DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
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MASS.GOV/MASSWILDLIFE

MASSWILDLIFE

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

Project Location:

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

Applicant:

Individual	Joey Negreann
Organization	Duxbury Beach Resrvation, Inc.
Mailing address	P.O. Box 2593 Duxbry, MA 02331
Phone & Email	Joey@duxburybeachresrevation.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**	17	5	4	24
Max. % of total pairs at site to be exposed				62%
Acreage affected				4
Max. % of total nesting acreage affected for this species at site				5%

* 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**	25	57	20(30)	81
Max. % of total pairs at site to be exposed				21.3%
Acreage affected				4
Max. % of total nesting acreage affected for this species at site				5%

* 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**	Yes	$ TBD	TBD
Applicant-implemented activities (in lieu of fee):			
· Selective predator management	Yes	Submit details in IAMP (see below)	46
· 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.)

☑ Site map – showing parcel boundaries and provide proof of ownership

☐ Written assent of landowner(s) to request coverage, if applicant is not landowner

☑ 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.

☑ 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 Lutazzi
Signature of Property Owner/Record Owner of Property Date 12/15/2023

Joey Negreann
Signature of Applicant (if different from Owner) Date 12/15/2023

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.

Duxbury Beach Reservation request for Certificate of Inclusion on Duxbury Beach, 2023 where 2024 is the expected first year of Implementation. See below for more information on the IAMP and Mitigation Plan.

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 2023

Introduction and Overview

The following is a request by Duxbury Beach Reservation, Inc. ('DBR' or 'The Reservation') for a Certificate of Inclusion (COI) in the statewide Habitat Conservation Plan (HCP) for Piping Plover for the 2024-2026 nesting seasons on Duxbury Beach. The request includes three covered activities: Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks and Least Tern Chicks; Recreation and Beach Operations; and Oversand Vehicle (OSV) Use in Vicinity of Unfledged Piping Plover and Least Tern Chicks. Review of the past three years of nesting on Duxbury Beach has determined that 24 Piping Plover pairs and 81 Least Tern pairs may be impacted. The area affected will be the 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 as well as the oceanside beach. 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 (66 yards) wide – ranging from 46 meters (50 yards) to 168 meters (184 yards) and covering approximately 300 acres. Duxbury and Kingston Bays, as well as the northerly part of Plymouth Bay, lie west of the beach.

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 A, Map 1). 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,Marshfield, and Duxbury, 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 trainings.

Site maps are included in Appendix A, Map 1.

1.1.1 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 29). Maps of recent symbolic fencing coverage are included in Appendix A, map 2. 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 occurred on Duxbury Beach via several methods from 1999 to 2019. Habitat areas were maintained as 400 to 1000 square meters (478 to 1196 square yards) plots in size and were level with the surrounding beach, typically 0.3 meters (1 foot) above the extreme high tide. All former 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 some of the plots remain suitable for nesting in 2023, though no further maintenance work of the areas is proposed.

Total acreage of nesting habitat on Duxbury Beach, including oceanside and bayside as discussed, is approximately 80 acres. The total acreage can change with storm impacts, restoration efforts, and other changes on the beach.

1.1.2 Piping Plover Abundance and Productivity

Prior to 2014, less than 20 Piping Plover (Charadrius melodus) pairs nested on Duxbury Beach. Between 2014 and 2020, the number of nesting pairs increased to a range of 20-30 pairs. In the past three years pairs of nesting Piping Plovers have slightly increased every season; 31 in 2021 to 40 in 2022 to 46 this season in 2023. One hundred and twenty six chicks hatched this season, and of those 51 fledged, for a fledging success rate of 0.40 chicks fledged/chicks hatched and a productivity of 1.10 chicks fledged/pair. Fifty-nine nests were laid, with 46 being first attempts, nine were second attempts, and two were third attempts. Thirty-nine nests (84%) hatched this season and of these, 25 (64%) fledged at least one chick.

Abundance and productivity of the Piping Plover population on Duxbury Beach for the years 2010 through 2023 are as follows.

Table 1-1. Piping Plover abundance and productivity 2010 through 2023.

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
2023	46	51	1.10

1.1.3 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 2021, 4 of 25 nest losses were attributed to predation, and in 2022, 7 of 11 nest losses were suspected or likely due to predation. In 2023, 5 of 19 nest losses were attributed to predation - either suspected or likely.

Table 1-2. Piping Plover egg loss due to predation 2011 through 2023.

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%
2023	59	5 (of 19)	26%

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 (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 observations of an increase in tracks and sightings. Due to the initial success of managing coyotes DBR has continued this strategy. 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, though since 2020 there has been no observed nest or chick loss due to red foxes observed at the Reservation.

From 2011 to 2023, there have been five instances of known nest predation events not caused by the three listed above. Common Grackles were deemed responsible for one nest failure in 2015 and suspected of the failure of a nest in both 2020 and 2023. A single nest from 2023 had an unknown gull species as the suspected cause of failure, and in 2017 one nest was lost to skunk depredation. These five events account for five of the 75 nest losses attributed to known predators from 2011 to 2023. In 2019, Common Grackles were observed predating Piping Plover chicks. Due to the levels of predation and number of grackles on-site, Common Grackle predator management was instituted during the 2019 season and was continued each year through the 2023 season.

Table 1-3. Total Piping Plover nests lost (% of total lost to known causes) to American crow, Eastern Coyote, Red Fox, and unspecified gulls 2011-2023.

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**	**Total Piping Plover nest lost (% of total lost to known causes) to Gull species**	**Total Piping Plover nest lost to Common Grackle**
2011	5 (33%)	2 (13%)	2 (13%)	0	0

2012	0	1 (10%)	1 (10%)	0	0
2013	1 (50%)	0-1 (50%)*	0-1 (50%)*	0	0
2014	0	4 (57%)	0	0	0
2015	1 (20%)	0	0	0	0
2016	0	5 (56%)	0	0	0
2017	2 (6%)	9 (26%)	12 (35%)	0	0
2018	0	0	4 (57%)	0	0
2019	0	3-4* (19%)	0-1* (5%)	0	0
2020	0-1^	0	0	0	0
2021	0	4 (17%)	0	0	0
2022	0	7 (64%)	0	0	0
2023	1 (6%)	2 (11%)	0	1 (6%)	1 (6%)

**Unknown if predation was due to fox or coyote – track indeterminate*
*** Includes 1 Common Grackle caused loss*
^ Loss due to either Red Winged Blackbird, American Crow, or Common Grackle - unable to determine
Note: in 2023, of 19 failed nests 18 had a known, single cause.

Due to the narrow nesting habitat on the oceanside beach, overwash during storms and monthly high tides does occur. In 2023 DBR experienced extremely high tides and severely inclement weather, most notably during the first week of June. Overwash led to the loss of 11 nests across 10 broods, of which one brood had two nests become overwashed with a final third successful re-nest that produced fledglings, and 6 other broods renested with only 3 of those re-nests successfully producing fledglings.

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. 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. Common Grackle predation on Piping Plover chicks was observed at least once in 2019. In 2020, only one Piping Plover nest was lost to predation, markedly different from the previous three years. In 2021 four nests were

lost to predation, three with enough evidence to be considered likely and one suspected, and all attributed to coyote predation. Only one chick was lost due to confirmed predation via unspecified gull species in 2021, though it's possible that unobserved chick losses were possibly due to predation as well. In 2022 there was an increase in nest predation via coyote with a total of 7 nests being lost in this manner. Again the only observed predation upon chicks was by unspecified gull species, and a total of 2 chicks were lost in this manner. In 2023 a total of 5 nests were lost with confirmed predation - either likely or suspected - across 4 predator species. One nest was predated by Common Grackle, one by American Crow, two were predated upon by Eastern Coyote, and one by an unspecified gull species. Of 75 chick losses in 2023, 2 were attributable to predation by either Great Black-Backed Gulls or Herring Gulls, and were the only 2 chick losses with evidence of predation out of 75 recorded chick losses. As with previous years, it's possible that chick loss due to predation is being underreported due to lack of observations of a large percentage of chick losses.

1.1.4 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 2010-2023, Least Tern have typically nested in six 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, 2022, and 2023 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 is located similarly 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, though in 2023 it was observed that some tern colonies, namely the northern OSV colony, were nesting at the crest of the dune behind the snow fencing. Additionally, in 2019, Least Terns were observed utilizing the dune crest and back dune area of the restored dune between Crossovers 1 and 2. Least Terns have not in recent years established colonies on the bayside of the site.

Table 1-4 Least Tern abundance and productivity 2010 through 2023.

Year	Pairs	Chicks fledged	Sub-Colony Productivity Estimates*
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
2023	353	130	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. The most prevalent cause of nest and chick predation of Least Tern nests and chicks over the past half decade has been via coyote. Evidence of tracks, droppings, predated eggs, and sightings have been observed throughout the 2018-2023 nesting seasons. In 2023, a predation event by a coyote caused a loss of approximately 35 Least Tern nests over the course of one night which caused a noticeable decrease in activity in the Mid-OSV Least Tern colony. Gulls, namely Great Black-backed Gulls and Herring Gulls, are another leading cause of Least Tern chick and nest predation. Gulls were observed predating chicks from the colonies in multiple instances in 2023 as well as in 2022, 2021, and 2020. Peregrine Falcons have also been observed to predate upon Least Tern chicks and recent Least Tern fledglings over the past few years, with noticeable Peregrine Falcon sightings around Plum Hills in 2023, and observed predation events in 2021, 2020, and 2019. Crows have also been observed predating Least Tern nests as recently as 2019, and their presence has been observed adjacent to colonies on the beach throughout each nesting season. In years past Red Foxes had been known to predate upon Least Tern nests, with the last confirmed predation event occurring in 2019. Fisher activity has also been observed on Duxbury Beach, with suspected nest predation occurring near High Pines in 2021. No confirmed predation of Least Tern eggs or chicks by Common Grackles has yet been observed on Duxbury Beach, but it is worth noting that in 2023 grackle tracks were observed in the immediate vicinity of a predated Piping Plover nest as well as the fact that they are present throughout the beach for the bulk of the nesting season.

2.0 Ownership and Management Entities

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 and the Duxbury Police Department to implement the program. The oversight of Beach Operations has fallen under the supervision of several Town departments over the years, and is now housed in the Recreation Department. The roles and qualifications of each group are outlined below.

Gurnet and Saquish are two private communities that are located on the southern end of the barrier beach formation. Together they consist of approximately 130 homes, a majority of which are only occupied seasonally during the summer, and approximately 370 additional plots of privately owned land with no structures on them. Gurnet and Saquish residents, owners of plots, their guests, and others with business in those communities have a court-protected right of way to access their property over Duxbury Beach Reservation property.

2.1 Duxbury Beach Reservation Responsible Staff

1. 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.

2. Reservation Coordinator, Joey Negreann

   Mr. Negreann started with Duxbury Beach Reservation in March 2023 as the Field Coordinator. At the end of the 2023 season he accepted a promotion to the role of Reservation Coordinator. Prior to working for Duxbury Beach Reservation Mr. Negreann spent many years working in different roles within the conservation field across many different public and private organizations. He worked in outreach and engagement, volunteer coordination, vegetation management, and biological data collection for the National Park Service, Audubon California, Point Blue Conservation Science, Western Ecosystems Technology, and the Smithsonian Migratory Bird Center. Mr. Negreann

holds a BA in International Relations from Goucher College. He is responsible for general oversight of the Coastal Ecology Program and the implementation of the Endangered Species Program. Mr. Negreann currently helps to coordinate the efforts of Duxbury Beach Reservation and the Town of Duxbury Beach Operations.

3. 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. As Assistant Director, Ms. McGlathery's responsibilities include management of the Coastal Ecology team.

4. Field Coordinator, Alec Mauk

   The Reservation hired a year-round Field Coordinator, Alec Mauk, who began in October 2023. Mr. Mauk holds a BS in Marine Biology and a BS in Wildlife & Conservation Biology from the University of Rhode Island. Prior to being Field Coordinator, Mr. Mauk worked 3 field seasons at DBR in 2021, 2022, and 2023, as a shorebird monitor, a field technician , and a shorebird monitor supervisor respectively. Mr. Mauk is responsible for the daily operations of the Duxbury Beach Endangered Species Program, including overseeing the shorebird monitors, field technicians, and shorebird monitor supervisors. Mr. Mauk reports directly to the Reservation Coordinator (Joey Negreann) and routinely communicates with the Town of Duxbury Beach Operations Division.

5. Field Technicians (3 positions)

   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 Field Coordinator, Reservation Coordinator, shorebird monitors/shorebird 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 report directly to the Field Coordinator and are required to communicate routinely with the shorebird monitor supervisors, Reservation Coordinator, and Beach Operations staff.

6. Shorebird Monitor Supervisor (or Monitor Supervisors) (3 positions)

The Reservation employs three shorebird monitor supervisors from late March through August to perform supervisory and administrative work in the management of the Endangered Species Program. The monitor supervisors assist the Field and Reservation Coordinators in initial and continued training of shorebird monitors. In addition, the shorebird monitor supervisors work to schedule and place shorebird 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 report directly to the Field Coordinator and are required to communicate routinely with the field technicians, Reservation Coordinator, and Beach Operations staff.

7. Shorebird Monitors (or Monitors) (20-35 positions)

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 Reservation 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.

8. Vegetation Technician (1 position)

In 2024, The Reservation is planning on employing a single vegetation technician to work from April to September. This role will be primarily focused on surveying and mapping plant cover on the barrier beach with a focus on invasive plants. Since their work will take place behind fencing placed for Piping Plover and Least Terns they will receive the same level of training as field technicians and shorebird monitor supervisors. They may also be asked to assist in aspects of the implementation of the Endangered Species Program as the need arises and will receive appropriate training. The vegetation technician would communicate with other shorebird staff on the movements and nesting of Piping Plover and Least Terns and work to minimize their impact on nesting species. This position might be extended into years two and three of the permit. The

vegetation technician would fall under the supervision of the Reservation Coordinator but communicate and work closely with the Field Coordinator.

2.2 Recreation Department Management Responsible Staff

1. Recreation Director, Steven Studley

   Mr. Studley held the position of Assistant Recreation Director for 23 years before becoming Recreation Director in 2022, and worked for Duxbury High School 5 years prior as a teacher, for 29 years total of employment with the Town of Duxbury. Mr. Studley graduated from Castleton State College. 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.

2. Assistant Recreational Directory, Loretta Doyle

   Ms. Doyle held the position of Department Assistant for 25 years before becoming Assistant Recreation director in 2022, for 26 years total employment with the Town of Duxbury. Ms. Doyle graduated from Kutztown University. Ms. Doyle works with all divisions of the Department and will provide necessary assistance as required for Beach Operations.

3. Department Assistant, Olivia Reed

   Ms. Reed has held the position for 1 year. Ms. Reed previously worked as Beach Ranger for 1 year prior to becoming the Department Assistant. Ms. Reed graduated from Stonehill College. Ms. Reed works with all divisions of the Department and will provide necessary assistance as required for Beach Operations.

4. Beach Operations Administrator, Arthur Fortune

   Mr. Fortune has held this position for 1 year. Mr. Fortune previously worked as a Beach Ranger for 1 year prior to becoming the Beach Operations Administrator. Mr. Fortune has 30 years of law enforcement experience and retired in 2021 as police commander, and was previously the police director over the Parks, Lakes & Recreation Division in Austin Texas. Mr. Fortune graduated from Northeastern University. 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.

5. Lead Beach Ranger (8 positions)

   The Lead Beach Rangers work year-round to support the Beach Operations Administrator. Hours they work may range from 8 to 40 hours per week depending upon the season and needs of Beach Operations. 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.

6. Beach Rangers (30-40 positions)

   Approximately 30-40 beach rangers work seasonally from April to October and are present on the beach during operating hours to control access, oversee parking, and enforce beach rules and regulations. Beach rangers work from 8 to 40 hours per week depending upon the season and needs of Beach Operations. 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.

2.3 Duxbury Police Department Responsible Staff

1. Police Chief, Michael Carbone

   The Duxbury Police Chief shall have executive responsibility for the Duxbury Police Department including the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach.

2. Deputy Police Chief, Friend Weiler

   The Duxbury Deputy Police Chief shall have executive responsibility for the Duxbury Police Department including the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach, in the absence of the Chief of Police.

3. Police Lieutenant (2 positions)

   The Duxbury Police lieutenant shall have responsibility for the Duxbury Police Department including the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach.

4. Patrol Sergeant (7 positions)

   The Duxbury Police Sergeant shall have responsibility for the Duxbury Police Department including the enforcement of all applicable laws and regulations relative to the use of Duxbury Beach.

5. Patrolman (21 positions)

   Approximately 21 patrolmen will work seasonally from April to October and are present on the beach according to the accepted town enforcement plan submitted with the COI permit application (Attachment D). The Patrolman assigned to Duxbury Beach are responsible for patrolling the beach and enforcing the conditions and regulations of the Endangered Species Program and the Certificate of Inclusion. This includes supporting DBR shorebird staff during Piping Plover Brood Crossings when on site. Patrolmen report to the Patrol Sergeant and communicate with Beach Operation Rangers while onsite.

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 (Table 3-1). Further restrictions may be required for access management or public safety.

Table 3-1. Over-sand permit use hours on Duxbury Beach for the 2023 season.

Time of Year	**Crossover 1**	**Crossover 2**	**Crossover 3**	**Beach Hours**
Summer Season (Memorial Day Weekend-Labor Day Weekend)	Open	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	Open	8:30-21:00
Late Fall Season (October 1-October 31)	Open	Closed	Closed	8:30-15:30 (Sun-Thurs) 8:30-19:30 (Fri-Sat)
Winter Season (November 1-March 31)	Open	Closed	Closed	8:30-15:30
Early Spring Season (April 1-April 30)	Open	Closed	Closed	8:30-15:30 (Sun-Thurs)

				8:30-19:30 (Fri-Sat)
Late Spring Season (May 1-Thursday before Memorial Day)	Open	Open	Open	8:30-21:00

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 3.3 kilometers (2 miles), starting near the first pedestrian crossover south of the Powder Point Bridge and extending to a location approximately 830 meters (908 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 Sensitive Wildlife Areas for nesting birds increase.

No non-emergency vehicles are permitted within Sensitive Wildlife Areas (front beach and bayside), which are placed north and south of brood ranges and tern nursery areas (for further discussion of Sensitive Wildlife Areas see page 29). Non-emergency essential vehicles related to the Endangered Species Program may pass through Sensitive Wildlife 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 is 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 Sensitive Wildlife 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 Sensitive Wildlife 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 at the end of 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 Sensitive Wildlife 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, kite flying) on both oceanside and bayside. In years past, walkers were asked to remain below what was then referred to as the 'Sensitive Wildlife Area' fence line (walking along the water line) in order to reduce disturbance. In 2023 for the first time visitors were permitted to set up and recreate within the newly renamed Sensitive Wildlife Areas (formerly 'Restricted Areas'), with shorebird monitors present to monitor for any disturbance to active plover broods and to intervene, educate, and redirect activities if needed. Beach Operations 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 Sensitive Wildlife 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 Sensitive Wildlife Areas established due to chick locations are closed to all vehicles, including kiteboarders. Landing is not permitted within Sensitive Wildlife 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 700 meters (766 yards) south of Crossover 3 to the South Poles. 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 Sensitive Wildlife 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.

Seasonal Installations

Many pieces of hardware are installed seasonally to facilitate recreation and maintain safety on the beach. This includes, but is not limited to, the installation of lifeguard chairs, stairs and ADA boardwalk at the Resident lot, mobility mats, portable toilets, speed control devices (speed bumps/speed limit trailer), etc. The Reservation works closely with the Town of Duxbury and Beach Operations to ensure that elements are installed before the onset of nesting season whenever possible. Due to storms and winter beach profile, it is not always possible to reinstall beach hardware prior to April. If hardware that is meant for the beach, lifeguard chairs, stairs and ADA boardwalk, and mobility mats are not installed before April 1st, DBR Shorebird Staff survey the area to be impacted before installation and are present to monitor shorebird movements for the duration of work on the beach.

3.2 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.

1. Northern 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 under an annual MOU with Duxbury Beach Reservation.
2. 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.

3. 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. From May through September lots are open 08:00 to 22:00 Monday to Thursday and 08:00 to 23:00 Friday to Sunday. In October lots are open 08:00 to 19:00 Monday to Thursday and 08:00 to 21:00 Friday to Sunday. From November through April lots are open 08:00 to sunset.
4. 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.
5. 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 Sensitive Wildlife Area, the pull-off will be closed off with a combination of sawhorses, symbolic fencing, cones, and signs if the back roadway is closed to recreation in that area. Under the COI, some pull-offs within Sensitive Wildlife 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, all vehicle pull-offs between 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, Crossover 2, and/or Crossover 3 during open hours. In addition, notices are posted at the Guardhouse, on the Town website, to email subscribers, and social media regarding roadway closures for recreational vehicles.

