

MISSION STATEMENT & VISION

PRESERVE DUXBURY BEACH TO SAFEGUARD
THE ADJACENT BAYS AND MAINLAND, PROTECT
WILDLIFE AND VEGETATION, AND PROVIDE
RECREATIONAL OPPORTUNITIES FOR ALL.



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Photo Credit: Karen Wong

Dear Friends,

Please join us as we celebrate our 100-year anniversary of preserving Duxbury Beach, a place so many of us treasure, whether you live here or visit from another town or state. The Reservation kicked off the start of our second century having just completed a major restoration of the dune structure between the first and second crossovers, a very narrow section of the beach that needed to be strengthened. Check out the new dune as you walk or drive over the crossovers and notice the width across the top of the dune and the gradual incline to the ocean side. The dune has been designed to slow wave energy and increase coastal resilience.

This dune work is an important step in proactively protecting Duxbury Beach as concern mounts for the impacts of sea level rise and increased frequency and intensity of storms. Due to the loss of access to federal reimbursement for storm damage repairs, we must be financially secure to face these challenges.

We are grateful for everyone's support, especially as we look to the future. The Reservation is planning on implementing large-scale coastal resilience work on the rest of the beach in the coming years. As we move forward with these projects, we thank you for your past support and generosity. We are thankful to all of you who lent a hand, and we are excited to continue the tradition of protecting and sharing this beautiful natural treasure with each of you.

Margaret "Maggie" Kearney President





100TH YEAR CELEBRATION

In 2019, Duxbury Beach Reservation, Inc. celebrates its 100th anniversary of owning and preserving Duxbury Beach. It is an important milestone for the Reservation and an important achievement for coastal conservation. While many beaches have been armored, subdivided, or fallen under state or federal ownership, Duxbury Beach has remained under the guardianship of the Reservation, a non-profit committed to its preservation and protection. The Reservation is proud of what has been accomplished these past 100 years and incredibly excited to celebrate with all who love and enjoy beautiful Duxbury Beach.

To commemorate the centennial, the Reservation has compiled its first annual "Impact Report", which covers the history of Duxbury Beach and its guardianship – its successes, setbacks, and future challenges. It is also an opportunity to look more closely at our recent history. The year 2018 had its ups and downs. A series of devastating storms, including three nor'easters in March of 2018, reminded us all how valuable and how vulnerable Duxbury Beach is.

The year 2018 ended amid the construction of one of the Reservation's largest dune restoration projects. The dune renourishment took place along one of the most narrow and endangered sections of the barrier beach. However, this work is only a small part of the coastal resilience efforts needed and we are looking ahead to the future. The work does not end with this milestone but will continue in order to preserve, protect, and enjoy Duxbury Beach.

AVOIDING DEVELOPMENT

For more than thirty years, plans were in motion to divide Duxbury Beach into 200 house lots. This would have resulted in a <u>very</u> different Duxbury Beach today! Several Duxbury families, fearing Duxbury Beach would become overdeveloped, raised enough money to purchase Duxbury Beach and thus the Duxbury Beach Association was formed. This was when the mission of Duxbury Beach Reservation truly began.

A BRIEF HISTORY

The Wright Family of Duxbury bought Duxbury Beach in 1887 and created plans to divide the beach into house lots. The Powder Point Bridge was built to provide access to this proposed community of summer cottages. Three houses were built but were subsequently moved off the beach after the Portland Gale of 1898 flattened Duxbury Beach and ended the dreams of the developer. Following World War I, eighteen Duxbury summer residents raised \$15,000 through subscriptions of \$100 per share and purchased the beach from the Wright Family. They took title as the Duxbury Beach Association with the declared objective "to preserve Duxbury Beach against encroachment detrimental to Powder Point and the Town of Duxbury." In 1974, the Duxbury Beach Association transferred ownership of the beach to Duxbury Beach Reservation, Inc., a Massachusetts nonprofit corporation created to fulfill the mission.

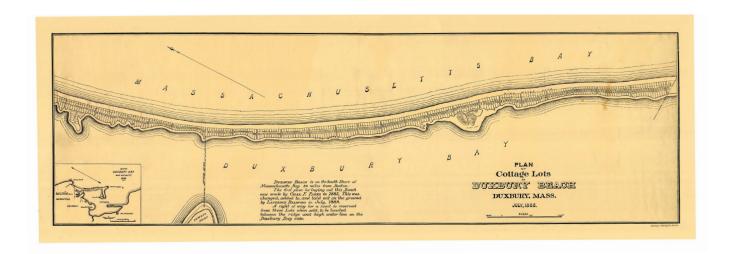




Photo Credits: Jason Wolfson

LOOK BACK TIMELINE

Duxbury Beach Association constructs resident parking lot at the east end of the Powder Point Bridge and a public parking lot to the north

