Marshfield
Beach Management Plan
FINAL

Prepared For:
Town of Marshfield
870 Moraine Street
Marshfield, MA 02050

Prepared By:
Woods Hole Group, Inc.
81 Technology Park Drive
East Falmouth, MA 02536

December 2017

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(508) 540-8080

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1.0 INTRODUCTION

1.1 OVERVIEW

The Town of Marshfield is located in the east coast of Massachusetts approximately half way between Cape Cod and Boston, and is bordered by the towns of Duxbury, Pembroke, Norwell, and Scituate (Figure 1-1). Its Atlantic coastline consists of over 5 miles of coastline. This coastal environment is one of the Town's most valuable natural resources and is comprised of a number of important resource areas, including but not limited to, coastal beaches, coastal dunes, barrier beaches, salt marsh areas, and federal and state-listed shorebird habitat.

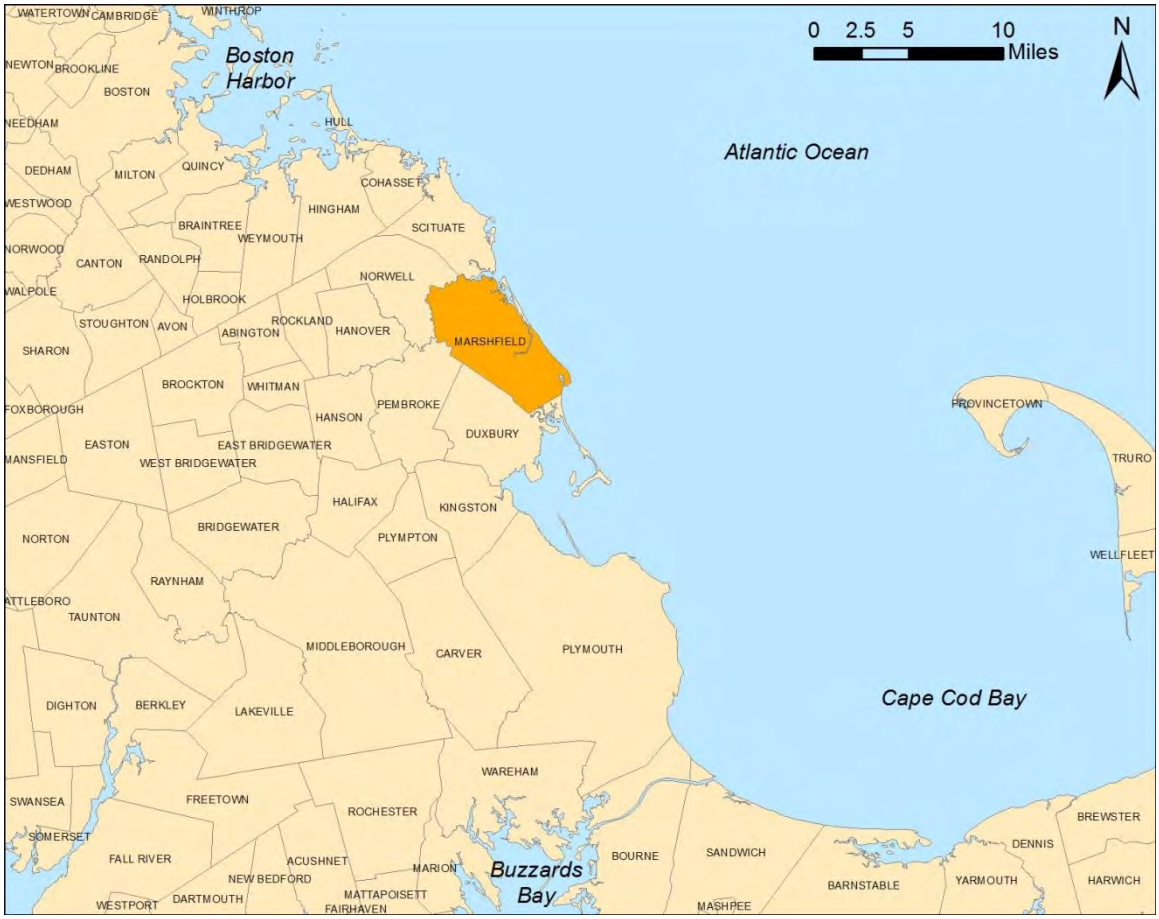


Figure 1-1. Geographic location of the Town of Marshfield.

Clearly defining the Town's goals and objectives for this Beach Management Plan is a crucial step in directing the writing and recommendations. The goals of the Beach Management Plan are to preserve and enhance the natural and recreational functions of the Marshfield public beaches, and to guide future management decisions. To achieve these goals, the following objectives were identified for the Beach Management Plan:

- Develop an inventory of natural and anthropogenic resources, and existing conditions at each public beach site that will serve as a reference document for beach managers.
- Develop a management program to preserve and enhance the natural and recreational functions of Marshfield's public beaches.
- Identify planning, maintenance and monitoring activities that will facilitate improved management of the beaches.

1.2 PUBLIC INVOLVEMENT

To fully engage the public the process of developing this Beach Management Plan, an online public survey was conducted and two public meetings were held. The public survey had 1302 respondents. The questions and a summary of the responses are provided in Appendix A.

The public meetings were held at key points in the process. The first meeting occurred in May 2017 and provided an overview of the Beach Management Plan development process, as well as a presentation of the public survey results, the existing conditions maps, and the shoreline change analysis. By having a public meeting early in the plan's development, this event provided the opportunity for residents to voice any comments, concerns or ideas that had about the Plan. The second public meeting occurred in October 2017 to present the draft plan and solicit any additional public feedback.

Figure 1-2. Green Habor Beach (photo taken from Bay Avenue ramp).

2.0 EXISTING CONDITIONS

The Town of Marshfield manages six public salt water beaches along the Massachusetts Bay shoreline. From north to south these include Rexhame Beach, Winslow Avenue Beach, Fieldston Beach, Sunrise Beach, Brant Rock Beach and Green Harbor Beach (Figure 2-1).

Figure 2-1. Map of public beaches in the Town of Marshfield.

To provide a basis for the long-term management of Marshfield's public beaches, an inventory of historical and existing conditions was performed. Information from aerial photographs, as well as from dredge and beach nourishment records were reviewed to document geomorphologic and anthropogenic changes to the beaches. Current conditions were also documented through site visits, resource area delineations, and review of aerial imagery, digital photography, and Town and State GIS databases. This background information is critical for the development of effective recommendations to guide future management of Marshfield's natural public beach resources.

Descriptions of the natural features and coastal processes, as well as the anthropogenic features and public beach services, are provided separately for each beach location. The physical components of the sites such as the size, type and extent of resource areas, protected species, vegetation, and topography are also discussed. Rates of historical

shoreline change are provided as well. Anthropogenic features such as coastal engineering structures, fencing, parking areas, restrooms, and buildings are also identified and displayed in a site map for each beach. Finally, a summary of the recreational and visitor services provided by the Town of Marshfield at each of the public beaches is included.

Existing conditions plans for the public beaches are provided in Appendix A. These plans were generated using Geographic Information System (GIS) data layers provided by the Town of Marshfield, as well as data layers created for the following attributes: restrooms, parking attendant locations, life guard stands, fencing, coastal structures, and wetland resource areas. These newly created data layers were mapped using a combination of field mapping and digitization off recent orthophotography (2014 available from MassGIS). Mapping information for Estimated and Priority Habitat was obtained directly from the Massachusetts Division of Fisheries and Wildlife Natural Heritage & Endangered Species Program (NHESP 2008). Information on storm surge elevations and flood zone designations for each beach was obtained from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) revised November 4, 2016 for the Town of Marshfield. Data describing the rate of shoreline change was obtained from the Massachusetts Shoreline Change Project (Theiler et al. 2001).

2.1 REXHAME BEACH

Rexhame Beach is located along the northern shoreline of Marshfield. The main point of access is from the public parking lot at the end of Standish Street, but there is semi-private pedestrian access from the ends of all the side streets from Porter Street to Parker Street, except East Street which is completely private (Figure 2-3). Rexhame Beach is a barrier beach, backed by the South River. The Town owned portion of Rexhame Beach extends from approximately 300 feet south of the Scituate Town line in the north, to Porter Street in the south; there is a single 4.6-acre lot between the Town owned portion of Rexhame Beach and the Scituate town line (Figure 2-3) that is a parcel of interest for future Town property acquisitions (see Activity 4.1.9 in Section 4). North of Parker Street, the Town owned parcel extends the entire width of the barrier, encompassing the beach, dune, scrub-shrub forests, and salt marsh bordering the South River. From Parker Street to Porter Street the private ocean front properties extend only to mean high water (MHW); the Town of Marshfield owns the beach itself. Rexhame Beach includes approximately 5,000 linear feet of ocean facing shoreline (Figure 2-2).

Figure 2-2. Rexhame Beach (facing south).

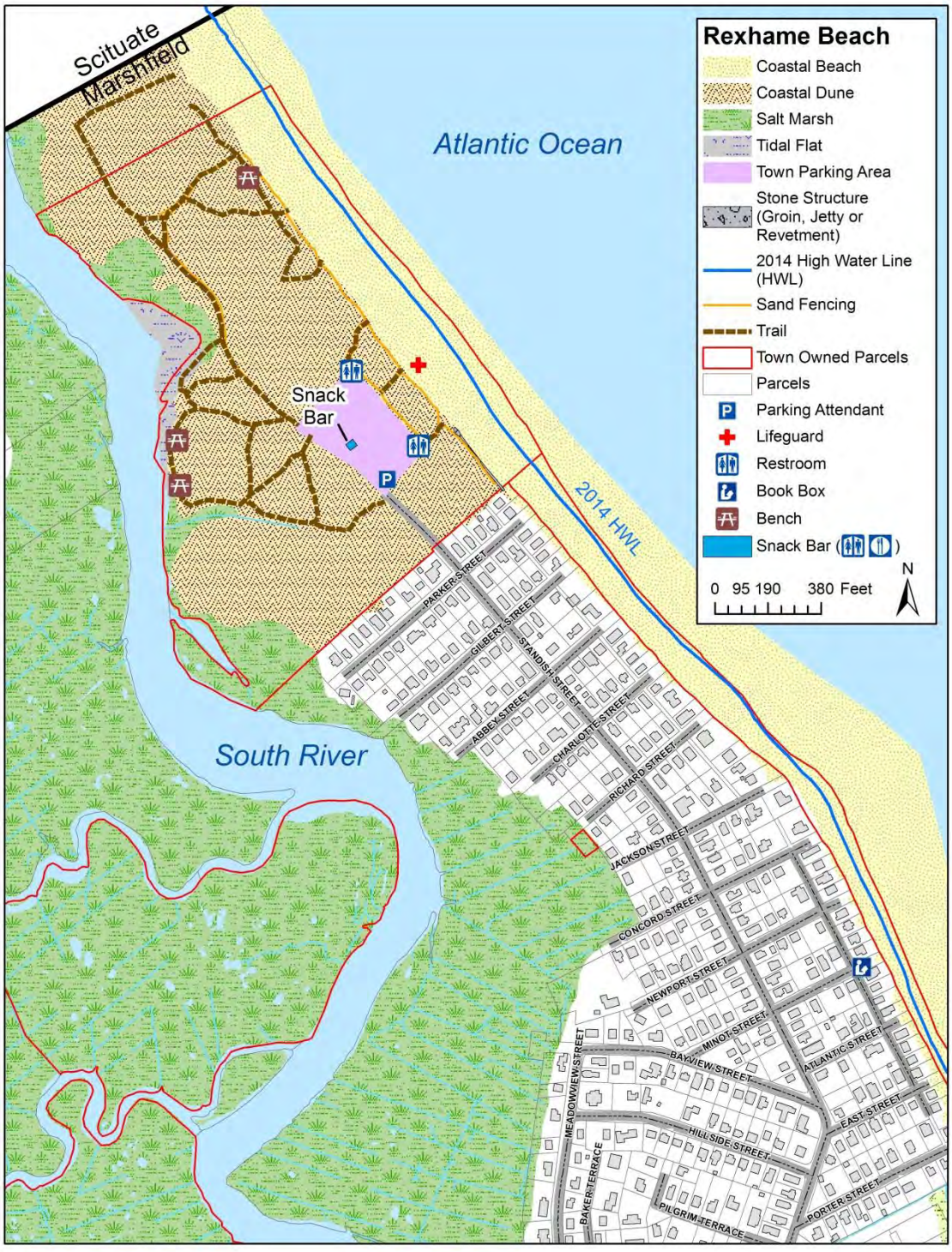


Figure 2-3. Rexhame Beach existing conditions.