Parking Lot Sweeping

There are three paved parking lots on Duxbury Beach, one at Duxbury Beach Park and two on the Town-leased portion of beach near the Powder Point Bridge. Each lot is swept in the spring prior to nesting by

the Town of Duxbury. The parking lot at Duxbury Beach Park is swept as part of the Town's efforts under an annual MOU that allows use of the Northern Lot.

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.

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 Beach Operation rangers on a weekly basis from April through Labor Day and monthly during the rest of the year. Trash removal occurs outside of Closed and Sensitive Wildlife 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 Reservation Coordinator, 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 minimize potential risk to the birds. Duxbury Beach Guide and Rules provided in Attachment A.

General

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 vehicle 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:
    1. Resident Beach Lot Permit for use of paved parking lots (valid April through March)
    2. 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)
    3. 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 non-transferable. (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 (15 PSI). All off-road vehicles 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: 08:00-22:00 Monday-Thursday and 08:00-23:00 Friday-Sunday from May through September, 08:00-19:00 Monday-Thursday and 08:00-21:00 in October, and 08:00-Sunset from November through April

    • South Lot: 08:00-22:00 Monday-Thursday and 08:00-23:00 Friday-Sunday from May through September, 08:00-19:00 Monday-Thursday and 08:00-21:00 in October, and 08:00-Sunset from November through April

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 1, 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 the 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.

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

<u>Dog Regulations</u>

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 Sensitive Wildlife 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 Sensitive Wildlife Areas on the oceanside or bayside beach or dunes.
5. Subject to locations of Piping Plover Broods dogs on leash will be permitted from Memorial Day to Labor day in a designated “dog area” bayside along the beach south of Powder Point Bridge for a quarter mile until posted “no dog” where dense vegetation creates a natural barrier to crossing.
6. 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.

7. 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.
8. 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.
9. 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.
10. 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.
11. 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.

Duxbury Beach Park

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 and in conjunction with the Duxbury Police are responsible for enforcing Duxbury Beach rules and regulations (including but not limited to dog rules, speeding, keeping the road closed during crossings, managing access at the guardhouse, people in fenced off areas, harassment of birds, Sensitive Wildlife Area rules, kite and drone use, etc.). In addition, it is both departments' responsibility to document and report violations of the federal and state Endangered Species Acts to the appropriate enforcement agency. 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.

During the summer of 2023, in response to a concerning rise of incidents relating to speeding vehicles, employee harassment, and vandalism MADFW requested that a new enforcement plan be created. The

new plan was to provide clarity on who is responsible for enforcement, where on the beach enforcement would be focused, training, and outlined reporting to be submitted to the state (Attachment D). A flowchart was paired with the enforcement plan to streamline communication and outline the course of action each organization would take in the event of an infraction (Attachment E). Examples of reporting logs can be found as Attachment F.

As per the enforcement plan Duxbury Police are responsible for enforcing traffic regulations including speed limits and overtaking (passing) vehicles, responding to DBR and Beach Operation staff requests for enforcement, and escorting offenders off of DBR property when necessary.

Beach operations rangers are responsible for stopping all vehicles entering the property to inform visitors of rules and regulations, managing OSV beach use and access, assisting DBR with traffic management during brood crossings and enforcing parking regulations. In terms of managing OSV beach use and access, beach operation rangers are responsible for preventing OSVs from queuing on the back roadway prior to Crossovers opening and escorting OSVs to the open Crossovers from the designated queuing area.

Duxbury Beach rules (as outlined in this document, the Duxbury Beach Pamphlet, and the enforcement plan) will continue to be enforced by the Town of Duxbury. The Duxbury Police will respond, if not onsite already, in the event that escalation is required, and a beach visitor refuses to comply/abide by beach operations or DBR shorebird staff 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 ranger 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 07:30-19:30 Friday through Sunday 07:30-21:30
November through January	Daily 08:00-16:00
February	Daily 08:00-16:00
March	Daily 08:00-17:30
April	Monday through Thursday 07:30-18:30 Friday through Sunday 07:30-20:30

**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, If the OSV Crossovers are able to be opened, meaning there is space for sufficient buffers between OSV use and unfledged Piping Plover chicks (dependent on age and brood range), they will remain open until 20:00. Beach Operations is responsible for ensuring that all OSVs are off the beach. From October

through April, Town of Duxbury staff 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

All groups of 20 or more persons need to complete a Group Use Application with DBR. Once approved by DBR, a Town Permit may also still be required if it is an event that is open to the public i.e. Town bonfire, polar plunge, road race, etc. Town permits are issued after review of the Safety Board. All group use must be approved by the DBR Executive Director and permits need to be received at least two weeks prior to the event. Research applications are reviewed by DBR, approved by the Executive Director, and require researchers to share findings (not raw data) at the end of each field season. 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 Sensitive Wildlife 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 Duxbury Beach Park and the North Poles typically after the close of the shorebird season. If some nesting is still occuring after August, the organizers consult with the Reservation to ensure no activity is within restricted distances of unfledged chicks. 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. Event organizers are informed prior to booking that events may be moved or canceled 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 25 centimeters (10 inches) in diameter and 1.2 meters (4 feet) above ground are placed about 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 before each season to proactively protect potential habitat (Figure 1, Map 2). Proactively fenced areas are located along the oceanside beach extending from the northern edge of the property adjacent to the northern lot all the way through to the southern end of the driving beach at the South Poles. The oceanside beach from the South poles south to the southern property line, parallel to the Gurnet Guardhouse. Additional bayside habitat north of High Pines will be proactively fenced depending on historic use of select suitable habitat present. As field technicians, supervisors, or the Field Coordinator identify new plover or tern nesting areas, they erect new areas of symbolic fencing 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. 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, "Sensitive Wildlife Area" fencing is erected one to two days prior to the estimated hatch date to proactively expand the protected areas for chicks. Sensitive Wildlife 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 Sensitive Wildlife Area is set at 200 meters (219 yards) north and south of the brood range for the first week after hatching as brood activity and range has not been established. For broods that are found post hatching when the nest was not identified a buffer of 500 meters (547 yards) is established. Following the first week of observation, Sensitive Wildlife Area fencing may be reduced to 100 meters (109 yards) adjacent to the OSV area. Sensitive Wildlife Areas within the pedestrian only zone will be placed in areas of high use to reduce disturbance.

The primary purpose of Sensitive Wildlife Areas is to prevent OSV use within specified distances of chicks based on brood range and age. The size of such Sensitive Wildlife Areas may vary depending on brood range and location on the beach which include the buffers depending on the age of the brood. However, additional rules are in place within Sensitive Wildlife Areas to further reduce disturbance, including not allowing pets, kites/kiteboarding/drones, boating, and biking. Specific rules for these activities are outlined in Section 3.3.

Sensitive Wildlife 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 (219 yards) on either side of plover nests, providing 400 meters (437 yards) of protected beach. Sensitive Wildlife Area fencing is placed around Least Tern colonies within or bordering the OSV area. Sensitive Wildlife Area fencing is placed 100 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 Sensitive Wildlife Area for a Least Tern nursery may be 50 meters (55 yards) (see section 4.1.1). Sensitive Wildlife Areas are adjusted as broods move throughout the site or tern chick nurseries shift to provide a 100-200 meter (109-219 yards) buffer from vehicles for PIPL broods and a 50-100 meter (55-109 yards)(depending on timing and range) buffer from vehicles for tern chick nurseries.

Pedestrians are able to traverse Sensitive Wildlife Areas and set up to recreate, with limitations on recreational activities depending on proximity to and impact on adjacent broods. 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 use discretion once within the denoted Sensitive Wildlife Area.

In places where vehicle pull-offs fall within the Sensitive Wildlife Area , 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 saw horses. Sections of roadway within a Sensitive Wildlife Area are delineated with “reduced speed limit” signs (speed drops to 5 mph), “15 mph” signs which are placed at the northern and southern ends of the roadway within the Sensitive Wildlife Areas as well as interspersed throughout the the roadway on both sides of the road (Figure 1). In addition, “Resume Normal Speed” signs will be placed on the opposite sides of reduced speed limit signs in order to clarify the edges of Sensitive Wildlife Areas and indicate that the speed limit increases beyond that point as well as “slow chick crossings” signs being placed facing oncoming traffic before the northern and southern boundaries of the Sensitive Wildlife Area. Visitors to the beach are informed of reduced speed limit areas by the attendants at the Powder Point Bridge Guardhouse or temporary guard station located at the entrance to the back road.

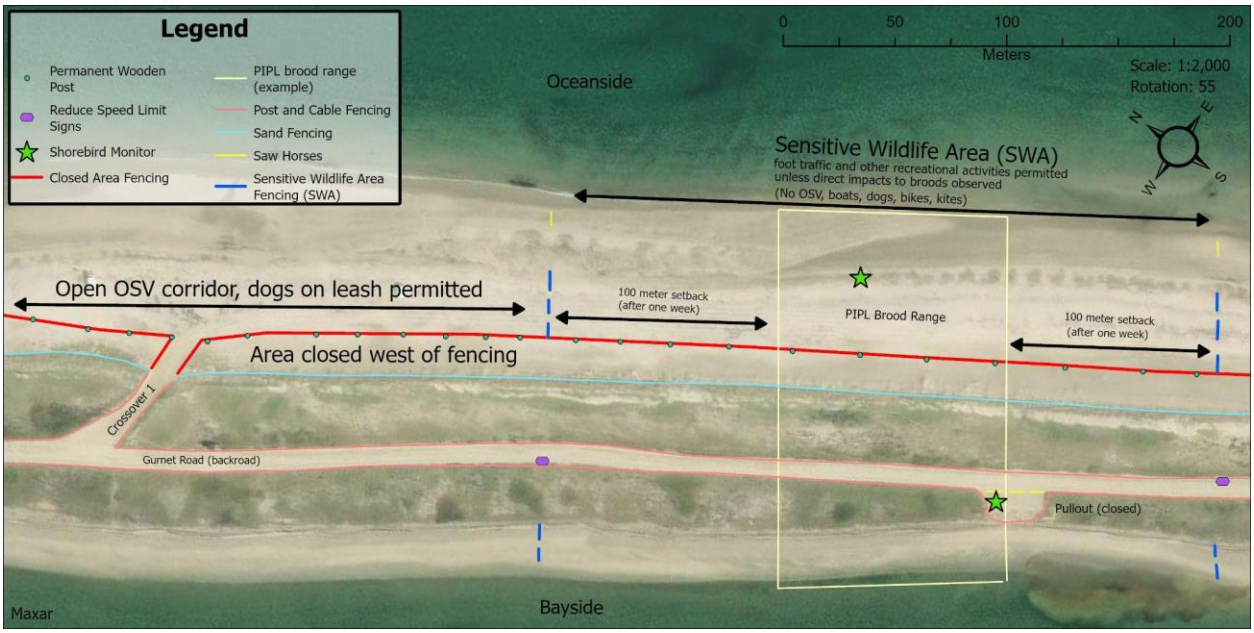


Figure 1: Example of symbolic fencing used during the season in conjunction with open OSV access. Only approved shorebird staff (supervisors, technicians, coordinators) are allowed in the area between the red closed area fencing and the pink post and cable fencing. Blue lines denote the extent of the 'Sensitive Wildlife Area (SWA)' fencing that enforces the necessary buffer (at minimum 100m (109 yd), but up to 200m (219 yd) or 1000m (1093 yd) in some instances) between OSV vehicles and unfledged Piping Plover chicks. SWA fencing as described is made up of rebar posts with signs but does not have twine between the rebar which allows beach goers to access this area. Saw horses east of the SWA fencing provide another visual deterrent for driving into SWAs when the tide is low. These saw horses are managed by beach operation rangers and are moved as the water recedes or advances.

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 or temporary guard station at the entrance to the back road south of the bridge, 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.

<u>Predator Management</u>

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 Crows (*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.

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 has continued up through the 2023 nesting season.

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. In 2023, a pair of coyotes created a den in the vicinity of the cottage of High Pines. Frequently the mock-exclosures were dug out and the non-toxic eggs were removed by coyotes prior to their removal. The Reservation will request protocols from APHIS for dealing with dens and pups on site for the future. Reservation Staff will start surveying the beach earlier before the season starts for the presence of predators and investigate potential denning sites. Information collected before the season will be relayed to APHIS. These changes to the predator management program will continue for 2024-2026.

On December 13, 2023, the Duxbury Beach Reservation Board of Directors voted to continue the predator management program for the duration of the COI (2024-2026), 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.

To mitigate the potential impacts of the covered activity on Piping Plovers, the Reservation self-funded a selective predator management plan in 2018-2023. The Reservation will continue this practice in 2024-26. 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 FY24 will be submitted and approved by MADFW and USFWS. Between February and July, 2023, WS employees made twelve visits to DBR for assessment, trapping, shooting, or DRC-1339 COR applications Between February and July, 2024, 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 increase if predator activity increases later in the season; a similar practice will hold in 2024.

Habitat enhancement:

After discussions with Dr. Scott Melvin (NHESP), the Reservation opted to create artificial nesting habitats in 1999. The endeavor began with the placement of 1,300 cubic meters of quarry sand being deposited on the bayside beach between High Pines and Crossover 3 that formed a rectangular area approximately 91 meters (100 yards) by 45 meters (49 yards) in size. A portion was veneered with natural beach sand to observe if there was any preference in sediment type by nesting Piping Plovers – which was moderately confirmed by the single plover pair that nested within the veneered portion in the 1999 season.

In 2000 the project continued, and two circular habitats with a diameter of 53 meters (58 yards) were created by depositing quarry sand over vegetation – and then placing a layer of natural beach sand over the quarry sand. Two pairs of Piping Plovers nested in two of the three habitats that season and produced three fledglings. In 2001 an additional two habitats were created in a similar manner, though no plovers utilized the new habitats that year – believed to be partly because of the habitats' proximity to the saltmarshes and a lack of appropriate foraging for chicks. No maintenance was done in 2002 and no plovers nested in the habitats either. In 2003 an attempt to restore the areas was made and the vegetation that had regrown by this point was rototilled – with limited success because of vegetation only being partly buried. No plovers nested in the habitats this year either.

In 2005 the Reservation received a five-year permit from the Massachusetts Department of Environmental Protection to burn grass to maintain and replicate nesting habitat. A burn was completed in the autumn of 2005 and again in the spring of 2006, and plovers nested within three of the five burned habitats. Despite this, burning was deemed unsuitable because of the rapid rate vegetation would regrow following burns. The Reservation then opted for scraping the replicated habitats as a means of maintenance through the use of a Bobcat skid steer. It was determined that even though vegetation would regrow after being scraped and buried, it allowed a window during egg laying and hatching for plovers to make use of the habitats.

In 2010, at the recommendation of Mass Audubon Coastal Waterbird Program staff, the Reservation began this method of "scrape" maintenance in the replicated habitats, with the goal of emulating washover habitat. Scraped habitats were then formed into either 279 or 371 square meter rectangular habitats, level with adjacent beach habitat at a height of 0.3 meters above the extreme high tide line. This scraping method continued in 2011, 2012, and 2013 and was considered a moderate success because each of these three seasons saw at least one pair nesting within the replicated habitats. In 2014 and 2015 maintenance was halted due to winter storms, before resuming again in 2016 when three of the replicated habitats were scraped. That year two pairs of Piping Plovers nested in the replicated habitats and produced three fledglings. In 2017 three of the habitats were maintained in this method, as well as an additional two previously maintained habitats being re-scraped, and a final sixth additional habitat being created bayside parallel to High Pines. Three pairs of Piping Plovers nested in the replicated habitats this year and produced a total of three fledglings.

In 2018 no maintenance was done, but two pairs still nested in the replicated habitats. In 2019 the southernmost replicated habitat received maintenance, and the northernmost replicated habitat was no

longer considered for maintenance because of the frequency of overwash that was occurring within it. Three pairs nested in the replicated habitats this season. Upon the request of NHESP to allow vegetation to regrow, no maintenance was completed prior to the 2020 nesting season – though two pairs of plovers still nested in the replicated habitats in 2020 and produced a total of six fledglings.

No maintenance has been done to the habitats since 2019, but plovers have been readily nesting within the replicated habitats despite this. In 2021 one pair had two nesting attempts that reached full clutch – the first had a single failure to hatch and three chick losses, and the second had four successful hatches and a single fledgling produced. In 2022 three pairs of plovers nested within the habitats and hatched a total of 12 chicks and ended up producing nine fledglings all together. In 2023 two pairs of Piping Plovers nested in the replicated habitats producing a total of five fledglings. Another pair of plovers nested immediately adjacent to the replicated habitats, right at the bottom of the scarp of the habitat, and hatched and produced two fledglings. Additionally, a fourth pair of plovers nested oceanside parallel to the northernmost replicated habitat, and at 5 days old crossed to the bayside intertidal habitat adjacent to the replicated habitats with two chicks where they remained and fledged both.

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. The Reservation will determine where exclosures may be a viable option as territories are established and eggs are laid.

The Reservation Coordinator for Duxbury Beach Reservation holds the exclosure permit for Duxbury Beach. Under the permit, the erection of exclosures will be completed by the Reservation. The Reservation Coordinator and 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 Reservation Coordinator, Field 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 91 centimeters (36 inches) apart. The Reservation has historically applied maintenance-blend fertilizer to beach vegetation annually, primarily through the use of a helicopter. However, it is suspected that fertilizing may be providing benefit to non-native and invasive plant species rather than supporting dune grass and other essential dune vegetation, so the Reservation has opted to forgo fertilizing in 2024 and possibly for the foreseeable future.

In 2023 DBR began mapping invasive Japanese knotweed (*Fallopia japonica*) and spotted knapweed (*Centaurea stoebe*) in the dune system. Mapping was completed at the end of July by DBR field technicians and shorebird monitor supervisors. Removal efforts were targeted to areas where they would not impact active Piping Plover broods. Data pertaining to removal was recorded using

Survey123. In total DBR staff worked for over 40 hours removing a small portion of the invasive monocultures.

Duxbury Beach Endangered Species Monitoring Program

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 reservation coordinator and field 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, 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, management activity, and recreational activity (Appendix B). In 2023, data collection transitioned from being collected solely in Neststory to being recorded in both NestStory and through the ArcGIS suite of applications - mainly Survey123 and the Fieldmaps. Going forward, the Reservation plans to solely utilize the ArcGIS suite of apps for data collection and to remove Neststory from its protocols. Staff scheduling and communication about schedules and needed coverage occurs through the Homebase application (Appendix B, Figure 14). Communications between reservation coordinator, 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 adjustments or work with the monitor supervisors to ensure shorebird monitors assigned to fencing work make the adjustments.

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 (1094 yards) of the open OSV area are monitored every morning prior to the OSV 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 roadways 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 (1094 yards) 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 Sensitive Wildlife 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 Sensitive Wildlife 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. Colony check data will be captured via Survey123 and Fieldmaps, and supplemented by NestStory data capture if needed.

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 field coordinator. The field coordinator completes the annual census reports, and site maps for Duxbury Beach to be submitted to the state each September. These forms are completed based on data captured during each site visit.

Shorebird Monitors

Shorebird monitors begin on the beach at least two days before the earliest plover nest is due to hatch. From this point, shorebird monitors are scheduled in three shifts per day with varying hours depending on nesting activity. Shorebird monitors will be present seven days per week while unfledged Piping Plover chicks are present in areas within 1000 meters (1094 yards) of the OSV area and/or adjacent to parking lots or roadway accessible to recreational traffic. Shorebird 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, facilitating crossings if necessary, barrier monitoring, and Piping Plover brood location checks. The daytime shift will entail more frequent and focused brood monitoring. Each shorebird monitor is given a tablet to record biological data and data required to be submitted by the Certificate of Inclusion permit.

Morning: First-shift shorebird monitors arrive at 06:00 and assist with fencing modifications to the Sensitive Wildlife Areas based on upcoming estimated hatch dates, fledging dates, and changes to brood range. At 08:00 the shorebird monitors will be assigned to one of a variety of tasks depending on nesting activity and presence of species on the beach. If Least Tern chicks are present in close proximity to an open Crossover or a barrier for Least Tern chicks is in use (see below), shorebird monitors will be assigned to monitor the colony or chicks and check the barrier. Once all Piping Plover chicks have fledged, if Least Tern chicks remain on the beach in close proximity to a Crossover or open OSV parking area, monitoring continues 7 days per week from 7:00 to 19:30. Other tasks assigned to shorebird monitors during the 08:00-10:00 timeframe will include patrolling the roadway for Piping Plover brood crossing events and implementing the crossing protocol, assisting field technicians in monitoring broods, and performing special projects (trash pick-up, vegetation removal, data entry).

Daytime: shorebird 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. Shorebird monitors will be assigned to different predetermined zones (Appendix A, Map 3) of the beach and responsible for implementing the Enhanced Intensive Monitoring (EIM) protocol as per Massachusetts Habitat Conservation Plan. Checks on broods in their zone will consist of a GPS location and chick counts with additional behavioral observations as necessary. Brood checks will occur at least twice a day but historically shorebird staff have been able to make checks more frequently ranging from 2 to 14 checks per brood per day.

