the monitors (listed above), but also covers band resighting, flock counting, nest searching, recording nest and chick loss, and more detailed information on specific protocols, including recreational nighttime driving, herding, and barrier use. Along with the in-field training topics mentioned above, technicians and supervisors also learn to recognize courtship behaviors, and plover and tern scrapes.

The Reservation also provides trainings on the brood road crossing protocol to Town of Duxbury Beach Operations Department staff. The training covers how to identify piping plovers, recognizing behaviors that might occur prior to a crossing (such as warning/alarm calls and adult plovers flying into the road), how crossings are conducted, and Beach Operations' responsibilities during crossings. Beach Operations staff also receive training on nest and brood fencing, general piping plover and least tern nesting biology, predator management, least tern crossover proximity protocols, and herding and barrier use protocols.

The DBR Coastal Ecology Program Coordinator is on-site five days per week to oversee staff duties and work with Beach Operations staff. Through this observation, the Program Coordinator can work with Town Staff, DBR Monitor Supervisors, and Field Technicians to determine any additional training needed or changes to protocols. In the event that changes to protocols are needed, DBR will reach out to MADFW.

Monitoring

Although Duxbury Beach is 7.2 kilometers (4.5 miles) in length, several physical obstacles impede shorebird access to the road. Deterrents to road crossing include thick vegetation, sharp scarp incline, and lack of foraging habitat on the bayside of the barrier beach. This has led historically to only a few locations where crossings have occurred rather than throughout the entire length of the road. As the beach is dynamic and storm alterations can build up or reduce dunes significantly during the winter, crossing areas that were utilized one year may not be a crossing site the following year. With that being said, over the past three years, the broods that consistently crossed the road throughout the season have utilized the area between Crossover 1 and Crossover

2 and between the replicated habitats and Crossover 3. Since piping plover accessible passage changes prior to the start of the nesting season, experienced shorebird monitors walk the beach and road to determine all locations where crossing is possible. All crossing areas are noted, and as piping plovers start to nest, possible corridors are mapped.

In order to decrease risk posed to broods north of Crossover 1 between 20:00 and 22:00/23:00, information regarding crossings is relayed to staff on duty after 20:00. During the day, Shorebird Monitors patrol Gurnet Road in areas where brood crossings may occur based on access, historical use, and behavior. The monitors are responsible for monitoring crossings of specific broods during each shift. The monitors are responsible for filling out a brood location data book for all broods that may cross the road. Data captured includes brood ID, number of chicks and adults, age of chicks, location when last observed (bayside/oceanside and along the length of the site), location of last crossing, and other details (which may include tendency to cross at specific tides, etc.). The monitor (oceanside or roadside) responsible for recording the information for a brood is dependent on whether the brood is located on the ocean or bayside beach at the end of the shift. If the brood is located oceanside then the oceanside monitor is responsible for recording the data at the Guardhouse. If the brood is located bayside, the roadside monitor is responsible. In either case, monitors are encouraged to communicate at the end of the shift to ensure that accurate and complete information is relayed to the Beach Operations staff on duty that night.

Brood location information will be recorded on NestStory for every brood that has been known to cross the road, however, special consideration will be given to those that cross north of Crossover 1. In general, additional monitoring will not occur by Beach Operations staff at night so as not to increase risk with additional driving on the dark roadway. The Beach Operations staff on duty at the Powder Point Bridge Guardhouse remind arriving vehicles of the restricted areas and to reduced speed limits throughout the site, with particular focus on the broods north of Crossover 1 for those operating recreational vehicles. In addition, speed limit cones are located on either side of the Restricted Area to remind drivers of brood presence.

The Reservation believes Duxbury Beach has one of the most thorough monitoring programs for plover chicks in the state. All broods within 1000 meters of the OSV area are monitored every two to three hours from 06:00 to 18:00 (20:00 if nighttime access). All broods in proximity to recreational vehicle use on the road, parking lots, or beach are monitored at minimum every three hours per day from 08:00-18:00. Broods beyond the scope of recreational access are monitored every other day with additional monitoring equal to that of broods within recreational areas as staffing allows or mitigation dictates. A key component to monitoring on Duxbury Beach is recognizing the movement of broods east to west and vice versa. Monitors patrol both the roadway and the oceanside beach from 10:00-18:00 seven days per week to record chick location and stop traffic in the event of a brood crossing. In the event of rain or storm conditions, monitoring may be reduced because the broods seek shelter and searching for them could cause chick mortality. In bad weather, enough monitors are kept on for coverage of known plover road crossing areas and areas adjacent to any non-restricted over-sand areas if the crossovers remain open.

The monitors will record all crossing events in NestStory, capturing time, direction of movement for adults and the brood, estimated chick age, GPS points, amount of time the crossing took, number of north-and southbound vehicles stopped, and start and end time of road closure. Monitors capture brood location (including proximity to road) in the course of regular monitoring, which occurs at least once every three hours (with one check being between 18:00 and 20:00 if chicks are within 1000 meters of Crossover 1) with the objective of identifying possible crossing attempts and maintaining appropriate buffers from OSV areas. A Crossing Summary Report will be submitted to the Massachusetts Division of Fisheries and Wildlife (MADFW) by October 15 outlining crossing activity and associated brood success.

In order to increase recreational access, DBR and the Town of Duxbury may decide to keep open or reopen pull-offs along the back road within Restricted Areas. In this case, intensive monitoring of the broods and roadway spanning leading to and including ~~this~~ accessible pull-offs will be employed according to the COI. In addition, shorebird monitors stationed on the roadway in zones with open pull-offs will specifically monitor each open pull-off for plover presence (including checking under parked vehicles) three to five times per day while the beach is open. If plover chicks are discovered in a pull-off then the pull-off will be closed until that brood has fledged or been lost. Beach Operations will assist in managing traffic out of the pull-off. Pull-offs within the known crossing range of a brood will not be opened.

Impact Minimization Specific to Least Terns

Management will remain consistent on Duxbury Beach with the addition of least terns to the CMP. The Reservation employs Field Technicians, Monitor Supervisors, and Shorebird Monitors to provide extensive monitoring of least tern chick nesting areas and chick nurseries. This includes monitoring of least tern nurseries within 100 meters of open OSV crossovers from 08:00-20:00.

Monitors are trained to recognize least tern nesting activity and to capture information on chick number and locations within colonies. As the tern colony areas oftentimes contain plover nesting territories, the monitors do spend time stationed at Restricted Areas set up for tern nurseries. Monitors are trained to inform Field Technicians and Monitor Supervisors of changes to tern nursery boundaries so that protection measures can be adjusted accordingly. In such cases as monitors are not consistently stationed at a Restricted Area protecting a tern nursery due to a lack of plover chicks, the area is monitored at least once per day if the nursery area is adjacent or proximal to recreational vehicle use. One of these monitoring sessions for nurseries adjacent to the OSV area will occur between 06:00 and 08:00, prior to the beach opening. The goal of this monitoring is to determine if nursery areas have shifted or expanded and Restricted Areas needs to be adjusted.

To minimize risk to least tern chicks within 100 meters of an open OSV crossover, the Reservation proposes increased monitoring of the tern nursery area. If chicks are within 30-100 meters of the crossover, the nursery will be monitored every hour from 08:00-20:00. Should chicks come within 30 meters of the crossover, a monitor will remain with the colony constantly from 08:00-20:00 to observe the least tern chicks and nesting adults. In the case that a least tern chick moves within 15 meters of the crossover, the tern chick will be herded 5 meters beyond the 15-meter buffer. To do so, the monitor will walk slowly towards the chick, coming from the direction of the crossover. The monitor will not push the chick towards the water or roadway, but will attempt to herd the chick parallel to the shoreline. No parking will be permitted within 100 meters of the nursery, unless a special protocol is implemented (see below). Fencing will be placed to allow a driving corridor but no parking along the beach in the direction opposite to the tern colony until the vehicle has moved at least 100 meters from the edge of the nursery area. This area will be adjusted should the nursery area expand or reduce. Monitors will collect data about the colony/nursery within 100 meters of a crossover via the NestStory app. Monitors will record numbers of incubating adults and tern chicks (according to age class) once per shift. In addition, they will take location data for the closest chick and incubating adult and record any instances of herding.

In the event that a least tern nursery area is within 50 meters of Crossover 1 and Crossover 1 is open to OSV access between 20:00 and 22:00/23:00, additional protection will be put in place for nighttime use. The Reservation will either require the Town Beach Operations Division to close the Crossover after 20:00 or will implement a barrier. A barrier will not be used if the area overlaps with the piping plover brood range and will not be used within 15 meters of a piping plover nest (unless the barrier was installed prior to nest initiation). The barrier will be constructed approximately 15 meters from the crossover in accordance with NHESP recommendations: mesh (with an opening size less than 1.3 cm) or sturdy plastic sheeting, or another material as outlined in the DBR Barrier Use Protocol, dug several inches into the ground, and extending from 1.5 meters

above the high tide line to dense vegetation or scarping. Mesh material is recommended to reduce the likelihood of plover or tern chicks sheltering against the barrier. Tern chick shelters will be placed (one per chick within 100 meters) in the nursery area to discourage movement towards the barrier. A staff member will check the barrier for entanglements or other problems between 06:00 and 08:00 each morning. The barrier will be installed for as brief a period as possible – either two days before the earliest estimated hatch date for least tern nests within 100 meters of Crossover 1 or two days prior to reopening Crossover 1 following a closure due to other activity.

If a barrier is in place as outlined above at either Crossover 1 or Crossover 2 due to day or nighttime OSV use, monitoring may be reduced. The barrier will be checked every three hours for entanglements and maintenance needs. The colony within 100 meters of the crossover will be monitored to capture chick numbers and age classes, number of incubating adults, and locations of nearest nest and chick to the crossover. If any activity is observed between the barrier and the crossover, a monitor will remain at the crossover while MADFW is contacted to determine best course of action.

In certain cases, parking may be allowed within 50 meters of a least tern nursery area. In these cases, a monitor will be stationed at the chick nursery the entire time vehicles are parked within 50 meters. In addition, a barrier will be placed at the edge of the nursery area (50 meters from parking area), following the same protocols for barrier use outlined above. Beach Operations staff will be present to ensure that no OSVs park until >50 meters from the nursery area.

Impact minimization measures are monitored by Shorebird Monitors and tracked via NestStory (Appendix 2, Figure 1, 4). The effectiveness of the measures and associated monitoring is determined by success of the colony. Since individual chicks are not monitored within the least tern colony, success is not recorded specifically for the area near the Crossover but for the overall colony. However, mortality or disturbance associated with the minimization measures will be recorded and evaluated in order to make changes to protocols. For example, DBR staff will record predation or predator presence near tern shelters to determine whether the shelters increase risk of predation (rather than decreasing risk of harm that could be caused by drawing tern chicks towards the shade of barriers).

4.1.2 Recreation and Beach Operations

Piping plover and least tern nesting occurs on Duxbury Beach annually from March through August, primarily south of Duxbury Beach Park. Proactive symbolic fencing is placed around the potential nesting habitat, which includes: oceanside beach from Duxbury Beach Park to the end of the driving beach south of Crossover 3, from the path at the Gurnet Guardhouse north to Plum Hills, and around the bayside replicated habitats.

As Field Technicians identify new plover or tern nesting areas, they erect new areas of symbolic or extend existing fencing, with the assistance of Monitor Supervisors and Shorebird Monitors. Fencing is also extended when nests are laid close to the fence line to provide a larger buffer from disturbance. This wider buffer extends 50 meters north and south of the nest. The areas of oceanside habitat are fairly narrow and so it is not always possible to create a buffer of 50 meters east and west of the nest. Fencing is extended as far as possible while providing a space for passage above the high tide line.

Duxbury Beach has several primary points of access to the front beach, both for pedestrians and for recreational and emergency vehicles. As nesting activity increases on Duxbury Beach for piping plovers and least terns, there is increased potential for nesting activity to block off access to primary access routes. This occurred on several occasions in 2019 and 2020, during which both Crossover 1 and Crossover 2 were closed for lengthy periods of time both due to nesting proximity and chick proximity.

There are three vehicles crossovers within the OSV portion of Duxbury Beach, two of which are typically used for recreation. In addition, there are 12 pedestrian pathways located north of Crossover 1 on the oceanside. The Reservation would reduce proactive fencing and implement deterrents at specific access points if nesting activity by piping plovers or least terns was observed. It would not be necessary to implement this covered activity at all access points as some paths are redundant.

Several of these pathways are important for recreational and operational access, including Crossovers 1 and 2. Four of the pathways are handicap accessible with wooden ramps or mobility mats. These same paths are the primary access routes from the Resident Parking Lot and the Duxbury Beach Park parking lot to the beach and include the pathways wide enough to allow emergency vehicles if needed. Two of the pathways are located between the parking lots and Crossover 1 and allow visitors on the road or beach to cross the dunes to form a "loop". In addition, the parking lot at the northern property boundary has only one access path to the beach, however, nesting has not been observed in that area historically.

In addition to access paths, there are seven parking lots on Duxbury Beach, three paved and four processed gravel. Each of these parking lots is vulnerable to closures due to nesting activity. While nesting is unlikely in paved lots due to lack of sand, nesting could be possible if cracks form or sand is washed onto the pavement. In addition, pairs could nest immediately adjacent to parking lots. Duxbury Beach is a barrier beach and so traveling to the beach by foot is difficult. There is one public parking lot on the west end of the Powder Point Bridge, however, it is limited in size and not usable to access the beach for those with mobility concerns. The properties to the north and south of Duxbury Beach are privately owned and parking by the public is not permitted. In addition, the Reservation relies on funding provided by parking lot revenues and the Town lease, in order to protect and maintain Duxbury Beach.

4.1.2.1 Recreation and Beach Operations Associated with Reduced Symbolic Fencing Around Nests

The Reservation proposes to reduce symbolic fencing around piping plover and least tern nests in order to keep access open at primary entrance paths and allow parking in lots on the property. This will not occur at every access path or lot but specific locations to ensure access during incubation through handicap accessible paths and to the drive-on portion of the beach.

Impact Minimization

Symbolic fencing will be reduced in accordance with the conditions outlined on page 3-7 of the HCP. Fencing reductions will begin at least 24 hours after clutch completion. Prior, fencing will be maximized to the extent practical following discussion with MADFW. Fencing will be reduced incrementally, no more than 10 yards per day, until the pathway or access point is no longer blocked. If this requires a buffer of less than 10 yards, DBR will contact MADFW to request permission for further decreases or to discuss moving the nest.

Reduced fencing will only occur around a portion of the nest. For example, fencing around a nest immediately north of Crossover 1 may have fencing reduced to less than 50 meters on the south and east sides to allow vehicles to pass over the crossover and travel north past the nest to park. Parking will not occur within 50 meters of nests.

Monitoring

The nest will be monitored daily while fence reductions occur and daily for one week after reductions are complete. Currently, staff are onsite daily to complete nest monitoring site-wide to ensure that each nest is monitored every other day prior to hatching. Staff onsite that day for nest monitoring will include checks of nests impacted by reduced symbolic fencing in order to increase checks to every day. Monitors will strive to

observe the nest during times of day when the path or access point is being utilized to determine whether the adults are disturbed. Monitoring will take place for 15 minutes each day, during which time the staff member will record changes in adult behavior (flushing from the nest, displaying defensive behavior, etc.) and any potential disturbances (pedestrians, vehicles, predators, etc.). Following the one-week daily monitoring, every other day monitoring will resume until the nest hatches. During each check, monitors will observe adult presence and behavior, disturbances, and infer nest presence based on adult behavior. The purpose of this monitoring will be to determine whether the reduced fencing is associated with lower productivity of pairs exposed to the activity.

These checks will be recorded on a spreadsheet uploaded to Google Drive for in-field electronic data capture (Appendix 2, Table 1). These observations will also be recorded in the NestStory daily brood check form (Appendix 2) in the Notes, Human Disturbance, and Predator Disturbance fields. Abandonment and chick loss and potential causes will be recorded within the egg and chick loss fields. After the nest hatches, any restrictions for vehicle use in proximity to unfledged chicks will be employed.

4.1.2.2 Recreation and Beach Operations Associated with Reduced Proactive Fencing

As discussed above, Duxbury Beach has several primary points of access for pedestrians, individuals with limited mobility, recreational vehicles, operations vehicles, and emergency vehicles. Nesting activity in front of or on these access paths or in or near parking lots could be very detrimental to recreational and operational activities. Due to the presence of chicks on the oversand driving portion of Duxbury Beach, OSV access has been extremely limited in recent years. Therefore, it is important to recreational operations that access to the drive-on portion remain open during nesting and incubation. In addition, many OSV users move to the pedestrian only beach when the OSV area is closed. Reducing or completely closing pedestrian access to the oceanside beach via pedestrian pathways or parking lots would effectively prevent many user groups from accessing the beach.