2.1.1 Natural Features and Coastal Processes

The majority of the unimproved section of the Rexhame Beach parcels is classified as Barrier Beach, Coastal Beach, Coastal Dune, and Salt Marsh (Figure 2-3). Other resources present include Land Under the Ocean, Ponds, Rivers, Lakes. Vegetation on the Coastal Dunes consists primarily of American beachgrass (Ammophila breviligulata), Northern bayberry (Morella caroliniensis), and Beach vetchling (Lathyrus japonicas), as well as the non-native Beach wormwood (Artemisia stelleriana). In the scrub-shrub forested portion of the property, vegetation is dominated by Northern bayberry (Myrica pensylvanica), Eastern red cedar (Juniperus virginiana) and Staghorn sumac (Rhus typhina). In the salt marsh portion of the property, vegetation is dominated by Smooth cordgrass (Spartina alterniflora), Salt hay grass (Spartina patens), and Marsh elder (Iva frutescens). Rexhame Beach is one of the only public beaches in Marshfield with a relatively wide high tide beach. The beach near the public parking lot is predominantly sandy, with scattered gravel and cobbles. Grain size analysis (Appendix C) from a sample taken from the intertidal area in the vicinity of the central beach access path from the main parking lot indicated that the sediment at Rexhame Beach is largely sand (99.8%), with 0.2% fines (i.e., silt or clay). Farther south (between Jackson Street and Porter Street), the beach material is predominantly cobbles.

The Massachusetts Department of Environmental Protection (MassDEP) began a program to map the state's eelgrass resources in 1995, and has completed multiple assessments between 1995 and 2013. None of these assessments have indicated the existence of eelgrass in the vicinity of Rexhame Beach. MassGIS contains a Shellfish Suitability layer, which represents areas that are believed to be suitable for shellfish based on the expertise of the MA Division of Marine Fisheries, local Shellfish Constables, input from commercial fishermen, and information contained in maps and studies of shellfish in Massachusetts. These maps represent potential habitat areas. This Shellfish Suitability data indicate the entire length of the subtidal portion of Rexhame Beach is suitable for surf clam spawning and settlement, and the portion of the South River backing the Rexhame property is suitable for blue mussel spawning and settlement.

The Natural Heritage & Endangered Species Program (NHESP), part of the Massachusetts Division of Fisheries and Wildlife, is responsible for the conservation and protection of hundreds of species that are officially listed as Endangered, Threatened or of Special Concern in Massachusetts. At Rexhame Beach there are at least one species of bird protected by the NHESP: the Piping Plover (*Charadrius melodus*), which is considered Threatened federally, as well as in the state of Massachusetts. MassAudubon's Coastal Waterbird Monitoring Program has observed infrequent Piping Plover nest activity at the north end of Rexhame Beach, but none of the nesting attempts in the last 6 years have produced chicks. At least one species of rare or threatened plant is also present in the Rexhame dunes. To better protect and manage these species, the NHESP has developed and outlined areas of Priority Habitats, which are based on the known geographical extent of habitat for all state-listed rare species, both plants and animals. Priority Habitat mapped for the Rexhame Beach area is displayed in Figure 2-4. Estimated Habitats, another designation of NHESP that represent a sub-set of the Priority Habitats excluding areas specific only to plants, are also present at Rexhame Beach, and

encompass a slightly smaller area than the Priority Habitat areas. Given the potential for impacts to state-listed species, any work planned for the Rexhame area should involve a consultation with NHESP prior to the finalization of plans.

Figure 2-4. Natural Heritage and Endangered Species Program Estimated and Priority Habitat at Rexhame Beach.

Information on historical shoreline change for Rexhame Beach was obtained from the Massachusetts Shoreline Change Project (MSCP; Theiler et al. 2001), and updated with one recent year of aerial photography (2014). The MSCP compiled relative positions of at least five historical shorelines between 1844 and 2009 for all seaward facing coastal areas within Massachusetts. For this analysis, MSCP shoreline data from the following years was used for the Rexhame Beach area: 1858, 1952, 1978, 2000, 2001, and 2008. Original sources for the historical shorelines were NOAA/NOS topographic maps, hydrographic maps, FEMA topographic maps, orthophotos, and aerial photographs. In addition, Woods Hole Group digitized and added shoreline position information for 2014. The high water shoreline positions for each year are depicted along with the transect locations where the shoreline change statistics were calculated in Figure . Both transect numbers and the rates of change (feet/year) from 1858 to 2014 and from 2000 to 2014 are shown in Figure . Table 2-1 provides a summary of the long-term rates of change from 1858 to 2014, as well as more recent shoreline change rates between 2000 and 2014.

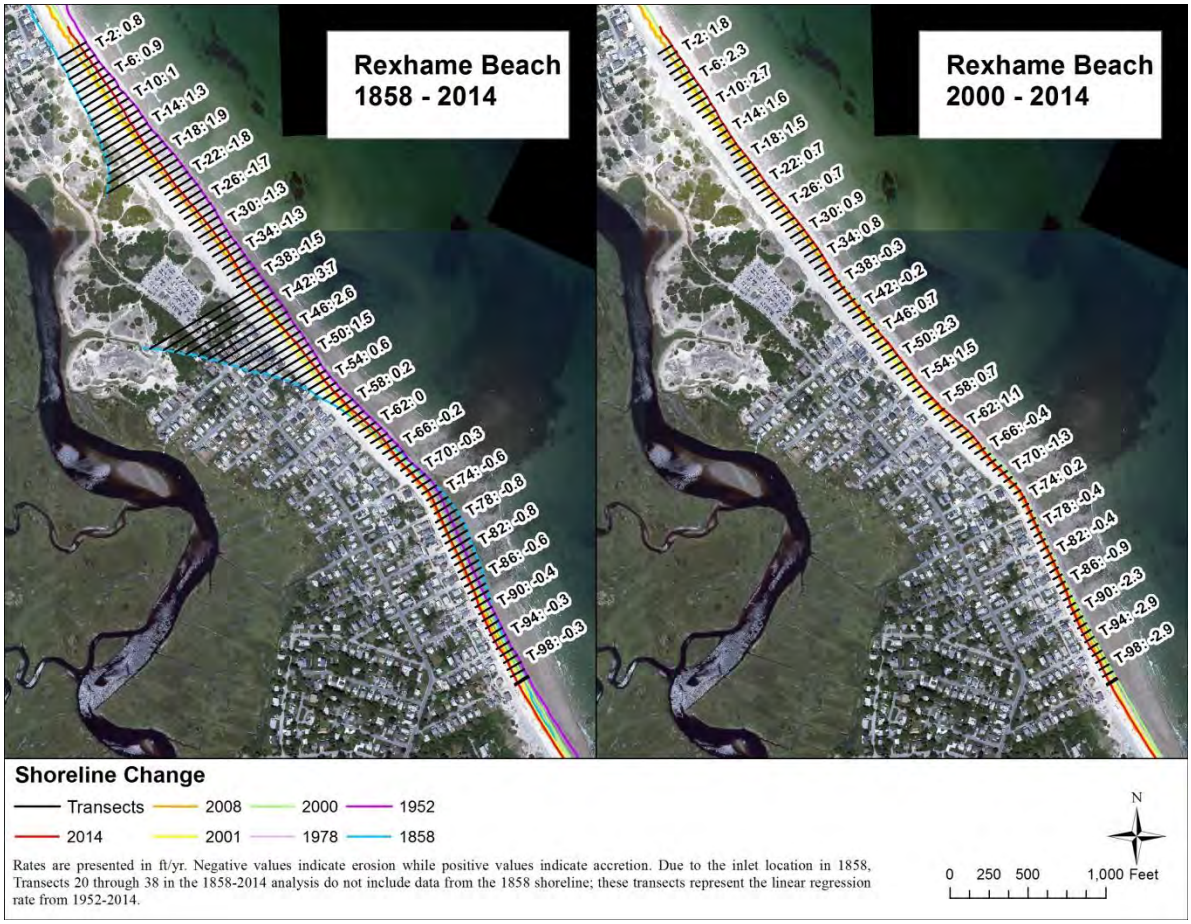


Figure 2-5. Long- and short-term shoreline change rates for Rexhame Beach.

The long-term (1858-2014) average rate of change for the entire Rexhame Beach study area was 0.2 ft/yr, indicating a fairly stable beach. However, this long-term rate is largely influenced by the 1858 shoreline; in 1858 there was an inlet in this location. If only the portion of Rexhame Beach fronting the parking lot and immediately to the north (where there is no 1858 shoreline because this was the location of the inlet) was considered, the 1952 to 2014 shoreline change rate averages to -1.5 ft/yr. This rate is more indicative of the changes observed at Rexhame Beach since it has been used as a major public recreation location. The short-term (2000-2014) average rate of change for the whole study area was 0.2 ft/yr, just like the long term. Again, this would indicate a fairly stable beach. However, it is worth considering different regions of the study area separately, however. For example, from Transect 66 south, the recent trend has been erosional, with an average rate of change for this portion of the beach of -1.4 ft/yr, which may have prompted the various shoreline stabilization projects between Parker and Porter Street (Figure 2-6 & Figure 2-7). The same area fronting the parking lot and immediately to the north (Transects 20 to 38) has an average shoreline change rate of 0.6 ft/yr. This rate reflects the three beach nourishment projects that have occurred in this location. 1,500 cubic yards of sand was placed on the beach in 2007, 800 cubic yards in 2013 and 3,000 cubic yards in 2016.

Table 2-1. Rexhame Beach shoreline change rates.

Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014	Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014	Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014
T-1	0.8	1.3	**T-35**	-1.3	0.6	**T-69**	-0.3	-1.3
T-2	0.8	1.8	**T-36**	-1.4	0.3	**T-70**	-0.3	-1.3
T-3	0.8	1.9	**T-37**	-1.4	0.1	**T-71**	-0.4	-1.1
T-4	0.9	2.0	**T-38**	-1.5	-0.3	**T-72**	-0.4	-0.3
T-5	0.9	2.2	**T-39**	4.7	-0.4	**T-73**	-0.5	0.2
T-6	0.9	2.3	**T-40**	4.3	-0.3	**T-74**	-0.6	0.2
T-7	1.0	2.5	**T-41**	4.0	-0.4	**T-75**	-0.7	-0.3
T-8	1.0	2.9	**T-42**	3.7	-0.2	**T-76**	-0.7	-0.5
T-9	1.0	3.0	**T-43**	3.3	0.0	**T-77**	-0.8	-0.4
T-10	1.0	2.7	**T-44**	3.1	0.1	**T-78**	-0.8	-0.4
T-11	1.1	2.5	**T-45**	2.8	0.2	**T-79**	-0.8	-0.5
T-12	1.1	2.1	**T-46**	2.6	0.7	**T-80**	-0.8	-0.6
T-13	1.2	2.0	**T-47**	2.3	1.1	**T-81**	-0.8	-0.4
T-14	1.3	1.6	**T-48**	2.1	1.6	**T-82**	-0.8	-0.4
T-15	1.4	1.4	**T-49**	1.8	2.1	**T-83**	-0.7	-0.4
T-16	1.5	1.4	**T-50**	1.5	2.3	**T-84**	-0.7	-0.6
T-17	1.7	1.4	**T-51**	1.2	2.2	**T-85**	-0.7	-0.8
T-18	1.9	1.5	**T-52**	1.0	2.2	**T-86**	-0.6	-0.9
T-19	2.2	1.5	**T-53**	0.8	2.0	**T-87**	-0.6	-1.0
T-20	-1.8	1.1	**T-54**	0.6	1.5	**T-88**	-0.6	-1.4
T-21	-1.8	0.9	**T-55**	0.5	1.4	**T-89**	-0.5	-1.9
T-22	-1.8	0.7	**T-56**	0.4	1.1	**T-90**	-0.4	-2.3
T-23	-1.8	0.6	**T-57**	0.3	0.9	**T-91**	-0.4	-2.3
T-24	-1.8	0.5	**T-58**	0.2	0.7	**T-92**	-0.4	-2.7
T-25	-1.8	0.6	**T-59**	0.1	0.5	**T-93**	-0.4	-2.9
T-26	-1.7	0.7	**T-60**	0.1	0.7	**T-94**	-0.3	-2.9
T-27	-1.6	0.8	**T-61**	0.0	1.0	**T-95**	-0.3	-3.1
T-28	-1.5	0.7	**T-62**	0.0	1.1	**T-96**	-0.2	-2.6
T-29	-1.4	0.8	**T-63**	-0.1	1.2	**T-97**	-0.2	-2.6
T-30	-1.3	0.9	**T-64**	-0.1	0.9	**T-98**	-0.3	-2.9
T-31	-1.2	0.8	**T-65**	-0.1	0.4	**T-99**	-0.3	-3.1
T-32	-1.2	0.6	**T-66**	-0.2	-0.4	**T-100**	-0.3	-3.2
T-33	-1.3	0.8	**T-67**	-0.3	-1.0	**T-101**	-0.3	-3.2
T-34	-1.3	0.8	**T-68**	-0.3	-1.1			

Figure 2-6. Various shoreline stabilization structures protect private houses between Parker Street and Porter Street.