Shorebird monitors will be assigned to zones that fall strictly within either oceanside habitat or roadside and bayside habitat. Should a brood move from the oceanside beach to the bayside beach, the shorebird monitor oceanside will be responsible for communicating with their corresponding bayside monitor to facilitate a successful crossing and to properly exchange responsibilities for brood monitoring, rather than having shorebird monitors themselves follow broods from oceanside to bayside and vice versa, as this would lead to large gaps in visual monitoring of broods that could lead to potential chick loss via road incident. The same holds true for instances where a brood is first monitored on the bayside beach and then crosses over to the oceanside beach. Zones and territories may shift depending on nesting activity, but generally will be laid out as illustrated in Appendix A, Map 3. Each monitoring zone will have a minimum of 1 oceanside and 1 roadside monitor while broods are present. The exact number of shorebird 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, shorebird 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). Shorebird monitor territories within their zone will be determined based on nesting locations, brood range extents, and proximity to recreational vehicle use. Shorebird monitors will be responsible for constant communication with other shorebird monitors in their zone, and if necessary, neighboring zones, to share current locations of broods and possible movement to the roadway or other zones. Shorebird 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 shorebird 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 at least every three hours during the day due to inclement weather, 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, shorebird

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. Shorebird monitors also act as an additional deterrent (besides fencing and signage) for any vehicles approaching the Closed or Sensitive Wildlife Areas on the oceanside beach. Shorebird monitors are instructed to stay as far from the brood as possible while still being able to effectively perform their monitoring duties to lessen any disturbance they might have on the brood. In addition, shorebird monitors are trained in Piping Plover and Least Tern behavior in order to recognize signs that the birds are being disturbed by their presence. Shorebird monitors do not access Closed Areas.

In areas where crossings are possible, shorebird monitors are responsible for identifying movement toward Gurnet Road and then informing the shorebird monitor stationed on the roadway and the shorebird monitor supervisor on duty of a probable crossing. The shorebird monitor supervisor will inform the on-duty beach operations ranger of the probable crossing. The on-duty beach operations ranger will either dispatch other rangers or make their way to the crossing location to assist 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 shorebird monitor and beach operations rangers can be in place well before the chicks approach the roadway. The shorebird monitor located on the roadway will stop traffic in both directions, including pedestrian traffic, in accordance with DBR brood crossing protocols based on the following criteria. If a brood is crossing from oceanside to bayside, a monitor will halt traffic when; an adult plover has entered the roadway and is calling for its chicks, chicks have passed west of the snow fencing and are no longer visible due to dense vegetation cover, chicks have passed west of snow fencing and are all visible and have approached within at least 4.6 meters (15 feet) to the roadway, any chicks have entered the roadway, or a known crossing brood is no longer visible. If a brood is crossing from bayside to oceanside, a monitor will halt traffic when; an adult plover has entered the roadway and is calling for its chicks, chicks have moved eastward towards the road and at least one chick is no longer visible, the brood has moved eastward and is visible and the chicks have approached less than 4.6 meters (15 feet) from the roadway, any chicks have entered the roadway, or a known crossing brood is no longer visible.

If visual is lost on any chick(s) within a crossing brood, shorebird staff present will implement DBR's "Difficult Crossing: Missing Chick(s)" protocol which starts with continued efforts by shorebird staff to locate the missing chick(s), searching for the missing chick(s); under and around vehicles, the roadway, habitat adjacent to the roadway, the bayside intertidal, etc. If the chick(s) cannot be located after 30 minutes, shorebird staff may begin a guided escort of vehicles which involves up to 5 cars at a time being led by a staff member through the crossing area. Escorting will be done by first guiding a group of northbound vehicles northwards, then guiding a group of southbound vehicles southwards, and repeated in this manner until all traffic halted has passed through. During the guided escort shorebird staff and beach operations staff are constantly surveying for the missing chick(s), and should they be seen, traffic will be halted immediately so the chick(s) safe crossing can be ensured. Once the initial stopped traffic has been guided past a crossing area, shorebird and Beach Operations staff will continue their search for the missing chick(s) while halting any new, oncoming vehicles. Should the chick(s) remain missing, a guided escort may take place at 15-minute intervals, though it may take longer than

15 minutes for a thorough search to be conducted before guided escorting can resume. These protocols will be followed until either the chick(s) become located or two hours pass without a sighting of the chick(s) and the field coordinator, reservation coordinator, and/or the assistant director approve the re-opening of the road.

During normal brood crossing circumstances, shorebird staff will reopen the road when; full visual contact is kept on all chicks crossing and the brood has cleared 4.6 meters (15 feet) from the roadway in the direction of the crossing, all crossing chicks reach the mean high tide line on bayside, and/or all chicks have reached or moved eastward beyond the snow fencing. If a bayside or oceanside shorebird monitor cannot locate one of their assigned broods, they will inform the other shorebird monitors in their zone and the shorebird 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 shorebird monitor stationed on Gurnet Road while the oceanside shorebird monitor remains within the oceanside broods range or periodically walks back and forth between the brood range and any other broods they might be assigned to that day. Pedestrian use of the bayside is much less frequent and, due to the topography and lack of structures (sand fence and sturdy drift fence), shorebird monitors stationed on the roadway are able to easily intercept pedestrians approaching Sensitive Wildlife Areas on the bayside beach if needed. In addition, because the roadway is above the bayside beach, shorebird monitors are more easily able to locate chicks and record observations without causing disturbance.

The exact placement of shorebird monitors and number of shorebird 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 coordinator, field coordinator, shorebird monitor supervisors 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.

Shorebird monitors carry tablets equipped with Survey123 and NestStory to record brood checks, brood locations, and crossing information (Date, start time, end time, length of crossing, tide information, brood number, number of vehicles stopped, success of crossing, crossing direction, herding, additional information). Shorebird monitors are responsible for the Enhanced Intensive Monitoring of broods assigned to them or within their zone of coverage, checking broods at least twice daily (but often as frequently as every half hour to two hours) and recording information, including brood location and number of adults and chicks in Survey123. Throughout shifts, shorebird monitors record predator presence or tracks, public interactions and information on special projects. Based on observations, the monitor informs the shorebird monitor supervisor if a brood moves within 100 meters (109 yards)(or

greater depending on time of day and age) of an OSV area so that the Sensitive Wildlife Area boundary can be adjusted.

Evening: Evening shifts are utilized in the case of Least Tern chick activity within 100 meters (109 yards) of an open OSV crossover, parking within 50 meters (55 yards) of unfledged Least Tern chicks, or to continue to monitor Piping Plovers. In these instances, one to four shorebird monitors would be on-site until 20:00 to monitor Least Tern chick numbers in proximity to the crossovers and open OSV corridor and to herd chicks that move within 15 meters (16 yards) to the crossovers. Piping Plover evening shorebird monitors would be responsible for locating broods between 18:00 and 20:00, adjusting Sensitive Wildlife Area fencing as necessary, and patrolling the back roadway for crossing activity.

Shorebird Monitor Supervisor

The shorebird monitor supervisors are responsible for overseeing the monitoring and data collection work of the shorebird 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 Sensitive Wildlife and Closed Areas when field technicians are not present. Supervisors are trained to fulfill the roles of both field technicians and shorebird monitors as needed.

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 perform 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 shorebird monitors to assist in the crossing. Beach Operations staff are responsible for determining the number of vehicles allowed on the beach depending 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 Sensitive Wildlife 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; Recreation and Beach Operations at Piping Plover and Least Tern Nest Sites with Nest Moving; and Oversand Vehicle (OSV) Use in Vicinity of Unfledged Piping Plover and Least Tern Chicks under the Massachusetts Habitat Conservation Plan (HCP). DBR is requesting coverage for up to 24 pairs of Piping Plover per season, for the three-year life of COI (62% of the three-year average 2021-2023).

Review of the Piping Plover activity on Duxbury Beach has determined that up to 17 Piping Plover broods (44% of the 39 on-site breeding pairs based on 2021-2023 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 due to restrictions or closure of the OSV Crossovers which will reduce the number of broods impacted by use of roadway and parking lots. Exposure encompasses the area of the maximum width of crossing area and the width of the roadway (7.6 meters, 25 feet) for a total of 17 Piping Plover broods. The approximate width of a single crossing area of a brood observed on Duxbury Beach is 10 meters (11 yards). Based on historic crossing activity, this equates to a total crossing area (exposure area) of 0.29 acres. The Reservation finances the employment of shorebird monitors to safeguard broods 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).

Review of the Piping Plover activity on Duxbury Beach has determined that up to 5 Piping Plover broods (13% of the 39 on-site breeding pairs based on 2021-2023 average) could be impacted by “Recreation and Beach Operations”, specifically reduced proactive fencing around nests and habitat if the Town of Duxbury and DBR decide to implement deterrence or to reduce fencing around pedestrian access paths or crossovers. The total area of reduced proactive fencing and use of deterrence measures would not exceed 4 acres. Areas found to have the potential for deterrence efforts and impacted Piping Plover and Least Tern pairs are outlined on map 7 (Appendix A).

Based on the feasibility of escorting vehicles through a travel corridor within the time constraints, the Reservation proposes that up to four Piping Plover broods (10% of the 39 on-site breeding pairs based on 2021-2023 average) could be impacted by the activity OSV Use in the Vicinity of Unfledged Piping Plovers Chicks. The escort corridor will be located on the oceanside of Duxbury Beach within the OSV beach boundary (designated by the North Poles and South Poles). The escort zone will not exceed 800 meters (875 yards).

Table 4-1. Piping Plover brood crossing data on Duxbury Beach, 2011-2023.

		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**
'23	46	16	4	4	2	0	2	7	0	5	0
'22	40	10	4	2	1	0	1	7	1	0	0
'21	31	9	4	4	2	0	2	4	0	1	0
'20	25	15	6	5	3	1	1	6	3	1	0
'19	28	12	5	4	3	0	1	3	3	0	2
'18	24	12	5	2	1	1	0	5	3	0	2
'17	28	3	2	0	0	0	1	2	0	0	0
'16	23	11	3	3	0	0	3	5	0	3	0
'15	25	11	3	3	3	0	0	4	0	4	0
'14	26	6	4	2	1	0	1	1	0	3	0
'13	17	2	1	0	0	0	0	0	0	2	0
'12	14	1	1	0	0	0	0	0	0	1	0
'11	12	4	2	0	0	0	0	3	0	1	0

Inclusion of Least Terns

The Reservation is requesting to allow exposure of up to 81 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 (2021-2023) is 381 pairs. The take exposures proposed would allow up to 21.3% of pairs to be impacted by covered activities during the 2024-2026 seasons. The Reservation anticipates utilizing take exposures for Least Terns to implement the covered activities; Use of Roads and Parking Lots in the Vicinity of Unfledged Least Tern Chicks, Recreation and Beach Operations, and OSV Use in the Vicinity of Unfledged Least Tern Chicks in accordance with procedures outlined below. For each covered activity there would be a maximum of; 57 pairs exposed to Recreation and Beach Operations (15% of pairs sitewide), 20 pairs exposed to OSV use (with an additional 10 to be exposed should temporary barriers be implemented - totaling 30 exposures altogether) under OSV Use in the Vicinity of Unfledged Least Tern Chicks, and 25 pairs exposed to proximal vehicle use under Use of

Roads and Parking Lots in the Vicinity of Unfledged Least Tern Chicks. The Reservation does not plan to use the maximum number of take exposures for each covered activity as that would surpass the requested 81 take exposures, rather it has set these bounds to allow for variable approaches in management to best fit the needs for each particular season. Through on-site selective predator management DBR will mitigate at a rate greater than four pairs per exposure.

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

There are two roads that allow for vehicle access to Duxbury Beach. One at the north end of the Reservations property, coming from the town of Marshfeild, and the second over Powder Point Bridge (Map 1-1). Once on the barrier beach Gurnet road runs the length and allows for access to several parking lots for beach goers. All large parking lots and paved lots/roads are located north of Powder Point Bridge. Gurnet Road south of the Powder Point Guardhouse is an improved gravel road that OSV permit holders can access in order to use OSV crossovers and parking pullouts along the road. Thus, the use of roads and parking lots in the vicinity of unfledged chicks could happen along the entire stretch of the barrier beach.

Gurnet Road also provides access to approximately 130 private residences, and additionally, to those who own plots with no structures on them. 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 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. In the event that Piping Plover broods are observed having trouble traversing windrows during the season care will be taken to alter the windrows. DBR Shorebird Staff will use shovels to dig out and flatten the windrows to allow for the brood to successfully cross in the area they prefer. While work is being done on the windrow a shorebird monitor(s) will be assigned to monitor the brood(s) in the area. If a crossing happens during the alteration of the windrow manual work will cease until the crossing is finished according to the crossing protocol.

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 that may be employed on Duxbury Beach include barriers, herding, signage, staff training, and managing traffic. In addition, Enhanced Intensive Monitoring will be implemented when chicks are <1000 meters (1094 yards) from accessible roads and parking lots, as mandated in the HCP, and described in detail below.

Barriers

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: shorebird monitor stationed at pathway or active: shorebird 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 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.

The Reservation proposes to extend barriers for the length of this permit to include two new areas and to reduce the likelihood of broods utilizing parking lots for crossing. With the increase in walk-on beach sticker sales DBR and the Town of Duxbury are facing increased pressure to maintain the full level of parking throughout the season. One proposal is to extend the length of the barrier from Blakeman's pavilion south to include a majority of the caterers lot. Another is to utilize barriers at the north end of the resident lot to prevent crossings through the resident parking lot.

DBR may decide to implement a barrier south of the Blakeman's Pavilion, most of, or all the way to the new emergency access point on the southern end of the lot (Map 4). This barrier will be constructed in the same manner as the barrier north of the Blakeman's Pavilion. Plastic sheeting will be placed at the bottom of the snow fencing and buried a few inches on the east side of the parking lot. Another barrier from east to west perpendicular with the snow fencing will span the length of the parking lot to the

road. This barrier will be constructed of rebar posts with plastic sheeting zip tied to the bottom. A folded over pocket at the bottom will be filled with rocks and/or sand to weigh down the bottom of the barrier and prevent any Piping Plover chicks from traversing under the barrier. The last segment of the barrier will be placed north to south along the east side of the roadway and constructed in the same manner as the east to west segment. Broods in the area will still be able to traverse the emergency beach access path into/out of the caterers lot and utilize this area to access the road for crossings from one side of the beach to the other.

DBR may decide to implement a barrier at the northern end of the resident lot to prevent broods from entering the parking lot (Map 4). This barrier will be constructed in the same manner as the barrier used north of the Blakeman's Pavilion. Plastic sheeting will be attached to the bottom of the snow fencing that runs perpendicular to the beach at the northern resident pedestrian path and follow the sand fencing to where it intersects the road. The barrier will continue onto the other side of the road running east to west along the northern end of the dirt resident lot. This barrier will either be constructed using rebar or fiberglass post driven into the ground with the plastic sheeting attached to the bottom and buried a few inches. Additional low barriers at bayside and oceanside access paths may also be constructed using two 2x4 wood beams stacked on top of each other to prevent broods from accessing the parking lot via these paths.

Use of barriers will be documented for each set of barriers using Fieldmaps or Survey123. Any issues with these barriers are promptly recorded and reported to supervisors so that fixes can be made immediately. 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 (Appendix B, figures 6 & 7).

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.

Sensitive Wildlife 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 Sensitive Wildlife Area is located 200 meters (219 yards) on the vehicle adjacent side(s) during the first week after hatching. Sensitive Wildlife 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. If there are established vehicle paths approaching a Sensitive Wildlife 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 Sensitive Wildlife 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 Sensitive Wildlife 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 Sensitive Wildlife 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 or at the temporary guard station located at the entrance to the back road south of the guardhouse. The Guide is also available online and mailed to all Duxbury Beach sticker holders. 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 available on-line via the Reservation and Town websites.

Shorebird monitors and DBR staff record human disturbance in nesting areas via Survey123 or NestStory (Appendix B). 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 Sensitive Wildlife 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 locate each brood within 1000 meters (1094 yards) 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 Sensitive Wildlife or Closed Areas, the Beach Operation 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 determines the locations of Sensitive Wildlife 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 and Duxbury Police Department 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 Sensitive Wildlife 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 B, Figures 6 & 7). After 20:00 while chicks are present on Duxbury Beach, a beach operations 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 (1094 yards) 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 shorebird monitor supervisor will inform beach operations rangers 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 fiberglass posts along the sides of the road in Sensitive Wildlife Areas. Staff also cover permanent 15 mph speed limit signs present within Sensitive Wildlife Areas and replace them 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 3.6.

Shorebird monitors track vehicles stopped and outcome of crossing activity via Survey123 data sheets and NestStory (Appendix B) 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 Sensitive Wildlife Areas along the road, all pull-offs within Sensitive Wildlife Areas are blocked with sawhorses or symbolic fencing and "Area Closed" signs as well as orange traffic cones. Pull-offs may be opened within Sensitive Wildlife Areas under the covered activity "use of roadways and parking lots" provided that Enhanced 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). This behavior precipitated the use of herding in order to reduce the likelihood of interaction between chicks and vehicles on the roadway.

When a Piping Plover brood attempts to use the back road for lengthy periods of time, 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.

In instances of difficult herding scenarios (chicks repeatedly scattering, moving around monitors, moving in the opposite direction of available exits from the roadway, etc), DBR staff may employ mobile barriers (plastic sheeting attached to posts or sections of plywood) to assist in herding chicks.

Herding is tracked via Survey123 (Appendix B, figures 6c & 7b) 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.

Field technicians and shorebird monitor supervisors attend 15 hours of classroom and in-field trainings across two days and an additional 8 hour in-field training day to cover all field skills required of staff. Training occurs 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 below), but also covers band resighting, flock counting, nest searching, recording nest and chick loss, and more detailed information on specific protocols, 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. Field technicians and shorebird monitor supervisors are also trained in data collection methods and protocols and how to use ArcGIS Fieldmaps and Survey123. Field technicians and shorebird monitor supervisors are expected to assist in the shorebird monitor training depending on their availability during the season. Additionally, shorebird monitor supervisors are expected to act as mentors to the shorebird monitors throughout the season and to provide as-needed in-field supplemental training and assistance to the shorebird monitors.

The largest aspect of the training program is provided for the shorebird monitors. Approximately 20-30 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. Initial training consists of 15 hours of in-class and in-field material totaling approximately 15 hours. This training includes plover and tern nesting biology, coastal waterbird protection and conservation efforts, chick monitoring protocols, brood crossing protocols, data collection, coastal geology, beach rules and regulations, public interaction protocols, focal species and predator tracking, and special projects. In addition, the monitors receive ongoing supplemental in-field training to ensure classroom instruction is carried out correctly. As the season progresses, additional formal classroom and in-field training will be provided to select shorebird staff as needed for; the implementation of the covered activity 'OSV Use in Vicinity to Unfledged Chicks', additional LETE surveys conducted by shorebird monitors, or for other protocols covered in the COI.

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), Survey123 and Neststory (used for electronic in-field data capture, Appendix B) and any other equipment needed to complete specific tasks. Lastly, a thorough review of recording crossings in Survey123 and Neststory during classroom and in-field instruction is held to ensure that observations on crossing observations are collected accurately and according to protocol. 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 Reservation Coordinator and ESP Field Coordinator are on-site throughout the season to answer questions and ensure all communications run smoothly.

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 Endangered Species Program Field Coordinator is on-site five days per week to oversee staff duties and work with Beach Operations staff. Through this observation, the Field Coordinator can work with Town Staff, 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, steep scarp inclines, and lack of foraging habitat on the bayside of the barrier beach. This has led historically to only specific stretches of road 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. Based on the last five years of data Piping Plover Brood crossings happen in a few places along the barrier beach. Those areas include: between the Pavilion and the Resident Lot, between Crossover 1 and 2, and between crossover 3 and Plum Hills. As the beach changes throughout the winter new areas may become more attractive to Piping Plovers to use for crossing the road. Prior to the start of the nesting season, the Field Coordinator, field technicians, and shorebird monitor supervisors walk the beach and road to determine all locations where crossing is possible. All new potential crossing areas are mapped and shorebird monitors are alerted to watch these areas as the season progresses.

In order to decrease risk posed to broods north of Crossover 1 between 20:00 and 22:00/23:00, information regarding crossings is communicated to staff Beach Operation Rangers 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. Shorebird monitors are responsible for brood monitoring and facilitating safe brood crossings and recording associated data from crossings, including; brood location, brood behavior, chick count, chick ages, tidal information at time of crossing, crossing location, crossing duration, crossing direction, traffic halted by crossings, herding information if utilized, etc. At the end of each 10:00-18:00 shift monitors are required to check out with the on-duty shorebird monitor supervisor to report chick count, crossing activity, and oceanside vs. bayside location for each brood within their assignment. This information is then passed along to staff on duty after 20:00 as well as to staff arriving the following day at 06:00 to assist in locating the broods that following morning.