The Reservation proposes implementing reduced proactive fencing on or around primary access paths for pedestrians and OSV users and parking lots in order to keep some parts of the oceanside beach accessible. As it is unlikely that pairs will attempt to establish territories at each of these nine “important” access points and parking lots mentioned above and so the Reservation does not foresee a need to impact greater than 2 acres or 10% of existing habitat. In addition, the Reservation does not intend to use greater than 50% of its take exposures on this covered activity.

Impact Minimization

Prior to hatching, nesting habitat on Duxbury Beach is monitored every other day in order to have a good understanding of nesting locations and hatching timeline. In addition, this helps ensure that fencing is adjusted to encompass any nesting activity (courtship tracks, scraping, eggs). Therefore, the Reservation would identify nesting activity in important access areas early in the breeding cycle. Should nesting activity be observed at one of the identified important access sites, the Reservation will notify MADFW of its intent to initiate the covered activity. Monitoring of this area will increase to every day to ensure that if eggs are laid the area is fenced and the access closed.

Mechanical beach raking does not occur on Duxbury Beach and will not occur due the high cobble content and other constraints. In order to deter nesting, the Reservation proposes using different materials to temporarily cover nesting habitat. The use of covers to deter nesting and the material used will be dependent on the access point and time of season. At paths used for handicap access, mobility mats and wooden ramps may be installed early to deter nesting. In other areas, silt fencing or tarps and wooden boards may be used. In areas where covers are not practical, rebar posts with flagging may also be erected as a deterrence to nesting. In the areas of

vehicle crossovers, materials put down to deter nesting would likely be destroyed. To deter nesting, trained beach staff may hand rake the beach at the crossovers or parking lots. A landscape drag or similar may be attached to the back of a vehicle in order to rake larger areas, such as unpaved parking lots adjacent to salt marshes, where hand raking is inefficient. This will help to deter nesting and will ensure that if eggs are laid, staff locate and protect nests prior to the crossover ramp or parking lot being open to recreation for the day.

Deterrents at parking lots may vary depending on the condition of the lot. For example, if pairs are exhibiting interest in a paved lot due to sand cover or cracks, the Reservation may sweep the lot and fill in cracked areas (approval from Duxbury Conservation Commission given 2/11/20). In cases of pairs attempting to nest on unpaved lots or adjacent to lots, deterrents would include silt fencing or tarps, plywood sheets, and hand raking. In the event deterrence measures are unsuccessful and a nest is laid in a parking lot, the area will be fenced and MADFW will be notified. In areas adjacent to unsuitable foraging habitats, such as salt marshes, corral-style barriers may be used to guide broods to appropriate foraging habitat once the nest has hatched. This was implemented successfully in 2020 when a pair nested in overflow (western) lot at Duxbury Beach Park, which is bordered by saltmarsh on the west and north and paved roadway and parking lot on the east. The Reservation will seek MADFW approval of barrier plans prior to implementation.

Monitoring

Should the Reservation choose to implement this covered activity in an area, that area will be monitored daily for piping plover or least tern activity by a qualified shorebird monitor. Currently, staff are onsite daily to ensure nests are monitored every other day prior to hatching. Staff onsite that day for nest monitoring will include checks of area impacted by reduced proactive fencing in order to increase checks to every day. The monitor will assess deterrents, making repairs and adjustments as necessary. If a nest is laid in the area subject to reduced proactive fencing, the area will be fenced according to the guidelines (unless the covered activity allowing reduced fencing around nests is implemented).

Data collection in association with this covered activity will include taking GPS points of the area left unfenced and of any deterrents, including any movement of deterrents. In addition, monitors will record any piping plover or least tern activity (breeding, movement, feeding) in the area and within 50 meters north and south of the area daily. Monitoring 50 meters north and south will help to determine if the pair first observed at the access point has shifted activity out of the immediate vicinity. Information will be captured in NestStory and specifically in a spreadsheet uploaded to Google Drive and accessed in the field while staff are monitoring and assessing deterrence measures (Appendix 2, Table 2). The surrounding habitat will continue to be monitored every other day. Monitoring will help to determine the effectiveness of deterrence measures by the continued use of the area by a pair.

4.1.2.3 Recreation and Beach Operations Associated with Nest Moving

In the case that reduced proactive fencing is unsuccessful in deterring nesting in an area important for recreational or operational access, the Reservation may request permission from MADFW to move the nest in order to allow access. As noted above, there are specific pathways and parking lots for which this permission may be requested. The need may vary depending on availability for access via other pathways or lots. For example, if Crossover 2 has been closed due to chick activity in the area, and Crossover 3 cannot be opened due to chick location, it would be more important for Crossover 1 to remain open for recreational and operational use as it is the sole remaining access.

The Reservation proposes to implement nest moving as a covered activity as a last effort following reduced proactive fencing and only in cases where reduced symbolic fencing around nests is inadequate to reopen an access point or parking lot.

Impact Minimization

A piping plover or least tern nest on Duxbury Beach will only be moved following discussion and permission from MADFW. In addition, it will be dependent on the ability to follow the minimization measures outlined on pages 3-11 and 3-12 of the HCP.

Prior to moving a nest, the Reservation will submit a plan to MADFW outlining the individuals responsible for moving and monitoring, the nesting activity of the pair thus far (nest attempts, behavioral observations), and the proposed new nest location along with a map showing other nesting activity within 1000 meters north and south. The proposed location will be no further than necessary to reopen the blocked access path or parking lot. However, the distance may be greater depending on habitat quality or level of disturbance. The plan will also include a proposed timeline for movement based on clutch completion (>48 hours post completion), weather, and MADFW staff availability. A nest will not be moved during extreme heat or cold, high winds or surf, monthly high tides, or during evening hours.

Following approval of the plan, the Reservation will receive training from MADFW on the "cylinder/plate/platform method" (referenced on page 3-11 of the HCP). Duxbury Beach cobble content varies depending on area of the beach and so the Reservation will also provide a description and photo of the nest site to DFW prior.

In conjunction with MADFW staff, approved Reservation staff will move the nest gradually to reduce the risk of abandonment. The first move will be <15 feet, exact distance determined by MADFW and DBR based on nest location and surrounding activity. Distance moved and frequency of movement will be based on conditions outlined in the HCP and dependent on adult response and site conditions. Following the initial nest move, a qualified shorebird technician will observe the nest and adults from a distance to determine results. If incubation does not resume within 1.5 hours, the nest will be moved halfway back to the original location. If incubation does not resume in this location, DBR will consult with MADFW.

If incubation does resume within 1.5 hours, a monitor will continue to observe the nest for an additional 90 minutes following onset of incubation. If incubation is consistent during that time, the nest may be moved again, either one additional time that day or the following (provided good weather). The nest will not be moved more than twice in one day and no more than 20 feet at a time. Monitoring will continue each day of movement as outlined above. If significant distress or inconsistent incubation is observed movement will cease for the day but may continue the following day. If incubation does not resume at any point, DBR will consult with MADFW.

Monitoring

Following the decision to attempt nest moving and during nest moving, the nest will be monitored daily. Currently, staff are onsite daily to cover nest monitoring every other day prior to hatching. Staff onsite that day for nest monitoring will 90 to 180-minute observation session for any nests impacted by nest moving. The observer will note adult location and behavior during each session. On days while the nest is being moved, the surrounding area will be monitored for new nesting activity or pair activity that may disrupt the pair from returning to incubation following nest movement. Monitoring following each nest movement will occur as outlined above, with 90-minute observation sessions following return to incubation.

During the 90 to 180-minute observation session (time dependent on return to incubation), the monitor will record adult behavior every 5 minutes, noting specifically when incubation ceases/resumes or adults switch off the nest. The monitor will also record any observations of disturbance and other pair activity in the vicinity, including interactions with the target pair. Nest Moving specific data will be captured in a spreadsheet located on Google Drive for in-field data capture (Appendix 2, Table 3). Once nest movement ceases, normal monitoring will resume, which will be captured in NestStory forms (Appendix 2). Monitors will observe the nest from a distance at least every other day, inferring nest presence based on adult behavior in order to determine the effectiveness of the nest moving method and survival or failure of the nest.

4.1.3 Compliance and Effectiveness Monitoring

As mentioned above, monitoring of piping plovers and least terns on Duxbury Beach is multifaceted with in-field training and reporting responsibility in the hands of multiple groups. Intensive, yet flexible, protocols are in place to help ensure success of nesting shorebirds throughout the site. The extensive monitoring that occurs helps to inform staff of vulnerabilities and potential for additional protection. The Reservation strives to ensure monitoring protocols are constantly evaluated to confirm the program maintains a comprehensive shorebird monitoring and observation program.

Compliance Monitoring

Compliance monitoring will document that impact minimization and mitigation measures associated with the covered activities are implemented and all information is available to provide to MADFW as requested. A summary of compliance monitoring is included in Figure 4-3.

A key aspect of implementing each covered activity is ensuring adequate staffing to capture specific data and implement changes to management as needed. The Reservation employs 35-40 Shorebird Monitors, three Shorebird Monitor Supervisors, three Field Technicians, and a year-round Coastal Ecology Program Coordinator who works on-site to ensure staffing is adequate for each covered activity. A minimum of one Field Technician or Shorebird Monitor Supervisor is onsite daily once covered activities are implemented. Hours vary based on the covered activity. Shorebird Monitor Supervisors are onsite daily post-hatching from 0600 to 2000 hr and Field Technicians are onsite daily post hatching from 0600 to 1300 hr. The consistency of these roles ensures full coverage of all activities and oversight of Shorebird Monitors.

Shorebird Monitors are scheduled weekly based on current covered activities and nesting activity. All scheduling occurs through the Homebase App, which Monitor Supervisors monitor daily to update coverage as needed. In addition, the Supervisors track staffing needs across the site on paper datasheets to ensure adequate coverage for implementation of Use of Roads and Parking Lots, barrier use, herding activity, and OSV Crossover access in the vicinity of least terns (Appendix 2, Figure 2). Monitoring of covered activities associated with Beach Operations is performed by Shorebird Monitor Supervisors and Field Technicians. Staff coverage is captured on associated spreadsheets located on Google Drive (Appendix 2, Tables 1-3).

Following initiation of any covered activity until the end of the season, the Reservation will provide weekly reports to MADFW outlining management and nesting activity associated with covered activities. The Reservation will also provide information regarding nighttime OSV use to MADFW on a weekly basis. The Reservation will ensure that the Annual Piping Plover and Tern Census forms will continue to be submitted along with associated maps indicating where nesting occurred. Data collected during the course of implementation will be submitted to MADFW along with a summary report. If applicable, any documented “take” of chicks or adults (injury or mortality) resulting from the covered activity will also be reported to MADFW and USFWS within 24 hours, as is currently standard Reservation practice.

Figure 4-3. Compliance monitoring summary and associated data collection locations for Duxbury Beach.

Element Tracked	Plan Participant Actions	DBR Tracking
Annual limit on statewide take exposure	• Provide piping plover census data including index and total counts in proper formats with maps	• NestStory pair/nest/colony checks (Appendix 2, Figure 1 (1 and 5) • Completion of PIPLODES and TERNODES and state short form
Site-specific and statewide number of broods/nests/territories affected	• Maintain log of initiation date(s) for covered activities; numbers of pairs, broods, nests, and chicks exposed; and locations; make the log available for inspection by the DFW/FWS upon request. Logs must also track monitoring frequency of all onsite breeding pairs and habitat. • Notify the DFW at least 24 hours in advance of initiation of any covered activity and when covered activity ceases.	• NestStory pair/nest checks and attachments (Appendix 2, Figure 1, 2) • NestStory brood crossing form (Appendix 2, Figure 1, 3) • NestStory colony proximity checks (Appendix 2, Figure 1, 4) • Appendix 2, Tables 1-3
Compliance with the Guidelines (except for covered activities)	• Maintain logs to document timing and frequency of activities such as installation of symbolic fencing, monitoring of plover activity, beach patrols, enforcement of ordinances such as leash rules, timely implementation of temporary prohibitions on non-essential vehicle use.	• Management activities captured in Slack communications and NestStory pair/nest/colony checks (Appendix 2, Figure 1 (1 and 5) • Patrol and enforcement information outlined in Section 3.5 – information provided by Town of Duxbury responsible personnel
Compliance with impact minimization protocols	• Maintain customized, daily, site-specific implementation log as described in the site specific IAMP approved by the DFW (e.g., to document staffing, frequency of brood monitoring, compliance with OSV escorting procedures). • Notify the DFW at least 24 hours in advance of initiation of any covered activity and when covered activity ceases.	• NestStory pair/nest/colony checks (Appendix 2, Figure 1 (1 and 5) dictate monitoring and staffing levels to ensure compliance with IAMP • Staffing tracked through Homebase App (Figure 5) and paper datasheets on-site (Figure 2) and confirmed through NestStory data entry

Compliance with mitigation requirements	• Monitor number of breeding pairs and within-site distribution on an annual basis. • Maintain log and invoices to document that the mitigation plan is carried out by qualified personnel in accordance with the DFW-approved site-specific IAMP and budget	• Pair numbers tracked through NestStory (Appendix 2, Figure 1 (1 and 5) and captured in PIPLODES and TERNODES and state short forms • Predator management activity captured in text thread communications and reported via Excel export and summary chart (in addition to APHIS final report and invoicing) • Other mitigation plans will be captured in logs created when specific proposals are implemented

Effectiveness Monitoring

The effectiveness of the program will be evaluated throughout implementation to determine how covered activities and associated impact minimization measures impact nesting activity (number of pairs, nesting/fledging success, mortality/failure) on Duxbury Beach. Monitoring objectives are outlined in association with impact minimization measures in Section 4.1. In addition, monitoring will be put in place to determine the effectiveness of mitigation measures implemented each year. See Sections 6.0.1-6.0.3 for discussion of effectiveness monitoring and monitoring objectives of proposed mitigation measures.

5.0 Budget

The implementation of the Impact Avoidance and Minimization Plan (IAMP) will be covered through the extensive monitoring program, referred to as the Duxbury Beach Endangered Species Program, a program of the Coastal Ecology Program. In December 2019, the program was moved from the Town of Duxbury's management to the Duxbury Beach Reservation's Coastal Ecology Program. The program is overseen by the Reservation's Assistant Director and managed by the Coastal Ecology Program Coordinator with general oversight from the Executive Director. Table 5.1 reflects the budget over the past five years with a partial list of additional expenses. The program is funded, in part, through the lease agreement with the Town of Duxbury. For the 2021 nesting season, the funding was authorized in part by the 2020 Spring Town Meeting, and the FY22 budget will be authorized by the 2021 Spring Town Meeting (Town of Duxbury fiscal year July 1-June 30).

Table 5-1. Duxbury Beach Endangered Species Program budget, 2016-2020. Projected budget 2021.

	2016	**2017**	**2018**	**2019**	**2020**	**2021 (projected)**
DBR Executive Director (15%)	0	$13,500 (FY18)^	$13,500	$13,500	$15,000	$15,000

DBR Assistant Director (45%)	0	$18,000 (FY18)^	$18,000	$27,000	$29,000	$36,000
Endangered Species Officers**	$128,674.14	$99,523.47	$110,494.13	$83,425.21	$1,520	0
DBR Coastal Ecology Program Coordinator (90%)	0	0	0	0	$31,500	$36,000
Monitor Supervisor & Shorebird Monitors^^	$87,952.50	$139,720.14	$214,869.66	$374,392.58	$139,698.66	$167,530
Mass Audubon monitoring	$26,414.87	$21,473.00	$23,500	$21,500	0	0
Field Technicians (3 beginning 2020)	0	0	0	0	$27,887.28	$37,188
Additional Expenses (education, predator management, signage, artificial habitat work, equipment)	$39,852.74	$64,535.65	$51,850.61	$35,115.56	$44,515.80	$36,989
Total Endangered Species Program Expenses	**$282,894.25***	**$325,252.26**	**$434,937.40**	**$554,933.35**	**$289,120.74**	**$328,707**

^ Salaries were not included in 2017 budget but will be in 2018
*Significant increase from prior year due to increase in piping plover pairs
**Positions do not exist beginning in 2020
^^ The number of Monitor Supervisors increased (1 in 2016-2017, 2 in 2018, 3 in 2019 & 2020) while the number of monitors decreased with a change in monitoring efforts after several years of increasing (40 in 2020, 74 in 2019, 60 in 2018, 57 in 2017, 53 in 2016)

6.0 Mitigation Plan

To mitigate for the proposed activities outlined above, Duxbury Beach Reservation proposes a series of measures to be implemented during 2021-2023. These measures are not intended to be comprehensively enacted during each year, but rather a subset will be depending on mitigation needs and feasibility. Mitigation planned for a given year will equal ~~36~~ 48 credits, based on the 3:1 ratio for 16~~2~~ anticipated take exposures. The 3:1 ratio for the covered activity Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks will be used as this is the most common activity on the beach.