Figure 2-7. Bank stabilization project underway at the end of Minot Road.

The elevations within the Rexhame parking lot at the end of Standish Street ranges from 9 to 11 ft NGVD, and the dune crest reaches heights of approximately 30 ft NGVD. The elevations along Standish Street range from 7.5 NGVD at Parker Street to 33 ft NGVD at Porter Street. For the 100-yr storm event, FEMA Flood Insurance Rate Maps (FIRMs) indicate that the entire Coastal Beach and Coastal Dune at the main portion of Rexhame Beach fall within a mapped velocity-zone (VE zone) with a Base Flood Elevation (BFE) of 17 ft NGVD, while the parking lot behind the dunes in a AE zone with a BFE 14 (Figure 2-8). In addition, the entire salt marsh and tidal creek area behind the beach parking lot falls within an AE zone of with a BFE of 10-15 ft.

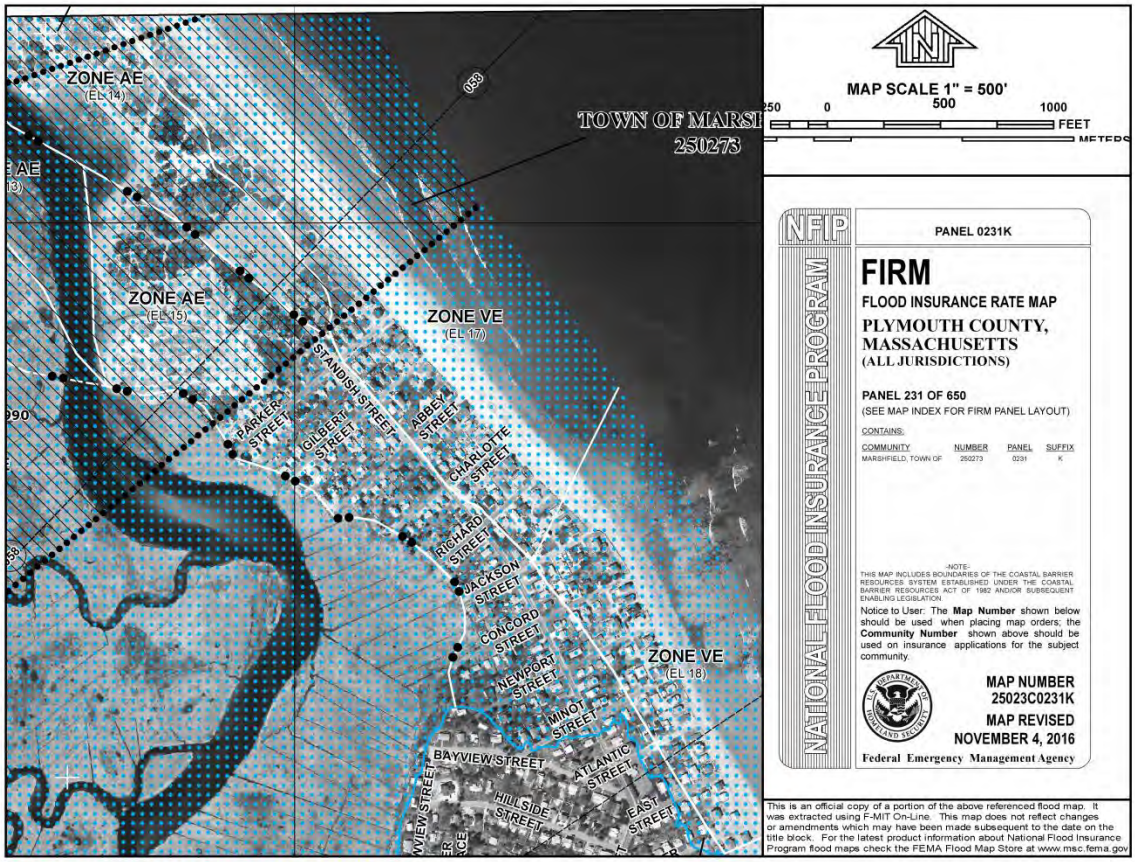


Figure 2-8. FEMA FIRM showing flood zone designations for Rexhame Beach.

2.1.2 Anthropogenic Features

The Coastal Beach and Coastal Dune fronting the public parking lot at the end of Standish Street are undeveloped and do not contain any groins, revetments or seawalls, with the exception of a partially buried stone revetment at the south end of the public beach at Rexhame (Figure 2-3). Many of the oceanfront properties in the portion of Rexhame Beach between Parker Street and Porter Street, however, do have some type of coastal projection. Structure types vary, ranging from rock revetments to vertical cement seawalls, but generally each one ties into the structures on the adjacent properties.

Although not nourished with regularity, in Rexhame Beach has been nourished with sand dredged from in front of the Marshfield Yacht Club on Ridge Road three times in the last 10 years. Approximately 1,500 cubic yards of material was placed on the beach in 2007, 800 cubic yards in November 2013 and 3000 cubic yards in February 2016.

The main Rexhame Beach parking lot at the end of Standish Street can hold approximately 300 cars (Figure 2-9). This lot is monitored by a parking lot attendant situated near the entrance in a tent, and accepts both cars with resident stickers, as well as visitors purchasing a day pass, however during busy summer weekends, day-pass visitors are limited to approximately 75 cars to ensure there is enough resident parking. Once the day-pass capacity is reached, additional visitors are redirected to Brant Rock Beach or

asked to wait until later in the afternoon when additional day-pass users will be admitted. If residents with a beach sticker arrive and the lot is full, they are queued at the parking lot entrance until a spot opens up, and then escorted to the new vacant parking space.

Figure 2-9. Rexhame Beach parking lot.

From the parking lot, there are three sand paths that cross over the Coastal Dune to access the Coastal Beach. These paths are delineated with sand fencing to deter visitors from walking through the rest of the dunes, but the fencing is in need of repair. Sand fencing is also placed on the seaward side of the dunes to help trap sand, but this line of fencing is currently situated approximately 10 to 15 feet back from the seaward toe of the dune. The coastal beach is a mix of sand and cobbles, and a dry beach is present at all tides. Seaweed can occasionally accumulate on this beach, but it is often manageable simply by hand raking it to spread it out so it can be washed away. Mechanical seaweed removal has not been required at this location for approximately 12 years.

There are also additional trails that begin at the northwest corner of the paved parking lot that cross over to the South River, as well as provide a network of walking trails through the scrub-forest backing the dunes. The Town has installed sand fencing back with old Christmas trees in some of the back dune areas to discourage pedestrians from walking in areas intended for revegetation (Figure 2-10); but has had limited success rerouting foot traffic. These trails are heavily used by walkers, dog-walkers, and equestrians, and are the point of access for kayakers wishing to launch their boats in the river. In the 1960s and 1970s, there was a gravel lot close to the river accessed by a dirt now (now one of the main foot paths) to facilitate boat launching. Currently, however, launching a kayak requires a lengthy portage from the main parking lot to the river bank (approximately 400 to 500 feet). The riverfront area is also becoming increasingly popular as a place to swim.

Figure 2-10. Sand fencing and piled Christmas trees to deter visitors from walking through the dunes.

A number of organized recreational activities are run out of the Rexhame Beach location during the summer. Yoga classes are offered every Saturday morning, and Levitate runs a weekly camp (Monday through Friday) that includes activities such as surf lessons and paddle boarding. There is also a basketball court present in the main beach parking lot available for public use, however, during busy summer beach days, this court is converted to additional parking spaces.

There are access points along the semi-private portion of Rexhame Beach: The side streets from Parker Street to Porter Street require a resident placard, distributed to residents along those streets, for street parking in those areas. With the exception of East Street, which is a completely private access way, there is a resident access path at the ocean end of each of the side streets, that residents from the surrounding homes and neighborhoods can use to access the beach. All oceanfront properties in this semi-private portion of Rexhame Beach own to the mean high water line, but the Town of Marshfield owns the intertidal beach fronting that.

During the summer, one life guard stand with two guards is stationed at the main part of the beach from 9:00 am to 7:00 pm (the semi-private portion of the beach and the riverbank area are unguarded). The blue building in the center of the main parking lots houses both the snack bar run by the Town, as well as the main restroom facilities. There are also two additional port-a-potties placed at the corners of the parking lot for additional capacity. Other amenities include a book box at the north end of the lot, dog bag boxes, and trash cans placed both at the main lot, as well as at main of the semi-private access points.

2.2 WINSLOW AVENUE BEACH

Winslow Avenue Beach is located along the shoreline of Marshfield, south of Rexhame Beach, extending approximately from Porter Street to Rexhame Road (Figure 2-12). There is no parking, and public access points are limited to the end of Rexhame Road and via the public right of way at the end of Winslow Avenue extension. Winslow Avenue Beach is unique in Marshfield because it has an unarmored shoreline and the houses are set back 250 to 400 feet from the beach. Winslow Avenue Beach includes approximately 1,500 linear feet of ocean facing shoreline.

2.2.1 Natural Features and Coastal Processes

The majority of the unimproved section of the Winslow Beach parcels is classified as Coastal Beach, and Coastal Dune. Other resources present include Land Under the Ocean, Ponds, Rivers, Lakes. Vegetation on the Coastal Dunes consists primarily of American Beachgrass (*Ammophila breviligulata*), Northern bayberry (*Myrica pensylvanica*), and Eastern red cedar (*Juniperus virginiana*). The beach itself is predominantly cobble and is backed by a cobble berm (Figure 2-11). There are no NHESP mapped Estimated or Priority Habitat areas at Winslow Avenue Beach.

Figure 2-11. Cobble beach and cobble berm at Winslow Avenue Beach.

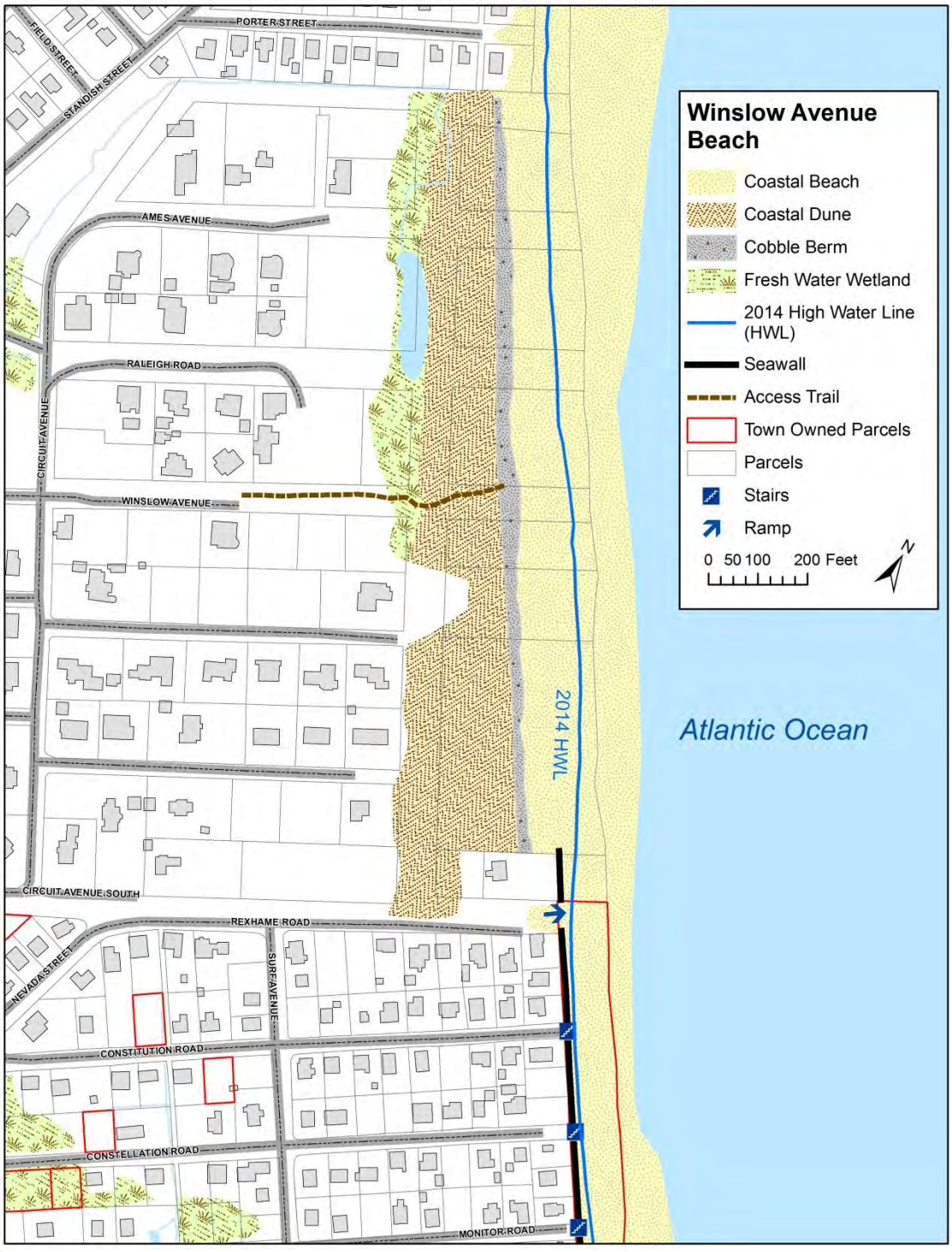


Figure 2-12. Winslow Avenue Beach existing conditions.