U.S. Army guards the coast (builds gun emplacements, digs trenches, practices maneuvers)

After damage to dunes from "beach buggies," the town votes \$4,500 for a summer police patrol and the Association provides a jeep

1931

1942

1956

1919

Frederick S. Pratt leads the charge in the purchase of Duxbury Beach for the Duxbury Beach Association, a common law trust

1941

Association builds a new public parking lot, improves the road, and constructs the Pavilion, also known as "Blakeman's", and part of today's Duxbury Beach Park

1950

The Town of Duxbury begins selling parking permits to finance the policing of the resident parking lot

1962

Volunteers organize the first beach clean-up



Town leases the beach from the Association Duxbury resident for the first time for initiates first experiments \$12,000 and hires a using snow fencing to beach conservation officer feet wide trap sand 1973 1964 1978 1966 1973 1975

The Blizzard of 1978, the worst storm since the Portland Gale of 1898, causes 26 major wash-throughs--one was 1,200 feet wide

The federal government designates piping plovers federally threatened species

1978 1986

1984

Duxbury Clipper

beach

prints ad: "Wanted,
Dead or Alive,"
requesting tinsel-free
Christmas trees for
erosion control on the

Duxbury resident leads 27 students in first beach grass planting effort Duxbury Beach Association transfers ownership to Duxbury Beach Reservation, Inc. (DBR), a

registered 501(c)3 non-profit

The Reservation places post and cable fencing along the back road to Gurnet-Saquish

to define the roadway

Photo Credit: Laurie Wenham



LOOK BACK TIMELINE

Battelle Institute sponsors the first annual international Coast Sweep Beach Cleanup on Duxbury Beach The No-Name Storm flattens most of beach and DBR hires contractors to retrieve 400,000 cubic yards of sand from the bay, salt marshes, and parking lots

DBR constructs second sacrificial dune after nor'easter wipes out first dune and volunteers plant 300,000 culms of beach grass on new dune DBR inserts steel rods at key points along the beach to monitor long-term and seasonal changes in beach morphology

1988

1991

1994

1998

1990

DBR begins tracking piping plover nesting and hires endangered species officer to oversee program in late 1990s 1992

DBR constructs "sacrificial dune" along entire beach and volunteers plant 500,000 culms of beach grass on new dune 1995

DBR creates Duxbury Beach Preservation Society to raise funds for beach preservation projects and future storm repairs 1999

DBR begins creating artificial nesting habitat areas for piping plovers on the bayside south of High Pines to encourage nesting away from recreational areas



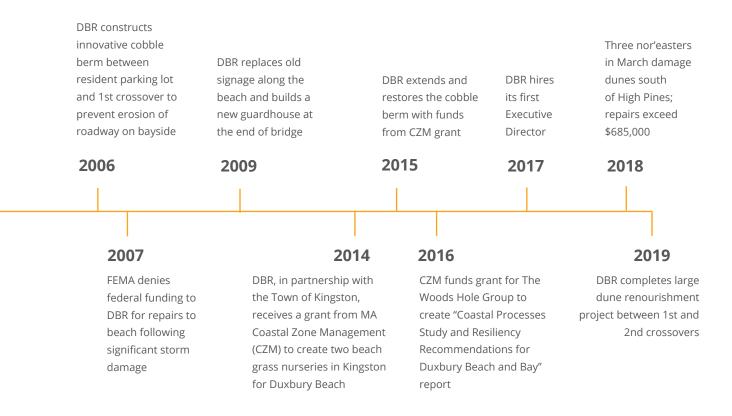


Photo Credit: Sheila Lynch-Benttinen

MANAGEMENT PROJECTS

Since 1919, the trustees of Duxbury Beach have tried and tested a number of different ideas and strategies for managing the beach's many uses and users. These include mitigating storm damage and erosion, maintaining infrastructure for recreation and safety, and providing public access.

REDUCING COASTAL EROSION

The stewards of Duxbury Beach have long recognized the impacts from storms and uncontrolled human use on erosion of the beach and dunes, and over the years they have implemented creative ways of mitigating the losses.

Early work to mitigate erosion came after a three day nor'easter in 1933 when material that broke off the damaged Powder Point Bridge was used to construct a fence intended to act as a "sand catcher." In the 1960s trustees and Duxbury town officials realized how detrimental human recreation, particularly driving could be to the beach. Throughout the 1960s and 70s, a number of new methods were put in place, including attaching sand fencing to the Coast Guard poles running to Gurnet, placing Christmas trees to trap the sand, and planting beach grass and woody shrubs. Some of these methods have continued and developed with time and testing, such as sand fencing and plantings, while others have been deemed less useful and potentially detrimental, like the use of Christmas trees to build dunes.