~~Based on changes to how surplus mitigation credits carry over as communicated by MADFW on January 20, 2021 the~~ The Reservation and MADFW recorded a surplus of 100.5~~3~~ mitigation credits generated in 2021-2022~~0~~ and available for use in 2023~~1~~. The Reservation is aware that these surplus credits may only be used in Year 1 (2024~~1~~) of a consecutive permit. A breakdown of mitigation credits ~~generated~~ anticipated in 2023~~0~~ is captured in Table 6-1.

Table 6-1. Anticipated o~~O~~n-site mitigation generated by Duxbury Beach Reservation in 2023~~0~~.

Mitigation Source	Mitigation
Carry-over mitigation from 2022~~19~~	101~~0~~.5~~4~~

On-site predator management	4025
~~Habitat enhancement~~	~~2~~
Education programs	2
Monitoring and protection for broods exposed to essential traffic	Dependent on recreation~~10~~

~~A total of 43 mitigation credits were generated in 2020. Thirty credits were utilized to mitigate for 10 take exposures (3:1 ratio for Use of Roads and Parking Lots). Therefore, the Reservation proposes to carry the surplus of 13 mitigation credits into this submission for use in 2021.~~

6.0.1 Selective Predator Management

The Reservation will self-fund a selective predator management plan in 2023~~1~~. This plan is expected to benefit approximately 40~~25~~ pairs of piping plover based on the number of breeding pairs in 2022~~0~~ to provide ~~25~~ 40 mitigation credits in 2023~~1~~. Additional information about the proposed 2023~~1~~ mitigation will be provided in the APHIS WS Proposal for FY23~~1~~ (~~Attachment D)~~)To be provided with implementation request documentation in February~~March~~ 2023). The work plan will be approved by MADFW and USFWS as required pursuant to the HCP prior to implementation. As set forth in the HCP, the Reservation will provide a selective predator management work plan to MADFW on an annual basis in order to ensure that at least 3 piping plover pairs benefit from selective predator management for each brood exposed to the use of roads and parking lots. After the work plan and budget are approved by MADFW, selective predator management will be implemented in advance of carrying out the covered activities during the beach season. An estimated 316~~299~~ pairs of least terns will benefit as well, based on the number of nesting pairs in 2022~~0~~.

In the event that DBR runs a mitigation deficit in a given year (e.g. due to between year decline in piping plover breeding population), DBR will make up any deficits by providing other supplemental mitigation approved by MADFW in the way of mitigation funds or the measures outlined below. The Reservation anticipates making up any deficit through a combination of increased education efforts, increased law enforcement, and protection of habitat on DBR property at Saquish. These measures are outlined below and will be specified prior to each season as measures involve the cooperation and approval of multiple parties, including the Town of Duxbury, Town of Plymouth, and Gurnet Saquish Corporation. Advance notice of intended mitigation measures will be given to MADFW prior to implementation of covered activities.

Selective Predator Management Plan Details

To mitigate for the potential impacts of the covered activity on piping plovers, the Reservation has contracted with the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service Wildlife Services (APHIS WS) to conduct on-site selective predator management of both avian and mammalian predators in concert with a robust comprehensive non-lethal predator management plan.

The cost for an APHIS WS Cooperative Service Agreement (CSA) that provides five months of control, consisting of an anticipated minimum of 10 control visits with a contracted amount of $19,000.00 (may change based on CSA). Final costs for predator management in a given season will vary based on predator activity. These visits may be used for any of the activities: trapping, shooting, or DRC-1339 COR applications. Wildlife Services will schedule control visits and may increase or decrease visits during the agreement depending on predator presence and activity.

The Reservation will provide a selective predator management work plan to MADFW on an annual basis in order to ensure that at least three breeding pairs benefit from selective predator management for each brood

exposed to the use of roads and parking lots activity to the extent able, with additional mitigation provided below (3:1 mitigation ratio for both piping plover and least terns as described in the HCP for Use of Roads and Parking Lots in the Vicinity of Unfledged piping plover Chicks). This work is expected to result in ~~25~~ 40 mitigation credits in 202~~3~~1, though the actual number of credits may change based on the number of nesting pairs.

The Reservation will monitor for evidence of predator presence on site, nest loss due to predation, chick loss due to predation, and pair disturbance due to predator presence throughout the season. All predator observations and evidence of loss will be recorded in NestStory (Appendix 2) and reported in PIPLODES and TERNODES. Predator and predation monitoring and associated impacts on nesting success will aid in evaluating the effectiveness of selective predator management as mitigation on Duxbury Beach.

A variety of non-lethal predator management measures also may be instituted to control the predator impact on nesting shorebirds including predator tracking, thorough refuse management, predator exclosures, electric fencing, elimination of perching availability, replicated habitats, and wooden chick shelters.

- The Reservation's Endangered Species Monitoring Program serves as a non-lethal deterrent to predators as there is heavy human presence near broods and nests, which are monitored by multiple parties. During the plover nesting season, between the hours of 06:00 and 20:00, the program requires the presence of a Monitor Supervisor, a Field Technician, numerous Shorebird Monitors, and Beach Operations staff resulting in 10-25 people at any one time on the beach. During an eight-hour period each day, at least one monitor will be patrolling each area of the beach with broods. Each morning while chicks are present one to two Field Technicians and one to four Shorebird Monitors (may be less if depending on number of broods) will be present on different parts of the beach. As some predators are more active in the early morning when beaches are typically less populated by people, the presence of monitors and Field Technicians in nesting areas beginning at 06:00 may deter some predators.

- All Technicians, Supervisors, and Monitors attend a tracking class provided by the Reservation CEP Coordinator at the commencement of the monitoring season. This training educates monitors in the identification of common avian and mammalian predator species of Massachusetts shorebirds and the tracks of common species (domestic and wild) observed on area beaches. Special focus is given to differentiating dog, coyote, and fox tracks, due to their similarities and prevalence on Duxbury Beach. An intensive in-field training compliments the classroom training to ensure field monitors can conduct routine predator surveys to evaluate the impact enhanced predator management has on the reproductive success of the piping plovers and least terns on Duxbury Beach.

- A thorough refuse management plan is in place to ensure that predators are not attracted to Duxbury Beach (see Section 4.3 for details).

- Predator exclosures have been tied to both nest abandonment and adult mortality, and so prior to erecting a predator exclosure, consideration must be given for predator community, plover pair behavior (tendency to abandon nests), and site characteristics. Much of Duxbury Beach is unsuitable for exclosures due to the narrow width, slope, rocky substrate, and dense vegetation of the beach. Clutches located in replicated habitat areas may be candidates for exclosures as these areas are primarily open, flat, sandy, and at less risk of overwash being on the bayside of the site. The Reservation and partners will determine where exclosures may be a viable option as territories are established and eggs are laid.

- Electric fencing is typically utilized to protect multiple shorebird nests (piping plover, least tern and/or American Oystercatcher) from mammalian predators. Electric fencing has not previously been employed on Duxbury Beach as narrow beaches at high tide are not ideal candidates due to the limited

space and potential for overwash. Small areas of electric fencing may be possible in some areas, such as the replicated habitats; however, these areas are typically small and used by only one pair. Three-sided electric fencing, connected only by a ground wire on the water side, may be considered around tern colonies to deter coyotes. Electric fencing will be considered for use on a case-by-case basis, depending on location and predator community.

- Prior to nesting season, a thorough review of perching post availability will be undertaken and all unnecessary posts will be removed. Thin posts are less likely to be used by potential avian predators as perches. Posts erected to mark the replicated habitat areas on the west side of the site are thin, rebar posts, thought to be poor perches. The Reservation will review and consider placing anti-perching materials (e.g., nails) on top of posts, depending on location and proximity to nesting.

- Wooden chick shelters are thought to protect tern, and less commonly plover, chicks from exposure and potential predators. Shelters can be used in areas where vegetation is limited and chicks have few options for cover. Shelters are typically used for tern colonies on Duxbury Beach.

6.0.2 Education, Outreach, and Increased Law Enforcement

In addition to the predation management program, the Reservation sponsors robust educational, outreach, and monitoring programs geared towards multiple user groups. The Reservation also works with and supports various law enforcement efforts beyond the scope of normal work on the beach.

Mass Audubon Educational Programs

The 2022~~0~~ season marked the 3~~7~~5th years of collaboration between DBR and Mass Audubon's South Shore Sanctuaries to offer educational programming on Duxbury Beach. During the 2022~~0~~ season, the Summer Education Programs at Duxbury Beach hosted 24 classes. These hour-and-a-half-long classes were offered on Tuesdays, Thursdays, and Saturdays throughout the months of July and August. Four classes are specifically directed or related to piping plovers: "Birding with David Ludlow", "Piping Plovers Pint Sized Dynamos" and "Shorebirds Rules!", and "Birding with Sue MacCallum". In addition, Mass Audubon educators speak about piping plover and least tern nesting, protection efforts, and the importance of conservation during each program. The Reservation's partners at Mass Audubon's South Shore Sanctuaries presented these programs. The cost of the Mass Audubon Summer Programs for the 2022~~0~~ season was $4,60~~35~~0.

The Reservation anticipates continuing this programming, with approximately 24 sessions per summer and utilizing this programming as mitigation for two credits. The Reservation will continue to contract Mass Audubon to track attendance and number of programs to determine reach of educational efforts.

Gurnet-Saquish Educational Events

The Reservation proposes initiating educational programming (minimum two sessions proposed) geared towards the communities of Gurnet and Saquish. The programs will contain both general piping plover nesting and protection information as well as education about plover use of the Duxbury Beach roadway. Reservation staff will work to create, advertise, host, and update programs annually. Programs will be held virtually or in-person depending on COVID-19 safety precautions and guidelines as well as participation and impact. These programs will be particularly beneficial to piping plovers on site as it will target a different group from the Mass Audubon summer programs. In addition, Gurnet-Saquish residents, contractors, and visitors account for a large percentage of vehicles traveling on the roadway, particularly south of High Pines where recreational access is not allowed while chicks are present and monitoring efforts may be reduced.

In order to determine the effectiveness of the education efforts, DBR will track attendance and send out a survey for feedback following each event to determine what percentage of residents attended and whether attitudes altered towards nesting birds. The Reservation anticipates utilizing this programming as mitigation for two credits in the initial year of implementation and for one credit in following years. If substantial changes are made to the programming, DBR will inform MADFW.

Training Community Monitors for Gurnet-Saquish

At the request of the Gurnet-Saquish communities, DBR may choose to train volunteer monitors (sourced by others) to effectively protect, monitor, and implement the Guidelines, including suggestions for appropriate interactions with visitors, for plovers nesting at Gurnet and Saquish in Plymouth. This would support efforts by Mass Wildlife, DBR, and others to grow a community monitoring program and encourage plover protection efforts.

This training would include classroom (may be virtual) and in-field training by DBR staff and would include a focus on plover use of the Duxbury Beach roadway and plover nesting and use of Gurnet and Saquish habitat. The effectiveness of this training could be evaluated by the subsequent monitoring and reporting of the volunteers, with the goal of increased monitoring visits prior to implementation and complete reporting on nesting numbers and success. The Reservation anticipates utilizing this programming as mitigation for two credits.

Intensive Monitoring for the Benefit of Gurnet-Saquish Traffic

Duxbury Beach Reservation monitors and protects piping plover and least tern chicks as outlined in this submission for the benefit of recreational activity through the Town of Duxbury lease and Duxbury Beach Park operation. In order to reduce recreational impact and pair exposure to take, DBR and the Town of Duxbury close portions of the roadway during the chick season to remove recreational traffic. This includes closure of the roadway south of OSV access once hatching is anticipated in that area and pull-outs ~~south of High Pines once hatching is anticipated in that area~~once broods begin crossing through the area. In addition, if ~~both Crossover 1 and 2~~all crossovers are closed to OSV access due to nesting activity on the beach, the roadway and pull-outs may close south of the Powder Point Bridge to recreationalists. If pull-outs remain open while the OSV is closed, DBR will implement its COI as outlined in this document for use of roads and parking lots in the area that recreation is permitted. ~~the roadway and pull-outs south of the Powder Point Bridge are shut down to recreationalists.~~ some ~~pull-outs will remain open unless they are being used by broods as crossing locations. If only Crossover 2 is closed, then access is limited to north of Crossover 1.~~ Enforcement of these closures and intensive monitoring measures are outlined in Section 4.1 and elsewhere in this submission.

The Gurnet-Saquish communities and guests have court-protected access down the roadway on Duxbury Beach. Without monitor presence to stop traffic during crossings, track brood range, and adjust Restricted Area speed limits on the roadway, pairs are at increased risk due to these vehicles. The Reservation proposes to intensively monitor some or all of these pairs as part of mitigation efforts as has been done in previous years (Table 6-2~~1~~). Monitoring will depend on mitigation needs, hatching success, and brood vulnerability (crossing propensity). The effectiveness of this activity is captured through staff tracking of brood crossing activity and success in different areas of the beach. The objective of the monitoring is to show increased brood protection through intensive monitoring.

Table 6-2. DBR monitoring efforts for the benefit of recreational traffic and Gurnet-Saquish traffic on Duxbury Beach 2018-2020.

Year	Total # Broods	Total # Crossing Broods	Total # of Broods Intensively Monitored by DBR	Total Cost of Monitoring Labor for ESP on Duxbury Beach	Total # Broods *exposed solely to Gurnet-Saquish traffic (# crossing broods)*	Total # Broods Intensively Monitored by DBR *solely for the benefit of Gurnet-Saquish traffic*	Labor Cost for ESP on Duxbury Beach *solely for the benefit of essential traffic*
2018	24	12	17	$348,863.79	10 (6)	10	$96,432.00
2019	28	12	22	$479,317.79	12 (7)	12	$123,260.40
2020	25	15	23	$184,041.94	12 (5)	10	$65,704.96

The Reservation anticipates utilizing intensive monitoring as mitigation for pairs never exposed to recreational traffic (one credit per pair) and for broods partially exposed to recreational traffic, but that are solely exposed to Gurnet-Saquish traffic for at least one week while present on the beach prior to fledging or failure (0.5 credits per pair).

Movement of Gurnet Saquish Checkpoint to the Powder Point Bridge

The Gurnet Saquish Corporation staffs a limited checkpoint at the guardhouse located at the southern end of Duxbury Beach. The checkpoint serves to ensure that only Gurnet-Saquish residents, guests, and contractors enter the communities. Checkpoint hours are typically situated to focus on the busiest times, particularly Memorial Day through Labor Day on Friday through Sunday.

Due to the location of the guardhouse in relation to nesting activity on Duxbury Beach, any vehicle that is not allowed access to Gurnet and Saquish passes unnecessarily down the roadway twice – increasing risk to piping plover broods that may be crossing (Table 6-~~3~~2). During 2019 and 2020, DBR worked with Gurnet Saquish Corporation to move the checkpoint further north. In 2019, the checkpoint was located at the eastern pull-out between the bridge and Crossover 1 while the OSV was closed. In 2020, the checkpoint was located at "The Whale Turnaround" between Crossover 2 and High Pines while Crossover 1 was closed but moved south to Gurnet by Gurnet Saquish Corporation on June 30th after the OSV closed entirely. Both locations have challenges and limited benefit to crossing broods due to location.

Table 6-3. Piping plover nesting activity south of the Powder Point Bridge on Duxbury Beach in 2018-2020.

Year	Total Pairs	Pairs S of Bridge	Crossing pairs S of bridge	# vehicles turned around by Gurnet Saquish checkpoint
2020	25	21	12	677
2019	28	24	9	187
2018	24	21	10	NA

The Reservation proposes working with the Town of Duxbury and Gurnet Saquish Corporation to relocate the Gurnet-Saquish checkpoint to the area near the Power Point Bridge while unfledged piping plover chicks are present. This will serve to reduce traffic on the roadway during busy daytime and nighttime hours while the checkpoint is operational.

This measure will take extensive preparation and cooperation from all three entities and may reduce available parking for the Town of Duxbury leased area in the lot south of the bridge. If full movement of the checkpoint occurs, the Reservation anticipates utilizing this measure as mitigation for five credits in year one and three credits in subsequent years.

The area surrounding the Powder Point Bridge abutment at Duxbury Beach is extremely busy with multiple vehicle access points, travel paths, and pedestrian ways. In addition, the Powder Point Bridge has weight limits and is currently undergoing repairs and assessment. Therefore, there is concern regarding long lines of vehicles building up on the bridge due to increased instruction for Gurnet Saquish vehicles. Due to these concerns for public safety, DBR, the Town of Duxbury Beach Operations, and Gurnet Saquish Corporation may choose to perform a trial year before making the decision to move the checkpoint fully to the bridge. This discussion is ongoing but would result in a request for reduced mitigation, depending on the amount of coverage. When additional information becomes available, DBR will submit a separate proposal to MADFW.

In the event that this measure is conducted, data will be collected on user types and numbers of vehicles let through the checkpoint and turned around at the checkpoint to evaluate whether the checkpoint prevents a substantial number of unnecessary traffic from passing through brood crossing zones.