The Massachusetts Department of Environmental Protection (MassDEP) began a program to map the state's eelgrass resources in 1995, and have completed multiple assessments between 1995 and 2013. None of these assessments have indicated the existence of eelgrass in the vicinity of Winslow Avenue Beach. MassGIS contains a Shellfish Suitability layer, which represents areas that are believed to be suitable for shellfish based on the expertise of the MA Division of Marine Fisheries, local Shellfish Constables, input from commercial fishermen, and information contained in maps and studies of shellfish in Massachusetts. These maps represent potential habitat areas. This Shellfish Suitability data indicate the entire length of the subtidal portion of Winslow Avenue Beach is suitable for surf clam spawning and settlement.

Information on historical shoreline change for Winslow Avenue Beach was obtained from the Massachusetts Shoreline Change Project (MSCP; Theiler et al. 2001), and updated with one recent year of aerial photography (2014). The MSCP compiled relative positions of at least five historical shorelines between 1844 and 2009 for all seaward facing coastal areas within Massachusetts. For this analysis, MSCP shoreline data from the following years were used for the Winslow Avenue Beach: 1858, 1952, 2000, 2001, and 2008. Original sources for the historical shorelines were NOAA/NOS topographic maps, hydrographic maps, FEMA topographic maps, orthophotos, and aerial photographs. In addition, Woods Hole Group digitized and added shoreline position information for 2014. The high water shoreline positions for each year are depicted along with the transect locations where the shoreline change statistics were calculated in Figure 2-13. Both transect numbers and the rates of change (feet/year) from 1858 to 2014 and from 2000 to 2014 are shown in Figure 2-13. Table 2 provides a summary of the long-term rates of change from 1858 to 2014, as well as more recent shoreline change rates between 2000 and 2014.

The long-term (1858-2014) average rate of change for the entire Winslow Avenue Beach study area was 0.1 ft/yr, indicating a stable beach, which is reflected in the fact that this portion of the shoreline has not required armoring, and may also be due to the increased stability provided by the cobble beach and cobble berm present at this location. The short-term (2000-2014) average rate of change was -1.5 ft/yr. This rate seems to be largely driven by the change between 2000 and 2008, while the changes between 2008 and 2014 appear to be largely accretional. The challenges with identifying a high water line on a beach with this unique sediment type (cobble rather than sand) may have added to the potential error in defining shoreline change rates for this location.

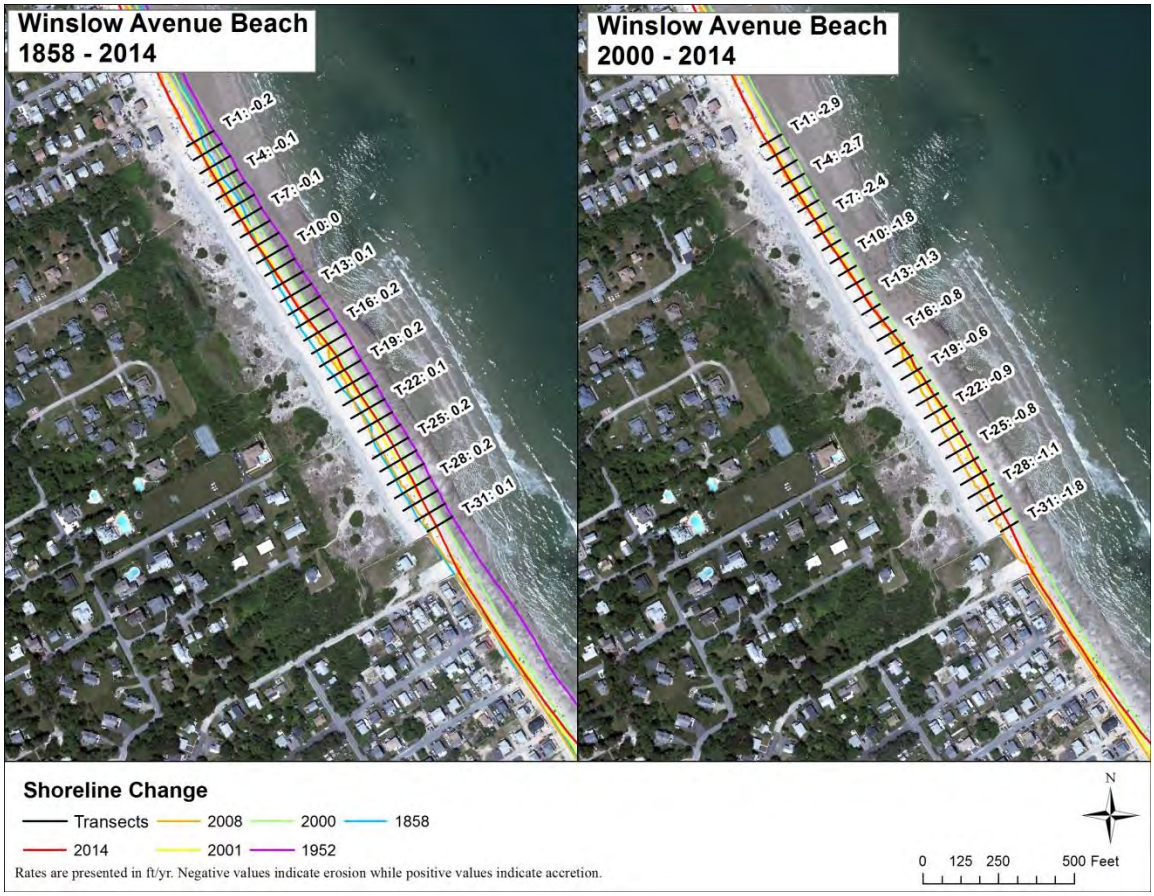


Figure 2-13. Long- and short-term shoreline change rates for Winslow Avenue Beach.

Table 2-2. Winslow Avenue Beach shoreline change rates.

Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014
T-1	-0.2	-2.9
T-2	-0.1	-2.6
T-3	-0.2	-2.8
T-4	-0.1	-2.7
T-5	-0.2	-2.7
T-6	-0.2	-2.5
T-7	-0.1	-2.4
T-8	-0.1	-2.3
T-9	0.0	-2.1
T-10	0.0	-1.8
T-11	0.0	-1.6
T-12	0.1	-1.4
T-13	0.1	-1.3
T-14	0.1	-1.3
T-15	0.2	-0.9
T-16	0.2	-0.8
T-17	0.2	-0.3
T-18	0.2	-0.3
T-19	0.2	-0.6
T-20	0.1	-0.8
T-21	0.1	-0.8
T-22	0.1	-0.9
T-23	0.1	-0.8
T-24	0.2	-0.7
T-25	0.2	-0.8
T-26	0.2	-1.0
T-27	0.2	-1.0
T-28	0.2	-1.1
T-29	0.2	-1.6
T-30	0.2	-1.6
T-31	0.1	-1.8

The average elevation of the crest of the cobble berm along Winslow Avenue Beach is approximately 15 to 17 ft NGVD. The elevations of the pedestrian access path from Winslow Avenue range from 40 ft (NGVD) at the start of the path at the terminus of Winslow Ave, to 9 ft (NGVD) at its lowest point in the center of the coastal dunes. This low point in the path was actually flooded and impassable during the April 18, 2017 site visit (Figure 2-15). For the 100-yr storm event, FEMA Flood Insurance Rate Maps (FIRMs) indicate that the entire Coastal Beach and Coastal Dune at Winslow Avenue Beach fall within a mapped velocity-zone (VE zone) with a Base Flood Elevation (BFE) of 17 ft NGVD (Figure 2-14).

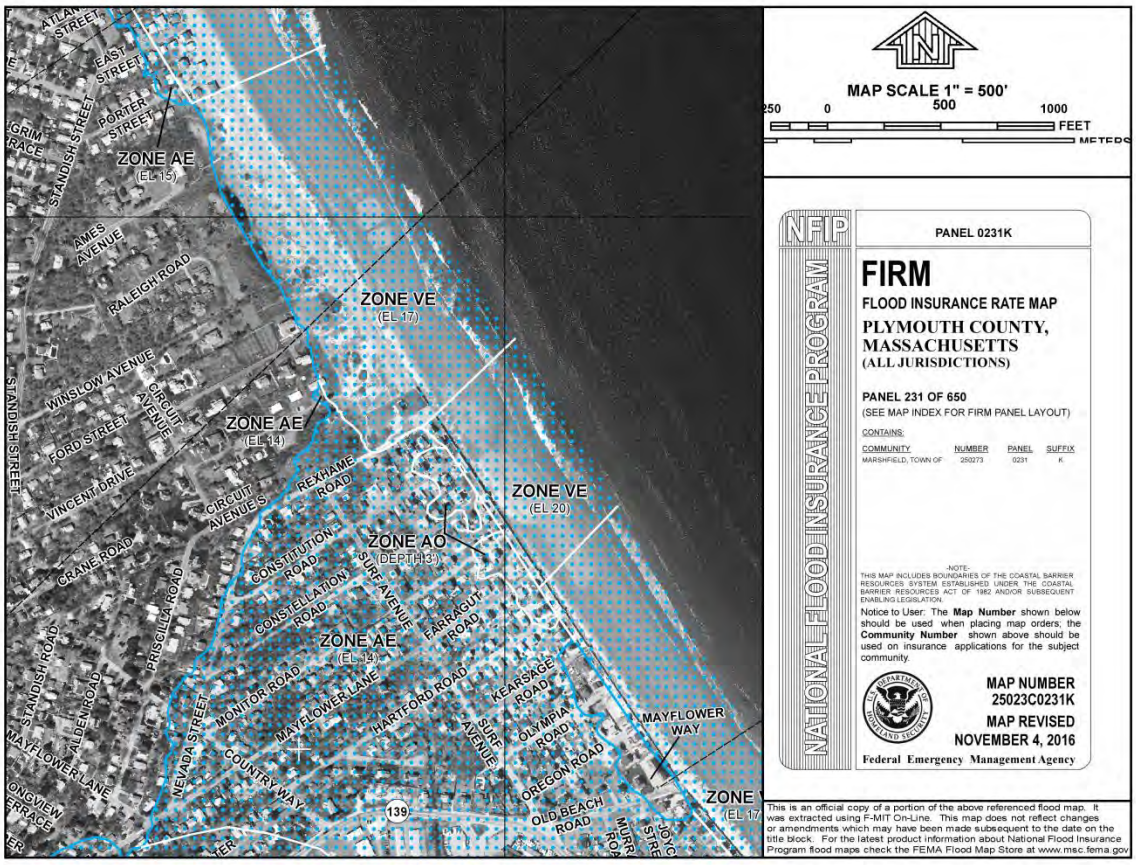


Figure 2-14. FEMA FIRM showing flood zone designations for Winslow Avenue and Fieldston Beaches.

Figure 2-15. Flooded low point on the public access trail to Winslow Avenue Beach.

2.2.2 Anthropogenic Features

Winslow Avenue Beach has very few anthropogenic features. Unlike much of the Marshfield shoreline, the Winslow Avenue Beach is unarmored (with the exception of the one property at the southern boundary of the beach with a seawall), and does not contain any groins, jetties, revetments or seawalls. Additionally, this beach has not been nourished.

There are five footpaths through the Coastal Dune that provide pedestrian access to the beach, but only one of these access ways is public; the public right of way to the beach begins at the seaward end of Winslow Avenue. This unimproved trail is approximately 500 feet long (Figure 2-16), and is predominately used by the nearby residents since there is no public parking at Winslow Avenue Beach. As mentioned above, this trail occasionally floods when the adjacent wetland is inundated, and access can be interrupted. Additionally, because there is no public parking, the Town of Marshfield does not currently collect any beach fees from people who utilize Winslow Avenue Beach. There are also no restrooms, life guards or other amenities at this beach.

Figure 2-16. Winslow Avenue Beach right of way.

2.3 FIELDSTON BEACH

Fieldson Beach is located along the shoreline of Marshfield, south of Winslow Avenue Beach, extending approximately from Rexhame Road to Old Beach Road (Figure 2-17). Public parking is limited to a small lot at the end of Old Beach Road, but there are public access points at the seaward end of all the side streets. Fieldston Beach includes approximately 2,000 linear feet of ocean facing shoreline.