Brood location information will be recorded through Survey123 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 Sensitive Wildlife Areas and to reduce speed limits throughout the site, with particular focus on the broods north of Crossover 1 for those operating

recreational vehicles. In addition, speed limit signs are located on either side of the Sensitive Wildlife 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 (1094 yards) of the OSV area are monitored in accordance to the Enhanced Intensive Monitoring protocol outlined within the Massachusetts Habitat Conservation Plan from 06:00 to 18:00. This includes all broods in proximity to recreational vehicle use on the road, parking lots, or beach are monitored from 08:00-18:00. Broods >1000 meters (1094 yards) from recreational access or roads and parking lots are monitored at minimum every other day, though if adequate staffing allows for it they will be included in EIM protocols. A key component to monitoring on Duxbury Beach is recognizing the movement of broods east to west and vice versa. Shorebird 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 inclement weather, should shorebird monitors be unable to perform the minimum monitoring requirements of EIM protocol (two checks daily during separate time intervals) then recreational vehicle traffic will be halted until adequate brood monitoring can be implemented.

The monitors will record all crossing events in Survey123, capturing time, location, direction of movement for adults and the brood, estimated chick age, 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 (1094 yards) of Crossover 1) with the objective of identifying possible crossing attempts and maintaining appropriate buffers from OSV areas. A COI 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 Sensitive Wildlife Areas. In this case, intensive monitoring of the broods and roadway spanning leading to and including 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.

<u>Impact Minimization Specific to Least Terns</u>

Management will remain consistent on Duxbury Beach with the addition of Least Terns to the CMP. The Reservation employs field technicians, shorebird monitor supervisors, and shorebird monitors to provide extensive monitoring of Least Tern chick nesting areas and chick nurseries. This includes intensive monitoring of Least Tern nurseries within 100 meters of open OSV crossovers from 08:00-20:00.

Shorebird monitors are trained to recognize Least Tern nesting activity and to input data on nest, chick numbers, locations, and chick age class within colonies in Survey123. When Least Tern colonies contain Piping Plover nests or broods, shorebird monitors spend more time stationed near or adjacent to the colony. Shorebird monitors inform field technicians and shorebird monitor supervisors of changes to tern nursery boundaries so that protection measures can be adjusted accordingly. In such cases that shorebird monitors are not consistently stationed near a tern nursery due to a lack of Piping Plover chicks in the area, the nursery area is monitored at least once per day if it 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 if associated fencing needs to be modified.

To minimize risk to Least Tern chicks within 100 meters (109 yards) of an open OSV crossover, the Reservation proposes increased monitoring of the Least Tern nursery area. If chicks are within 30-100 meters (33-109 yards) of the crossover, the nursery will be monitored once an hour every hour from 08:00-20:00. Should chicks come within 30 meters (33 yards) 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 (16 yards) of the crossover, the tern chick will be herded 5 meters (16 feet) beyond the 15 meter (16 yards) 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 (109 yards) of the nursery, unless a special barrier 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 (109 yards) from the edge of the nursery area. This area will be adjusted should the nursery area expand or reduce. Shorebird monitors will collect data about the colony/nursery within 100 meters (109 yards) of a crossover via a google sheet or on a comparable Survey123 form. 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.

If a barrier is in place as outlined below at either Crossover 1 or Crossover 2 due to OSV use, monitoring may be reduced. The barrier will be checked every three hours for entanglements and maintenance needs. The colony within 100 meters (109 yards) of the crossover will be monitored to capture chick numbers and age classes, number of incubating adults, and locations of the 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 the best course of action.

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 (16 yards) 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 (5 feet) above the high tide line to dense vegetation or scarping. Plastic

sheeting has been used historically for barrier use at DBR with no observed adverse effects on listed species to date. If tern chicks are observed seeking shade near the barrier then tern chick shelters will be placed (one per chick within 100 meters (109 yards)) 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 (109 yards) of Crossover 1 or two days prior to reopening Crossover 1 following a closure due to other activity.

This covered activity will also be initiated to allow parking of vehicles as close as 50 meters (55 yards), with the use of a barrier, from Least Tern chicks. The barrier will be placed perpendicular to the beach to prevent Least Tern chicks from moving closer than 50 meters (55 yards) to an open OSV area. Barriers will be constructed with posts and plastic sheeting that at the bottom is buried two to three inches deep in the sediment. The barrier will be placed 35 meters (38 yards) away from the open OSV area and 15 meters (16 yards) from the nursery area or closest Least Tern chick for a total setback of 50 meters (55 yards) from OSV parking. When a Least Tern chick barrier is implemented a minimum of four checks will be made on the barrier and adjacent tern nursery/chicks daily, with barrier checks adhering to the following protocol; a shorebird staff member will check the barrier before 08:00 to ensure LETE chicks are >15 meters (16 yards) from the barrier and/or not stuck or entangled in the barrier. Between 08:00 - 20:00 a minimum of two checks will be performed on the barrier, and a final closing check on the barrier and adjacent nursery will be done by 20:00. If any chicks were found on the OSV parking area side of the barrier an attempt to herd them 20 meters (22 yards) beyond the barrier would be made so in total the chick would be 55 meters (60 yards) away from the open OSV area. Herding will be implemented in the same manner as described above for crossover use. If this is not possible due to tides or other conditions the barrier will be shifted so that it is 15 meters (16 yards) from the chick and the OSV area would be shifted 35 meters (38 yards) away from the barrier, accounting for the maintenance of a 50 meters (55 yards) buffer in between the chick and open OSV area. While the barrier is being implemented DBR will check the barrier and document separately any chicks between 100-50 meters (109-55 yards) and 50m (55 yards)-to the barrier (35m, 38 yards) from the open OSV. A minimum of four checks will be made throughout the day. In the case that the barrier was moved to accommodate a chick that could not be herded back behind the barrier a minimum of two additional checks will be made to ensure safety of the chick. Beach operations rangers and DBR shorebird staff will ensure that OSVs do not park closer than 35m to a barrier.

Impact minimization measures are monitored by shorebird monitors and tracked via google sheets or a comparable Survey123 (Appendix B, Figure 10, Data Table 5). The effectiveness of the measures and associated monitoring is determined by the 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). 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.

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 Gurnet Guardhouse and bayside around the area of the habitats.

As field technicians identify new plover or tern nesting areas, they erect new areas of or extend existing symbolic fencing, with the assistance of shorebird 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 (55 yards) 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 (55 yards) east and west of the nest. Fencing is extended as far as possible while providing 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 vehicle crossovers within the OSV portion of Duxbury Beach, all of which are 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 and could be closed to through traffic.

Several of these pathways are important for recreational and operational access, including Crossovers 1, 2, and 3. 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 9 meters (10 yards) per day, until the pathway or access point is no longer blocked. If this requires a buffer of less than 9 meters (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 (55 yards) 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 (55 yards) 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 either on a spreadsheet and uploaded to Google Drive for use in the field or in a comparable way on Fieldmaps or Survey123 for Piping Plover nests with reduced fencing (Appendix B, Data Table 1). Observations will also be recorded in the Survey123 daily brood check form (Appendix B, figures 3 & 4) with additional observations recorded for human and predator disturbance as needed. 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 Symbolic Fencing of Piping Plover and Least Tern Habitat

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 broods 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/OSV crossovers and parking lots in order to keep some parts of the oceanside beach accessible. The Town of Duxbury and DBR may decide to impact up to 4 acres in order to deter Piping Plovers from nesting in and around these access paths. Potential areas to be impacted and historical nesting information can be found in Appendix A, Map 7.

Impact Minimization

Prior to hatching, nesting habitat on Duxbury Beach is monitored at least 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. The Town and DBR may decide to implement deterrence in an area prior to nesting activity being observed but which have had nesting activity in previous seasons. DBR will notify MADFW prior and provide information on proposed deterrence measures, size of the deterrence area, and number of impacted pairs (based on historic nesting). Two areas are outlined on Map 7 (Appendix A). Monitoring of this area will increase in frequency to every day to ensure that if eggs are laid the area is fenced and the access closed.

In order to deter nesting, the Reservation proposes using several methods, depending on their suitability for the area in question. 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, tarps, pallets and/or wooden boards may be used. In areas where covers are not practical, rebar or wooden 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 or large areas in front of crossovers, where hand raking would be inefficient. Monitoring of the area for signs of nesting will take place before the deterrence measure chosen. Any scrapes, sightings, or territorial activity will be recorded using Fieldmaps or Survey123 forms. If eggs are found prior to the use of the deterrence method that day DBR shorebird staff will fence the area to the appropriate buffer and deterrence methods will be re-evaluated for the surrounding area. Due to the close monitoring of the beach every day DBR shorebird staff will pay special attention to the movement of deterred Piping Plover pairs. They will note if they observe a new pair in a new area of the beach and make a note if they believe, based on the timeline, that it was the deterred pair. This will help in determining which pairs to apply take exposures to.

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 (activity is part of DBR's annual project list submitted to Duxbury Conservation Commission and NHESP on 12/5/2023, last approved 1/17/2023). 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 areas impacted by reduced proactive fencing in order to increase checks to every day. The shorebird 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 creating a polygon of the area left unfenced and include any deterrents, including any movement of deterrents. In addition, shorebird monitors will record any Piping Plover or Least Tern activity (breeding, movement, feeding) in the area and within 50 meters (55 yards) north and south of the area daily. Monitoring 50 meters (55 yards) 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 either in a spreadsheet uploaded to Google Drive and accessed in the field while staff are monitoring and assessing deterrence measures or comparable Fieldmaps or Survey123 form (Appendix B). 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 (1094 yards) 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 <4.6 meters (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 field technician , shorebird monitor supervisor or the Field Coordinator 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 6 meters (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 have a 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), A member of the DBR shorebird staff will record adult behavior every 15 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 either in a spreadsheet located on Google Drive for in-field data capture or in a comparable Fieldmaps or Survey123 form (Appendix B, Data Table 3). Once nest movement ceases, normal monitoring will resume, which will be captured in Fieldmaps. 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 Oversand Vehicle (OSV) Use in Vicinity of Unfledged Piping Plover and Least Tern Chicks

Introduction

As discussed previously Duxbury Beach is a narrow barrier beach with many pairs of nesting Piping Plover and Least Terns. Due to the number and density of chicks on the OSV beach, access has been reduced or closed for part of the last three seasons. Closures are often due to multiple plover brood or tern chick locations and their associated buffers which overlap with crossover entrances and much of the OSV beach. When feasible DBR proposes implementing OSV Use in Vicinity of Unfledged Piping Plover and Least Tern Chicks. This would provide the Town of Duxbury and DBR some flexibility during the season to provide access for OSV use to areas of the beach that may not be impacted by chick buffers.

Due to the narrowness of the beach the complexity of escorting passed unfledged Piping Plover and Least Tern Chicks is best assessed on a case by case basis. The Town of Duxbury and DBR will decide what is the best method of escorting, either a caravan or self-escorting program, and will notify MADFW a minimum of two days before the implementation of the covered activity.

In either case, caravan or self-escort, DBR proposes establishing a driving corridor for OSV passage past two or more Piping Plover broods and/or no more than 20 of Least Tern chicks at distances closer than would normally be allowed by the guidelines. If escorting OSV vehicles in close vicinity to Piping Plover or Least Tern chicks causes mortality or results in a close call of mortality DBR will cease using the escort corridor immediately and contact Mass Wildlife for discussion. If vehicles are still on the beach during a mortality or close call event they will be escorted off the beach by a caravan after the situation has been assessed and cleared. All OSV use in association with the escort corridor will cease until Mass Wildlife is consulted.

4.1.3.1 OSV use in the Vicinity of Unfledged Piping Plover Chicks

Impact Minimization

In order to safely escort past unfledged broods and chicks DBR will implement a number of different protocols to reduce the chance of a take occuring.

Hours of operation for the escort corridor are proposed to be in two travel windows with the schedule of Monday through Sunday 8 am to 11 am and 4 pm to 7 pm or in three travel windows with the schedule of Monday through Sunday 8 am to 10am, 12 pm to 2 pm and 4 pm to 6 pm. Timing of travel periods may be flexible within one hour based on weather and chick locations.

The times and days of operation of the escort corridor may be subject to change, based on many factors that might warrant adjustment including but not limited to; consultation with MADFW, location of active nests, propensity of Piping Plover and Least Tern chicks to traverse the escort corridor, user demand,

etc. The Town of Duxbury and DBR will coordinate with MADFW regarding specific operational details prior to initiation or any changes during implementation. Travel will not exceed six hours per day over three time periods.

No vehicles will be allowed to use the escort corridor outside of these times except for emergencies as described below. Duxbury Beach Operation Rangers will ensure that no vehicles traverse the corridor outside of the designated hours of operation.

Vehicles, as part of a caravan or self-escort, will pass through a corridor that is no more than 4.6 meters (15 feet) wide and well marked by posts and signage. The corridor will begin at least 100-200 meters (109-219 yards) (depending on age of plover brood) from the closest Piping Plover or Least Tern chick and end 100-200 meters (109-219 yards) past the last Piping Plover or Least Tern chick. The escort corridor will be designated by post and twine fencing on either side with appropriate signage affixed to the posts. The maximum length of the corridor will not exceed 800 meters (875 yards) . Total acreage impacted by the maximum implementation of this covered activity would be .9 acres. Additionally, 9 meters (30 feet) laterally (east and west) on either side of the escort corridor will serve as a "safety zone" for Piping Plover and Least Tern chicks whereby the OSV escort would be halted should chicks enter this zone (see detail in Procedures below). Vehicles will not be allowed to park within the escort corridor and will only be permitted to stop when a chick comes within 9 meters (30 feet) of the escort corridor.

Duxbury Beach is often very narrow at high tide or along specific sections of beach. In order to increase the feasibility of successful escorts during the limited travel windows, DBR and the Town will first assess the width of the beach in a proposed escort area. In most instances, escorting will not be employed if the entire escort corridor is not equal to or greater than 35 meters (38 yards) in width from the toe of the dune to the high tide line. This accounts for a 4.6 meter (15 feet) escort corridor and 15 meters (16 yards) on either side (east and west). This is to allow, at a minimum, a 6 meter (20 feet) wide section of beach for Piping Plover chicks to utilize for foraging on either side of the escort corridor without halting traffic. Since the width of the beach is variable, if potential pinch points (areas within the proposed escort corridor less than 35 meter (38 yards) of width at high tide or normally) exist and Piping Plover broods have been using that area then an escort corridor is unlikely to be implemented. If the brood is located bayside and has not used the area described as a pinch point for the last seven days then the corridor may be implemented. In the case that the bayside brood crosses back to ocean side during the period that the escort corridor is being implemented in the pinch point section the escort corridor will continue to be used until DBR shorebird staff make observations of the brood utilizing the pinch point section. For any stretch that falls within this minimum width DBR will have specific monitoring requirements as outlined below in the monitoring section.

The maximum number of vehicles permitted to pass through the escort corridor will vary based on the available space on the beach for OSV use, the length of the corridor (how long it takes vehicles to pass through the escort corridor), and the number of vehicles that can be managed by Beach Operations within the limited travel windows.

It is anticipated that two pairs (but possibly up to four in the case of multiple travel corridors during the season) will be impacted by this activity unless discussed and approved by MADFW and while remaining under the requested number of take exposures for Duxbury Beach (24 take exposures requested for 2024-2026).

Self-Escort Procedure

1. A predetermined area for staging of OSV vehicles utilizing the escort corridor will be established so that OSV traffic is not on the back road. Beach Operation Rangers will be in charge of managing the queue before the travel times. OSVs will queue in the dirt portion of the Resident Lot before the travel windows. The queue location may be moved depending on time of day and number of vehicles.
2. Two Beach Operation Rangers and one to four DBR shorebird staff will be assigned to oversee the operations of the escorting near unfledged chicks per travel corridor. One Beach Operation Ranger will be stationed at either side of the escort corridor, as Compliance Monitors, to ensure compliance with self-escorting procedure laid out below. DBR shorebird staff member(s) will observe and monitor Piping Plover and Least Tern chick activity during the escort window. The amount of DBR shorebird staff will be determined by the number and location of Piping Plover and Least Tern Chicks.
3. At least 1 hour prior to commencement of vehicle escorts, DBR shorebird staff will proceed along the designated vehicle corridor and surrounding area to determine locations and counts of unfledged Piping Plover broods within the travel corridor. Once the shorebird staff have established the locations of all chicks, they will review if the limits (start and end points) and associated signage of the escort corridor should be adjusted based on chick locations and activity. The DBR Field Coordinator, or a field technician or shorebird monitor supervisor will then notify the Beach Operation Rangers of the brood location and indicate that the trail is ready to be opened. During the travel window a DBR shorebird monitor will continue to monitor the broods that are located within the travel corridor for the duration of the travel windows with frequent checks between escort times. 30 minutes before the start of the next travel window DBR staff will notify the Beach Operation Rangers of the locations of broods and chicks within the travel corridor.
4. If all chicks have not been located, opening of the travel corridor may be delayed until such time as all chicks have been accounted for, or it has been determined that no chicks are present within the travel corridor or bordering safety zone.
5. Prior to opening the escort corridor, the beach operations ranger monitor vehicles will confirm with DBR shorebird staff that the locations of all chicks are accounted for, and/or it is safe for the trail to open. During the self-escort period, a DBR shorebird monitor shall maintain constant oversight on any Piping Plover chicks using binoculars from a close distance without disturbing the chicks. Disturbance, if any, of the chicks shall be minimized. Once vehicles have passed through the delineated “chick zone”, which shall extend at least 100m. past the closest chick, vehicles may proceed to use the sections of beach previously determined to be free of Piping Plover and Least Tern chicks in accordance with state and federal Guidelines

6. Each vehicle must have at least one passenger 16 years of age or older to walk approximately 3 meters (10 feet) in front of the vehicle in the self escort corridor. The escort will look for chicks in the corridor and stop the vehicle if either a chick is observed or if one of the DBR shorebird monitors requires the vehicle to stop. All self-escorted vehicles must maintain a safe distance of at least 4.6 meters (15 feet) from the vehicle in front.
7. All OSV operators participating in the self-escort program are required to have read and signed the HCP Guide and Procedures and watched the Town of Duxbury video regarding the HCP self-escort program. Signed proof that the operator of the vehicle has read and understands the rules and procedures must always be carried in the vehicle.
8. In order to allow unimpeded chick passage across the OSV corridor when vehicles are not present vehicle "ruts" will be raked, as needed, by a beach operation ranger at the end of the afternoon self escort period. Mechanized raking will be utilized only with a DBR field technician or shorebird monitor supervisor walking in front of the vehicle to search for chicks. Smoothing of tire ruts will continue until all Piping Plover chicks present near the escort corridor are more than 14 days old.
9. If at any time during the escorting process, the shorebird monitor(s) lose visual contact with one or more chicks, the vehicles will be allowed to continue on their way and the period between the self-escort time frame (or after the afternoon session) will be used to determine the presence or absence of the chick(s) in the area of the corridor. DBR shorebird monitors will document in the Survey123 daily escort report the approximate time that visual contact with the chick(s) was lost and information about efforts made to relocate it.
10. Each DBR shorebird staff assigned to the escort corridor for the day will fill out a survey123 daily escort report form. The form will include information about the activity of the adults and chicks specific to foraging and territorial behavior. Data collected also includes recommending the need for increased signage or fencing to afford greater protection to the HCP brood. The monitoring logs will be reviewed daily by the DBR Field Coordinator or Reservation Coordinator.

11. All DBR shorebird staff and beach operation rangers will have the independent authority to temporarily close the escort corridor at any time for any reason. For example, if at any time a shorebird monitor determines that chicks have approached within 9 meters (30 feet) of the escort corridor, the shorebird monitor will immediately notify the Beach Operations Vehicle Monitors to temporarily halt traffic at the entrance and exits and allow the chicks to cross the corridor and/or move >9 meters (30 feet)* from it. DBR shorebird staff will adhere to the crossing protocols as outlined above and as implemented in past seasons, using stop signs to halt vehicles already within the corridor and allow for the Piping Plover brood to cross the corridor safely. In the event that a brood does cross DBR shorebird staff will complete the Survey123 form for a road crossing and assign it as an escort corridor crossing.

    *The distance chicks are permitted from moving vehicles in the travel corridor may be reduced if other conditions are met (see Herding and Monitoring sections below).

12. Duxbury Beach Operations rangers acting as Vehicle Monitors will have a valid driver's license, be familiar with safely operating a 4-wheel drive OSV on the beach, and have clear written

communication skills. Duxbury Beach Operations rangers receive training from the Duxbury Beach Administrator and DBR Field/Reservation Coordinator at the beginning of the season that covers Beach Operation Rangers duties as it pertains to the COI. Beach Operation Rangers will receive additional training as a refresher in HCP/COI protocols before the covered activity of escorting is initiated.