The Blizzard of 1978 put much of this erosion control work to the test. Although major repairs were needed, the Reservation noted that in the areas where snow fence and beach grass had been, the damage was considerably less. Again, the Reservation rebuilt the dunes and road, installed sand fence and planted beach grass to stabilize the dune. Recognizing the need for more extensive resilience work, the Reservation constructed the first "sacrificial dune" on Duxbury Beach following the "No-Name" storm of 1991. In recent years, the Reservation has continued to test new methods of dune preservation using rows of snow fence, differing patterns of grass planting, and cobble berms to prevent the back road from eroding on the bayside. The Reservation is constantly looking toward new technology and research for improving and protecting the beach while retaining its natural character.

Protecting Duxbury Beach means balancing many interests and requires extensive management. To the right is the wide-ranging list of methods utilized for assessment, maintenance, and improvement.

1 VULNERABILITY & RISK ASSESSMENTS

- Measure changing beach & dune profile
- Coastal Processes Study & Resiliency Recommendations
- Species assessment







2 NATURAL STORM DAMAGE PROTECTION

- Cobble berms
- Sacrificial dunes
- Dune repair

3 MAINTENANCE

- Dune renourishment
- Cobble berm restoration
- Beach grass nurseries
- Eradication of invasive plants
- Planting beach grass & woody vegetation
- Fertilization of vegetation



4 BEACH ACCESS

- · Roadway retreat landward
- Raising roadway
- Road pitch & slope evaluation
- Crossover redesign and repairs
- Road grading and repaving

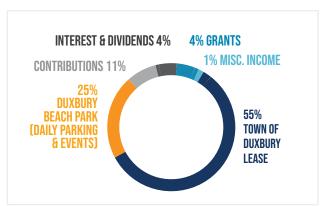


5 HARDWARE & ECOLOGICAL

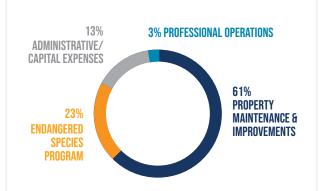
- Sturdy fencing
- Sand fencing
- Post and cable fencing
- · Artificial habitats
- Nest and brood fencing
- Predator evaluation

FY 2018 FINANCIALS

REVENUES, GAINS & OTHER SUPPORT



EXPENSES



In 2018, Duxbury Beach Reservation, Inc. had a solid financial foundation, in large part due to contributions from prior years. This support was evident when a Blizzard in January, followed by three nor'easters in March required immediate funds to remedy storm damage and preserve access to the beach. Duxbury Beach relies on state grants, private contributions and other sources to guard and maintain the barrier beach while protecting Duxbury and Kingston and allowing the enjoyment for all without Federal Emergency Management Agency support.

Financial Highlights:

It is all thanks to our contributors. In 2018 we saw a 27% increase in private donations compared to 2017, allowing us to perform necessary coastal resilience work.

In 2018, the Reservation received exciting news! The Massachusetts Office of Coastal Zone Management announced we had been awarded the largest Coastal Resilience Grant in the state. In 2019, this \$500,000 grant will help fund a \$1.4 million dune renourishment project.

MARCH NOR'EASTERS

2018 STORM IMPACT

Past contributions from generous donors enabled the Reservation to respond quickly and effectively to the March 2018 nor'easters that slammed Duxbury Beach. In 2018, the Reservation spent approximately \$685,000 restoring dunes, rebuilding the road, mending fencing, and planting vegetation.

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

Year ended October 31, 2018 (dollars in hundreds)

ASSETS

ASSETS

	Total Assets	4,573,527
•	Investments	4,309,895
•	Cash and cash equilivents	263,631

LIABILITIES AND NET ASSETS

LIABILITIES

	Total Liabilities	157,073
•	Rockland Trust Line of Credit	149,948
•	Accrued Expenses	7,125

NET ASSESTS

	Total Liabilities and Net Asset	4,573,527
	Total Unrestricted Net Assets	4,416,454
•	HCP Grant	10,000
•	Unrestricted Storm Damage Fund	2,427,009
•	Unrestricted General Fund	1,979,445

CONSOLIDATED STATEMENTS OF ACTIVITIES

Year ended October 31, 2018 (dollars in hundreds)