2.3.1 Natural Features and Coastal Processes

The entirety of the unimproved section of the Fieldston Beach parcels is classified as Coastal Beach and Land Under the Ocean, Ponds, Rivers, Lakes. There is no Coastal Dune present along the stretch of coastline and no vegetation fronting the concrete seawall and stone revetments. The high tide beach along Fieldston Beach varies from narrow but present at the southern end near the Oregon Road access, to completely absent at the northern end near the Constitution Road access. Most of the beach is sand with large deposits of cobble (Figure 2-18). Grain size analysis (Appendix C) from a sample taken from the intertidal area in the vicinity of the small parking area at the end of Ocean Beach Road indicated that the sediment at Fieldston and Sunrise Beaches is largely sand (93.9%), with 5.4% gravel, and 0.7% fines (i.e., silt or clay); note that one grain size sample was taken to represent both Fieldston and Sunrises Beaches. There are no NHESP mapped Estimated or Priority Habitat areas at Fieldston Beach.

Figure 2-17. Fieldston Beach existing conditions.

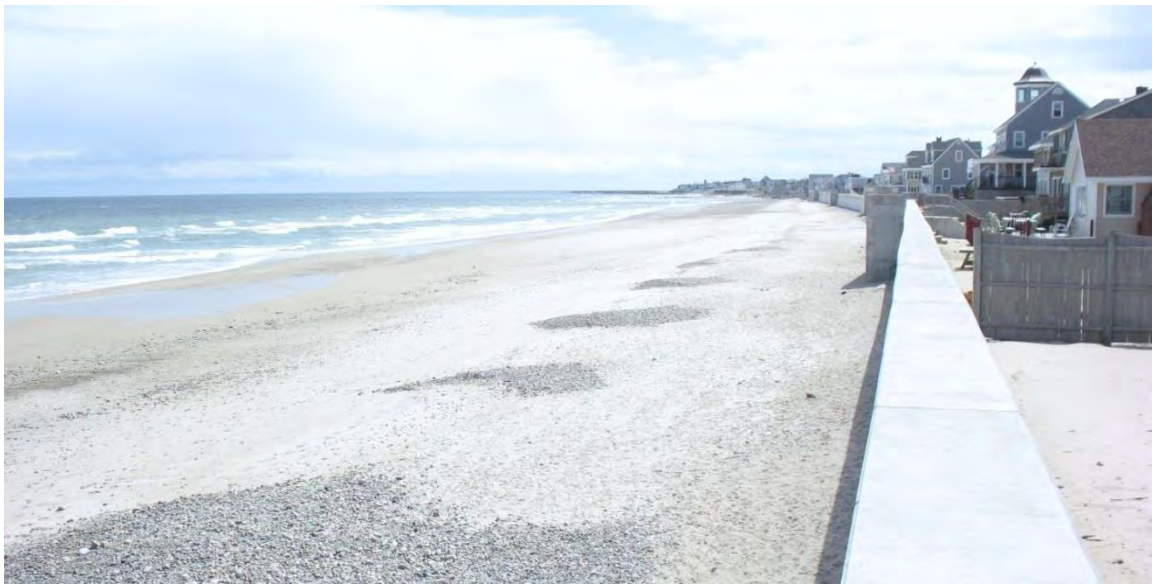


Figure 2-18. South-facing view of Fieldston Beach from the Hartford Road access.

The Massachusetts Department of Environmental Protection (MassDEP) began a program to map the state's eelgrass resources in 1995, and have completed multiple assessments between 1995 and 2013. None of these assessments have indicated the existence of eelgrass in the vicinity of Fieldston Beach. MassGIS contains a Shellfish Suitability layer, which represents areas that are believed to be suitable for shellfish based on the expertise of the MA Division of Marine Fisheries, local Shellfish Constables, input from commercial fishermen, and information contained in maps and studies of shellfish in Massachusetts. These maps represent potential habitat areas. This Shellfish Suitability data indicate the entire length of the subtidal portion of Fieldston Beach is suitable for surf clam spawning and settlement.

Information on historical shoreline change for Fieldston Beach was obtained from the Massachusetts Shoreline Change Project (MSCP; Theiler et al. 2001), and updated with one recent year of aerial photography (2014). The MSCP compiled relative positions of at least five historical shorelines between 1844 and 2009 for all seaward facing coastal areas within Massachusetts. For this analysis, MSCP shoreline data from the following years was used for the Fieldston Beach area: 1858, 1952, 2000, 2001, and 2008. Original sources for the historical shorelines were NOAA/NOS topographic maps, hydrographic maps, FEMA topographic maps, orthophotos, and aerial photographs. In addition, Woods Hole Group digitized and added shoreline position information for 2014. The high water shoreline positions for each year are depicted along with the transect locations where the shoreline change statistics were calculated in Figure 2-19. Both transect numbers and the rates of change (feet/year) from 1858 to 2014 and from 2000 to 2014 are shown in Figure 2-19. Table 2-3 provides a summary of the long-term rates of change from 1858 to 2014, as well as more recent shoreline change rates between 2000 and 2014.

The long-term (1858-2014) average rate of change for the entire Fieldston Beach study area was 0.0 ft/yr, indicating a stable beach. The short-term (2000-2014) average rate of change was -0.3 ft/yr. The shoreline change rates in this area appear to be stable, or only

slightly erosional, but that is largely due to the presence of a concrete seawall for the entire length of the analysis area at Fieldston Beach. This seawall was originally constructed during the 1930s by the Commonwealth of Massachusetts, and has prevented any further retreat of the shoreline. With the exception of the 1858 shoreline, this means the long-term shoreline change analysis timeframe for this area has been influenced by that seawall. There is little to no dry high tide beach in this section of town, which means that additional horizontal erosion cannot occur. Vertical erosion, which must be measured through targeted low-tide LiDAR data or through field topographic surveys, can and likely will continue to occur. If the beach profile is lowered enough, the stability and integrity of the seawalls will be threatened.

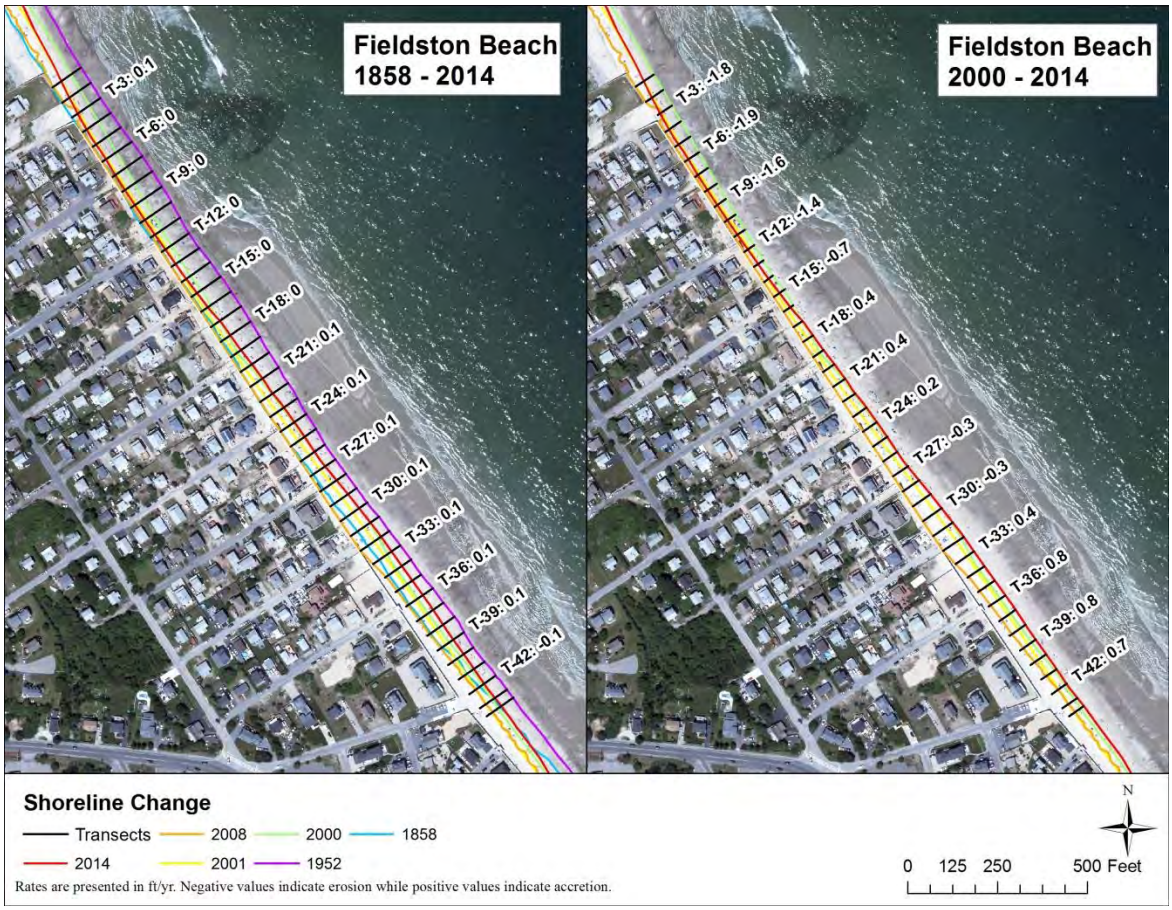


Figure 2-19. Long- and short-term shoreline change rates for Fieldston Beach.

Table 2-3. Fieldston Beach shoreline change rates.

Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014	Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014
T-1	0.1	-2.0	T-23	0.1	0.3
T-2	0.1	-2.2	T-24	0.1	0.2
T-3	0.1	-1.8	T-25	0.1	0.1
T-4	0.0	-2.2	T-26	0.1	-0.1
T-5	0.0	-2.0	T-27	0.1	-0.3
T-6	0.0	-1.9	T-28	0.1	-0.3
T-7	0.0	-1.9	T-29	0.1	-0.3
T-8	0.0	-1.8	T-30	0.1	-0.3
T-9	0.0	-1.6	T-31	0.1	-0.2
T-10	0.0	-1.6	T-32	0.1	0.0
T-11	0.0	-1.5	T-33	0.1	0.4
T-12	0.0	-1.4	T-34	0.1	0.7
T-13	0.0	-1.1	T-35	0.1	0.7
T-14	0.0	-0.8	T-36	0.1	0.8
T-15	0.0	-0.7	T-37	0.1	0.9
T-16	0.0	-0.4	T-38	0.1	0.8
T-17	0.0	0.2	T-39	0.1	0.8
T-18	0.0	0.4	T-40	0.0	0.7
T-19	0.0	0.7	T-41	0.0	0.6
T-20	0.0	0.5	T-42	-0.1	0.7
T-21	0.1	0.4	T-43	-0.1	0.9
T-22	0.1	0.2	T-44	-0.1	1.1

The average elevation of the seawall along Fieldston Beach is approximately 20 ft NGVD. For the 100-yr storm event, FEMA Flood Insurance Rate Maps (FIRMs) indicate that the entire Coastal Beach at Fieldston Beach falls within a mapped velocity-zone (VE zone) with a Base Flood Elevation (BFE) of 17 ft NGVD (south of Hartford Road) or 20 ft NGVD (north of Hartford Road (Figure 2-14). Much of the area behind the beach and seawall is in either an AO zone with a Depth of 3 ft or an AE zone with a BFE of 14 ft (Figure 2-14).

2.3.2 Anthropogenic Features

There is a cement seawall present for the entire length of Fieldston Beach from Rexhame Road to Old Beach Road. Portions of this seawall are also fronted by a low rock revetment.

There is one small parking lot at the end of Old Beach Road, which has a capacity of 6 cars (4 regular spaces and 2 handicapped spaces). This location also serves as an access ramp to allow emergency vehicles and maintenance equipment to access the beach through the seawall. The opening to this access is boarded up in the winter to protect

against storms. However, because there is no designated parking for most of this beach, it is visited primarily by people within walking distance. As with the semi-private section of Rexhame Beach, residents can purchase up to 2 parking placards to allow cars to park on the street directly in front of their homes.

In addition to the small parking lot at the end of Old Beach Road, there are nine (9) additional access points to Fieldston Beach from the ends of the side roads off Surf Ave (Figure 2-20).

1) Oregon Road – permanent concrete stairs, constructed in 2013, built into seawall;
2) Olympia Road – there is a permanent set of wooden steps on the landward side of the seawall and the Olympia Road residents provide their own set of metal stairs for the ocean side of seawall;
3) Kearsarge Road - permanent concrete stairs, constructed in 2013, built into seawall;
4) Hartford Road – permanent concrete stairs, constructed in 2013, built into seawall;
5) Farragut Road – permanent concrete stairs built into seawall;
6) Monitor Road – residents purchased a set of metal stairs that is managed by the Town (metal stairs are removed seasonally), and are access by a permanent set of wooden steps on the landward side of the seawall leading to a permanently affixed metal platform;
7) Constellation Road – permanent concrete stairs built into seawall;
8) Constitution Road – Town maintains a seasonal metal staircase, which is accessed by a permanent set of concrete steps landward of the seawall; and
9) Rexhame Road – cobble/gravel ramp to water.