Speed Trailer on Roadway

In cooperation with the Town of Duxbury, DBR proposes to place a speed trailer device on the roadway for entire weekends (late Friday afternoon to Monday morning) from April 1 to mid-August. The location would be determined by DBR and the Town based on current recreational activity, crossing activity, and safety. This measure would serve to decrease speeding on the roadway by setting up good behavior prior to hatching and focusing on weekends when recreation and travel to Gurnet-Saquish are highest.

The effectiveness of this measure would be evaluated through the device's data capture and on-site observation by Town and DBR staff to gauge immediate and long-term impacts on speeding. The objective would be to decrease speeds long-term by altering driver behavior. The number of weekends where this measure is implemented may vary depending on the season. Availability and proven effectiveness will dictate mitigation as approved by MADFW. Provided suitable coverage of weekends, the Reservation proposes utilizing this measure as mitigation for two credits in the first year of implementation.

Increased Year-round Beach Coverage

The Town of Duxbury will hire a full-time, year-round Beach Operations Administrator who will hold a wide range of enforcement duties. This position will also offer continuity year to year and greater off-season enforcement and outreach. In addition, the Town will hire a seasonal Lead Beach Ranger who will also assist in enforcement of rules and regulations. These new positions are subject to Town Meeting approval and subsequent funding (March 2021).

The Reservation has worked with the Town of Duxbury to identify the need, roles, and responsibilities of these positions. In addition, DBR staff will work closely with existing Town staff and new hires for the positions to educate staff on beach protocols, nesting ecology, and rules and regulations. These new Beach Operations positions will meet with DBR staff onsite regularly throughout the season to address issues. The Reservation proposes utilizing this measure as mitigation for one credit.

Speed Radar Patrol

In cooperation with the Town of Duxbury, DBR proposes to reduce speeds on the roadway during the chick season (May through August) through minimum monthly speed radar patrol. Currently, there are several areas of the roadway where speeding is common due to the straight path. Several of these areas coincide with sections where crossing activity is common, including between Crossovers 1 and 2 and between the Replicated Habitats and Plum Hills. Although monitors are present on the roadway and attempt to signal drivers to slow down, these efforts are inadequate at stopping speeding.

The effectiveness of this measure will be evaluated by recording the number of vehicles stopped over the course of the season, with the goal of decreasing speeders.

Prior to implementation of this measure, the Town of Duxbury will involve their legal counsel to determine increased enforcement ability and adoption of lowered speed limit on a private road. Following this discussion, if approved by the Town, DBR and Duxbury Police Department would determine the most effective locations and timing for speed radar patrols. The Reservation will provide MADFW with the proposed plan (location, timing, hours, frequency) for discussion of mitigation prior to enacting.

Increased Town of Plymouth Police Presence

The Town of Duxbury Police Department proposes making a formal request to the Town of Plymouth Police Department for assistance on weekends monitoring the Plymouth portion of the roadway on Duxbury Beach for violations of beach rules and regulations, with speeding being a particular focus. The roadway crosses into the Town of Plymouth in the Plum Hills area. While there is very infrequent crossing activity on this section of the roadway, police presence at the southern end of the road will discourage speeding as drivers make their way further north. It may also discourage trespassers from attempting to drive on the Boathole and Saquish, decreasing risk to the nesting pairs in this area (estimated three pairs in 2020).

Reservation staff would communicate regularly with Plymouth Police to target efforts where birds are present and may be crossing. Additionally, DBR staff will take note of trespassing activity on the south end of Duxbury Beach and the Boathole at Gurnet and advise Plymouth Police of these incidents. This may require increased coverage by DBR on the Plymouth section of Duxbury Beach (monitored every other day) and on DBR property at Gurnet and Saquish (monitored one to two times weekly). If the Plymouth Police Department agrees to the request, DBR will provide MADFW with the proposed plan for discussion of mitigation.

Increased Educational and Enforcement Signage

The Reservation and Town of Duxbury are exploring increased signage on Duxbury Beach for the purposes of educating visitors on nesting activity and beach rules and regulations. This may include topics such as crossing activity, fencing, reducing disturbance to nesting birds, speeding, nesting ecology, habitat protection, and more. The purpose of such signs would not only be to increase compliance with guidelines and existing beach rules, but also to improve support and understanding of the conservation work going on at the beach. Signs may be permanent or seasonal depending on content and location. The Reservation will provide MADFW with additional information pertaining to content, cost, and location of potential signage for discussion of mitigation.

6.0.3 Nesting Habitat Improvement

Protection of Nesting Habitat at Saquish

The Reservation owns several parcels of property on Gurnet and Saquish, including the area of the first vehicle crossover onto “The Boulevard” or front beach of Saquish. This section of beach is extremely narrow at high tide and while there is limited nesting habitat, there are expansive flats for foraging. The area is well utilized by piping plover pairs and chicks that nest east (DBR property at “The Boathole”) and west (typically beyond DBR property). However, vehicle access to the area threatens both adults, chicks, and existing nesting and foraging habitat through continued degradation. The Reservation currently closes the crossover onto Saquish once chicks are present on Saquish beach.

To protect and improve nesting habitat and foraging habitat in the area of the crossover, the Reservation proposes to implement a full or partial closure of the crossover. A full closure would entail year-round,

permanent closure of the crossover to eliminate vehicle access over that section of the beach. Alternatively, DBR may close the crossover from May 1 through Labor Day (or after all chicks in the area are fledged). This action would be less contentious, hopefully garnering more support and compliance from residents and visitors. It would serve to protect the habitat during the chick season and a large part of the overall nesting season. This time frame also coincides with the heaviest traffic and much of the grass growing season, thereby protecting both the birds and allowing for improved habitat.

The effectiveness of this activity would be evaluated annually through tracking of nesting activity, damage to closures, and vehicles observed on DBR property. This monitoring will be assessed in conjunction with any increases or decreases in brood use of the area or pair activity (territorial, nesting, etc.). The Reservation anticipates utilizing this activity for mitigation for three credits if a full closure is implemented and one and a half credits if a partial closure is implemented.

Replicated Nesting Habitats on Duxbury Beach

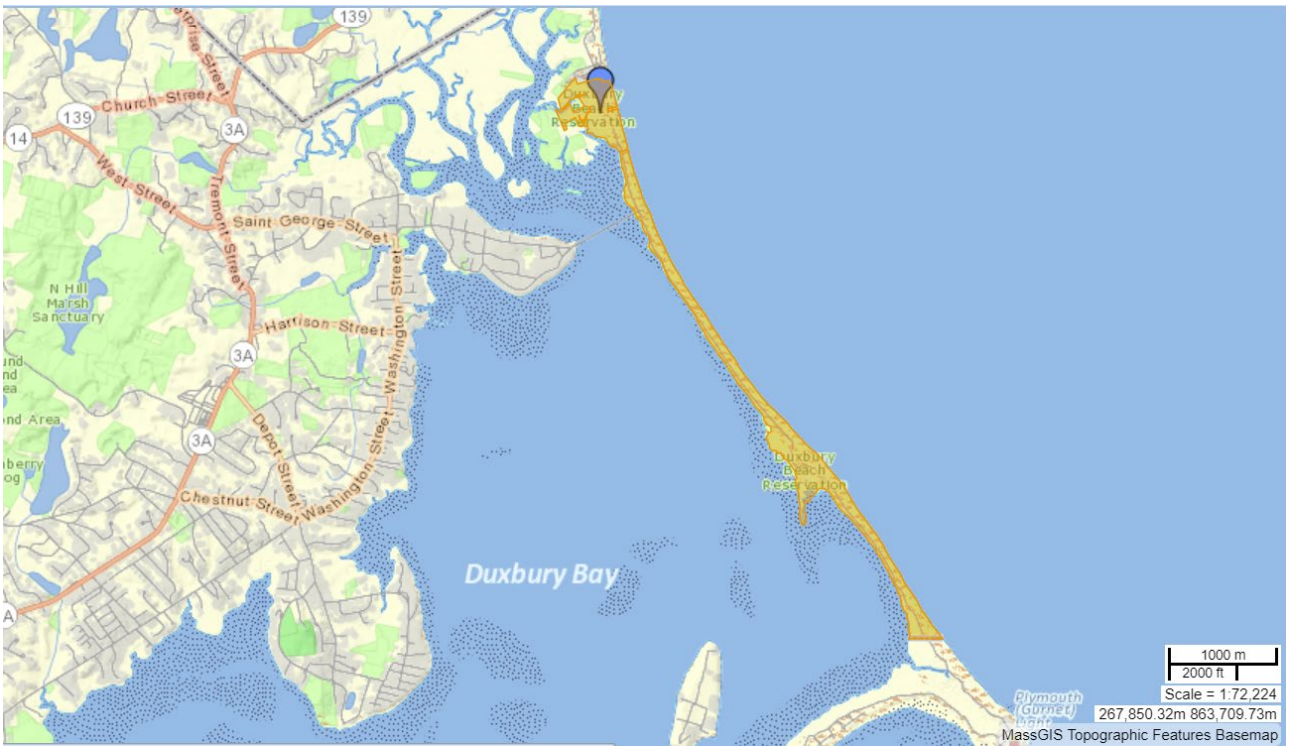
Since 1999, DBR has created and performed maintenance on "replicated habitats" on the bayside of Duxbury Beach for the purposes of plover nesting habitat. Since that time 1-3 pairs of piping plover have utilized the replicated habitats. Five individual replicated habitats were maintained on Duxbury Beach in 2019 and nesting continued within the habitats in 2020. Mass Wildlife has requested that maintenance of the replicated habitats cease in an effort to decrease crossing activity in that area. Should activity or habitat on the beach change and replicated habitat work is re-initiated, the Reservation proposes to utilize the work for the purpose of mitigation with the number of pairs that nest in the habitats equaling the number of mitigation credits (estimated 1-3 pairs).

6.1 Mitigation Monitoring Plan

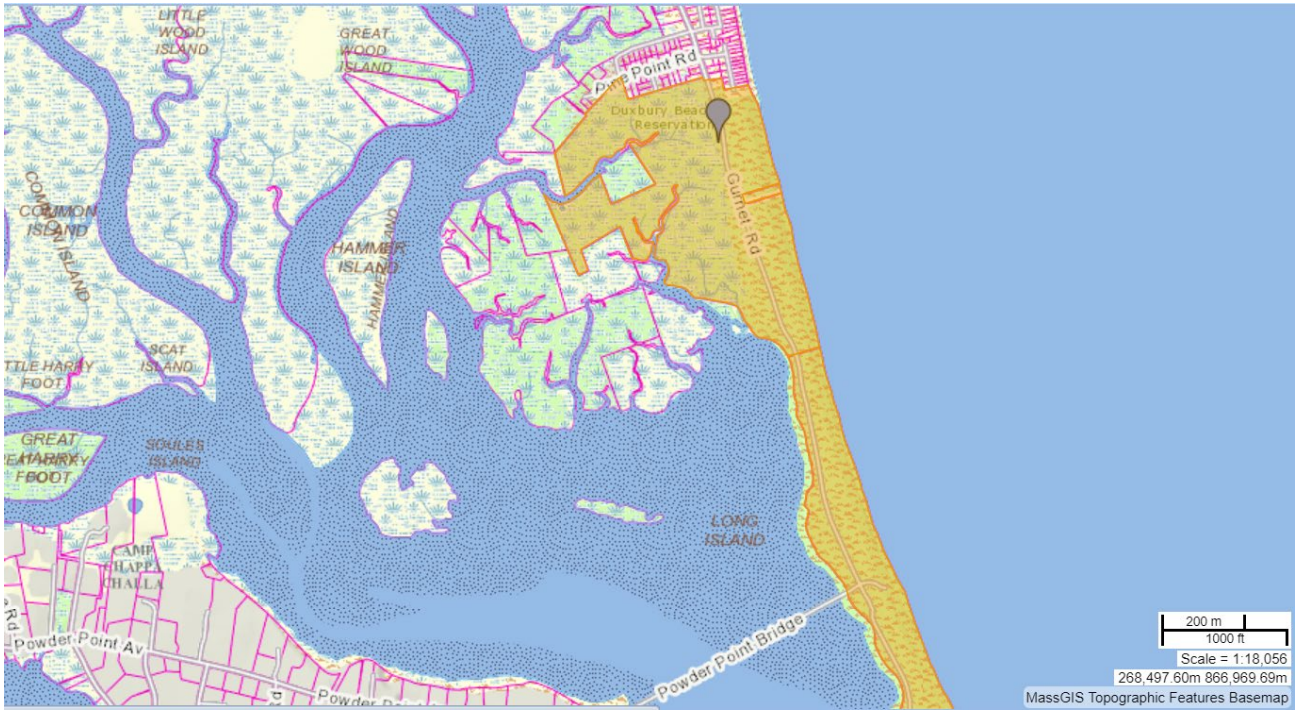
To assess effectiveness of the mitigation plan, the Reservation will monitor and report the following to MADFW annually:

- The actual number of piping plover broods exposed to covered activities
- The actual number of least tern chicks exposed to covered activities
- Actual number of breeding pairs of piping plovers that benefited from selective predator management
- Actual number of breeding pairs of least terns that benefited from selective predator management
- Actual number of breeding pairs of piping plovers that benefited from experimental habitats
- Piping plover productivity from the site
- Least tern productivity from the site
- Causes of nest and chick loss
- Any mitigation credits or deficits that will be carried over into the following season
- Effectiveness tracking of new measures as outlined in section 6.0