Caravan Procedure

DBR and The Town of Duxbury reserve the right to substitute escorted caravans for self-escorting as described in the HCP. If escorted caravans are implemented, groups of up to 25 OSVs would stage at the Resident lot or an area of the open OSV corridor where unfledged plover and tern chicks are not present. Once the caravan reaches the area where unfledged chicks are present and escorting is required, a qualified DBR shorebird staff will lead the caravan through the escort area either on foot or in an open top OSV. All other requirements, including but not limited to shorebird monitors assigned to brood monitoring and compliance monitors, would remain in place as described in the self-escorting protocols.

Herding Procedure in Conjunction with Escort Corridor

Due to the narrowness of the beach there is a possibility that herding may need to be implemented in conjunction with an escort corridor. Herding would be implemented in the same manner as outlined in section 4.1.1. Active herding would be implemented at a ratio of 1:2, DBR shorebird staff to chicks, and occur if a brood has approached within 30 ft of the escort corridor and after 15 minutes does not appear to be crossing the corridor. In this case the brood would be actively herded >9 meters (30 feet) away from the corridor and DBR shorebird staff would then use non-active herding to stand between the corridor and the brood to ensure that the brood did not re-enter <9 meters (30 feet) from the corridor and until the brood is foraging and acting normally. Herding will only be implemented if staffing allows for a 1:2 ratio of shorebird staff to chick coverage or if the number of chicks to be herded is two or fewer. In order to reduce the likelihood of a split brood if there are more than 2 chicks DBR proposes using a “moving” barrier constructed out of a small piece of plywood, or the like, .6 meters (2 feet) in height and 1.5 meters (5 feet) in length. DBR shorebird staff would implement these moving barriers by holding the plywood low to the ground and moving slowly in order to herd the brood to the desired location.

Mandatory Self-Escort OSV Operator Education

To participate in the escort program, OSV users must watch an instructional video about escorting and pass a written quiz approved by MADFW that will document familiarity with the rules and procedures. After completing the video and quiz, a self-escort permit will be issued. The escort permit is only valid in conjunction with a valid Duxbury Beach Sticker. The escort permit and driver’s license must be presented each time the OSV operator accesses the escort corridor. In addition, Duxbury Beach Operations will maintain a list of escort permit holders.

Contingency Plan

Personnel Availability
Two compliance monitors designated from Duxbury Beach Operation Rangers will be present to implement the escort corridor. One to four (depending on broods, Least Tern Chicks, and staffing availability) DBR shorebird staff will be designated to work the corridor on a given day. If full staffing of the corridor is not possible other qualified members from Beach Operations (as vehicle monitors) or DBR staff (as shorebird monitors) will be used. However, if lack of staffing makes the safe implementation of the corridor unrealistic on that day, escorting will not be implemented.

Inclement Weather
DBR and Duxbury Beach Operations will monitor weather forecasts daily. If a storm warning is predicted by the National Weather Service, or any other weather warning that could jeopardize public safety within a 24-hour period, the escort corridor shall be closed for the duration of the hazard, or the start time may be made one hour later or earlier. The escort corridor may not reopen until the ranking DBR shorebird staff and Beach Operation Ranger on-site has given the "all clear". It shall be presented in writing prior to purchasing an OSV sticker that users shall use the beach at their own risk. If there is an unforeseen inclement weather event and OSV users are out on the beach, OSV sticker holders shall be informed in writing that a "shelter in place" policy will go into effect until the inclement weather has passed or scheduled exiting escorts have begun.

Medical or Family Emergencies
OSV sticker holders shall be advised in writing at the time of OSV sticker application, via affidavit, that egress from the beach outside of the self-escort windows shall be strictly prohibited. In the event of a life-threatening medical emergency, Duxbury Beach Operation Rangers and/or emergency responders should be notified. Essential vehicles will assist in escorting the vehicle off the beach. Emergencies will be dealt with in the same manner as emergencies that occur during road crossing events. OSV sticker holders shall be informed in writing that they should bring any routine medical supplies (medication) with them for the duration of their time on the beach as exit between escort periods will not be permitted.

Violations

There is a zero tolerance policy for any violations committed as related to the escort corridors. Beach Operation Rangers and DBR shorebird staff will be in constant contact through a specific Slack channel and over the phone to report on infractions. Beach Operation Rangers will revoke OSV stickers and eject the violators from the beach immediately. Violators of the escort procedure shall be subject to OSV sticker revocation and have their rights to operate an OSV at Duxbury Beach suspended immediately for a period of one year from the date of violation.

Monitoring

Monitoring on Duxbury Beach is complex and most monitoring is conducted in relation to Gurnet Road that runs the length of the barrier beach and has vehicle use (recreational and essential) throughout the season. As such DBR shorebird staff are well trained to manage monitoring Piping Plover broods in

relation to and in close proximity to vehicles. However, there are different considerations to be made when monitoring for OSV use on the beach. Data tables associated with the implementation and use of this covered activity can be found in Appendix B (Tables 6 & 7).

Different considerations for monitoring within the escort corridor may be applied in unique situations outlined below:

1) If the brood(s) whose brood range is within the length of the escort corridor is located bayside DBR may assign one shorebird monitor bayside to watch the brood and one shorebird monitor Oceanside in case the brood crosses Gurnet road. If the the entire brood(s) is (are) located bayside before the travel window, DBR Shorebird Staff may give the all clear for the commencement of escorting without a sweep Oceanside of the corridor (However, if Least Tern chicks are located along the escort corridor a sweep and count of Least Tern chicks will take place in accordance with the Least Tern chick procedure below. All other Piping Plover broods present on the beach not within 1000 meters (1094 yards) of the open OSV or escort corridor will be located daily)
2) In the case that a brood will be herded, DBR will not begin herding until there is a ratio of 1:2 shorebird staff to chicks.
3) DBR Shorebird staff will maintain a ratio of 1:2 shorebird staff to chicks if traffic is allowed to continue after the brood has been herded and while the brood may remain within 15 meters (50 feet) of the escort corridor.
4) When making initial staffing decisions for the escort corridor DBR will take into account the increased likelihood of needing multiple shorebird staff when the tide is high or if the escort corridor is located in a particularly narrow stretch of beach. DBR will increase staffing in the cases of a narrow beach/foraging area adjacent to a travel corridor. If the tide is out and wide stretches of foraging area exist on the oceanside of the corridor DBR may decide to reduce staffing to 1:1, shorebird staff to brood, initially until the tide starts to rise or the brood starts to move towards the corridor.
5) If the brood is split on either side of the corridor, traffic in the corridor will be halted until the brood is reunited on their own or if the brood enters into the safety zone or corridor and shorebird staff are able to herd them back together. If staffing allows for two monitors to be present to monitor a brood that is split on either side of the escort corridor then one monitor will be stationed oceanside and one stationed on the duneside.
6) Depending on staffing level and characteristics of Piping Plover broods within the length of the escort corridor, one shorebird monitor will be assigned as an 'OSV escort corridor floater'. Generally they will patrol the length of the corridor until needed and will help to attend to issues that require more than one shorebird staff to be present, including but not limited to, helping with herding or if there is a split Piping Plover brood.

<u>Reporting</u>

Chick numbers, chick locations, and travel corridor locations/dimensions shall be provided to the Reservation and Field Coordinator daily, prior to commencing OSV escorts.

As required by the HCP, a daily log will be kept to document staffing, frequency of brood monitoring, and compliance with OSV escorting procedures, and will be made available to MADFW upon request. Any violations, incidents or accidents associated with the vehicle escort program, including take of a chick(s) shall be immediately reported to MADFW and USFWS staff. In the event of an alleged incident related to the escort program, the Reservation Coordinator in coordination with the Field Coordinator and any DBR shorebird staff involved shall cooperate with and assist Town, State, and Federal officials with the investigation of the incident. Depending on the nature of the incident, DBR, The Town of Duxbury, MADFW, and USFWS reserve the right to suspend all vehicle escorts for such time as they deem appropriate. Each week, a summary report will be submitted to MADFW.

The report will include (responsible party); (1) daily vehicle trip count (Beach Operations); (2) for each affected brood, daily observations of chick numbers and behavior including a daily brood range map (DBR); (3) weekly tally and description of any rules violations and enforcement actions taken (Beach Operations); (4) weekly tally and description of all observations of broods crossing or approaching <50 feet from the vehicle corridor, both during the OSV travel windows and any other such observations during routine monitoring (DBR); (5) any other notes, observations, or recommendations relevant to operating the escorting program (Beach Operations and DBR). By October of each calendar year, DBR will submit an escort monitoring report to MADFW. The report shall describe, at minimum, the estimated age of chicks in each brood when self escort was initiated, fledging success, escorting dates, number of broods, number of chicks present during self-escorting on each date, estimated daily chick survival based on daily brood counts, number of vehicle passages, and any documented “take” of chicks resulting from the vehicle escort program. The report will also contain recommendations for improving the efficiency and/or effectiveness of the escort program in the future.

DBR data will be recorded using Fieldmaps and Survey123 and will include: affected brood number(s), number of chicks in each brood, behavior of adults and chicks, chick corridor crossing events, daily escorting corridor boundaries, observations of broods within 50 meters (55 feet) of corridor, general notes from the field about implementation.

4.1.3.2 OSV use in the Vicinity of Unfledged Least Tern Chicks

Due to overlap in nesting habitat it is very likely that any escort corridor established for Piping Plover broods would also impact Least Tern chicks. Additionally, because unfledged Least Tern chicks tend to still be present on the beach later than unfledged Piping Plover chicks, it is possible that a travel corridor will be established to escort OSVs solely past unfledged Least Tern chicks. Historically, there are three Least Tern Colonies that overlap the designated OSV area: the North-OSV, mid-OSV, and South-OSV colonies. This covered activity is intended to take advantage of available space between colonies or as chicks fledge and the decreased density allows space for OSV parking. DBR shorebird staff monitor colonies throughout the season and map the extent of the colonies and conduct counts of nests and

chicks. In addition, shorebird monitors record locations of nests and chicks when necessary to aid in management. This data collection will allow DBR and the Town of Duxbury to take advantage of opportunities to self-escort or utilize a caravan to escort OSV users past unfledged Least Tern chicks. No more than 20 unfledged Least Tern chicks would be exposed to OSV traffic in this way.

In the event that a Least Tern chick nursery area is directly adjacent to an OSV Crossover (within 100 meters, 109 yards) that would otherwise be open (does not fall within a Piping Plover brood range or Sensitive Wildlife Area) and the nursery is not intersected by a Crossover, special monitoring will be employed to allow OSV access.

Shorebird monitors will be assigned to Least Tern colonies to implement these management practices with oversight from the monitor supervisors and field technicians.

Impact Minimization Measures

Impact minimization measures employed for an escort corridor will include a narrow travel corridor for OSVs, parking restricted to areas beyond 100 meters (109 yards) of unfledged chicks, restricted travel hours, vehicle escorting, staff training, enforcement and communication, mandatory OSV operator education, and smoothing of tire ruts. All of which would be similar in implementation to what is proposed for an OSV escort in the vicinity of unfledged Piping Plover chicks.

Impact minimization measures employed for the use of a crossover when it does not intersect a Least Tern nursery area will include increased monitoring of the area and in some cases the use of barriers when Piping Plover chicks are not present.

Self Escort and Caravan Procedure

This will be the same procedure as outlined for Piping Plover broods above except in the case of the implementation of a barrier outlined below.

Barrier Use

In the event that DBR and the Town of Duxbury decide to utilize an escort corridor past only unfledged Least Tern chicks DBR may choose to implement the use of a see-through temporary barrier(s) to prevent Least Tern chicks from crossing the corridor during travel windows, no more than a maximum of 6 hours per day. The use of the barrier(s) may allow vehicles to pass within 6 meters (20 feet) of unfledged Least Tern chicks but would not impact more than 20 chicks. Barriers will be erected before travel windows and removed after travel windows according to the schedule of those travel windows.

The barrier would be constructed out of see-through mesh netting (mesh size sufficiently small enough to prevent chicks from passing through) and anchored in place by fiberglass poles. The barrier would be placed parallel on the dune side (west) of the escort corridor with unfledged chicks located between the dune (to the west) and the barrier (to the east). The barrier would be placed 3 meters (10 feet) east of

the chick(s) and would extend 6 meters (20 feet) north and south past the most northerly and southerly chick(s) for a minimum length of 12 meters (40 feet) (note that the barrier may be smaller in size for the purpose of minimizing impact to a smaller number of chicks) . To ensure that the barrier is flush to the ground, lawn staples, tent stakes, or the like will be used to secure the bottom of the barrier and prevent chicks from going under the barrer. The barrier would be constructed by a DBR field technician and/or shorebird monitor supervisor as a lead and with the help of one or two shorebird monitors. After the barrier is constructed one shorebird monitor would monitor the Least Tern chicks for the duration of the travel window.

If a Least Tern chick approaches within 1.5 meter (5 feet) of the northern or southern extent of a barrier the shorebird monitor will alert a DBR shorebird monitor supervisor or a field technician. The responding shorebird monitor supervisor or field technician would assess the situation and determine if the shorebird monitor would be able to herd the Least Tern back to the 3 meter (10 feet) buffer from the northern or southern extent of the fencing on their own. If the field technician or shorebird monitor supervisor decides the situation may require their assistance and arrives after the chick reaches the end of the barrier the shorebird monitor will stop traffic in the escort corridor until the field technician or shorebird monitor supervisor arrives and assists in herding the chick either back behind the barrier or down the beach towards the tide line >6 meters (20 feet) away from the escort corridor.

The shorebird monitor supervisor, field technician, and/or shorebird monitor will record the location and length of the barrier, amount of time the barrier is in place, the number of Least Tern chicks located west of the barrier, and any movement of chicks within 3 meters (10 feet) of the northern or southern extent of the barrier. Furthermore, if a field technician or shorebird monitor supervisor is needed to herd the chick, information about the herding event will be recorded as well. All data would be recorded in Fieldmaps or Survey123 (Appendix B, tables 5 & 6).

DBR and the Town of Duxbury may decide to utilize a barrier in order to facilitate the use of a crossover that does not intersect a Least Tern Nursery area and when OSV access is not restricted by Piping Plover brood setbacks. The installed barrier would allow vehicle access within 100 meters (109 feet) of Least Tern chicks, with the condition that the barrier and adjacent Least Tern chick nursery receives a minimum of four checks a day. There will be a 35 meter (38 yards) buffer between OSV parking and the installed barrier, and another buffer of 15 meters (16 yards) between the barrier and the closest Least Tern chick to the open OSV. During the four daily checks of the barrier, should a Least Tern chick be found within 15 meters (16 yards) of the barrier, DBR staff will actively herd the Least Tern chick to a minimum of 15 meters (16 yards) away from the barrier.

Herding Procedure in Conjunction with Escort Corridor

Same procedure as outlined above for Piping Plover broods.

Mandatory Self-Escort OSV Operator Education

Same procedure as outlined above for Piping Plover broods.

Contingency Plans

Same procedure as outlined above for Piping Plover broods.

Violations

Same procedure as outlined above for Piping Plover broods.

Monitoring

While Least Tern chicks are considered semi precocial, they generally don't travel as great a distance from their nest area as plovers. Least Tern chicks spend much of their time in vegetation or other cover and are fed by their parents, which can make them more difficult to count than Piping Plover chicks. Most of the counting and mapping of nest and chick locations will be conducted from a distance outside "closed areas'' with binoculars and/or a spotting scope to minimize disturbance. In some cases, it may be necessary to enter nesting areas to confirm the presence of nests or chicks. If this is the case only field technicians or shorebird monitor supervisors will enter the closed area.

Least Tern Colonies within the OSV corridor are monitored daily to every other day on Duxbury Beach. In preparation of the covered activity DBR Shorebird Staff would monitor the OSV colony that will have an escort corridor adjacent once per day at least three days leading up to the covered activity. All locations of nests and chicks will be input into fieldmaps or survey123 (Appendix B, Figure 11). Data also includes the estimated age of Least Tern Chicks.

Prior to the beginning of each travel window, one or two shorebird monitors will verify the locations of and count all chicks by searching the beach adjacent to and within 100 meters (109 yards) of the escort corridor. The shorebird monitors will search the entire area of the escort corridor including at least the 15 meters (16 yards) buffer on either side. Areas with unfledged chicks <15 meters (16 yards) from the escort corridor and any unfledged chicks seaward of the escort corridor will be noted for extra attention during the travel period. As noted DBR may implement a barrier in order to ensure that chicks on the dune side of the escort corridor do not enter the vehicle corridor during the travel window.

In the event that inclement weather may adversely affect the chicks, monitoring frequency may be reduced and non-essential vehicle access will be restricted. To estimate the number of chicks exposed to OSVs, at least two nest/chick counts will be conducted in the three days prior to the anticipated start of the escorting program, including one count within 24 hours of the start date. Estimates of active nests will be obtained for all sections of beach located within 200m (219 yards) of the anticipated escort corridor. During the period when this covered activity is occurring, the number of active nests will be tracked, with recounts 2 times per week during the escort period.

The number of DBR shorebird staff monitoring Least Tern chicks during the travel windows will be dependent on the length of the corridor and number/density of chicks. Shorebird Monitors will be

assigned to zones containing chicks no larger than 275 meters (300 yards) in length. Depending on the density, locations, and age classes of chicks along the escort corridor shorebird monitors may either be stationary or mobile over the zone of the corridor they are assigned. One shorebird monitor will be assigned as an 'OSV escort corridor floater' to attend to issues, such as but not limited to, barrier installation or removal, Least Tern chicks being located on either side of the corridor in one area, or to help herd chicks across the corridor.

In the case that a crossover does not intersect a Least Tern Nursery area and is open, monitoring will be implemented throughout the day depending on where Least Tern Chicks are located in relation to the crossover. If Least Tern chicks are 30-100 meters (32-109 yards) 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 (32 yards) 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 (16 yards). Monitoring in the event that a barrier is installed will be altered and implemented as outlined in the barrier use section above.

Monitoring will be carried out by a qualified DBR shorebird staff. Chick numbers, chick locations, chick ages and escort corridor locations/dimensions will be provided to the DBR Field and Reservation Coordinator before implementation that day.

4.1.4 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 table 4-1.

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 20-30 seasonal shorebird monitors, three seasonal shorebird monitor supervisors, three seasonal field technicians, a year-round Endangered Species Program Field Coordinator to directly oversee the program, and a year-round Reservation Coordinator to assist the Field Coordinator. 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 and time of season. 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 shorebird monitor supervisors monitor daily to update coverage as needed. In addition, the shorebird monitor supervisors track staffing needs across the site in a dedicated Google Sheets document made accessible to all field technicians and shorebird monitor supervisors 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 B, Figure 9). Monitoring of covered activities associated with Beach Operations is performed by shorebird monitor supervisors and field technicians. Staff coverage is captured on associated spreadsheets made accessible through Google Drive (Appendix B, Figure 13).

In addition to DBR staff, Town of Duxbury Beach Operations staff are also involved in enacting and ensuring compliance with the impact minimization measures outlined, particularly in regards to OSV Use in the Vicinity of Unfledged Chicks. Beach Operations staff includes a beach administrator, lead beach rangers, and beach rangers. Duxbury Police Department personnel are involved in many aspects of enforcement on the beach and associated data collection.

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 containing data provided by both DBR staff and Town of Duxbury staff. The Reservation will ensure that annual Piping Plover and Least 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.

Table 4-1. Compliance monitoring summary and associated data collection locations for Duxbury Beach.

Element Tracked	**Plan Participant Actions**	**DBR Tracking** *(Forms found in Appendix B)*
Annual limit on statewide take exposure	· Provide Piping Plover census data including index and total counts in proper formats with maps	Fieldmaps and Survey123 pair/nest/colony 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 NestStory brood crossing form NestStory colony proximity checks and/or Survey123 pair/nest check data sheet Survey123 brood crossing form Survey123 colony proximity and barrier proximity data sheet
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, NestStory pair/nest/colony checks, Survey123 pair/nest/colony data sheet Patrol and enforcement information outlined in Section 3.4 – 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 and Survey123 pair/nest/colony checks dictate monitoring and staffing levels to ensure compliance with IAMP Staffing tracked through Homebase App and paper datasheets on-site and confirmed through NestStory and/or Survey123 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 and Survey123 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 Reservation Coordinator and managed by the Endangered Species Program Field Coordinator with general oversight from the Assistant 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 2024 nesting season, the funding was authorized in part by the 2023 Spring Town of Duxbury Meeting, and the FY25 budget is expected to be authorized by the 2024 Spring Town Meeting (Town of Duxbury fiscal year July 1-June 30).

Table 5-1. Duxbury Beach Reservation Endangered Species Program budget, 2021-2023. Projected budget 2024.