The ramp at the end of Rexhame Road is not barricaded in the winter, and the tide regularly overflows onto the road. During the summer, there is a lifeguard station set up on the concrete pad at the top of the stairs at the end of Hartford Road (roughly at the center point of the beach area). There are no public restrooms or other amenities at this beach.

Figure 2-20. Beach access locations at Oregon Road (top left), Olympia Road (top right), Constellation Road (bottom left) and Constitution Road (bottom right).

2.4 SUNRISE BEACH

Sunrise Beach is located along the shoreline of Marshfield, south of Fieldston Beach, extending approximately from Old Beach Road to the southern end of Foster Avenue (Figure 2-22). Although there is no public parking, there are public access points at the seaward end of all odd-numbered side streets between 3rd Road and 13th Road, as well as the Brook Street and Shephard's Avenue access ways. Sunrise Beach includes approximately 3,700 linear feet of ocean facing shoreline.

2.4.1 Natural Features and Coastal Processes

The entirety of the unimproved section of the Sunrise Beach parcels is classified as Coastal Beach and Land Under the Ocean, Ponds, Rivers, Lakes. There is no Coastal Dune present along the stretch of coastline and no vegetation fronting the concrete seawall and stone revetments. Grain size analysis (Appendix C) from a sample taken from the intertidal area in the vicinity of the small parking area at the end of Ocean Beach Road indicated that the sediment at Sunrise and Fieldston Beaches is largely sand (93.9%), with 5.4% gravel, and 0.7% fines (i.e., silt or clay); note that one grain size sample was taken to represent both Sunrise and Fieldston Beaches. There are no NHESP mapped Estimated or Priority Habitat areas at Sunrise Beach.

The Massachusetts Department of Environmental Protection (MassDEP) began a program to map the state's eelgrass resources in 1995, and have completed multiple assessments between 1995 and 2013. None of these assessments have indicated the existence of eelgrass in the vicinity of Sunrise Beach. MassGIS contains a Shellfish Suitability layer, which represents areas that are believed to be suitable for shellfish based on the expertise of the MA Division of Marine Fisheries, local Shellfish Constables, input from commercial fishermen, and information contained in maps and studies of shellfish in Massachusetts. These maps represent potential habitat areas. This Shellfish Suitability data indicate the entire length of the subtidal portion of Sunrise Beach is suitable for surf clam spawning and settlement.

Information on historical shoreline change for Sunrise Beach was obtained from the Massachusetts Shoreline Change Project (MSCP; Theiler et al. 2001), and updated with one recent year of aerial photography (2014). The MSCP compiled relative positions of at least five historical shorelines between 1844 and 2009 for all seaward facing coastal areas within Massachusetts. For this analysis, MSCP shoreline data from the following years was used for the Sunrise Beach area: 1848, 1858, 1952, 1978, 2000, 2001, and 2008. Original sources for the historical shorelines were NOAA/NOS topographic maps, hydrographic maps, FEMA topographic maps, orthophotos, and aerial photographs. In addition, Woods Hole Group digitized and added shoreline position information for 2014. The high water shoreline positions for each year are depicted along with the transect locations where the shoreline change statistics were calculated in Figure 2-21. Due to limited extends of historical data, in the 1800's to 2014 analysis, only transects 37 through 79 contain the 1848 shoreline, and therefore represent 1848-2014 rates of change; transects 1 through 36 represent 1858 to 2014 rates of change. Both transect numbers and the rates of change (feet/year) from the 1800's to 2014 and from 2000 to 2014 are shown in Figure 2-21. Table 2-4 provides a summary of the long-term rates of

change from 1848 or 1858 (depending on the transect) to 2014, as well as more recent shoreline change rates between 2000 and 2014.

The long-term (1848/1958-2014) average rate of change for the entire Sunrise Beach study area was 0.0 ft/yr, indicating a stable beach. The short-term (2000-2014) average rate of change was -0.7 ft/yr, indicating a slight erosional trend. There appears to be a point around Transect 36 (approximately between Fourth and Fifth Roads), where north of this point the beach is stable to slightly accretional (average 2000-2014 shoreline change rate of 0.1 ft/yr), while the area south of this point is erosional (average 2000-2014 shoreline change rate of -1.4 ft/yr). Like Fieldston Beach, Sunrise Beach is entirely backed by a concrete seawall that originally constructed during the 1930s by the Commonwealth of Massachusetts. The shoreline retreat rates observed in the southern portion of the beach will not continue indefinitely. Given that there is currently little to no dry high tide beach, it is likely that the seawall will prevent any further horizontal retreat of the shoreline in this area. Vertical erosion, which must be measured through targeted low-tide LiDAR data or through field topographic surveys, can and likely will continue. If the beach profile is lowered enough, the stability of the seawalls will be threatened.

Figure 2-21. Long- and short- term shoreline change for Sunrise Beach.

Figure 2-22. Sunrise Beach existing conditions.

Table 2-4. Sunrise Beach shoreline change rates.

Transect	Rate (ft/yr) 1858 - 2014	Rate (ft/yr) 2000 - 2014	Transect	Rate (ft/yr) 1848 - 2014	Rate (ft/yr) 2000 - 2014
T-1	-0.1	1.1	T-37	0.0	-0.2
T-2	-0.2	1.1	T-38	0.1	-0.4
T-3	-0.2	1.1	T-39	0.1	-0.9
T-4	-0.2	1.1	T-40	0.1	-1.0
T-5	-0.3	0.9	T-41	0.1	-1.1
T-6	-0.3	0.9	T-42	0.2	-1.1
T-7	-0.4	0.9	T-43	0.2	-1.0
T-8	-0.4	0.8	T-44	0.2	-1.4
T-9	-0.4	0.6	T-45	0.3	-1.4
T-10	-0.4	0.3	T-46	0.3	-1.6
T-11	-0.5	-0.2	T-47	0.3	-1.8
T-12	-0.5	-0.5	T-48	0.3	-2.2
T-13	-0.5	-0.5	T-49	0.3	-2.0
T-14	-0.5	-0.2	T-50	0.3	-3.4
T-15	-0.5	0.0	T-51	0.3	-3.6
T-16	-0.5	-0.1	T-52	0.3	-3.1
T-17	-0.3	-0.4	T-53	0.3	-2.0
T-18	-0.3	-0.5	T-54	0.2	-1.3
T-19	-0.4	-0.1	T-55	0.2	-0.9
T-20	-0.3	0.3	T-56	0.3	-0.8
T-21	-0.3	0.6	T-57	0.3	-1.3
T-22	-0.3	0.5	T-58	0.3	-1.2
T-23	-0.3	0.0	T-59	0.4	-1.0
T-24	-0.4	-0.4	T-60	0.4	-0.9
T-25	-0.4	-0.8	T-61	0.4	-0.9
T-26	-0.5	-0.8	T-62	0.4	-0.8
T-27	-0.5	-0.6	T-63	0.4	-0.8
T-28	-0.5	-0.4	T-64	0.5	-0.9
T-29	-0.5	-0.2	T-65	0.4	-0.8
T-30	-0.5	-0.4	T-66	0.3	-0.8
T-31	-0.6	-0.3	T-67	0.4	-1.0
T-32	-0.6	0.1	T-68	0.4	-1.2
T-33	-0.6	0.0	T-69	0.3	-1.4
T-34	-0.6	0.0	T-70	0.4	-1.7
T-35	-0.6	0.3	T-71	0.4	-1.0
T-36	-0.6	0.2	T-72	0.4	-1.1
			T-73	0.4	-1.2
			T-74	0.4	-1.4
			T-75	0.4	-1.5
			T-76	0.5	-1.7
			T-77	0.5	-1.9
			T-78	0.5	-1.6
			T-79	0.5	-1.6

*Due to different shoreline orientations and extents, the transect numbering is unique between the 1848-2014 and 1994-2014 analyses.

The average elevation of the seawall along Sunrise Beach is approximately 19 ft NGVD. For the 100-yr storm event, FEMA Flood Insurance Rate Maps (FIRMs) indicate that the entire Coastal Beach at Sunrise Beach falls within a mapped velocity-zone (VE zone) with a Base Flood Elevation (BFE) of 17 ft NGVD (Figure 2-23Figure). Much of the area behind the beach and seawall is an AE zone with a BFE of 14 ft (Figure 2-23).

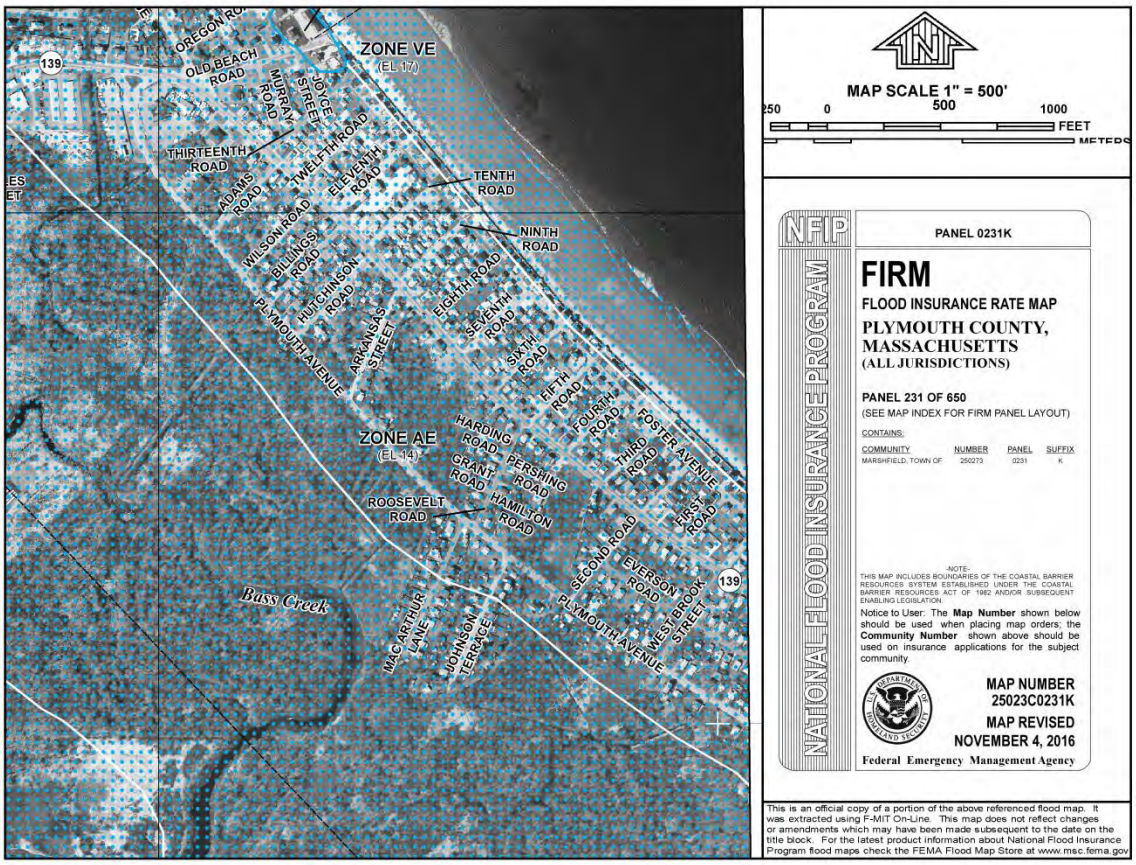


Figure 2-23. FEMA FIRM showing flood zone designations for Sunrise Beach.

2.4.2 Anthropogenic Features

Like Fieldston Beach, the entire length of Sunrise Beach is fronted by a continuous concrete seawall. The northern stretch of concrete seawall, down to the 9th Street Access was recently repaired and increased in height. The southeastern portion of the beach, from the 5th Street Access south, also has a rock revetment fronting the concrete seawall. The 5th Street Access also roughly divides the sandier beach to the north and the rockier beach to the south. Much of Sunrise Beach has no dry beach at high tide.

There is no designated parking lot for Sunrise Beach. As such, this beach is used primarily by residents in the surrounding neighborhoods. There are seven (7) public access points to Sunrise Beach from the ends of the side roads off Ocean Street. Each

access point has a staircase, a trash barrel, and a dog bag box. The seven access points are:

- Shepard's Ave Access (at approximately 14 Foster's Ave), which is a paved pathway to a metal staircase that descends the rock revetment;
- Brook Street Access, which contains an equipment access ramp through the seawall that is barricaded closed in the winter. The rocks at the base of the ramp have been cemented together. There is a small paved lot located landward of the ramp, but public parking is not permitted;
- 3rd Street Access, which has a concrete staircase;
- 5th Street Access, which has a concrete staircase in need of repair;
- 7th Street Access, which has to a concrete staircase;
- 9th Street Access, which has a concrete staircase (newly reconstructed in 2015) and an additional concrete platform;
- 11th Street Access, which has a concrete staircase (new reconstructed in 2015); and
- 13th Street Access, which has a concrete staircase (newly reconstructed in 2015).