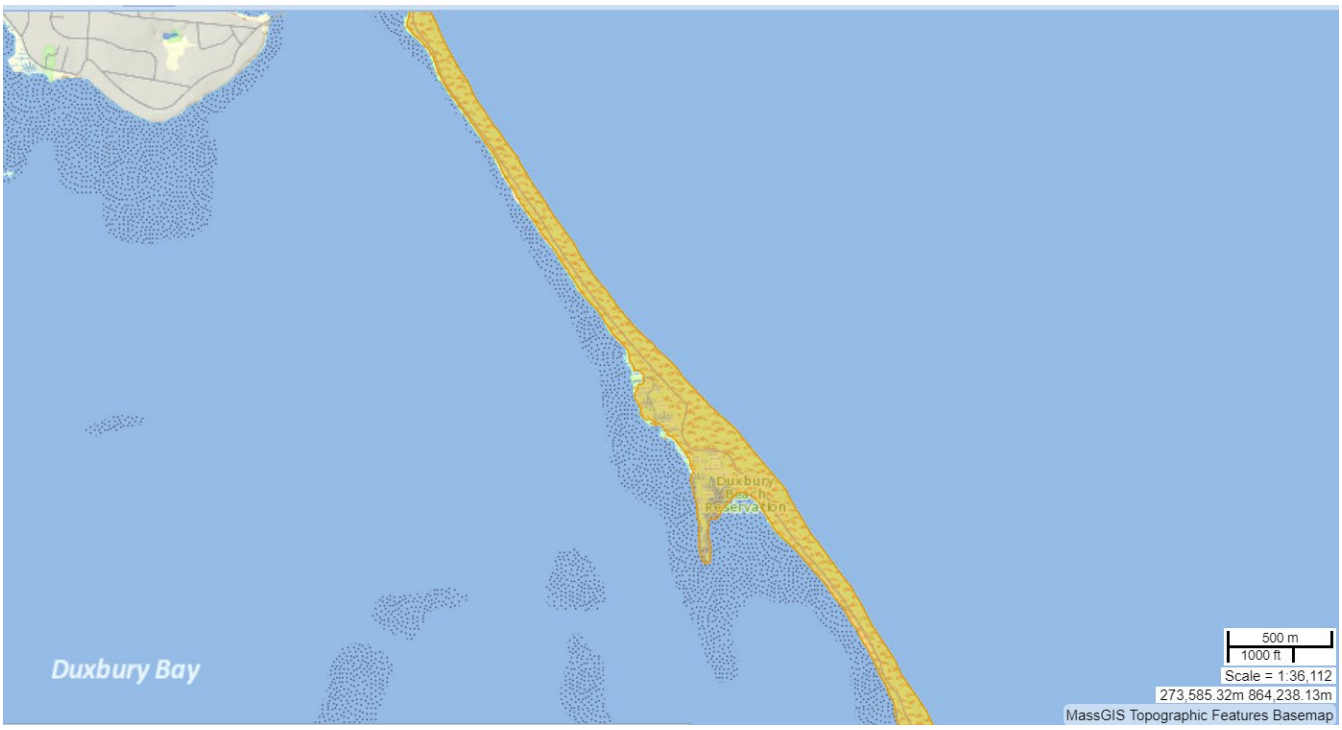
Appendix 1. Duxbury Beach Maps



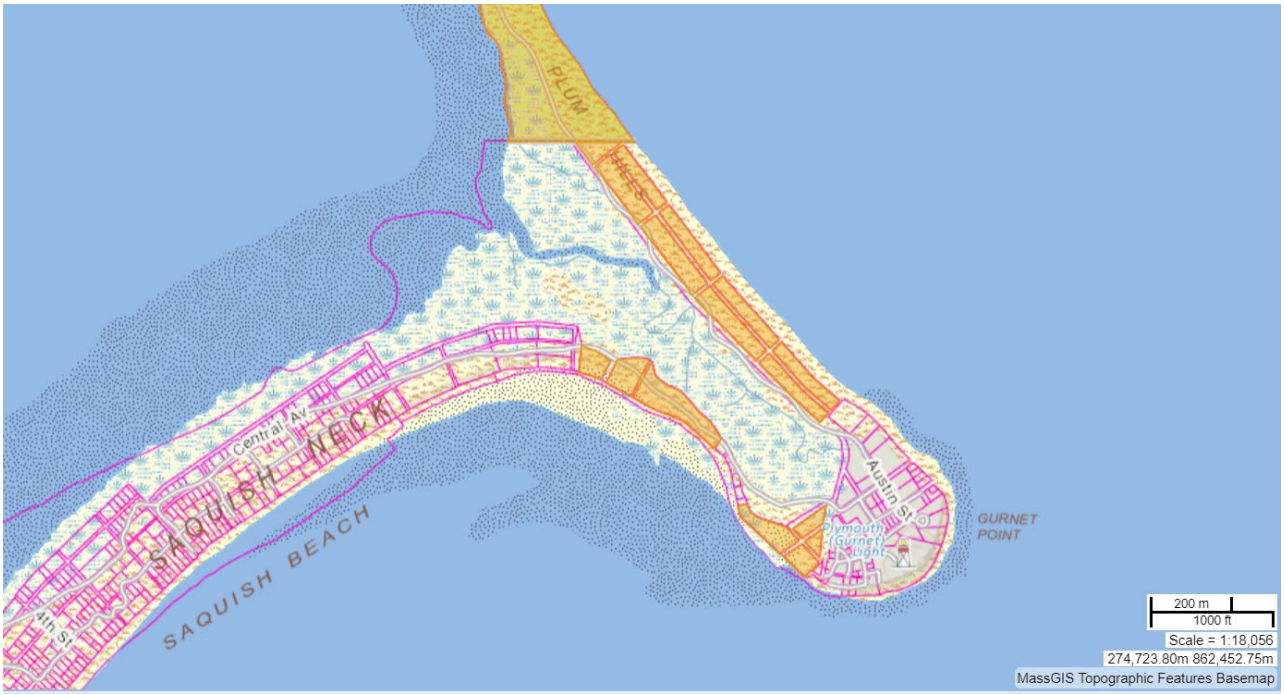
Map 1. Duxbury Beach Reservation property located in the Town of Duxbury. Including parcels: 145_400_000 and 141_421_900



Map 2. Duxbury Beach Reservation Property, including Lagerstedt Lot, McLaughlin Cottage, Duxbury Beach Park, and Town of Duxbury Resident Lots/Pedestrian Beach.

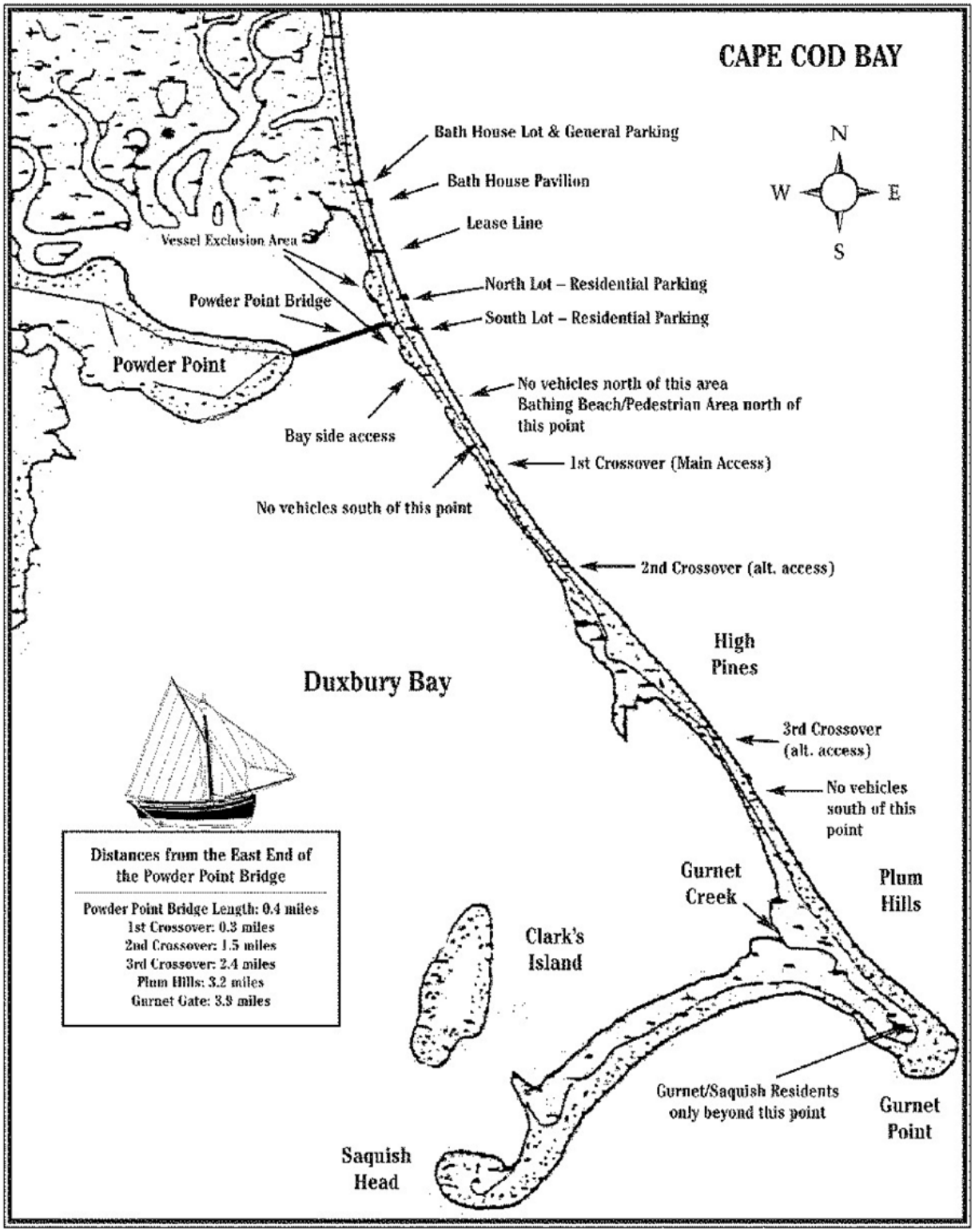


Map 3. Duxbury Beach Reservation property, including OSV beach (Crossover 1 to Crossover 3) and up to Town of Plymouth Line.

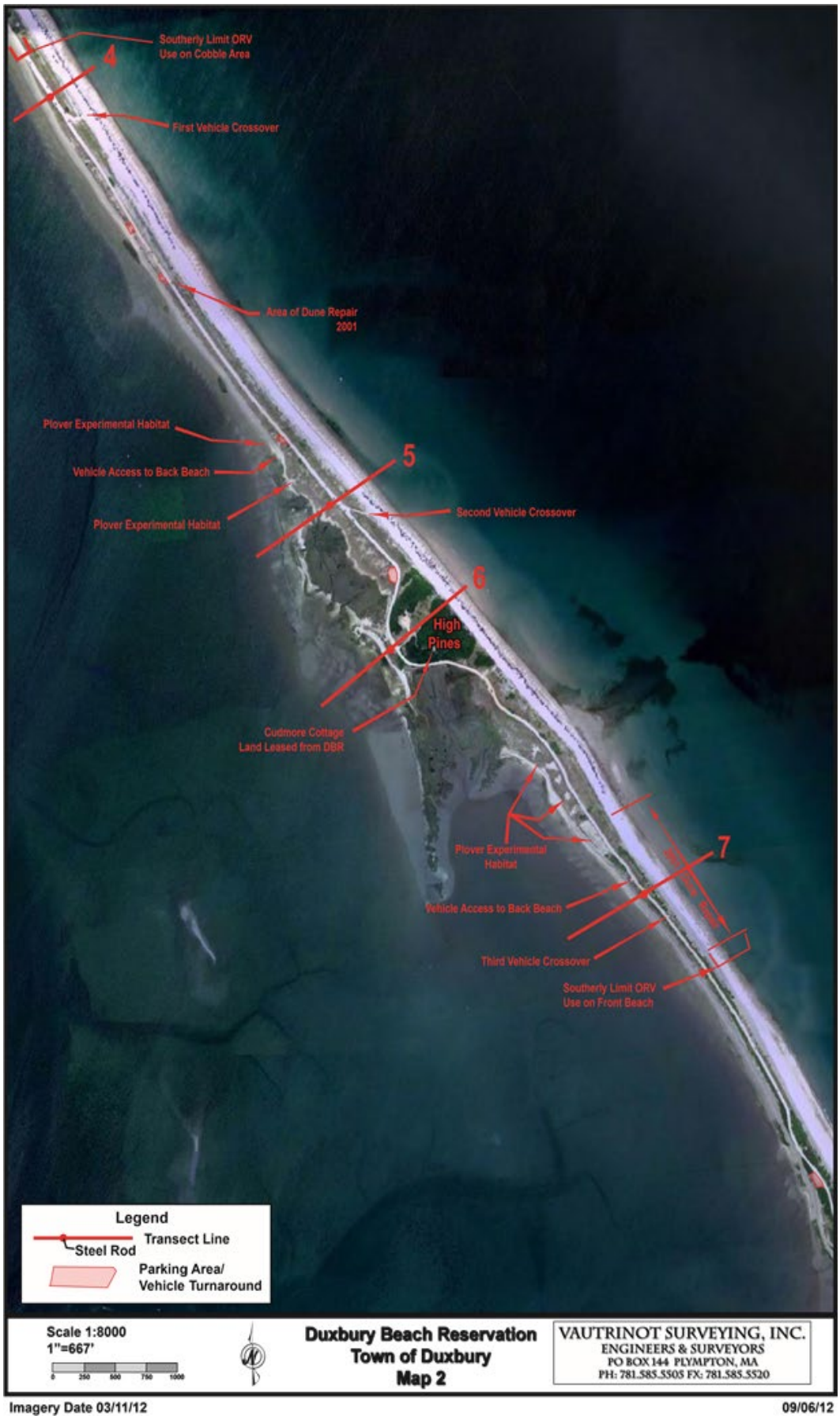


Map 4. Duxbury Beach Reservation property located in the Town of Plymouth. Property ID: 132-000G-096-000.

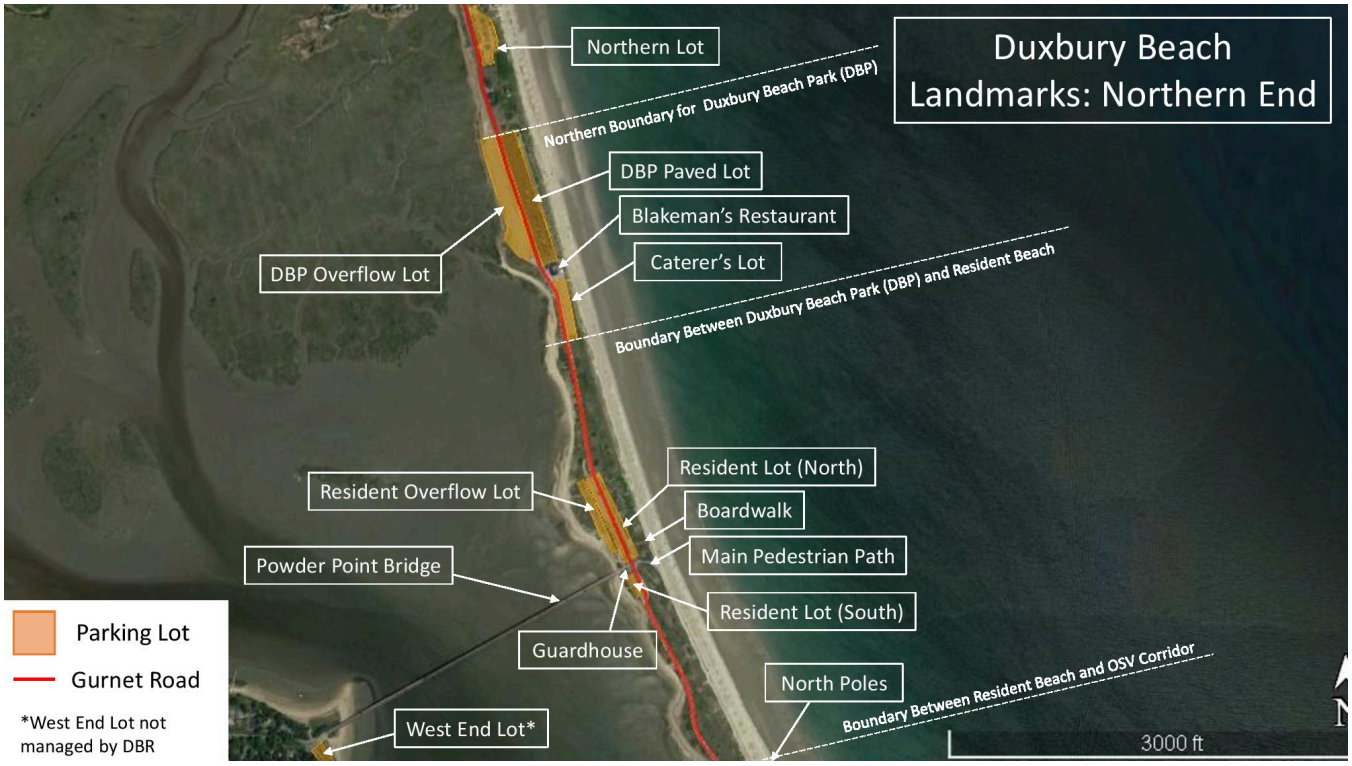
Map 5, a-g. Duxbury Beach Reservation landmarks related to implementation of covered activities, nesting activity, enforcement, and recreation.

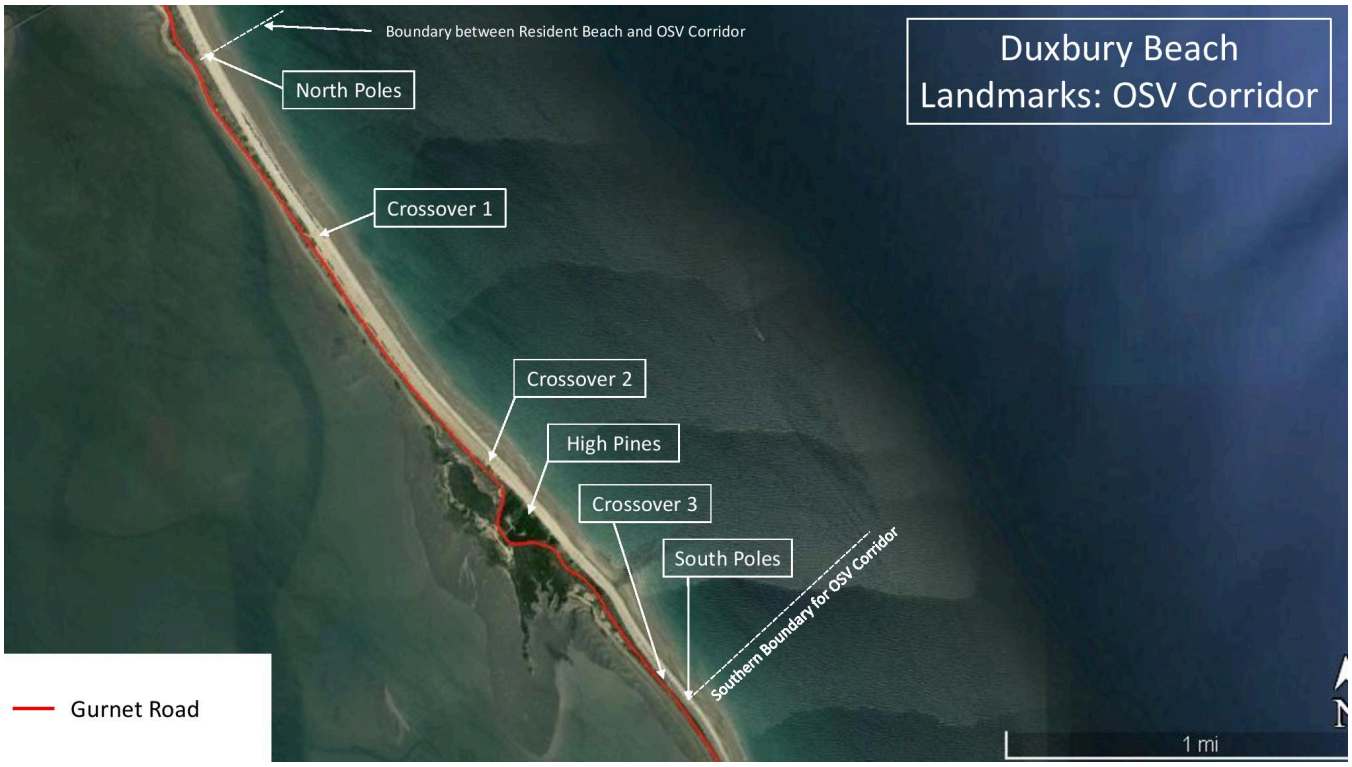



Southerly End of Concrete Seawall
Pedestrian Crossover
McLaughlin Cottage
Land Leased from DBR
Sandfilled By-Pass
Pedestrian Crossover
1
Pedestrian Crossover
Paved Non-Resident Parking Area
Historic Saltmarsh Exposed at Low Tide
Pedestrian Crossover
Handicapped Access Ramp
Emergency Vehicle Access
Blakeman's Pavillion
Gravel Pavement
Paved Resident Parking Area
Pedestrian Crossover
Handicapped Access Ramp
2
Sandfilled By-Pass
Emergency Vehicle Access
Sandfilled By-Pass
South Parking Area (Paved)
POWDER POINT BRIDGE
3
Pedestrian Crossover
Northerly Limit on ORV Use on Front Beach
Powder Point
Northerly Limit on ORV Use on Cobble Area
DUXBURY BAY
Cobble Area
Vehicle Access to Cobble Area
Pedestrian Crossover
Legend
Transect Line
Steel Rod
Parking Area/ Vehicle Turnaround
Scale 1:8000
1"=667'
0 250 500 750 1000
Duxbury Beach Reservation
Town of Duxbury
Map 1
VAUTRINOT SURVEYING, INC.
ENGINEERS & SURVEYORS
PO BOX 144 PLYMPTON, MA
PH: 781.585.5505 FX: 781.585.5520
Imagery Date 03/11/12
09/06/12