Position	**2021**	**2022**	**2023**	**2024 (projected)**
DBR Executive Director	$15,000	$11,200	$25,000	$10,000
DBR Assistant Director	$36,000	$4,368	$10,000	$20,000
DBR Reservation Coordinator	0	0	0	$40,000
DBR Coastal Ecology Program Field Coordinator	$36,000	$42,000	$45,000	$45,000
Monitor Supervisor, Shorebird Monitors, Field Technician	$204,718	$188,224	$214,790	$261,740
Additional Expenses (education, predator management, signage, artificial habitat work, equipment)	$36,989	$24,541	$32,000	$40,000
Total Endangered Species Program Expenses	**$362,081**	**$270,333**	**$326,790**	**$371,740**

Table 5-2 displays possible recreational scenarios if DBR did not participate in the state's HCP program. Scenarios 2 and 3 are both contingent on approval of monitoring plans by NHESP and/or USFWS to allow

driving on the back road in areas with crossings and OSV use on the front beach within 100-200m (109-219 yds) of unfledged PIPL chicks.

Table 5-2. Duxbury Beach Reservation Endangered Species Program budget estimates and levels of recreation if DBR was not a part of the HCP

Description	**Staffing**	**Total Cost**	**Summary (compared to 2024 season under COI)**
Recreational access via road/parking lot (where crossings may occur) and OSV limited to areas outside guideline established setbacks (1000m for PIPL and 100 yards for LETE)	Seasonal Staff: 3 field technicians March-September to monitor and protect nesting activity and submit data via PIPLODES/TERNODES	$51,150 (33% of 2024 overhead) + $34,503 (field tech) = $85,653	Recreation ↓ Cost ↓
Scenario 1 + intensive monitoring program to protect broods and allow access to and use of the Resident Parking Lots while broods are crossing.	Seasonal Staff: -3 field technicians -3 monitor supervisors -17 shorebird monitors* (2:1 monitoring of each brood between Blakemans and the bridge (~3 broods) from 6:00-20:00)	$102,300 (66% of 2024 overhead) + $72,677 (field tech and supervisors) + $42,160^ = $217,137	Recreation ↓ Cost ↓
Maintain access to parking lots, on the back road, and to the OSV beach within 100-200m of unfledged chicks (without escorting, herding, barriers, reduced fencing, etc. as allowed under the HCP)	Seasonal Staff: -3 field technicians -3 monitor supervisors -92+ shorebird monitors** (2:1 monitoring of each brood between Blakemans and 1000m of OSV area (~35 broods) from 6:00-20:00).	$155,000 (100% of 2024 overhead) + $72,677 (field tech and supervisors) + $493,024^^ = $720,701	Recreation ≈ Cost ↑

*Assumes that there will be some period of time when all three broods are active at once

**Based on staffing needed for 28 pairs in 2019 and adjusted for pairs in 2023. However, if all broods are active at once and the roadway remains open, then 196 monitors would be needed to cover all the shifts in a week without overtime.

^A total of 340 shifts, which is based on the number of shifts in 2019 (the last year this level of monitoring was enacted on DB) and adjusted to account for the increase in the number of pairs requiring 2:1 monitoring and a similar number of LETE colonies.

^^A total of 3,976 shifts, which is based on the number of shifts in 2019 (the last year this level of monitoring was enacted on DB) and adjusted to account for the increase in the number of pairs requiring 2:1 monitoring and a similar number of LETE colonies.

6.0 Mitigation Plan

To mitigate for the proposed activities outlined above, Duxbury Beach Reservation proposes a series of measures to be implemented during 2024-2026. 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 72 credits, based on the 3:1 ratio for 24 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.

The Reservation and MADFW recorded a surplus of 157 mitigation credits carried over from 2023 and available for use in 2024. The Reservation is aware that these surplus credits may only be used in Year 1 (2024) of a consecutive permit. A breakdown of mitigation credits anticipated in 2024 is captured in table 6-1.

On-site selective predator management will also benefit Least Terns nesting throughout the site. Duxbury Beach Reservation proposes to mitigate for the proposed activities related to Least Terns through on-site predator management at a rate greater than four pairs per exposure, based on a three year average of 381 pairs.

If the need arises to add offsite mitigation over the course of the permit cycle (2024-2026) DBR and the Town of Duxbury will consult with MADFW. The discussion will clarify how many take exposures would need to be offset through DBR's selective predator management, offsite mitigation through payments to a mitigation fund or escrow, and any other mitigation measures.

Table 6-1. Anticipated on-site mitigation generated by Duxbury Beach Reservation in 2024.

Mitigation Source	**Mitigation**
Carry-over mitigation from 2023	157
On-site predator management	46
Education programs	2
School Field Trips	1
Habitat enhancement in Saquish	1.5
Rubber or gravel speed bumps	1

Speed trailer	2
Traffic monitoring	1
Year-round beach coverage	1
Monitoring and protection for broods exposed to essential traffic	≥10

6.1 Selective Predator Management

The Reservation will self-fund a selective predator management plan in 2024. This plan is expected to benefit approximately 46 pairs of Piping Plover based on the number of breeding pairs in 2023 to provide 46 mitigation credits in 2024. Additional information about the proposed 2023 mitigation will be provided in the APHIS WS Proposal for FY24 (To be provided with implementation request documentation in February 2024). The work plan will be approved by MADFW and USFWS as required pursuant to the HCP prior to implementation. 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 353 pairs of Least Terns will benefit as well, based on the number of nesting pairs in 2023.

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.

<u>Selective Predator Management Plan Details</u>

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 $15,000.00 (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 coverage is adequate to mitigate for all pairs on the site. This work is expected to result in 46 mitigation credits in 2024, 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 Fieldmaps and Survey123 (Appendix B, figure 5) 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 Piping Plover nesting season, between the hours of 06:00 and 20:00, the program requires the presence of a shorebird 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 field technicians, shorebird monitor supervisors, and shorebird monitors attend a predator tracking class provided by the Reservation's Field Coordinator at the commencement of the monitoring season. This training educates Shorebird Staff in the identification of common avian and mammalian predator species of Massachusetts shorebirds and the tracks of common species (domestic and wild) observed on local 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 Shorebird Staff can conduct routine predator surveys. Predator surveys and observations help 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 3.2 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, Piping 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 or other more sandy 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 and rebar posts are 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.

6.2 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 2023 season marked the 38th year of collaboration between DBR and Mass Audubon's South Shore Sanctuaries to offer educational programming on Duxbury Beach. During the 2023 season, the Summer Education Programs at Duxbury Beach hosted 25 classes. These hour-and-a-half-long classes were offered on Tuesdays, Thursdays, and Saturdays throughout the months of July and August and totaled 37.5 hours. Two classes were specifically directed or related to Piping Plovers: "Piping Plovers: Pint Sized Dynamos" and "Shorebirds Rule!" In addition, program leaders were asked to include a short discussion of Piping Plovers and Least Terns and their use of and importance on Duxbury Beach during every 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 2023 season was $4,600.

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.

Field Trips for Schools from Underserved Districts & Summer Information Tables (DBR funded portion)

Duxbury Beach Reservation hosts field trips for classes from schools in underserved districts and hosts summer information tables on the beach as part of its efforts to expand access and educate the public about the importance of a barrier beach as habitat for listed species. This work began in 2023 under an HCP Mitigation Grant and will continue in 2024 under HCP grant funding. A portion of the budget for this work will be funded by DBR as a grant match. DBR proposes utilizing this match funding as mitigation for HCP implementation on Duxbury Beach or if grant funding is not received, to use the full project as mitigation in future years.

Field Trips
The Duxbury Beach Reservation will partner with the Mass Audubon South East and Duxbury Bay Maritime School to provide field trips to Duxbury Beach for schools from underserved districts. The Reservation will work with these organizations to identify appropriate schools and grade levels and coordinate trips. The trips will utilize curriculum developed as part of DBR's 2022 grant to fully incorporate information about the piping plover and least tern activity and protection on Duxbury Beach, the importance of endangered species protection in general, and how students can be good stewards of listed plants and animals around them. Programs will meet education frameworks that schools are looking for and strive to supplement learning that is occurring in the classroom.

Summer Information Tables
Piloted in summer 2023, DBR's Summer Information Tables offer an opportunity for DBR staff to directly interact with beachgoers. Staff are prepared to answer questions about beach management, clarify access restrictions, and share natural history information on the unique wildlife that call Duxbury Beach home. Tables were in place on four Saturdays in 2023. Overall reception was positive with many beachgoers stopping by, an average of 35/date. Piloting these programs allowed DBR to gauge interest, gather a sense of what types of questions might arise, and begin to develop materials. With funding to commit dedicated hours to the Summer Information Tables, the Reservation will be able to expand the number of dates as well as expand outreach to nonresidents who visit the beach for a daily fee at

Duxbury Beach Park.

Due to the nature of educational outreach, it is difficult to measure how programming benefits piping plovers and least terns on Duxbury Beach. In order to aid in determining the efficacy of the program, the Reservation proposes to capture several pieces of information both about field trips and human actions on Duxbury Beach. Mass Audubon will record and provide information about field trips, including school location, number of students, number of classes, and number of chaperones. This will quantify the number of people (and potential social circles) educated about piping plovers and least terns. In addition, Mass Audubon gathers student and teacher feedback through their "Student Reflections and Wrap-up Questions" form and "Teacher Questionnaire" form. Staff will collect information on topics that come up at the Summer Information Tables in order to be prepared for future interactions as well as make note of misinformation that might be circulating in the community. A plan for distributing accurate information can then be formulated.

The Reservation anticipates utilizing the match portion (projected to be $1,610 for DBR coordination with the Town of Duxbury, Mass Audubon, Duxbury Bay Maritime School, and participating schools in 2024) programming as mitigation for one credit in years that a majority of the work is funded by an HCP mitigation grant. The total cost of programming in 2024 is $12,720 - if DBR funds the whole program or a larger portion of the program in future years, we will coordinate with MADFW to determine if increased mitigation credits for such work are appropriate.

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 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 once broods begin crossing through the area. In addition, if 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 recreational vehicles. 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 where recreation is permitted. Some 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 shorebird monitor presence to stop traffic during crossings, track brood ranges, and adjust Sensitive Wildlife Area speed limits on the roadway, pairs are at increased risk due to these vehicles. The Reservation proposes to employ Enhance Intensive Monitoring on some or all of these pairs as part of mitigation efforts as has been done in previous years (Table 6-2). 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 2018-2023.

Year	**Total # Broods**	**Total # Crossing Broods**	**Total # of Broods Enhanced 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 Enhanced Intensive 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***
2021	31	9	21	$240,718	12 (7)	15	$56,500
2022	40	10	26	$230,224	21 (9)	20.5	$64,996.40
2023	46	16	34	$259,790	30 (9)	25	$79,910.00

The Reservation anticipates utilizing Enhanced 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). 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 2018-2023.

Year	Total Pairs	Pairs S of Bridge	Crossing pairs S of bridge	# vehicles turned around by Gurnet Saquish checkpoint
2023	46	40	14	647
2022	40	36	9	579
2021	31	27	7	1,014
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. 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 plans to place a speed trailer device on the roadway when there is a high volume of recreational traffic, schedule still to be determined but the trailer would be in operation from April-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 on-site observations and data capture 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 hired a full-time, year-round Beach Operations Administrator who holds a wide range of enforcement duties. This position offers continuity year to year and greater off-season enforcement and outreach. In addition, the Town hired a seasonal Lead Beach Ranger who will also assist in enforcement of rules and regulations.

The Reservation worked with the Town of Duxbury to identify the need, roles, and responsibilities of these positions. DBR staff worked closely with existing Town staff and these new hires to provide education on beach protocols, nesting ecology, and rules and regulations. These new Beach Operations positions meet with DBR staff onsite regularly throughout the season to address issues with additional, dedicated meetings between the Beach operations Administrator weekly during the on-season and bi-weekly during the off-season. The Reservation proposes utilizing this measure as mitigation for one credit.

Speed Radar Patrol

In cooperation with the Town of Duxbury, DBR plans to reduce speeds on the roadway throughout the season. The Town of Duxbury and Duxbury Police Department, through the enforcement plan (Attachment D), has committed to 7 days a week of traffic enforcement from April to September. 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, most notably between

Crossovers 1 and 2 and between the Replicated Habitats and Plum Hills. Although shorebird monitors are present on the roadway and attempt to signal drivers to slow down, these efforts are inadequate for slowing speeding traffic. Locations for focused traffic enforcement are laid out in the enforcement plan (Attachment D). 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 the number of speeding vehicles.

Prior to implementation of this measure, the Town of Duxbury will involve their legal counsel to determine increased enforcement ability and adoption of a 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. The Reservation proposes utilizing this measure as mitigation for one credit.

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 (three pairs in 2023).

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.

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. In 2023 the Reservation proactively closed access to the vehicle crossover on 04/01/2023 and kept vehicle access restricted until all chicks in the vicinity had fledged, effectively opening the crossover on 07/28/2023.

To protect and improve nesting habitat and foraging habitat in the area of the crossover, the Reservation will implement either full or partial closures of the crossover going forward. 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 April 1 through Labor Day (or after all chicks in the area are fledged). The latter is less contentious, hopefully garnering more support and compliance from residents and visitors. It serves 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 will 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 Plovers 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).

In 2023 a total of two pairs nested within the habitats, an additional pair nested at the base of the scarp of the habitats, and a fourth and final pair nested parallel to the habitats on oceanside, and crossed with their brood after the chicks reached 5 days of age and utilized the adjacent bayside intertidal zone to the habitats.

6.3 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 A Duxbury Beach Maps

Map Series 1: Site Overview

Map 1-1 Landmarks/Boundaries/Rec Access

Map 1-2 Landmarks/Boundaries/Rec Access

Map 1-3 Landmarks/Boundaries/Rec Access

Map 1-4 Landmarks/Boundaries/Rec Access

Map 1-5 Landmarks/Boundaries/Rec Access

Map 2: Symbolic Fencing

Map 3: Shorebird Monitor Zones

Map 4 Additional Barriers at Resident and Caterer's Lot

Map Prepared By: Joey Negreann
November 28, 2023

Esri Community Maps Contributors, MassGIS, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Maxar

Map 5 Mapped Nesting Distribution PIPL/LETE 2023

Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Maxar

Map 6: Duxbury Beach Reservation Property

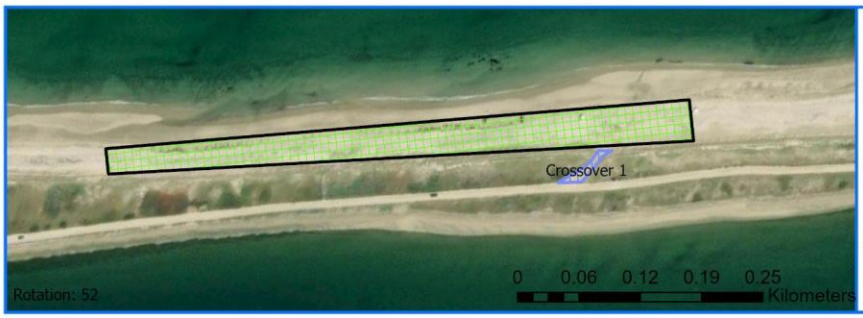
Map 7 Potential Deterrence Areas

Legend

Deterrence Area (Acres)

4

Crossover 1



Piping Plover pairs by year within potential deterrence area by year (Crossover 1)

2021	2022	2023
2	3	2

Least Tern Pairs within potential deterrence area based on 3 year average density in colonies

2021-2023
50

Crossover 2 to 3

Piping Plover pairs by year within potential deterrence area by year (Crossover 2 to 3)

2021	2022	2023
1	1	2

Least Tern pairs within potential deterrence area based on 3 year average density in colonies

2021-2023
30

Map Prepared By: Joey Negreann
January 25, 2024

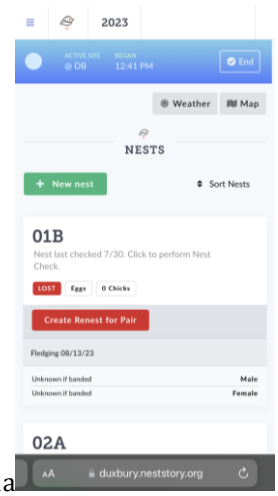
Maxar

Appendix B Duxbury Beach Data Capture

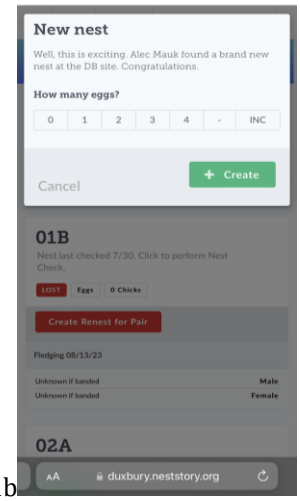
Note: *In 2023 the Reservation started implementing data collection via ArcGIS Survey123 and Fieldmaps. The Survey123 and Field Maps forms shown below were used in tandem with NestStory in 2023, but the Reservation plans to switch entirely to data capture via the ArcGIS suite of apps moving forward. In the 2024 field season, the Reservation anticipates that data capture through NestStory or on spreadsheets will be phased out and the NestStory forms and spreadsheets depicted below will be replaced with identical data capture forms that, at minimum, collect the same data represented as in the NestStory and spreadsheet data sheets. Fieldmaps and Survey123 forms depicted below provide good examples of what the other data capture will look like.*

Figure 1) Adding Piping Plover Nests in NestStory

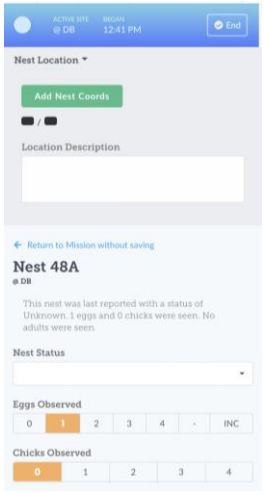
Once a Piping Plover nest has been found, shorebird monitors and field technicians utilized Neststory to create a nestcard for a nesting pair (1a & 1b). Once a nestcard has been created, it can be selected to add in the nest coordinates, as well as a site description and the behavioral observations of the Piping Plover pair associated with the nest (1c & 1d).



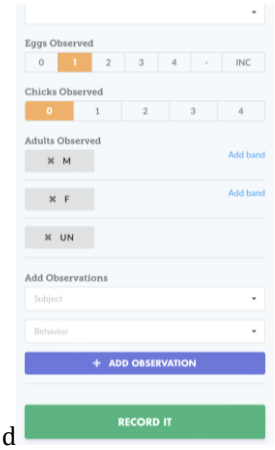
1a



1b



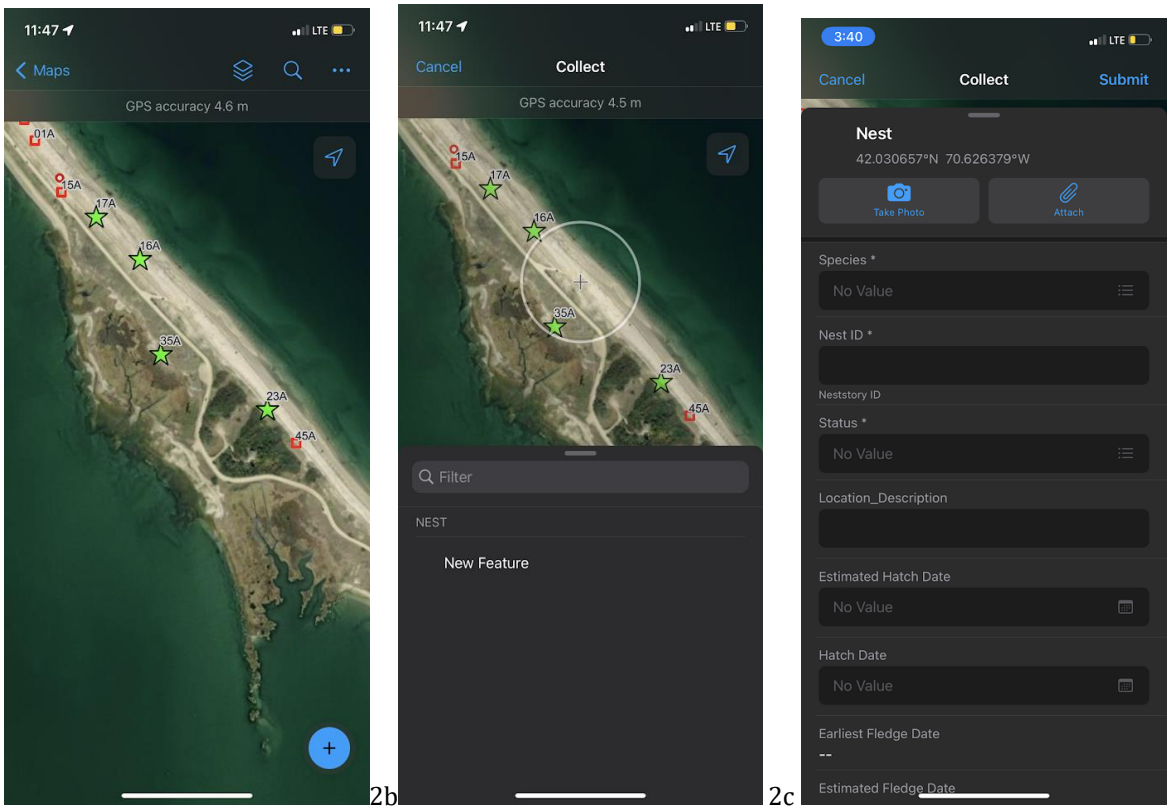
1c



1d

Figure 2) Adding Piping Plover Nests in Field Maps

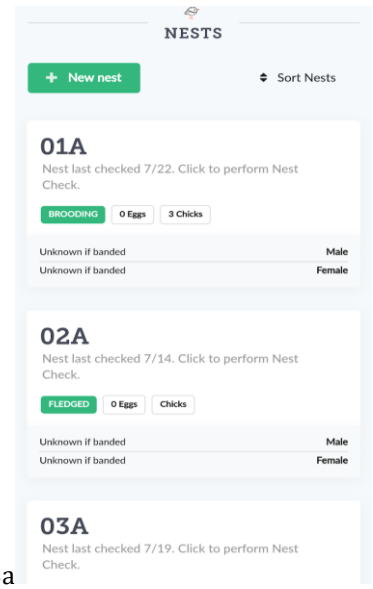
In addition to adding a found Piping Plover nest into NestStory, nest data was also collected through the Field Maps application that each monitor supervisor and field technician had downloaded onto their phone. Once a nest was located and input into NestStory, the staff present would then input the same data into the Field Maps app, including the nest location, nest status, and a location description (2a, 2b, & 2c).