CHANGES IN UNRESTRICTED NET ASSETS

REVENUES, GAINS AND OTHER SUPPORT

Total Revenues	1,310,790
Misc. Income	11,031
Grants	55,539
Interest and dividends	56,329
Contributions	132,982
Duxbury Beach Park (daily parking & events)	329,759
Town of Duxbury lease	725,150

EXPENDITURES

	Total Expenditures	1,910,246
	Professional Operations	64,933
•	Administrative/Capital Expenses	245,265
•	Endangered Species Program	434,937
•	Property maintenance and improvements	1,165,111

FY 18 CHANGES IN NET ASSETS*

Net assets, Beginning 5,015,910 Net Assets, Ending 4,416,454

^{*}Decrease due to March nor'easters, see text box to the left

2018 PROJECTS

IN 2018, EXTENSIVE PLANNING,
PERMITTING, AND CONSTRUCTION
WORK TOOK PLACE ON DUXBURY
BEACH BY DUXBURY BEACH
RESERVATION, INC. AND PARTNERS.
THE RESERVATION'S TECHNICAL
COMMITTEE, EXECUTIVE DIRECTOR,
AND RESERVATION COORDINATOR
OVERSAW ALL WORK TO ENSURE
REGULATORY COMPLIANCE AND TO
GUARANTEE THAT EACH PROJECT
WAS IN KEEPING WITH THE MISSION
OF THE RESERVATION.



5.5 MILES OF SAND FENCING

Help build dunes



1. VEGETATED BERM

Decrease impervious surface area



BEACH GRASS & SHRUB PLANTING

Holds dune in place



2. REPAVING & CROSSWALKS

East end access to beach



22 DUMPSTERS OF DEBRIS

Clean up the beach after winter storms

2

5 Beach

6

5

Duxbury Bay

3



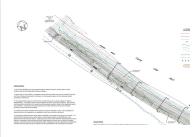
5.RADIO-FREQUENCY IDENTIFICATION SYSTEM

Electronic car counting system

High Pines

4

5



6. SURVEY & DESIGN FOR DUNE RENOURISHMENT

Increase coastal resilience





7. 350' STURDY FENCING

Slows wave energy



3. SAND BERM

Help to dissuade pedestrian disturbance



4. ROAD REPAIR

Maintain access



IT TAKES A VILLAGE





SPRING CLEAN-UP AND COASTSWEEP

During 2018, approximately **350 volunteers** combed the beach and removed **5.6 tons** of debris, rotten posts, and damaged sand fencing.





BEACH GRASS PLANTING

Over the course of **2 days**, volunteers worked in teams to plant **18,000 culms** of beach grass along more than **1 mile** of beach.





WOODY SHRUB PLANTING

Volunteers lent their strong backs and got their hands dirty planting **8,000 woody shrubs** at a restored dune area and near the resident parking lot.

THANKS TO YOU

One hundred years of battering storms and countless repairs. A century's worth of beautiful beach days and starry beach nights. Hundreds of smiles, ice creams, plover chicks, and sandcastles. **All of it has been thanks to you.**

Over the past ten decades volunteers young and old and from near and far, have spent countless hours preserving and protecting Duxbury Beach. Thanks to you, we can all continue to enjoy this amazing place. The Duxbury Beach volunteer community has taken on everything from testing new erosion control methods, organizing planting and clean-up efforts, protecting and improving the beach through signage, outreach, and a multitude of other projects.

In 2018 you made time for multiple beach clean-ups and planting days. You learned new skills and shared your expertise to take on important projects. With over 4.5 miles of beach to care for, the Duxbury Beach Reservation relies on its volunteers and you have never let us down!

CELEBRATING 100 YEARS

The Reservation is celebrating in 2019 the amazing dedication, ingenuity, and tireless efforts of all those who have supported DBR – as donors, volunteers, partners, trustees, and directors – over the past 100 years. More importantly, we want to celebrate the coming century and all the amazing memories and exciting work yet to come. None of this would be possible without the incredible group of volunteers who have lent their energy, knowledge, and passion for Duxbury Beach to put together a number of community and outreach events, with a big celebration to cap it all off!

EVERYONE'S BEACH

Duxbury Beach Reservation is proud to be part of the South Shore community. One hundred years ago, the question of dividing the beach into housing lots came to a close. It was then that the dream of protecting Duxbury Beach for its valuable natural resources, its role as an irreplaceable protective barrier, and its countless recreational opportunities came to be. Duxbury Beach means something different to all of us - it's somewhere to relax on a sunny day, walk or jog all year long, hold family celebrations, reflect on troubles, admire the view, and so much more. Duxbury Beach Reservation is committed to preserving Duxbury Beach because it is more than a feature of the coastline, it is a part of the community.



Photo Credit: Barbara Van Dingstee

MARGARET AND ME

"How do I describe Margaret?