Southerly Limit ORV
Use on Cobble Area
4
First Vehicle Crossover
Area of Dune Repair
2001
Plover Experimental Habitat
Vehicle Access to Back Beach
Plover Experimental Habitat
5
Second Vehicle Crossover
6
High
Pines
Cudmore Cottage
Land Leased from DBR
Plover Experimental
Habitat
7
Vehicle Access to Back Beach
Third Vehicle Crossover
Southerly Limit ORV
Use on Front Beach
Legend
Transect Line
Steel Rod
Parking Area/
Vehicle Turnaround
Scale 1:8000
1"=667'
0 250 500 750 1000
Duxbury Beach Reservation
Town of Duxbury
Map 2
VAUTRINOT SURVEYING, INC.
ENGINEERS & SURVEYORS
PO BOX 144 PLYMPTON, MA
PH: 781.585.5505 FX: 781.585.5520
Imagery Date 03/11/12
09/06/12

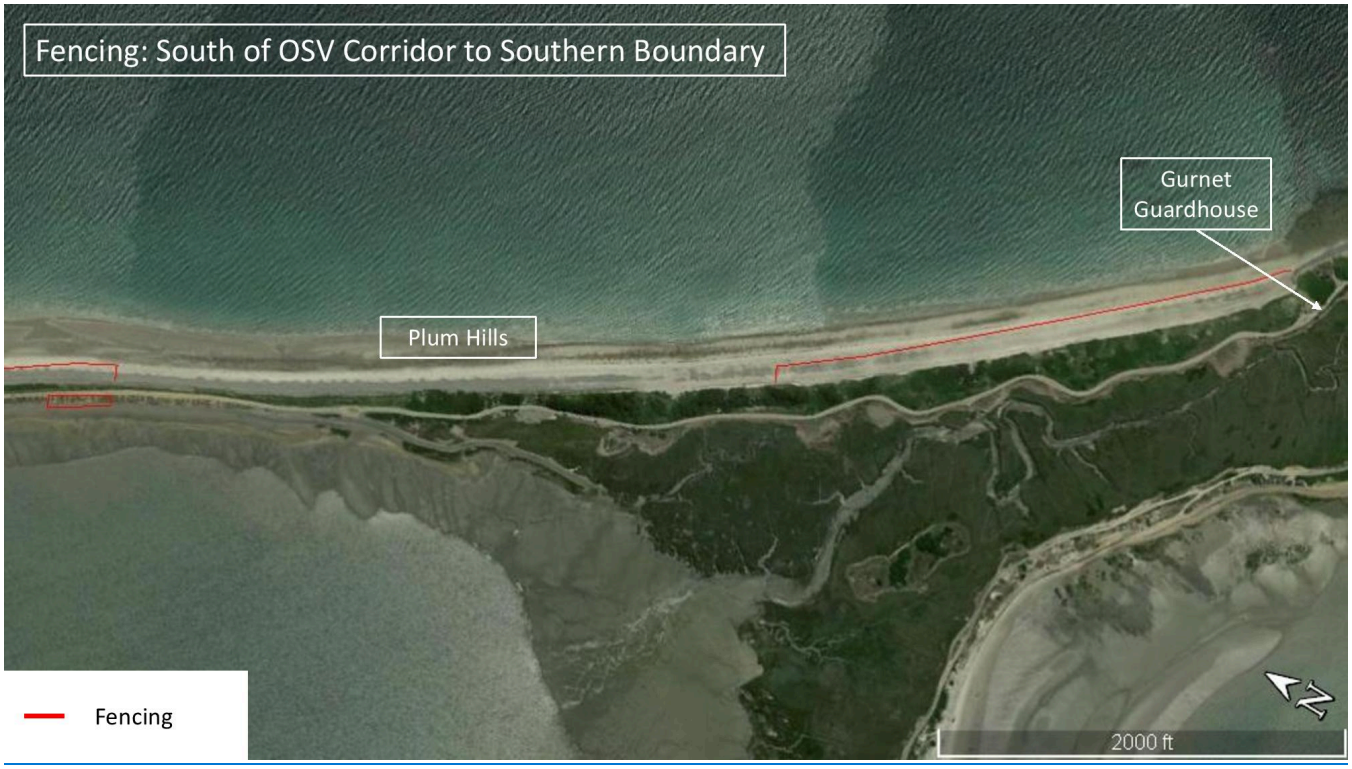

Duxbury
Plymouth
Plum
Town Line
8
Hills
Parking Access for Lighthouse
Gurnet Gate
Guard House
The Gurnet
Fort Andrew
1776
Gurnet Lighthouse
Legend
Transect Line
Steel Rod
Parking Area/
Vehicle Turnaround
Scale 1:8000
1"=667'
0 250 500 750 1000
Duxbury Beach Reservation
Town of Duxbury
Map 3
VAUTRINOT SURVEYING, INC.
ENGINEERS & SURVEYORS
PO BOX 144 PLYMPTON, MA
PH: 781.585.5505 FX: 781.585.5520
Imagery Date 03/11/12
09/06/12


Duxbury Beach
Landmarks: Northern End
Northern Lot
Northern Boundary for Duxbury Beach Park (DBP)
DBP Paved Lot
Blakeman's Restaurant
Caterer's Lot
DBP Overflow Lot
Boundary Between Duxbury Beach Park (DBP) and Resident Beach
Resident Lot (North)
Resident Overflow Lot
Boardwalk
Main Pedestrian Path
Powder Point Bridge
Resident Lot (South)
Guardhouse
North Poles
Boundary Between Resident Beach and OSV Corridor
West End Lot*
Parking Lot
Gurnet Road
*West End Lot not managed by DBR
3000 ft


Duxbury Beach
Landmarks: OSV Corridor
Boundary between Resident Beach and OSV Corridor
North Poles
Crossover 1
Crossover 2
High Pines
Crossover 3
South Poles
Southern Boundary for OSV Corridor
Gurnet Road
1 mi

Map 6. Symbolic fencing locations on Duxbury Beach in 2020. This fencing is representative of typical symbolic fencing to protect piping plover and least tern nesting areas on Duxbury Beach.


Fencing: Crossover 1 to Southern OSV Extent
Southern OSV Extent (South Poles)
Crossover 1
Crossover 2
Crossover 3
High Pines
Fencing
3000 ft

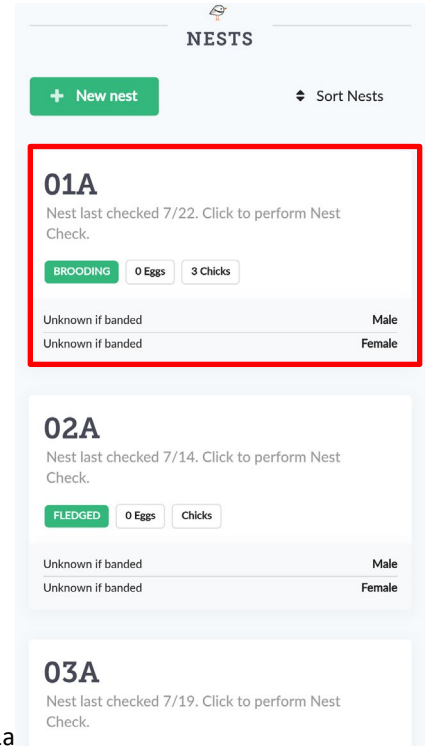

Fencing: South of OSV Corridor to Southern Boundary
Gurnet Guardhouse
Plum Hills
Fencing
2000 ft

Appendix 2. Duxbury Beach Data Capture

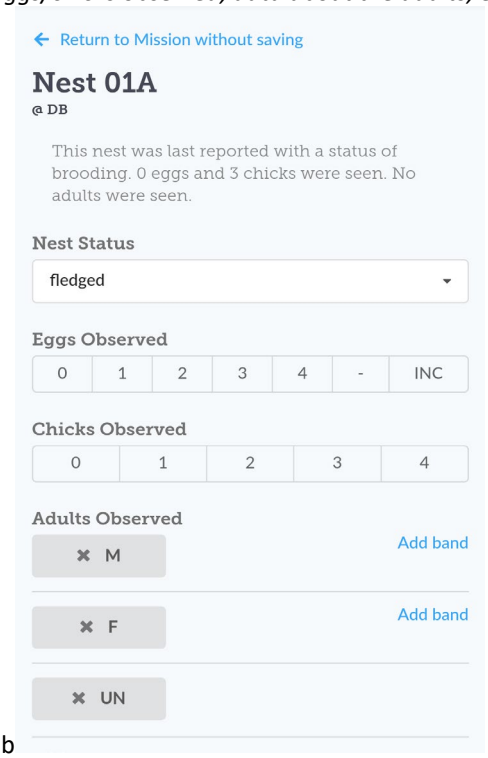
Figure 1. NestStory forms for piping plover and least tern monitoring on Duxbury Beach.

1) Piping Plover Nest Check Form

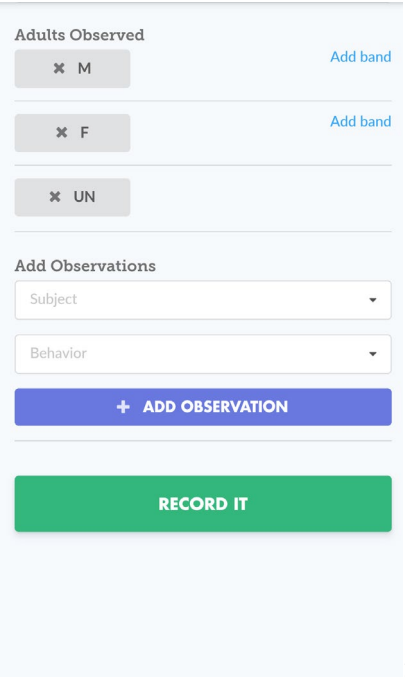
Recording information on nests and broods is done utilizing the same form, with the nest status being changed when the nest hatches, broods, and fledges (1b). The locations of the brood, as well as any crossings, are recorded below the general information about the brood (number of eggs/chicks observed, data about the adults, etc.).



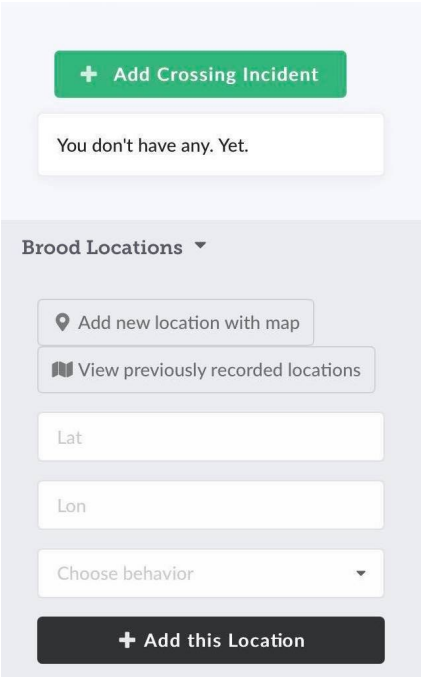
1a



1b



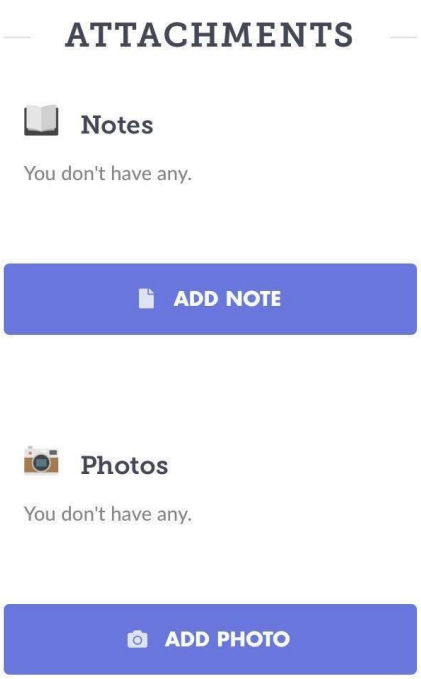
1c



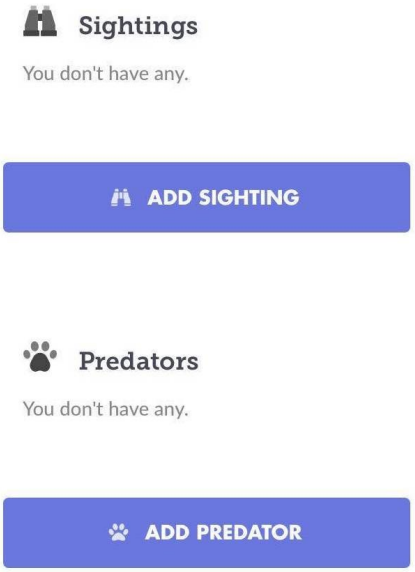
1d

2) Piping Plover Nest Check Form-Attachments

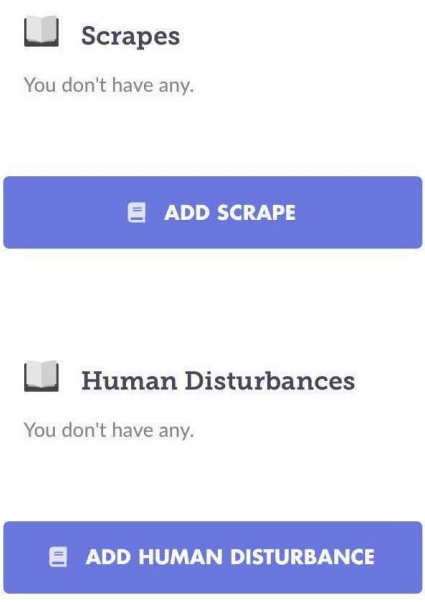
Various attachments can be included to a nest/brood check in NestStory to include any observations and/or incidents not covered in the main part of the form. These include general notes, any sightings of the focal species, photos, predator sightings, human disturbances, and scrapes. The attachment options are available both in individual nest checks, colony/crossover proximity check for least terns, and for the overall monitoring period ("mission").