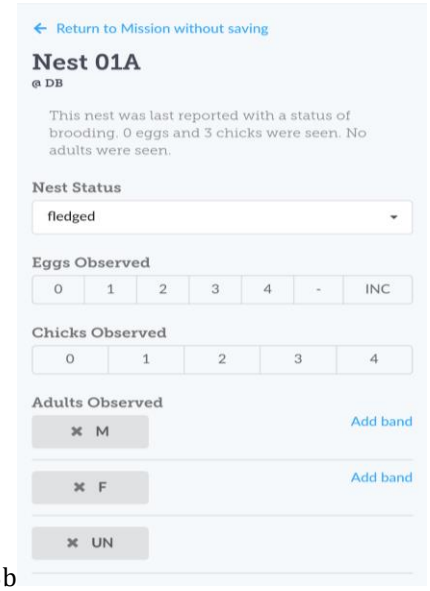
2a 2b 2c

Figure 3) Piping Plover Nest Check Form NestStory

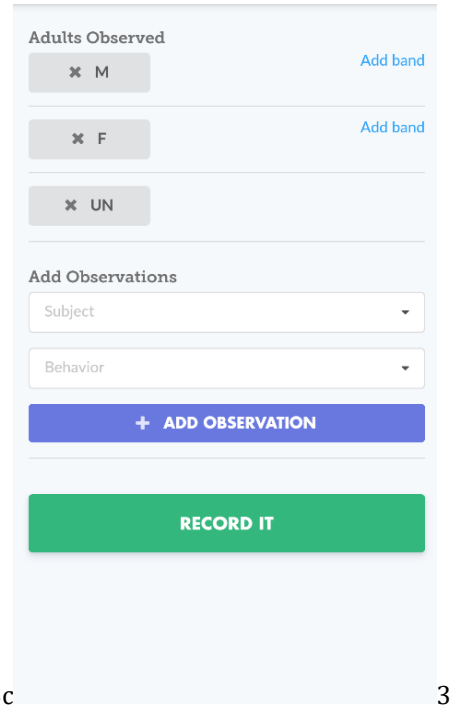
Recording information on nests and broods is done utilizing the same form, with the nest (3a) status being changed when the nest hatches, broods, and fledges (3b). The locations of the brood, as well as any crossings, are recorded below the general information about the brood (number of eggs/chicks observed, data about the adults, etc.)(3c & 3d).



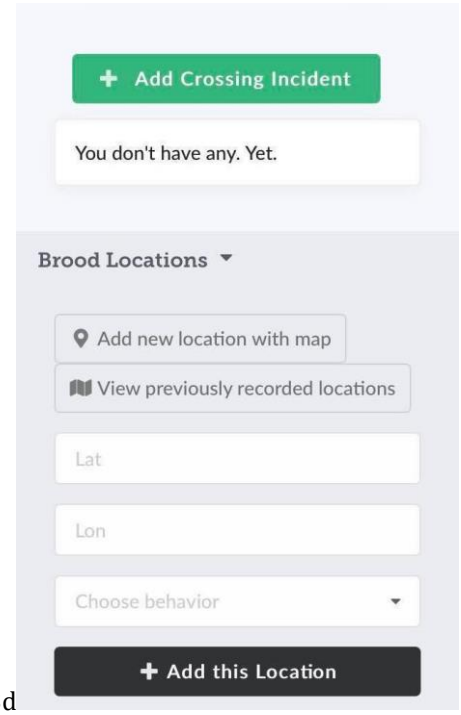
3a



3b



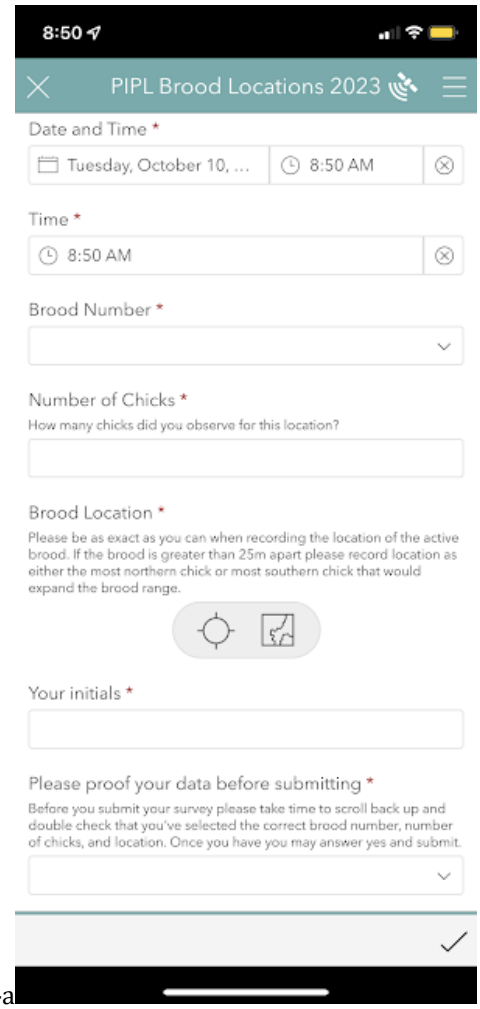
3c



3d

Figure 4) Piping Plover Brood Check Survey123 Form

In addition to recording information on broods in NestStory, shorebird monitors utilized the Survey123 app, which was available via mobile device through an access link OR available preloaded onto iPads distributed to shorebird monitors daily (4a). This form allowed shorebird monitors to record brood locations and chick counts while also auto-populating the ArcGIS Field Maps nest map with brood locations (4b) [brood location denoted by colored diamond, fledged brood denoted by star-shaped nest location, active brood denoted by green circle at nest location, and lost brood/nest denoted by red circle on nest location].

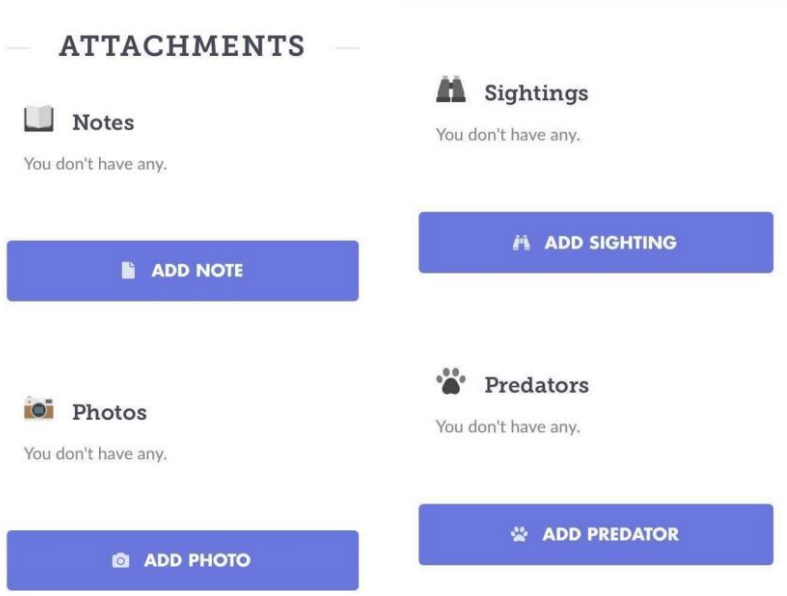


4a

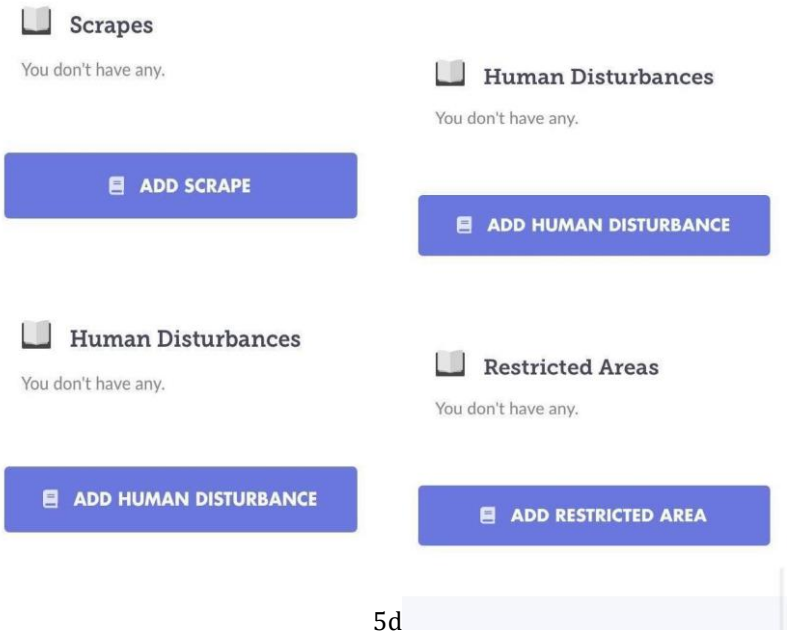
4b

Figure 5) 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 (5a, 5b, 5c, & 5d). The attachment options are available both in individual nest checks, colony/crossover proximity check for Least Terns, and for the overall monitoring period ("mission").



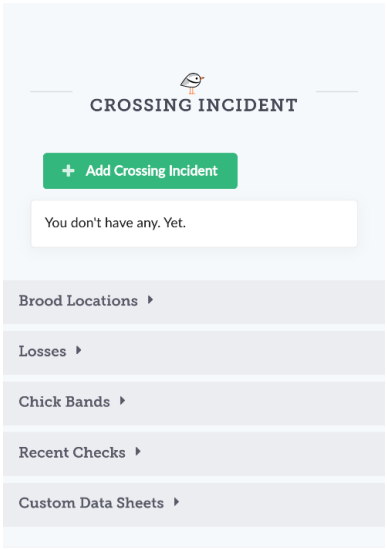
5a 5b



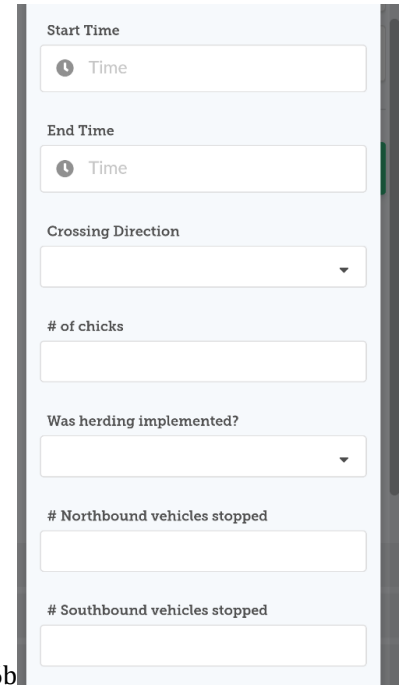
5c 5d

Figure 6) Brood Road Crossing Forms

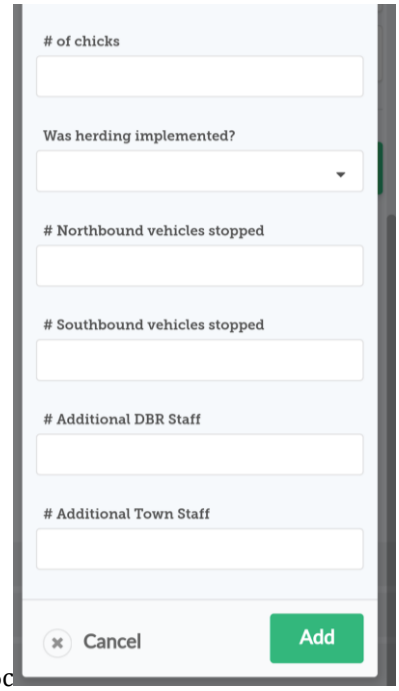
This form is filled out in NestStory for every observed crossing and compiled in the Crossing Log (6c-d). It is accessed from within the unique Nest Check Form for an individual brood (6a). The location of the crossing must be added after the form is completed, using the Edit Location option shown below (6d).



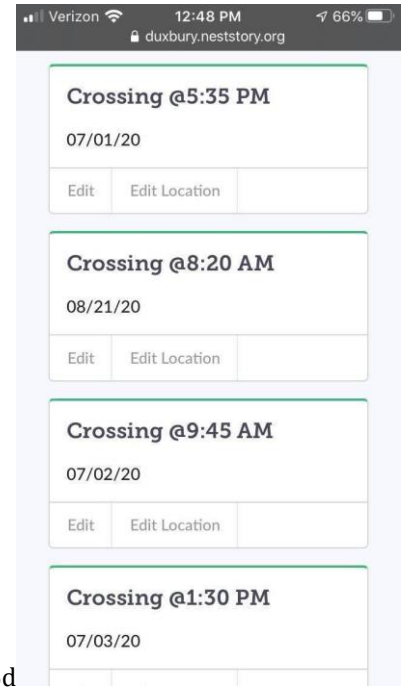
6a



6b



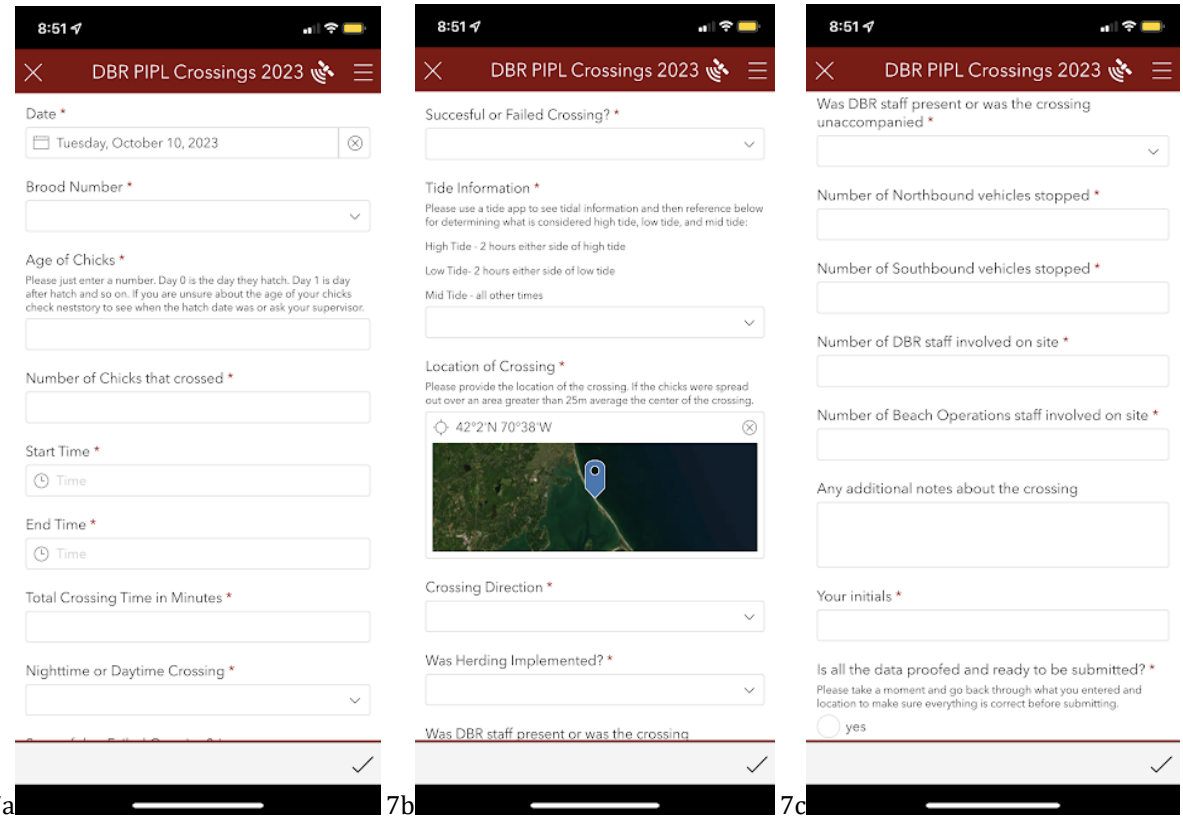
6c



6d

Figure 7) Piping Plover Brood Road Crossing Survey123 Form

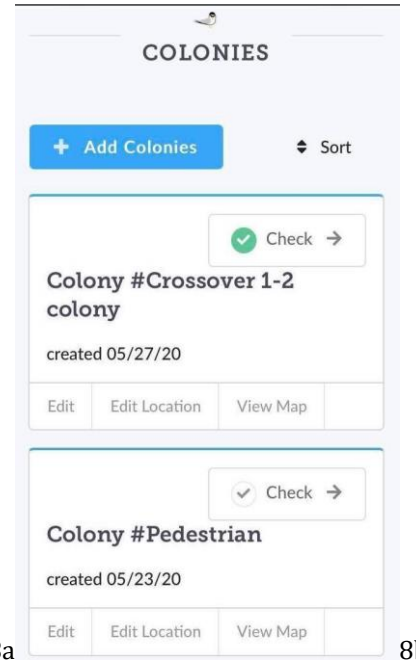
In addition to the NestStory crossing form, a Survey123 "DBR Piping PloverCrossings 2023" form was also filled out via the Survey123 app by DBR staff following the completion of a road crossing (7a, 7b, & 7c). The collected crossing location would autofill into the ArcGIS map, with that information accessible through the Field Maps app for better data visualization.



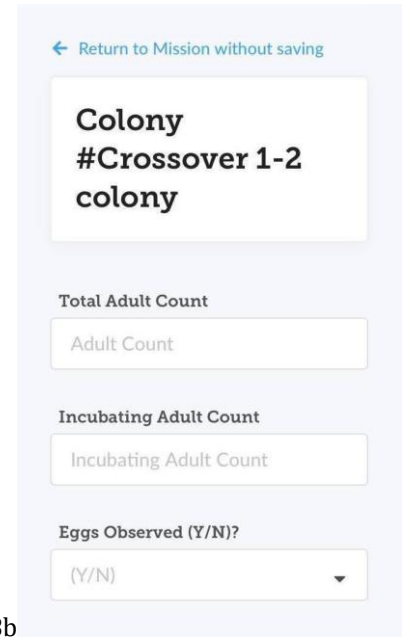
7a 7b 7c

Figure 8) Least Tern Colony Check Form

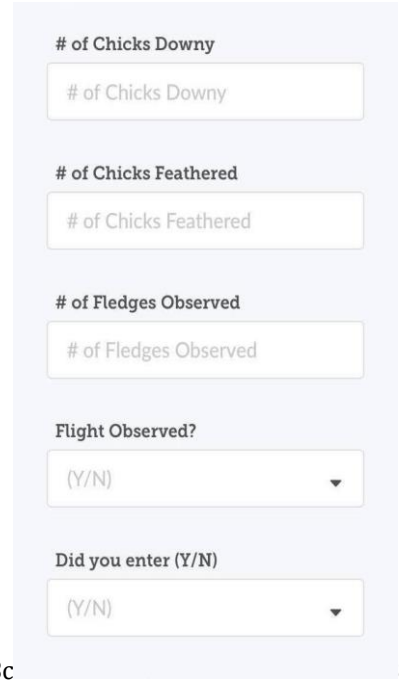
This form is used to get counts of adults and chicks in each colony found on the beach. As with the other Least Tern form, the attachments section has the same options as those found in the Piping Plover Nest Check Form (8a, 8b, 8c, & 8d).