She was my friend, my mentor, and elder with a wealth of information on how to live in harmony with the environment. Margaret had a deep love and respect for all that nature provided, and she was a brilliant observer of the natural world. Once a week, Margaret, my 90-pound yellow lab, Kody, and myself piled into my FI Cruiser and headed for Duxbury Beach and a trip down the Gurnet Road. A stop at "French Memories Bakery", was a must. Margaret always came back to the car with two donuts and a coffee made with lots of sugar and cream. This menu was not chosen for her, but for Kody. By the time we crossed the Powder Point Bridge and got onto the dirt road, Margaret, my car, and Kody were covered in donuts and coffee. Our journey was always a lesson in being present in the moment whether it was the clouds in the sky, the wind blowing the beach grasses, the waves, the color of the water, or the birds or animals that gifted us with their presence. We would drive at a crawl and stop every few feet to get a better look at whatever caught our attention. We were always grateful to the harbormaster and the young men in their official trucks who stopped to check on the two old ladies. The uniqueness of the habitat at Duxbury Beach provided us with many breathtaking gifts from Nature: snowy owls, birds of prey, ducks, piping plovers, coyotes running on dunes, a buck dancing in the marsh. There was the bittersweet moment of discovering a dead whale on the beach, the magnificence of seeing the entire massive mammal out of the water yet feeling the deep sadness at its death. One bright, magical morning we stood in the middle of the dirt road holding our arms out as monarch butterflies surrounded us landing on our outstretched limbs.

Margaret, my good friend, died last year, and now Kody and I take our journey down to Duxbury Beach alone. Last week, I witnessed something I've never seen in all my years, a snowy owl attacking a Northern Harrier. Kody and I knew it was Margaret saying hello. I raised my coffee cup and gave the dog another piece of donut."

- Barbara Anne Prince, Writer, Educator

The things I remember from 50s and 60s: Getting a 5 cent bounty on horseshoe crabs. Watching the telephone poles move from the bay side of the beach to the outside through the years. Water skiing behind cars/jeeps/trucks at low tide on the outer beach

- Wells Dow, lived on Cove St from 1948-1998

"My 2 favorite beach memories, pregnant with my first and then him playing at the beach 1 yr later."

- Sarah Hopkins and son Quinlan



"I have been coming to duxbury beach since I was a child. I have now raised all three of my kids coming here since babies it's our second home in summer. I have so many great memories and I can't wait to continue to make more."

- Kristen Chesna



"We spend such quality family time at Duxbury Beach"

- Paul Munzing



Photo Credit: Paul Munzing

"

I love walking and running on the beach in the fall, winter and spring when you are the only one out there with "all of America behind you." In April 2018 I was walking the beach with my golden, Gracie-June, as humpback whales were rolling, blowing and breaching just offshore. It was surreal. I counted ten of them. I have walked the beach my whole life and never experience anything like this.

- Capt. David Bitters, Baymen Charters

"...always fun filled times of beauty" - Patti Johnston





"Although I've had many favorite occasions on the beach running into the freezing water and running out again, I remember also in 1941-5 (?) jumping into the large circular holes made for gun emplacements. They were about five feet deep, and the sides were propped up with sand bags. We played commandos and jumped in, then squatted down quickly (before "the enemy" could see us). I was terribly disappointed when, after the war, I went out to Long Beach (as it was called then) expecting to find my favorite hangout. But they were nowhere to be found—the town had filled them in."

- Lorrie Hall



"Day or night, it's the place to be"

- Caroline Burns



Photo Credit: Douglas Bannerman



"I grew up in Duxbury and began collecting Indian arrowheads in the first grade. In 1976, I became a member of the Massasoit Chapter of the Massachusetts Archeological Society. Our group has done several "digs," including digs on the Gurnet where we discovered arrowheads and tools, many of them much larger than the ones we have found on the mainland. The speculation is that the larger arrowheads were used to spear seals and perhaps whales."

- Dennis Martin, Kingston, MA



"My parents Peyton & David Wells owned a restaurant Fiddler's Green (now the Sun Tavern) and we were able to spend a lot of summer days out on the beach with friends and just loved it. Most of these are with me and my brothers, Mason & Squire Wells. We were not allowed to grill out at night like you can now."