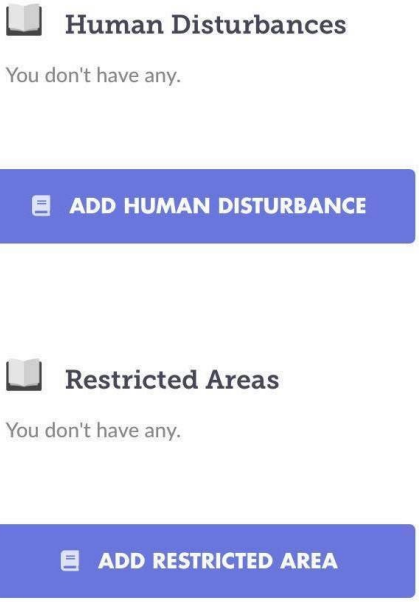
2a



2b



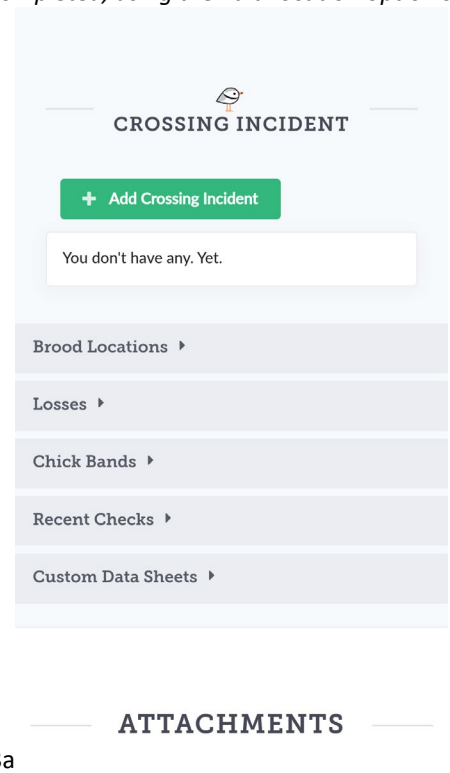
2c



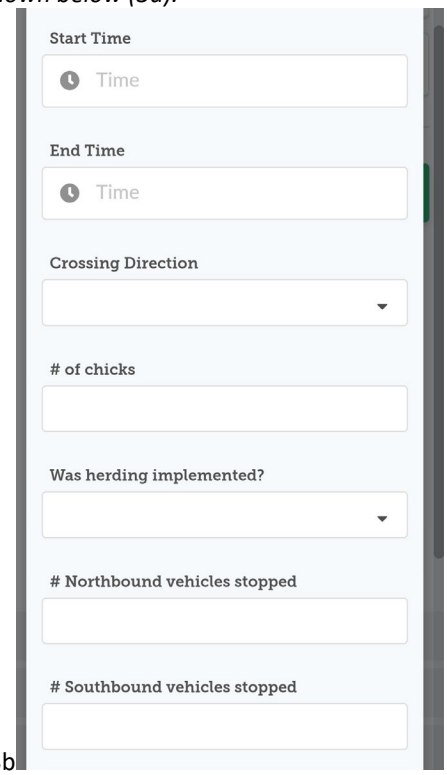
2d

3) Brood Road Crossing Forms

This form is filled out in NestStory for every observed crossing and compiled in the Crossing Log (3c-d). It is accessed from within the unique Nest Check Form for an individual brood (3a). The location of the crossing must be added after the form is completed, using the Edit Location option shown below (3d).



3a



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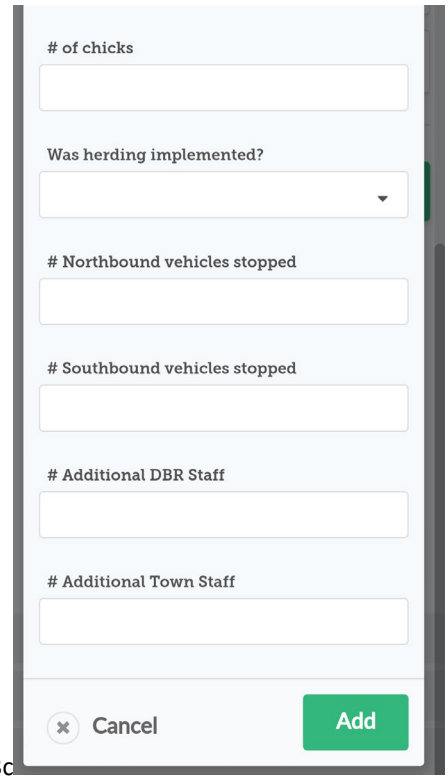

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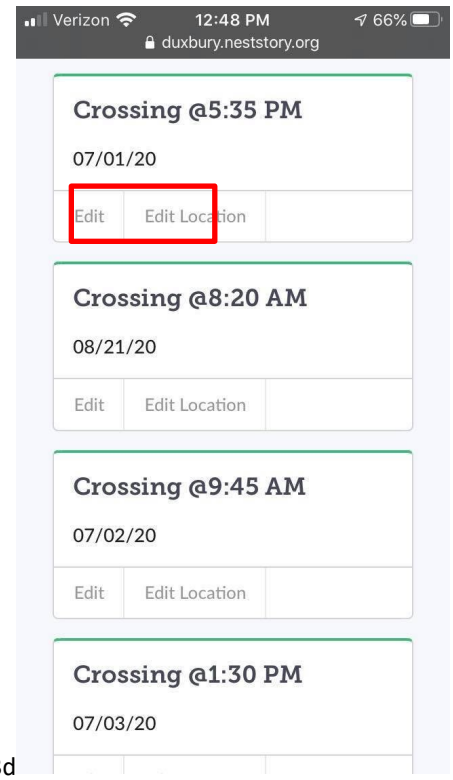
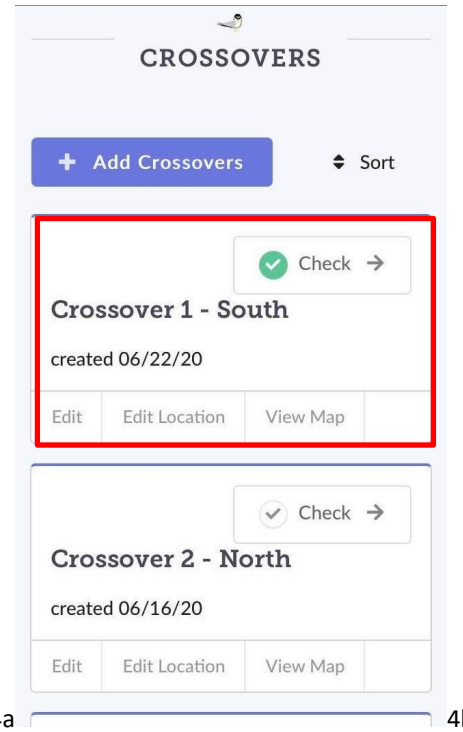


3d

4) Least Tern Crossover Proximity Check Form

When OSV crossovers are open, this form is used to regularly document when least tern chicks are near the open crossover. If chicks get within 15m from the open area and herding is necessary, that is recorded using this form as well. The attachments section is the same as that in the Piping Plover Nest Check Form.



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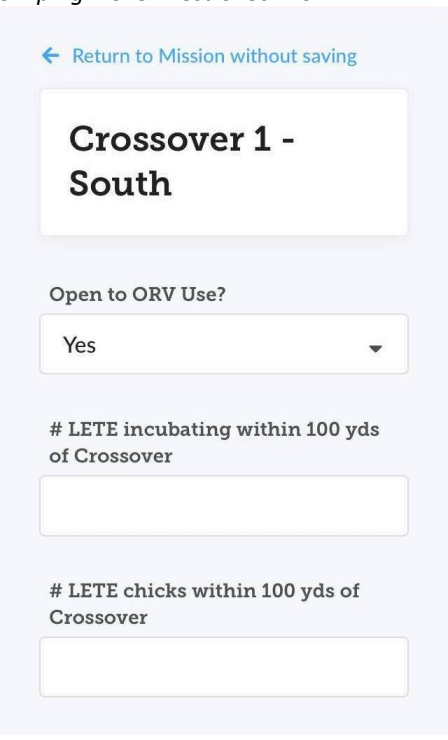

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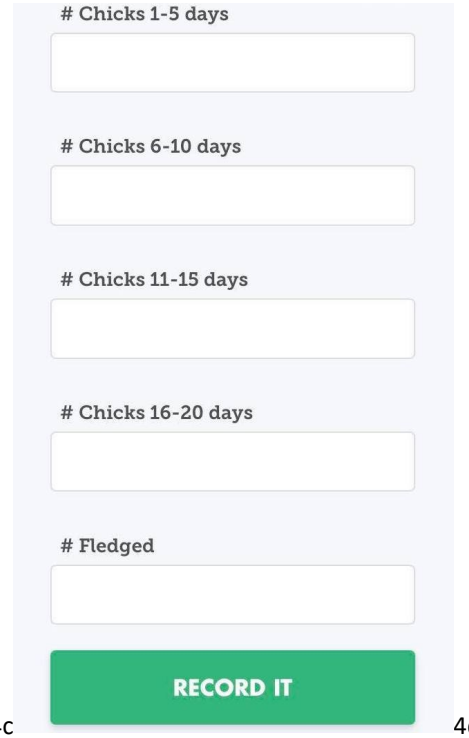

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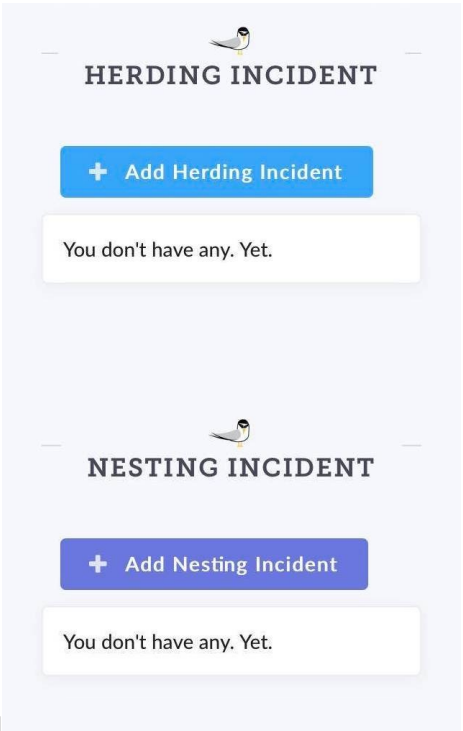

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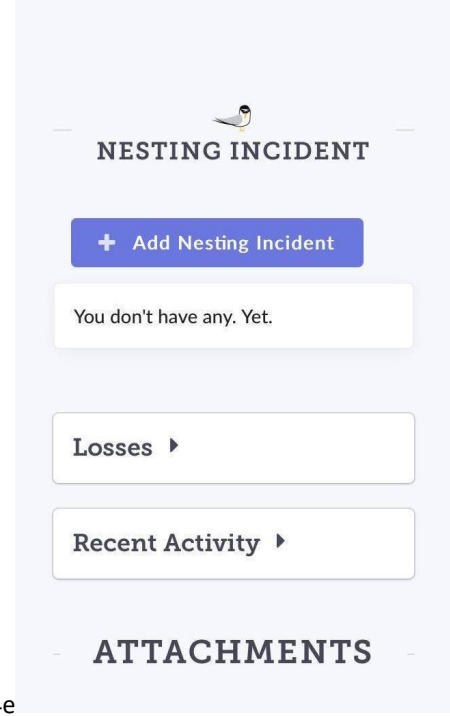
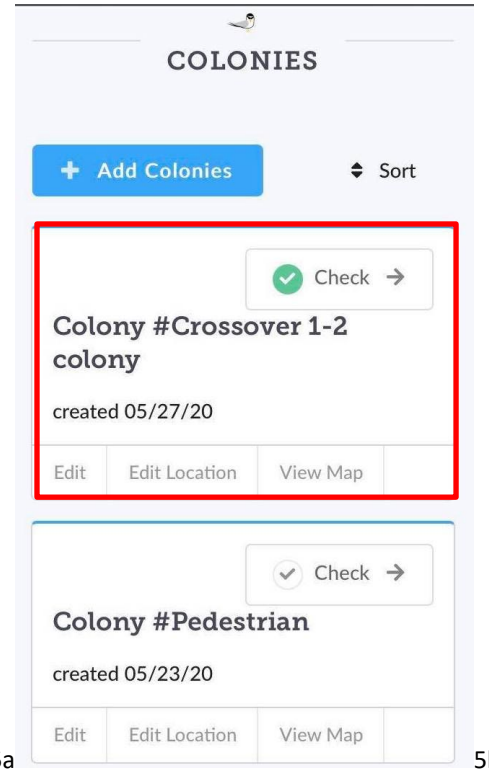

NESTING INCIDENT
Add Nesting Incident
You don't have any. Yet.
Losses
Recent Activity
ATTACHMENTS

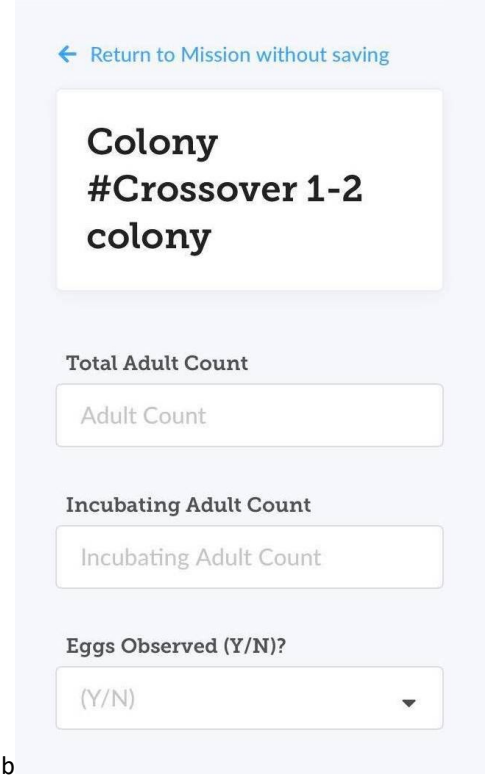
4e

5) Least Tern Colony Check Form

This form is used to get counts of adults and chicks in each colony found on the beach. As with the other least tern form, the attachments section has the same options as those found in the Piping Plover Nest Check Form.



5a



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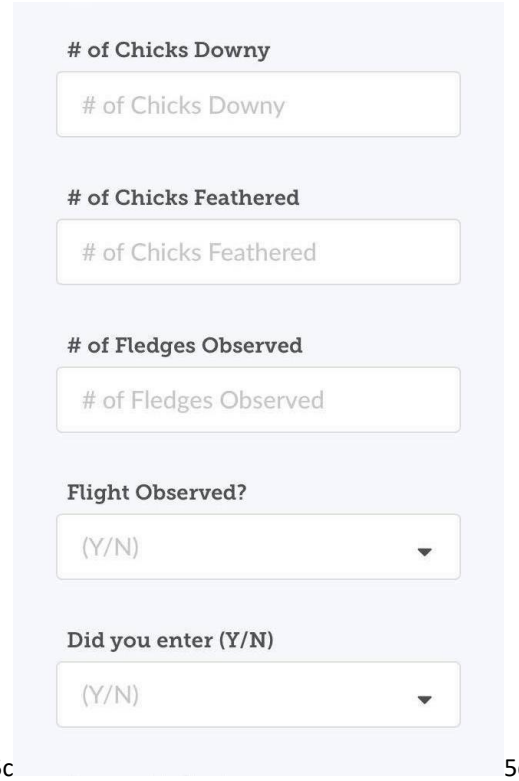

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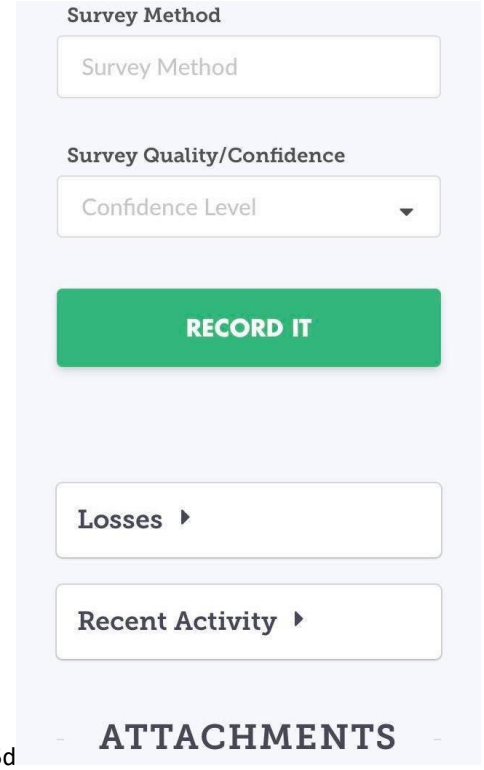

5d

Table 1. Effectiveness monitoring data capture for Reduced Symbolic Fencing around Nests. This spreadsheet is captured on Google Drive which staff access via phones or iPads onsite to perform daily (one week) and every other day monitoring.

Reduced Symbolic Fencing Around Nests

Date	Staff	Start time	End Time	Nest ID	Abandonment (y/n)	# of times adult flushed off nest during observation window	# of times defensive behavior observed during observation window	# Pedestrians within 50m	# vehicles within 50m	# predators within 50m	Comments on disturbances observed

Table 2. Effectiveness monitoring data capture for Reduced Proactive Fencing. This spreadsheet is captured on Google Drive which staff access via phones or iPads onsite to perform daily (one week) and every other day monitoring.

Reduced Proactive Fencing

Date	Staff	Start time	End Time	Description of Location	GPS Location	Types of Deterrents implemented	New deterrence measures implemented	Pair present (y/n)	Scrapes present (y/n)	Eggs present (y/n)

Table 3. Effectiveness monitoring data capture for Nest Moving. This spreadsheet is captured on Google Drive which staff access via phones or iPads onsite to perform daily (one week) and every other day monitoring.