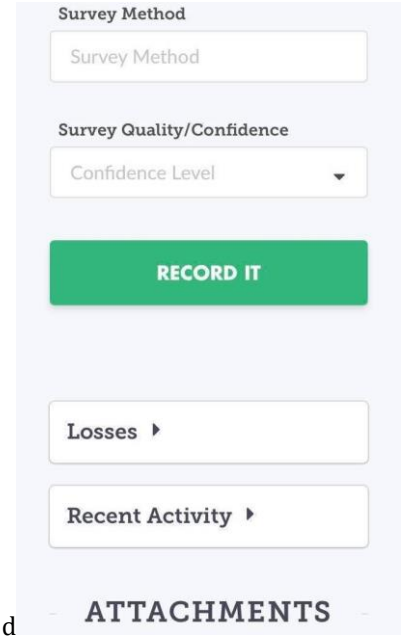
8a



8b



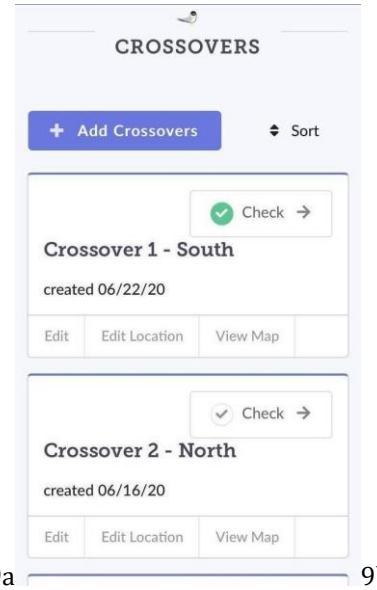
8c



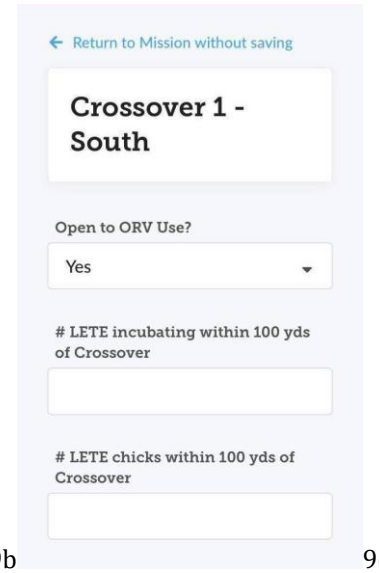
8d

Figure 9) Least Tern Crossover Proximity Check Form

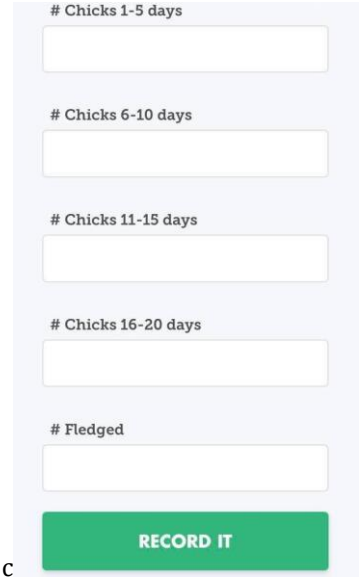
When OSV crossovers are open, this form is used to regularly document when Least Tern chicks are near the open crossover. If chicks get within 15m from the open area and herding is necessary, that is recorded using this form as well (9a, 9b, 9c, 9d, & 9e). The attachments section is the same as that in the Piping Plover Nest Check Form.



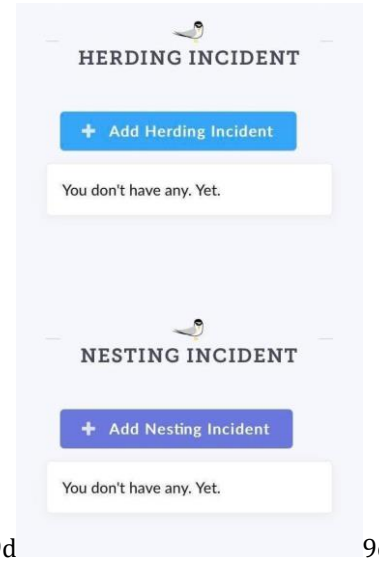
9a



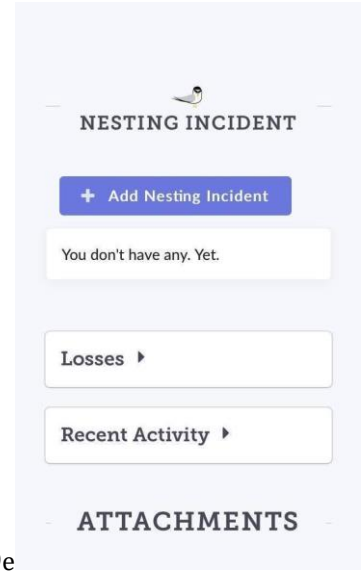
9b



9c



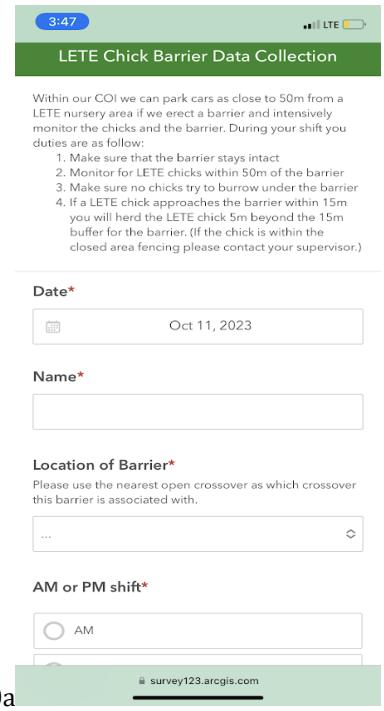
9d



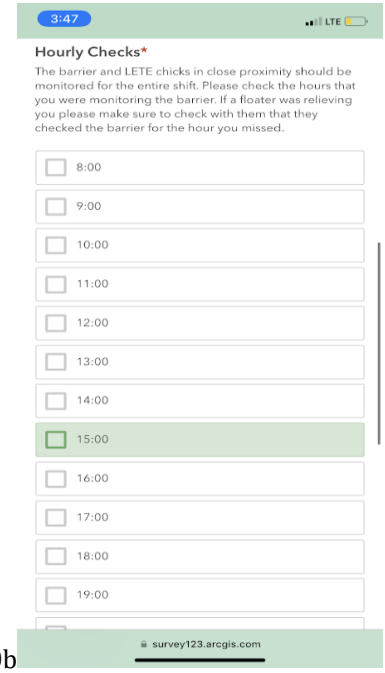
9e

Figure 10) Least Tern Barrier Check Survey123 Form

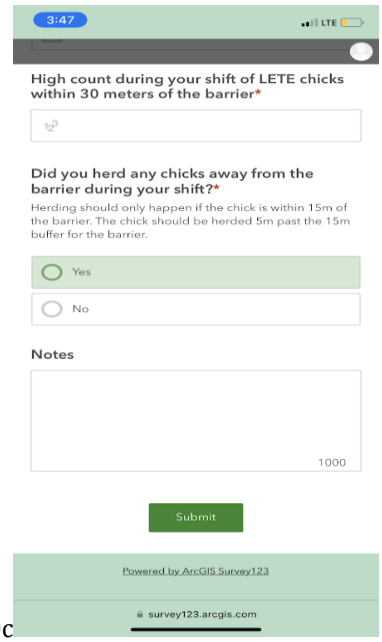
When barriers are utilized on the OSV to increase vehicle access in proximity of less than 100m but greater than 50m from an incubating Least Tern or a Least Tern chick, shorebird monitors were stationed at each barrier used. In these instances there was constant monitoring of the adjacent Least Tern nursery and hourly checks on Least Tern activity completed by filling out the "Least Tern Chick Barrier Data Collection" survey (10a, 10b, & 10c).



10a



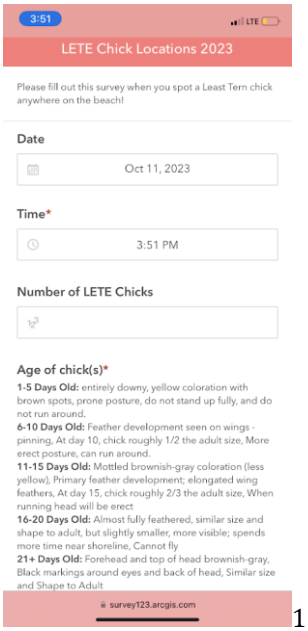
10b



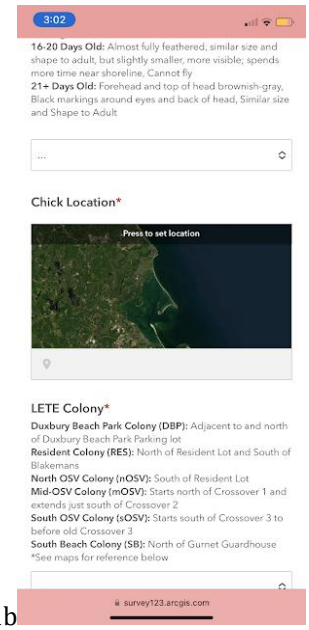
10c

Figure 11) Least Tern Chick Survey123 Form & Field Maps

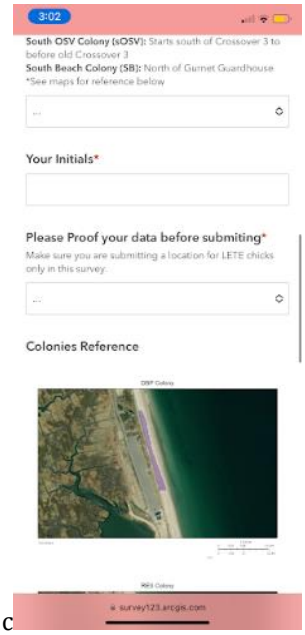
All DBR staff had access to the Survey123 form "Least Tern Chick Locations 2023" which allowed staff to record observed Least Tern chick locations and age classes (11a, 11b, 11c, & 11d). Inputted Least Tern chick locations would autopopulate in the ArcGIS Field Maps app. During colony surveys, field technicians and monitor supervisors could also directly input found Least Tern nests and Least Tern chicks into the Field Maps app (11e).



11a

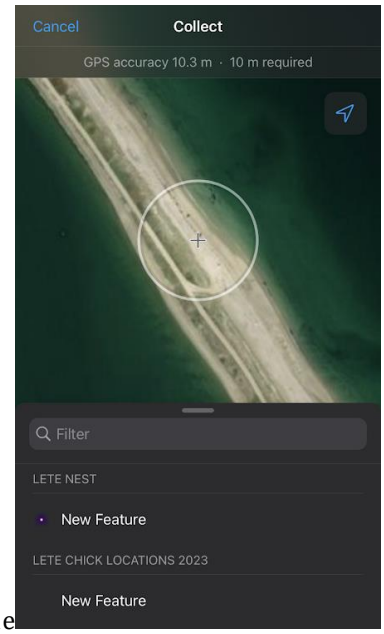


11b



11c

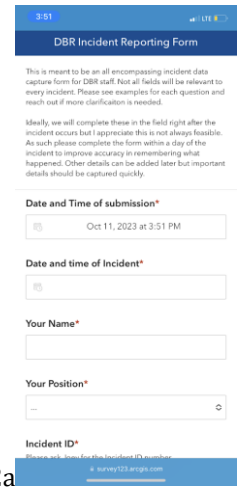
11d



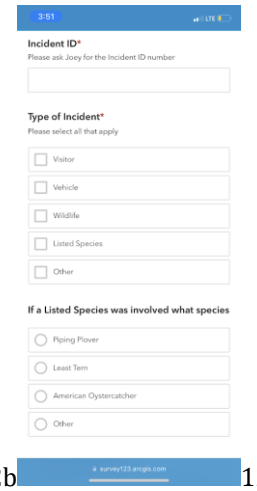
11e

Figure 12) Incident Report Survey123 Form

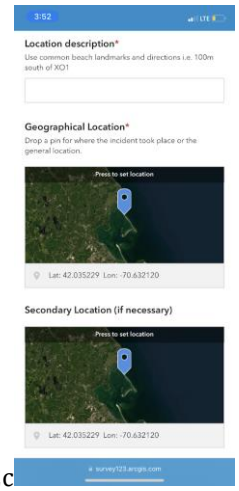
In instances where an incident occurred involving Piping Plovers, Least Terns, other wildlife, DBR staff, visitors, or any other outlying party, DBR staff was provided with the "DBR Incident Reporting Form" via Survey123 (12a-12g). Incidents include, but are not limited to; harassment of wildlife, harassment of DBR staff, road loss of a Piping Plover chick, personal injury, and so on.



12a

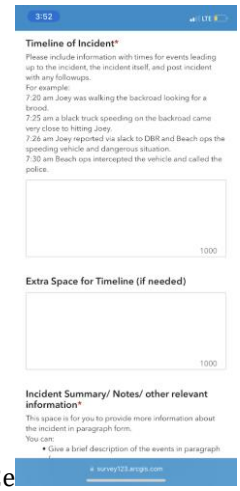


12b



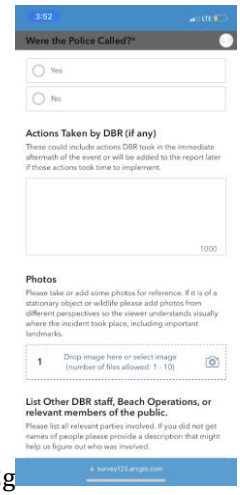
12c

12d



12e

12f



12g

Figure 13) Shorebird Monitor Assignment Sheet and End of Day Brood Location Sheet

Excerpt of the 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. Broods color-coated based off of zone location, and red tiles signify a lost nest/brood while green represents a fledged brood (13a). Paper data sheets were completed by monitor supervisors at shorebird monitor check-out (18:00) to inform Town and DBR staff present after 18:00 (13b). If nighttime OSV access is closed then this sheet is also used to inform DBR staff arriving at 06:00 the following day of last known brood locations and activities.

13a

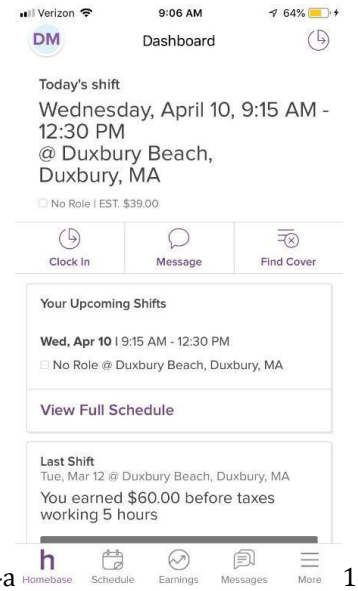
	A	B	C	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY
3	Zone	Monitor coverage (2 days be	Nest/Coverage	June 30	July 1	July 2	July 3	July 4	July 5	July 6	July 7	July 8	July 9	July 10
4	NA		AM/PM monitor	Chantal AM/ Lily	Courtney AM/ D	Declan AM/ Elidh PM		Charlotte AM/ Ni	John AM + Kira /	Johanna Am/Ale	Lily (Pm)	Allie am/Chantal	Nico AM/ Alexis	Natalie/Lily
5	NA		Floater	Olivia		Kaye			Kaye	Natalie p	John	Elidh	olivia	Allie
6	ONE	06/10/2023	27A	John	Olivia	Lily		Abi	David	Natalie C	Sam	Nico	Kaye	Jon
7	ONE	06/10/2023	25A (lost 6/26)											
8	ONE	05/22/2023	18A	John	Olivia	Lily	fledged							
9	ONE	06/20/2023	36A	Courtney	Olivia	Lily / Cam		Chantal		Jonathon	Courtney	John	Natalie P	Natalie C
10	ONE	05/21/2023	02A	Courtney	Cam	Nico /Cam	fledged							
11	ONE	06/05/2023	22A	Courtney	Cam	Nico		Cameron	Nico	David	Nico	Olivia	Sophie	Alexis
12	ONE	NA	BS Zone 1 coverage	Charlotte	John	Courtney (36A)		Chantal		Jonathon	Courtney	John	Natalie P	Natalie C
13	TWO	07/09/2023	11C										Allie	Courtney
14	TWO	06/01/2023	09A (lost 6/12)											
15	TWO	05/28/2023	06A	Jonathon	Lily	Natalie P		courtney	Lily	Lily				
16	TWO	07/07/2023	41A								Maggie	Cam	Allie	Charlotte
17	TWO	05/28/2023	20A	Jonathon	Lily	Natalie P		Natalie C	Chantal	Lily	Maggie	Cam/ Fledged		
19	TWO	06/29/2023	19B			Natalie P		Natalie C	Chantal	Lily	Maggie	Cam	Allie	Charlotte
20	TWO	07/12/2023	30B											
21	TWO	05/29/2023	07A	Alexis	Allie	Abi		Kira	Charlotte	Olivia				
22	TWO	NA	BS Zone 2 (pedestrian path no	Cam	Lynn	Allie		Jonathon	Johanna	Elidh			Cameron	Johanna
23	THREE	NA	BS Zone 3	Cam (05)	Lynn	Allie (05A)		Jonathon	Johanna	Elidh	Johanna	Maggie	Cameron	Johanna
24	THREE	06/01/2023	12A	Alexis	Allie	Abi		Kira	Charlotte	Olivia	Declan	Sam	David	
25	THREE	05/28/2023	05A	Alexis	Allie	Abi		Jonathon	Johanna	Elidh	Johanna	Maggie	Cameron	Johanna
26	THREE	06/02/2023	08A (lost 6/6)											
27	THREE	05/22/2023	03A (lost 6/10)											
28	THREE	05/28/2023	13A (lost 7/3)	David (BS)	Abi	Charlotte	lost							
29	THREE	06/09/2023	29A (lost)											
30	THREE	05/19/2023	01A (lost)											
31	THREE	07/16/2023	01B											
32	THREE	05/19/2023	15A (roadside) (lost)											

13b

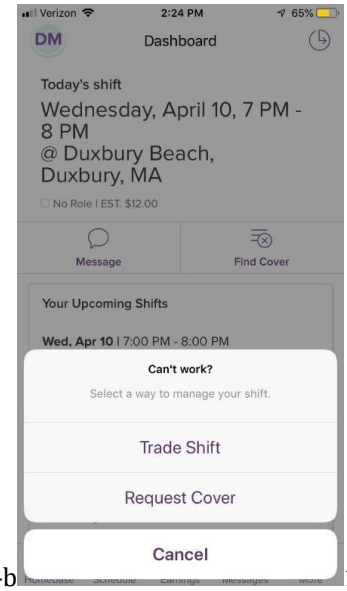
End of Day Brood Locations			
Brood #	#Chicks	Location	Crossing Activity

Figure 14.) ***Homebase Scheduling Application***

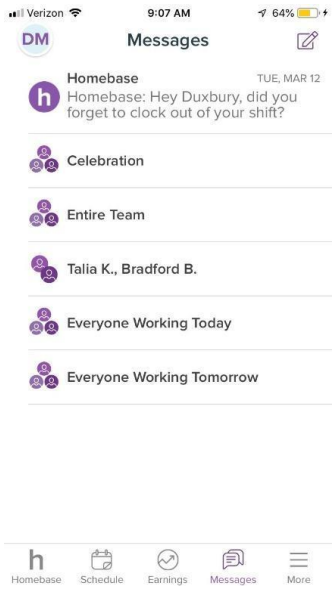
DBR staff utilize the Homebase app to create schedules, assign/trade/cancel shifts based on staffing needs and communicate internally. The dashboard shows each staff their current shift, upcoming shifts, and allows the user to navigate to other functions within the app (schedule, earnings, message) (14a). 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 (14b). DBR staff can use the Homebase app to communicate with monitor supervisors, co-workers, or larger groups. This function is used by monitor supervisors to give training reminders during relevant points in the season. Shorebird 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 (14c). Cell phones are also used for this purpose. 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.



14a



14b



14c

Data Tables

Data 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

Data 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)

Data 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**

Data Table 4) *Data entry form for use with the implementation of Semi-permanent Least Tern barriers to reduce Least Tern chick buffers from 100m to 50m.*

Date	Time Start	Time Off	Colony Code	# Least Tern incubating within 100 meters	# Least Tern Chicks within 100 meters

Data Table 5) *Data entry form for use with the implementation of an escort corridor*

Date	Time	Brood Number	Colony Code	# of PIPL chicks	# of LETE chicks	Number of PIPL chicks in 30ft safety corridor	Number of LETE chicks in 30ft safety corridor	Time/ number of chicks herded

Data Table 6) *Data entry form for use with the implementation of an escort corridor*

Date and travel window	Corridor location	Length	Number of PIPL and LETE chicks (i.e. 2/12)	Change in corridor? (length or location)	Contingencies (*i.e. medical emergencies, inclement weather, violations)*	Number of vehicles