- Selden Tearse

"

When my family first arrived in Duxbury in 1955 there were no cars on the beach with the exception of an occasional dune buggy. We enjoyed picnics in the dunes, which were once substantial features, and at night, when the sand was still warm. we would watch the sky for shooting stars and satellites. Fishing for blues was exciting and provided a great feast to be shared with friends that evening. Families often celebrated New Years Day with a stroll and one family brought their goat for that special outing. And when 911 occurred and no planes were in the sky, the beach provided a place to reflect and it was so quiet and peaceful. The beach is a gift that we must never take for granted. 77

- Holly Morris

DUXBURY BEACH WILDLIFE

Duxbury Beach is much more than just a bathing beach. The 4.5-mile stretch of beach contains a variety of habitat types that provides opportunities for hunting and foraging, raising young, and finding shelter. The oceanside and bayside beaches and dunes, saltmarshes, and wooded areas each offer a unique set of resources for many plant and animal species.

Beach visitors are familiar with the piping plovers and least terns, which receive special protection due to their status as listed species under federal and state law. Visitors may be less familiar with some of the other species that use Duxbury Beach seasonally and throughout the year. Horseshoe crabs lay tens of millions of eggs along the shoreline, particularly along the beach's bayside. These eggs serve as a snack for scores of shorebirds, like killdeer and willets, who use the beach to raise their chicks or for those like sanderlings and semipalmated sandpipers which may stop to feed for a few days during their long migration.

In late summer and early fall, the beach teems with different

species of sandpipers, gulls, plovers, and terns. In the winter, south bound snowy owls are captured at Logan Airport and released on Duxbury Beach.

Northern harriers glide and dive along the dunes, hunting for voles and other small mammals. Duxbury Beach hosts abundant plant life, several mammalian species, and numerous shellfish sheltered in the flats and bays behind the beach. Indeed, the list of species that use or benefit from Duxbury Beach seems endless.

2018 marks the first time the Reservation has begun to put names and numbers to the species that spend time here.

Using employee observations, as well as citizen science data from websites like ebird.com and inaturalist.com, the Reservation has been able to compile a list of all mammal, plant, and avian species spotted on Duxbury Beach during 2018. The Reservation hopes to track this data seasonally and over several years to learn more about which species use Duxbury Beach.









Photo Credit: Sheila Lynch-Benttinen

ONGOING RESEARCH

One of Duxbury Beach Reservation's chief goals is to protect the natural resources of the beach that provide important habitat for plants and wildlife and serve to maintain the barrier beach itself. To do so, DBR strives to understand this unique coastal feature.

PIPING PLOVER HABITAT CREATION

Perhaps best known among the wildlife inhabiting Duxbury Beach are the piping plovers that return each spring and summer to nest and raise their chicks. This threatened species of shorebird often comes into conflict with beachgoers, whose recreational activities pose a danger to the small, camouflaged eggs and chicks. Duxbury Beach Reservation has experimented for almost two decades on how to alleviate some of the pressure and to better share Duxbury Beach. DBR began creating artificial nesting habitat areas in 1999 in hopes of attracting plovers away from recreational areas and giving them direct access to prime chick foraging areas. Over the last 19 years, DBR has worked to determine the best method of construction and maintenance of habitat areas. More intensive data collection began in 2018 through a state grant to determine specifically what habitat characteristics are most attractive to plover pairs.

PLOVER/TERN MONITORING

Along with the piping plovers, each summer brings a new cohort of shorebird monitors to the beach to monitor and protect young plover chicks. In 2018, monitors were equipped with new field datasheets for collecting a variety of information. This data will enable DBR to learn more about the birds and other animals that call Duxbury Beach home in the summer: How much space are the chicks using on the beach? Where and how long are road crossings? And much more. Duxbury Beach is one of the larger sites for piping plover nesting in the state. Many challenges related to protected species nesting have and will continue to come up in relation to managing recreation and implementing beach maintenance projects. DBR plans to use the data collected throughout the season to ensure management is timely and effective and to help plan for the future.

VEGETATION

As the birds begin to nest and beachgoers come out to enjoy the warmer weather, the beach grass and other plants play their own important role. Vegetation is the glue that holds the dunes together. The strong, dense root systems hold sand and cobble in place and the stalks and branches above ground slow wind and catch sand. The Duxbury Beach Reservation began planting beach grass in 1973 in hopes of slowing erosion and strengthening the barrier beach. Experienced and knowledgeable Reservation trustees have tested, altered, and tweaked planting programs for decades to ensure the species, configuration, location, and maintenance of beach plantings are just right for Duxbury Beach. This work continued in 2018 with a mini-experiment to compare the use of two beach rose species, *Rosa rugosa* and *Rosa virginiana*, on a restored section of dune.

MOVING AHEAD

The Reservation plans to continue efforts to study and better understand the barrier beach, plants and wildlife that reside within the system. In 2019, DBR will begin collecting data on the coastal resilience project between Crossovers 1 and 2. This includes tracking alterations to the restored dune's slope and width, growth of the recently planted grass and shrubs, and changes in sediment color.