Reduced Symbolic Fencing Around Nests

Date	Staff	Start time	End Time	Nest ID	Distance of nest movement	Adult behavior (incubation resume/cease/switch off)	Pair activity within 100m	Disturbance

Zone Assignment Sheet

Date: _____

	Bayside	Oceanside
Zone 1		
Zone 2		
Zone 3		
Zone 4		
Floater		

Date: _____

	Bayside	Oceanside
Zone 1		
Zone 2		
Zone 3		
Zone 4		
Floater		

Figure 2. Shorebird Monitor coverage datasheet used to track monitoring needs on the beach for the purposes of implementing Use of Roads and Parking Lots, barrier use, herding activity, and OSV Crossover access in the vicinity of least terns.

Figure 3. Data entry spreadsheets for the purposes of capturing piping plover activity, management activity, and recreational activity when nighttime driving on the OSV, via Crossover 1 on Duxbury Beach, is permitted with unfledged piping plover broods present within 1000m. Data forms are located on Google Drive to allow electronic entry in the field.

Brood ID	Hatch Date	# Chicks	Qualifying Factor	Reason for Removal	Removal Date	Requalifying Factor	Requalifying Date
2A	5/20/2019	3	Nested within OSV Corridor	Brood traveled outside 1000m buffer	5/28/2019	Brood traveled back into 1000m buffer	6/2/2019

Table a. Data entry form to record broods within 1000m of the OSV while the OSV is open after 2000 hr. Example data provided in second line.

Date	Time	Brood ID	# Chicks	Reason for Missing Brood	Location Brood Last Seen (Oceanside/Bayside)	# Sweeps of OSV Corridor	Date Brood Found	Time Brood Found	Location Brood Found (Oceanside/Bayside)
7/1/2019	10:35	5B	2	Monitor Could not locate brood, Supervisor notified	Oceanside	3	7/1/2019	13:47	Oceanside

Table b. Data entry form to record broods not found prior to OSV opening at 0800 hr following nighttime OSV use. Example data provided in second line.

Date Erected	Latitude	Longitude	Location Description	Date Adjusted	New Latitude	New Longitude	Adjustment Direction (North or South)
5/11/2019	42.03413	-70.63042	North of 2XO	5/17/2019	42.03378	-70.63009	South

Table c. Data entry form for Restricted Area fence locations after 2000 hr for broods located within 1000m of the OSV. Columns continue as new adjustments are made to existing Restricted Area fence lines. Example data provided in second line.

Date	Crossover 1 (daytime)	Crossover 2 (daytime)	Crossover 1 (nighttime)	Crossover 2 (nighttime)
6/25/2019	Open	Closed	Open	Closed

Table d. Data entry form indicating the status of an OSV crossover on Duxbury Beach during daytime (0800-2000 hr) and nighttime while unfledged piping plover chicks are present within 1000m of the OSV with nighttime access open. Example data provided.

Figure 4. Paper data sheet completed by Shorebird Monitors and Shorebird Monitor Supervisor to inform Town and DBR staff present after 1800 hr. If nighttime OSV access is closed then this sheet is also used to inform DBR staff arriving at 0600 hr the following day of last known brood locations and activities.

End of Day Brood Locations			
Brood #	#Chicks	Location	Crossing Activity

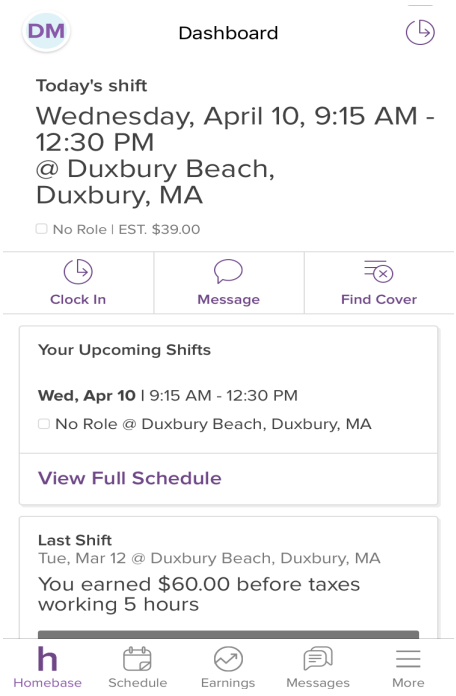

Figure 5.A

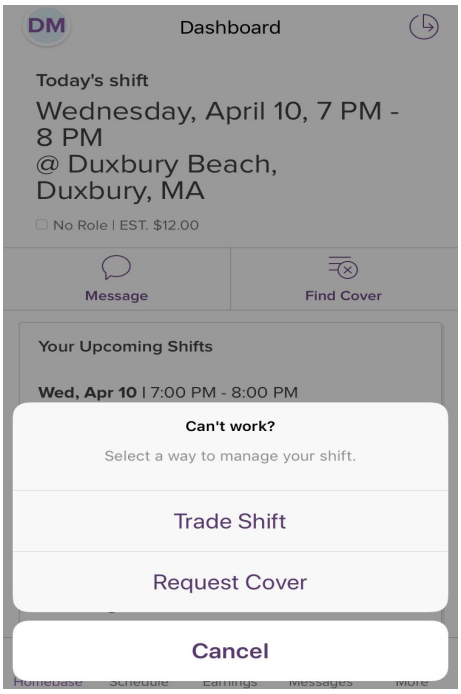

Figure 5.B

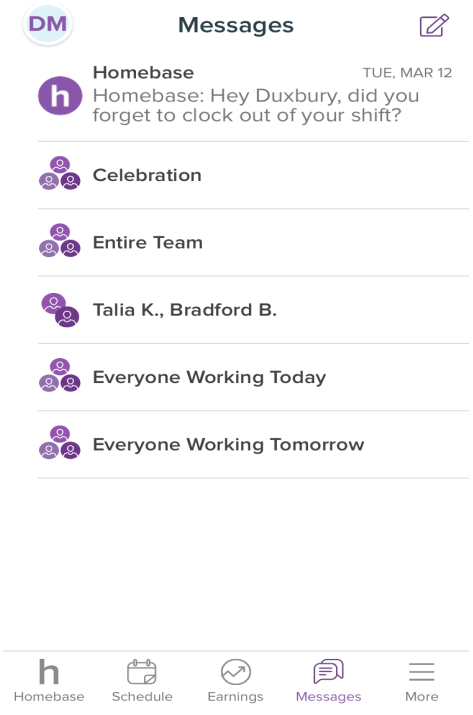

Figure 5.C

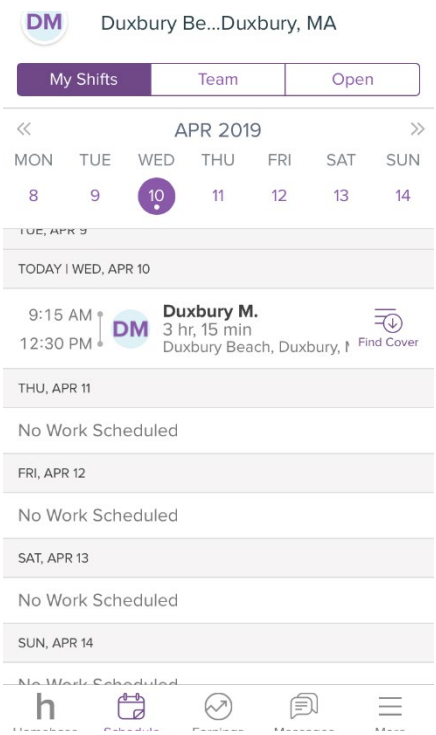

Figure 5.D

Figure 5 a-d. DBR staff utilize the Homebase app to create schedules, assign/trade/cancel shifts based on staffing needs and communicate internally. A) The dashboard shows each staff their current shift, upcoming shifts, and allows the user to navigate to other functions within the app (schedule, earnings, message). B) Staff can request to trade shifts and find coverage for shifts they have been assigned. A Monitor Supervisor must approve all trades or dropped shifts to ensure there is proper coverage on the beach. C) DBR staff can use the Homebase app to communicate with supervisors, co-workers, or larger groups. This function is used by Supervisors to give training reminders during relevant points in the season. Monitors

are able to use this to determine who else is working in their monitoring zone (in case of changes after the shift begins), communicate about brood activity, needing coverage for breaks, etc. Cell phones are also used for this purpose. D) Staff can view the full published schedule through the Homebase app to confirm proper coverage and determine where staff should be placed on the beach.

Duxbury Beach Reservation, Inc.
Piping Plover Brood Herding Protocol
Created: March 20, 2020; updated 12/14/2022~~0~~

Purpose: This protocol describes when and how Piping Plover broods may be herded off the back road or away from paved parking lots on Duxbury Beach in situations approved under DBR permits.

Herding due to plovers' use of roadway

When a Piping Plover brood attempted to use the back road for lengthy periods of time (>1 hr) in 2019, MassWildlife authorized the Duxbury Beach Reservation to escort vehicles past the birds at scheduled times during daylight hours. Outside of scheduled times, vehicles had to wait to travel until the next scheduled escort time.

- **Details**:
  - Initially, a brood may be herded off the road after 15~~30~~ minutes (following herding protocol below under *Herding Procedure)*. If the Plover activity continues in the road, herding will occur at scheduled times.
    - Scheduled times are 7 am, 9 am, 11 am, 1 pm, 2 pm, 4 pm, 6 pm, and 8 pm**.**
    - Schedule has been set up to accommodate Gurnet-Saquish resident work schedules and monitoring staff shift start and end times. Scheduled times may shift dependent on staffing but will remain every two hours.
  - Schedule will be distributed to Gurnet-Saquish Corporation officers who in turn post on Gurnet/Saquish Corporation Facebook page and distribute via resident emails
  - If the back road is open to recreational vehicles, the schedule will also be posted by the Town of Duxbury on the town website, email blast, and Twitter.
- If the birds are not in the road, travel by Gurnet-Saquish residents may proceed as normal.
- This protocol is not intended for use during active road crossings.
- NOTE: Brood's extended use of the road may be due to vehicles blocking access to normal crossing area/accessible crossing area. If feasible given number of vehicles in queue, work with Beach Ops staff to move vehicles back to allow access to potential entryway into bayside or oceanside dune. This should be attempted prior to herding and requires adequate staff to keep eyes on all chicks and adults, hold traffic, and direct vehicles that need to move.

Herding near Pedestrian Pathways

There are several areas of Duxbury Beach that do not provide Piping Plover habitat on the bayside. This primarily consists of saltmarsh but also includes the Powder Point Bridge with associated revetment and footings. In two sections these non-habitat areas border paved parking lots. This includes the length of the paved parking lot at Duxbury Beach Park and the main pedestrian path across from the Powder Point Bridge. In cases where a brood is using the area oceanside or exhibits behavior indicating an attempt to access the parking lots in these areas, a combination of herding and barriers (see *Barrier Use Protocol*) will be utilized to discourage crossings in these areas. This will not prevent the brood from crossing to the bayside in other sections of the beach.

- **Duxbury Beach Park Paved Parking Lot:**
    - Should a pair nest on the oceanside of the paved parking lot at Duxbury Beach Park, staff will erect a barrier according to the DBR PIPL Barrier Use Protocol along the length of the west side of the oceanside dune prior to hatching to prevent entry into the parking lot. This should include all pedestrian pathways north of the boardwalk.
    - If a brood moves into the area north of Duxbury Beach Park, a barrier will be erected along the western length of the oceanside dune bordering the parking lot. During the time that the barrier is being erected, a second monitor (two may be necessary depending on brood range) will be stationed at the nearest pathway to discourage plovers from entering. Should it become necessary, the brood will be herded (minimum two staff) away from the path.
    - The boardwalk path should be assessed daily at 10:00and 20:00 to ensure access via this path is not possible by chicks. Should access become possible because of sand build-up, a monitor will remain with the brood and a second monitor will be stationed at the access path to discourage entry. Should it become necessary, herding according to the Herding Procedure outlined below should be implemented until a barrier or other method of preventing access can be erected. Currently there is no access via the boardwalk due to the height difference between the beach and the boardwalk itself. This will continuously be evaluated throughout the season when barriers have been erected.
- **Resident Parking Lot Main Pedestrian Path:**
    - Should a brood begin to approach the pedestrian path across from the Powder Point Bridge (move within 10 meters of the pathway and direction indicates they may use the path), staff should immediately begin preparing a barrier that can be erected across the width of the pathway on the east end. Staff will immediately initiate the DBR Herding Protocol (non-active herding).
        - Barrier may consist of landscape fabric or silt fencing, low enough for pedestrians to step over, with stabilizing wooden posts along its length.

        - The barrier should be able to stand up to normal wind but should also allow emergency vehicle access should it be necessary as this is the closest vehicle access path to the Town Pedestrian Beach.
        - Signs will be erected facing east and west at the barrier to inform pedestrians of the barrier and direct them to the nearest alternate handicap access.
        - Fluorescent flagging will be tied along the length of the barrier to increase visibility for pedestrians.
    - From 10:00-18:00, a monitor will be stationed with the brood. Should the brood begin moving towards the path, the monitor will position themselves in front of the pathway to discourage entry. If the brood moves within 3 meters of the pathway, the monitor will proceed to herd the brood away from the path following the *Herding Procedure* below.
    - At 20:00, the barrier will be rolled out across the east end of the pathway and signs will be re-erected. Following initial observation of the brood the following morning, the barrier will be rolled off the path to allow use of the limited mobility access path.

Resident Paved and Unpaved Parking Lot:

- Should a brood begin to cross between oceanside and bayside through the Resident Parking Lots (paved and unpaved), in conjunction with proper permits and approval from MADFW, DBR may use a combination of herding and barriers to maintain crossing at the north end of the parking lots.
- In addition to barrier use described in the DBR Barrier Use Protocol, DBR staff may enact non-active or active herding in the paved section of the lot where barriers are not feasible. Due to the roadway needing to remain open. Herding will be used to maintain crossing activity in the section closed to parking with access to both bayside and oceanside.
    - A Shorebird Monitor will be stationed in the area during open beach hours to stop traffic and initiate herding as necessary.

<u>Herding Procedure</u>

- Herding at Duxbury Beach may be defined as “Active” or “Non-active”.
    - Active herding is described below and indicated monitors are moving towards a brood to usher them in a certain direction.
    - Non-active herding indicates a monitor is stationed at a certain location to discourage brood movement towards that area by their presence and not movement towards the brood.
- Should herding be deemed necessary and no DBR staff member is present, Beach Operations staff must notify DBR prior to implementing herding to ensure the activity complies with DBR permits.

    - In the case of non-active herding away from the above-mentioned pedestrian pathways, the monitor with the brood should alert the Monitor Supervisor. The Supervisor should instruct the monitor to position themselves at the east end of the pathway and alert the CEP Coordinator.
- Two staff must be present for herding to occur (this may include Beach Rangers, Monitor Supervisors, Shorebird Monitors, and Field Technicians).
    - In the case of herding away from the main pedestrian path at the Resident Parking Lot, this number may be reduced to one if another staff is not immediately present.
- In the case of herding out of the roadway, prior to herding, staff should communicate to determine which direction (east or west) they will attempt to herd the brood. In the case of herding away from a pedestrian path, prior to herding, staff should communicate to determine which direction (north, south, or east) they will attempt to herd the brood. Considerations include:
    - Direction of brood's movement
    - Predator presence
    - Tide (at low tide bayside may be preferable, at high tide oceanside may be preferable)
    - Access (dense vegetation, etc.)
    - Pedestrian presence
- During herding, staff should line up next to one another (spanning the width of the brood) and move slowly towards the brood. If the brood begins to move off the road or away from the pathway (>5m) independently, staff should stop herding.
- **Road Reopening:**
    - Road reopening following herding should not occur until the brood is at the eastern crest of the oceanside dune OR west of the vegetation on the bayside.
    - A minimum of two staff should be present to reopen the road following herding (additional staff may be necessary depending on number of chicks and tendency to range widely).
    - Monitors must have eyes on all chicks and adults in the brood prior to opening the road.
    - Prior to escorting, staff will explain the procedure to the first car in line north and south.
    - Vehicles should be escorted past the brood (200 ft from the brood north and south)
        - Monitor will walk in front of the northbound line of cars until the last car has passed the brood. The monitor will then lead the southbound cars in the same fashion.
        - 1-2 monitors should be observing the brood throughout the time needed to escort the vehicles past the brood.

Emergencies

- Emergency Vehicles
    - There are no restrictions during emergencies.
    - Emergency vehicles should avoid the birds to the extent practicable under the circumstances.
    - Should beach staff be notified of an emergency vehicle approaching or observe it at an adequate distance, staff should notify a supervisor and attempt to herd the brood out of the road if safe to do so.
- Personal Vehicles
    - Beach personnel should offer to call an ambulance for the person.
    - If person declines emergency personnel, Beach Operations staff should notify DBR who will in turn notify MassWildlife.
    - Following proper notifications, the brood should be herded off the road and the vehicle escorted through (as described above) after notifying DBR.