The stairs at the Shepard's Ave Access point frequently get damaged in the winter and must be repaired or replaced. All access points have a paved path leading to the stairway, and many of the pathways have been lined with painted rocks placed by visitors. The vacant lot to the north of the 3rd Street Access is owned by the Town and could be used as a location for additional beach amenities (Figure 2-24). There is also a vacant lot to the north of the 9th Street Access (not currently owned by the Town). The 9th and 11th Street Access locations are the most developed, with a landscaped buffer along the path; the 11th Street Access also contains a bench and a book box. The concrete platform at the 9th Street Access is also where the lifeguard station is located during the summer.

Figure 2-24. Vacant lot north of the 3rd Street beach access.

2.5 BRANT ROCK BEACH

Brant Rock Beach is located in the vicinity of the Esplanade and can be accessed from Ocean Street (Figure 2-27). The main points of access are from the public access ways at the ends of South and North Streets, as well as from the staircase located directly adjacent to Ocean Street. Brant Rock Beach has a unique rocky feature at the seaward end of the groin at the southern end of the beach. The Town owned portion of Brant Rock Beach extends from small ocean front parking area at the top of the hill on Ocean Street north to Sunrise Beach. Brant Rock Beach includes approximately 5,000 linear feet of ocean facing shoreline.

2.5.1 Natural Features and Coastal Processes

The entirety of the unimproved section of the Brant Rock Beach parcels is classified as Coastal Beach, Rocky Intertidal Shore, or Land Under the Ocean, Ponds, Rivers, Lakes. There is no Coastal Dune present along the stretch of coastline and no vegetation fronting the concrete seawall and stone revetments. There is a sandy area of high tide beach just north of the main Brant Rock groin (Figure 2-25). Most of Brant Rock beach, however, is either cobble beach or rocky intertidal shore (Figure 2-26), with little to no high tide beach present. There are no NHESP mapped Estimated or Priority Habitat areas at Brant Rock Beach.

Figure 2-25. South-facing view of Brant Rock Beach from the North Street access.

Figure 2-26. Rocky intertidal shore around the Brant Rock groin.

Grain size analysis (Appendix C) from a sample taken in the intertidal area 250 feet northwest of the main Brant Rock groin indicated that the sediment at Brant Rock Beach is largely sand (92.5%), with 7.0% gravel, and 0.5% fines (i.e., silt or clay).

The Massachusetts Department of Environmental Protection (MassDEP) began a program to map the state's eelgrass resources in 1995, and have completed multiple assessments between 1995 and 2013. None of these assessments have indicated the existence of eelgrass in the vicinity of Brant Rock Beach. MassGIS contains a Shellfish Suitability layer, which represents areas that are believed to be suitable for shellfish based on the expertise of the MA Division of Marine Fisheries, local Shellfish Constables, input from commercial fishermen, and information contained in maps and studies of shellfish in Massachusetts. These maps represent potential habitat areas. This Shellfish Suitability data indicate that the entire length of Brant Rock Beach is suitable for blue mussel surf clam spawning and settlement.

Information on historical shoreline change for Brant Rock Beach was obtained from the Massachusetts Shoreline Change Project (MSCP; Theiler et al. 2001), and updated with one recent year of aerial photography (2014). The MSCP compiled relative positions of at least five historical shorelines between 1844 and 2009 for all seaward facing coastal areas within Massachusetts. For this analysis, MSCP shoreline data from the following years was used: 1848, 1952, 1978, 2000, 2001, and 2008. Original sources for the historical shorelines were NOAA/NOS topographic maps, hydrographic maps, FEMA topographic maps, orthophotos, and aerial photographs. In addition, Woods Hole Group digitized and added shoreline position information for 2014. The high water shoreline positions for each year are depicted along with the transect locations where the shoreline change statistics were calculated in Figure 2-28Figure . Both transect numbers and the rates of change (feet/year) from 1848 to 2014 and from 1994 to 2014 are shown in Figure 2-28. Table 5 provides a summary of the long-term rates of change from 1848 to 2014, as well as more recent shoreline change rates between 2000 and 2014.

The long-term (1848-2014) average rate of change for the entire Brant Rock Beach study area was 0.2 ft/yr. Similarly, the short-term (2000-2014) average rate of change for the entire study area was -0.2 ft/yr. Both indicate a fairly stable beach. This is likely due to the presence of a concrete seawall for the entire length of the analysis area at Brant Rock Beach. This seawall was originally constructed during the 1930s by the Commonwealth of Massachusetts, and has prevented any further retreat of the shoreline. With the exception of the 1858 shoreline, this means the long-term shoreline change analysis timeframe for this area has been influenced by that seawall. There is little to no dry high tide beach along this stretch of coastline, with the exception of the area immediately north of the large Brant Rock groin, which means that additional horizontal erosion cannot occur. Vertical erosion, which must be measured through targeted low-tide LiDAR data or through field topographic surveys, can and likely will continue to occur. If the beach profile is lowered enough, the stability and integrity of the seawalls will be threatened. The area immediately north of the groin, Transects 46-53, has experience accretion at a rate of 0.9 ft/yr since 2000. This is due to sediment carried on the southerly long-shore current that gets trapped and collected against the shore perpendicular structure.

Figure 2-27. Brant Rock Beach existing conditions.

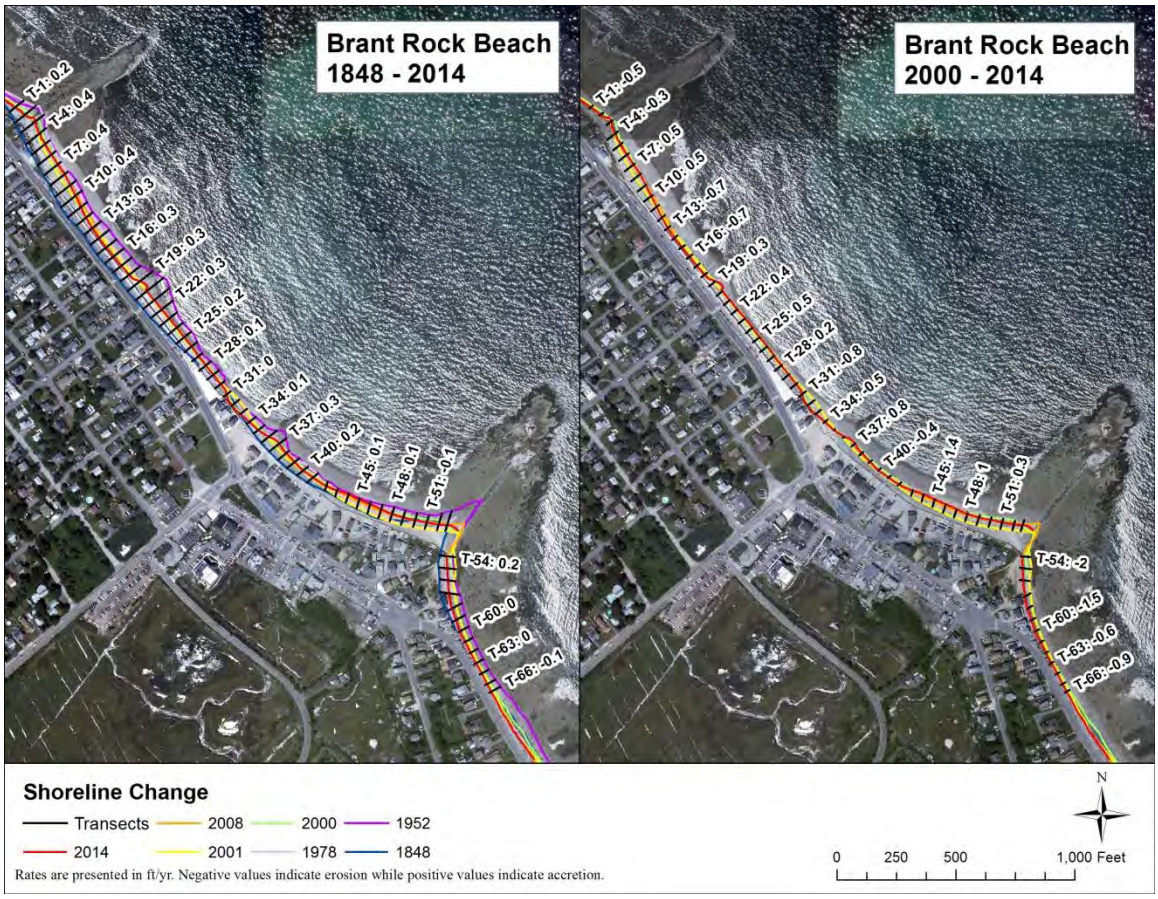


Figure 2-28. Long- and short-term rates of shoreline change at Brant Rock Beach.

Table 2-5. Brant Rock Beach shoreline change rates.

Transect	Rate (ft/yr) 1848 - 2014	Rate (ft/yr) 1994 - 2014		Transect	Rate (ft/yr) 1848 - 2014	Rate (ft/yr) 1994 - 2014
T-1	0.2	-0.5		**T-34**	0.1	-0.5
T-2	0.3	-0.7		**T-35**	0.1	-0.3
T-3	0.4	-0.5		**T-36**	0.2	0.4
T-4	0.4	-0.3		**T-37**	0.3	0.8
T-5	0.4	0.1		**T-38**	0.3	0.3
T-6	0.4	0.3		**T-39**	0.2	-0.1
T-7	0.4	0.5		**T-40**	0.2	-0.4
T-8	0.4	0.8		**T-41**	0.2	-0.3
T-9	0.4	0.6		**T-42**	0.1	-0.2
T-10	0.4	0.5		**T-43**	0.1	0.6
T-11	0.4	0.2		**T-44**	0.1	1.3
T-12	0.3	-0.2		**T-45**	0.1	1.4
T-13	0.3	-0.7		**T-46**	0.1	1.6
T-14	0.3	-1.0		**T-47**	0.1	1.4
T-15	0.3	-0.7		**T-48**	0.1	1.0
T-16	0.3	-0.7		**T-49**	0.0	0.7
T-17	0.3	-0.8		**T-50**	-0.1	0.5
T-18	0.3	-0.9		**T-51**	-0.1	0.3
T-19	0.3	0.3		**T-52**	-0.1	0.4
T-20	0.3	0.2		**T-53**	0.0	1.3
T-21	0.3	0.3		**T-54**	0.2	-2.0
T-22	0.3	0.4		**T-55**	0.3	-2.0
T-23	0.3	0.5		**T-56**	0.2	-2.1
T-24	0.2	0.6		**T-57**	0.2	-2.1
T-25	0.2	0.5		**T-58**	0.1	-1.8
T-26	0.2	0.5		**T-59**	0.1	-1.5
T-27	0.1	0.3		**T-60**	0.0	-1.5
T-28	0.1	0.2		**T-61**	0.0	-1.1
T-29	0.0	0.0		**T-62**	0.0	-0.8
T-30	0.0	-0.2		**T-63**	0.0	-0.6
T-31	0.0	-0.8		**T-64**	0.0	-0.8
T-32	-0.1	-1.6		**T-65**	0.0	-0.8
T-33	0.0	-1.1		**T-66**	-0.1	-0.9

The elevation of the seawall along Brant Rock Beach is decreases from north to south. At the northern end of the roadside parking area, the seawall is approximately 24 ft NGVD, while at the southern end near the main Brant Rock groin, the seawall is

approximately 18 ft NGVD. A large segment of the southern portion of the seawall, in the vicinity of the North Street access is badly damaged and is scheduled for repair; the repairs will also increase the height of this portion of the wall. For the 100-yr storm event, FEMA Flood Insurance Rate Maps (FIRMs) indicate that the entire Coastal Beach at Sunrise Beach falls within a mapped velocity-zone (VE zone) with a Base Flood Elevation (BFE) of 19 ft NGVD (Figure 2-29). Much of the area behind the beach and seawall is an AE zone with a BFE of 16 ft (Figure 2-29).