PLOVER HABITAT CREATION 2018 STATS

3,336
SQ FT OF HABITATS

2
PAIRS OF PLOVERS

4
CHICKS FLEDGED

72%
OF SCRAPES WERE > 0.5 METERS FROM VEGETATION



ENDANGERED SPECIES PROGRAM

Working cooperatively with the Town of Duxbury and Mass Audubon's Coastal Waterbird Program, Duxbury Beach Reservation monitored and protected nesting piping plovers and least terns.

PIPING PLOVER

Twenty-four pairs of piping plovers nested along Duxbury Beach, from Duxbury Beach Park to the Gurnet-Saquish Guardhouse. This number represents fewer pairs in 2018 compared to 28 pairs in 2017. Productivity, however, increased greatly from 0.39 to 1.0 chick fledged/pair.

Piping plover hatching success also increased, from 21% of nests in 2017 to 71% in 2018. The major causes of egg loss at Duxbury Beach remained consistent with previous seasons. Predation was the leading cause of egg loss, followed by overwash from flood tides and storms.

LEAST TERN

One hundred and fifty-two pairs of least terns nested in six areas in 2018, compared to 192 pairs in 2017. The terns produced 65 fledglings, an amazing number when compared to 2017, during which no chicks survived to fledge. The primary cause of least tern egg loss in 2018 was suspected to be fox and coyote predation based on observations of tracks through the colonies.

2018 SHOREBIRD MONITORING EFFORT

Coastal Natural Resource Monitors & Supervisors Hired:	
Total Monitoring Hours:	18,475
Total Monitoring Shifts:	2,435
Monitoring Start and End Dates:	May 20—September 8



YOUR FEEDBACK

Duxbury Beach Reservation may be turning 100 years old, but we know there is always more to learn about the beach and those who visit it. In 2018, DBR set out to learn more about Duxbury's beachgoers. The Reservation set up three surveys for different parts of the beach. Each survey reveals more about who visits the beach and how they use it. This endeavor will provide insight into recreational use and attitude that is important when making decisions regarding beach management, maintenance, and outreach.

- It's a family affair! About 60% of respondents said they came to the beach with family.
- The 900+ survey respondents visited Duxbury Beach from 96 towns in Massachusetts, 14 states, and 3 countries.
- 68% of respondents said they spend 3-5 hours at the beach each visit.
- Duxbury Beach visitors are well-informed! When asked about their awareness of how certain challenges may impact Duxbury Beach now or in the future, visitors showed a high level of awareness.
 - 92% responded as "very aware" or "somewhat aware" of the role of the beach in providing habitat for wildlife
 - 82-87% visitors reported being at least "somewhat aware" of the potential threats to the beach due to climate change, from sea level rise, increased storm activity and changes to daily weather patterns.
 - 76% reported being "very aware" or "somewhat aware" of the barrier beach's ability to buffer communities from sea level rise and storm impacts
 - Overall, visitors to the over-sand area of the beach or the town-leased pedestrian beach responded as being more aware of all potential concerns than visitors to Duxbury Beach Park.

CROSSOVER DUNE RESTORATION

This past winter, the Duxbury Beach Reservation took on one of its largest dune renourishment projects in its 100 year history. The project which covered the dune structure between the first and second over-sand vehicle crossovers represents a portion of the resilience work needed to strengthen and preserve Duxbury Beach. However, it is an exciting and much-needed first step. This very narrow section of the barrier beach suffers from increased wave energy which has been pulling sand away from the dune. Restoration work serves to strengthen the entire barrier beach by adding sand to a sediment-starved system and protecting the beach from breaching in this area. Dune restoration increases the beach's ability protect the communities behind it, particularly in the face of sea level rise and increased frequency and intensity of storms.

The dune restoration project is the product of extensive research and modeling work. It represents the third step in the process of project conception, design, and implementation—created by Woods Hole Group, an environmental engineering firm, and funded in part by the MA Office of Coastal Zone Management (CZM) Coastal Resilience Grants. With finalized plans in place, DBR received a \$500,000 Coastal Resilience Grant through CZM during summer 2018 to fund a portion of the \$1.4 million restoration work. The construction took place during December 2018 through March 2019 by SumCo Eco-Contracting with oversight from the Reservation and the Woods Hole Group.

Of course, dune restoration is not as simple as adding sand to the beach. Extensive prep work was involved and multiple steps were taken to ensure that the restored dune matched the design specs for increased resilience. This meant taking measurements on slopes, dune width, and dune height as each section was finished. Although it is difficult to predict exactly what Mother Nature will throw at Duxbury Beach next, this work will have many benefits.



- Dune nourishment feeds a sand-starved system by adding compatible material
- Restoration assists in strengthening the barrier beach structure
- · The damage to landward areas is postponed by extending the shoreline toward the ocean
- · Nourished area will weather storms much better than non-restored sites. If some sand is eroded and moves it is doing its job

The next time you are out on Duxbury Beach or visiting any of our precious coastal resources, remember that these are fragile and incredibly important areas. To help preserve them, be sure to stay on designated paths and roads, respect fencing, and stay off vegetation – your intrusion exacerbates erosion problems. Place trash in receptacles or take it with you. These simple steps will help protect the wildlife in these coastal habitats and adjacent oceans and bays. Dune restoration projects like this one do not end when the trucks stop rolling: they need your cooperation.

76,633

TONS OF SAND

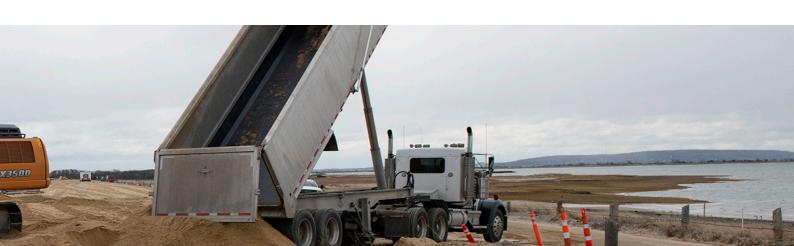
3,500'

DUNE RAISED TO 17FT AND THE TOP OF THE DUNE WAS BUILT OUT TO >45FT 3,600'

FEET OF SAND FENCING WAS REPLACED TO PROTECT THE DUNE FROM FOOT AND VEHICLE TRAFFIC AND TRAP SAND TO HELP BUILD THE DUNES 80,000

CULMS OF AMERICAN BEACH GRASS AND 100 WOODY SHRUBS 2

CROSSOVERS RAISED & REALIGNED





UPCOMING COASTAL RESILIENCE WORK ON DUXBURY BEACH

The Duxbury Beach Reservation is embarking on an ambitious program to increase the resilience of Duxbury Beach with a new, all-inclusive approach to barrier beach management. This large-scale platform will allow the Reservation to assess and prioritize resilience work efficiently and in a cost-effective manner. The Reservation's submission, which is expected to result in a 10-year certification, will provide us with the flexibility to respond to impacts due to increased storm intensity and frequency and rising sea levels.

In implementing a coastal resilience project, the first step is to submit and receive regulatory permits. It can take months to secure the proper authorizations between preparation of the submission and the review process. Furthermore, there are seasonal work restrictions that projects need to be scheduled around. Rather than submitting one project at a time, under the Reservation's all-inclusive approach, we will submit a single Expanded Environmental Notification Form for many projects. This multi-project submission will encompass an analysis of all proposed projects, possible alternatives, potential environmental impacts, and mitigation measures.

PROJECT LIST INCLUDES

- BEACH RENOURISHMENT
- DUNE RENOURISHMENT
- ROAD ADJUSTMENT
- COBBLE BERM MAINTENANCE
 & EXPANSION
- SALTMARSH RESTORATION

LOOKING AHEAD

The past 100 years have seen many changes to Duxbury Beach - rising tides, shifting dunes, increasing storms, new regulations, and so much more. We have helped the beach to withstand and adapt to all of these changes. But the work does not end here. The Reservation will continue to sustain the beach as a protective barrier beach and at the same time bolster dunes, protect plants and wildlife, maintain roadways and access paths, care for parking lots and buildings, and preserve the beach for the enjoyment of all.

In our second century, Duxbury Beach Reservation is committed to looking forward. We are working to assess and prioritize projects with constant attention to new information about how current and future changes will impact the beach. The resilience work, and other exciting steps developed with your support, will work to preserve the valuable and beneficial ecosystems and services provided by the barrier beach.

YOUR SUPPORT

DUXBURY BEACH RESERVATION

To support the Duxbury Beach Reservation's work to maintain and restore Duxbury Beach, please join our email list at www.duxburybeach.com or follow on Facebook, Instagram, or Twitter to stay up to date on volunteer opportunities and other news. Help preserve and protect so we can all enjoy Duxbury Beach for the next 100 years and more!

Duxbury Beach Reservation, Inc. is a 501(c)3 charitable organization

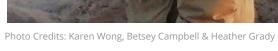














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DUXBURY BEACH RESERVATION, INC. P.O. BOX 2593, DUXBURY, MA 02331 INFO@DUXBURYBEACH.ORG