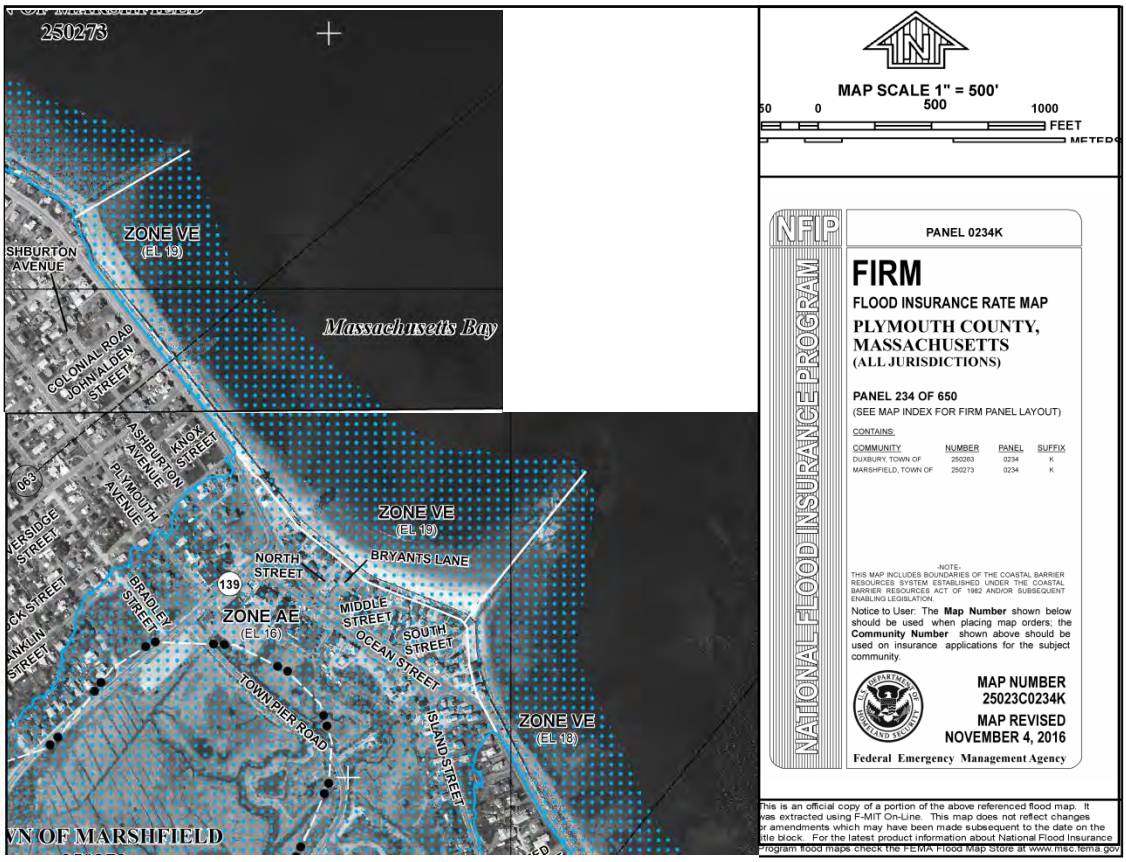


Figure 2-29. FEMA FIRM showing flood zone designations for Brant Rock Beach.

2.5.2 Anthropogenic Features

Like some of the other Marshfield Beach, the entire length of Brant Rock Beach is armored in some way. From Samoset Avenue to the south, the beach is backed by a continuous concrete seawall, much of which is currently in need of repairs. The Town has plans to repair and increase the height of the seawall between North Street and Dyke Road. In many places this seawall is also fronted by a rock revetment: from Puritan Street to Dyke Road and from the large groin at South Street to the south. North of Samoset Avenue, there are private homes fronting the beach, which all have individual but connected coastal armoring, consisting mainly of concrete seawalls fronted by a wide rock revetment. There are also four rock groins at Brant Rock Beach: one approximately 675 feet long between Shawmut Ave and Samoset Ave, one approximately 150 feet long

between Puritan Street and Webster Avenue, one approximately 150 feet long at the end of Dyke Road, and one approximately 475 feet long between the point at South Street and Brant Rock itself. Although much of the beach is narrow and rocky, there is a small section of sandy dry beach at high need near the Brant Rock groin.

The main Brant Rock parking area, an unpaved parking lot, is located on Dyke Road and can now hold 88 cars. Beach visitors can park with a resident sticker or purchase a day pass ($10 on weekdays and $15 on weekends) from the parking monitor that is stationed in the tent at the entrance to the lot. A concrete sidewalk and new fence was recently added to the perimeter of the lot to increase pedestrian safety, but this reduced the total number of cars the lot was able to hold. When full, this lot can be very congested and traffic flow can become a problem. There is a second entrance into this parking lot off Joseph Driebeck Way, but this entrance is often barricaded closed to ensure a single parking attendant can monitor the lot. Although the main lot is approximately 700 feet from the ocean, it does provide magnificent views of the salt marsh between Dyke Road and Joseph Driebeck Way, as well as Green Harbor. There is also street parking available along the seawall on Ocean Street, which is and can hold 42 cars, and a small parking area at the top of the hill on the south end of Ocean Street, which can hold an additional 8 cars. These areas are also monitored by an attendant, who checks resident beach sticker as well as sells day passes ($10 on weekdays and $15 on weekends); town police officers also check to see that the cars parked in these locations have stickers as they pass by during the day. There is also parking along the Esplanade, but these spaces are 2-hour parking spaces and are intended for patrons of the surrounding businesses.

There are six (6) public access points to Brant Rock Beach:

- A sand path at the end of South Street, which leads to a metal staircase;
- A concrete ramp through the seawall at the end of North Street;
- A steep concrete ramp through the seawall across from Massasoit Ave at the north end of the beach;
- A concrete staircase along the ocean-front portion of Ocean Street and Puritan Street; and
- Two seasonal metal staircases that are installed at either end of the beach.

The North Street ramp is barricaded during the winter to limit adverse impacts from flooding and storm surge.

The Comfort Station, which houses the main beach office as well as public restrooms, is located at the corner of Dyke Road and Ashburton Ave. There is a large cement platform, called the “Patio”, on top of the seawall across from Hancock Street, which serves as a viewing platform and seating area for those not able to descend the stairs to the beach itself. There is a lifeguard station at the North Street entrance of Brank Rock Beach. The beach is guarded from Puritan Street to Brant Rock.

The Town currently owns one vacant oceanfront lot at the corner of Dyke Road and Ocean Street. To nearby lots were recently for sale, but were not acquired by the Town due to lack of available funds.

2.6 GREEN HARBOR BEACH

Green Harbor Beach is located along Bay Avenue in the southern end of Marshfield; it extends from the southwestern Green Harbor jetty in the north to the Stage Lane entrance in the south (Figure 2-30). The main points of access are access ways along Bay Avenue, fed by three separate parking areas: the Bay Avenue, Beach Street (next to the Green Harbor Post Office), and Avon Street lots. Although much of the beach is relatively narrow, with little to no beach at high tide, there is a fairly wide sandy dry beach at the northern end of Green Harbor Beach near the jetty. With the exception of two private lots that extend to the low water mark, the Town owns the entire stretch of beach south of the boardwalk to the Bay Street access ramp. In total, Green Harbor Beach includes approximately 3,000 linear feet of ocean facing shoreline.

2.6.1 Natural Features and Coastal Processes

The majority of the unimproved section of the Green Harbor Beach is classified as Barrier Beach, Coastal Beach, and Coastal Dune. Other resources present include Land Under the Ocean, Ponds, Rivers, Lakes. Coastal dune egetation consists primarily of American beachgrass (*Ammophila breviligulata*), northern bayberry (*Morella pensylvanica*), and beach rose (*Rosa rugosa*). The northern end of the beach is fairly wide and sandy, but is narrower and more dominated by cobbles as you move south. Grain size analysis (Appendix C) from a sample taken in the intertidal area in the vicinity of the access point between 152 and 148 Bay Ave indicated that the sediment at Green Harbor Beach is largely sand (94.2%), with 5.1% gravel, and 0.7% fines (i.e., silt or clay).

The Natural Heritage & Endangered Species Program (NHESP), part of the Massachusetts Division of Fisheries and Wildlife, is responsible for the conservation and protection of hundreds of species that are officially listed as Endangered, Threatened or of Special Concern in Massachusetts. To better protect and manage these species, the NHESP has developed and outlined areas of Priority Habitats, which are based on the known geographical extent of habitat for all state-listed rare species, both plants and animals. Priority Habitat mapped for the Green Harbor Beach area is displayed in Figure 2-31. Estimated Habitats, another designation of NHESP that represent a sub-set of the Priority Habitats excluding areas specific only to plants, are also present at Green Harbor Beach, and are exactly the same as the Priority Habitat areas. Note that the Estimated and Priority Habitats do not include the coastal beach. Without filing an information request with NHESP, it is impossible to known what endangered or threatened species are present in salt marsh and offshore areas around Green Harbor Beach.

The Massachusetts Department of Environmental Protection (MassDEP) began a program to map the state's eelgrass resources in 1995, and have completed multiple assessments between 1995 and 2013. None of these assessments have indicated the existence of eelgrass in the vicinity of Green Harbor Beach. MassGIS contains a Shellfish Suitability layer, which represents areas that are believed to be suitable for shellfish based on the expertise of the MA Division of Marine Fisheries, local Shellfish Constables, input from commercial fishermen, and information contained in maps and studies of shellfish in Massachusetts. These maps represent potential habitat areas. This Shellfish Suitability

data indicate that areas in the northern portion of Green Harbor Beach are suitable for surf clam spawning and settlement.

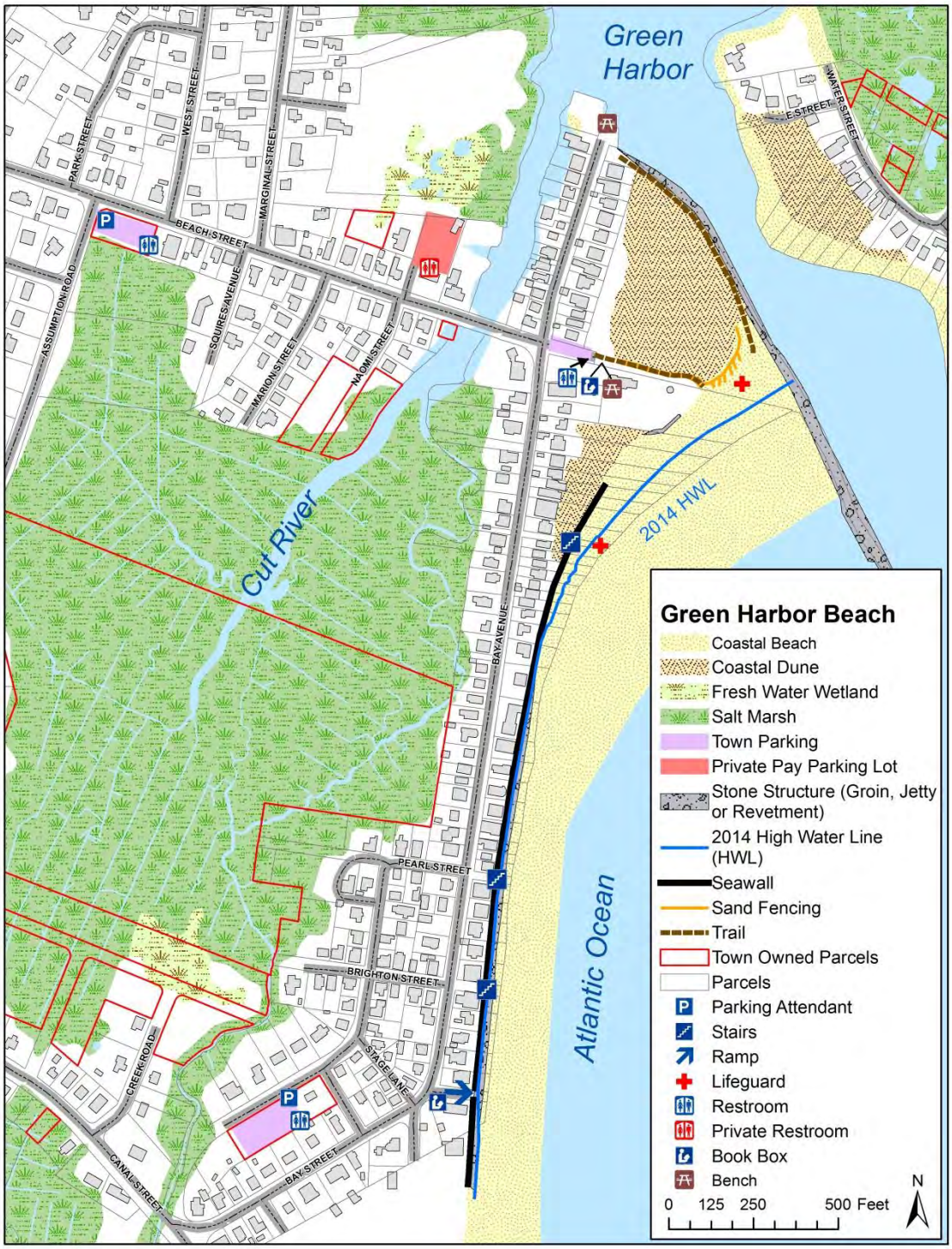


Figure 2-30. Green Harbor Beach existing conditions.

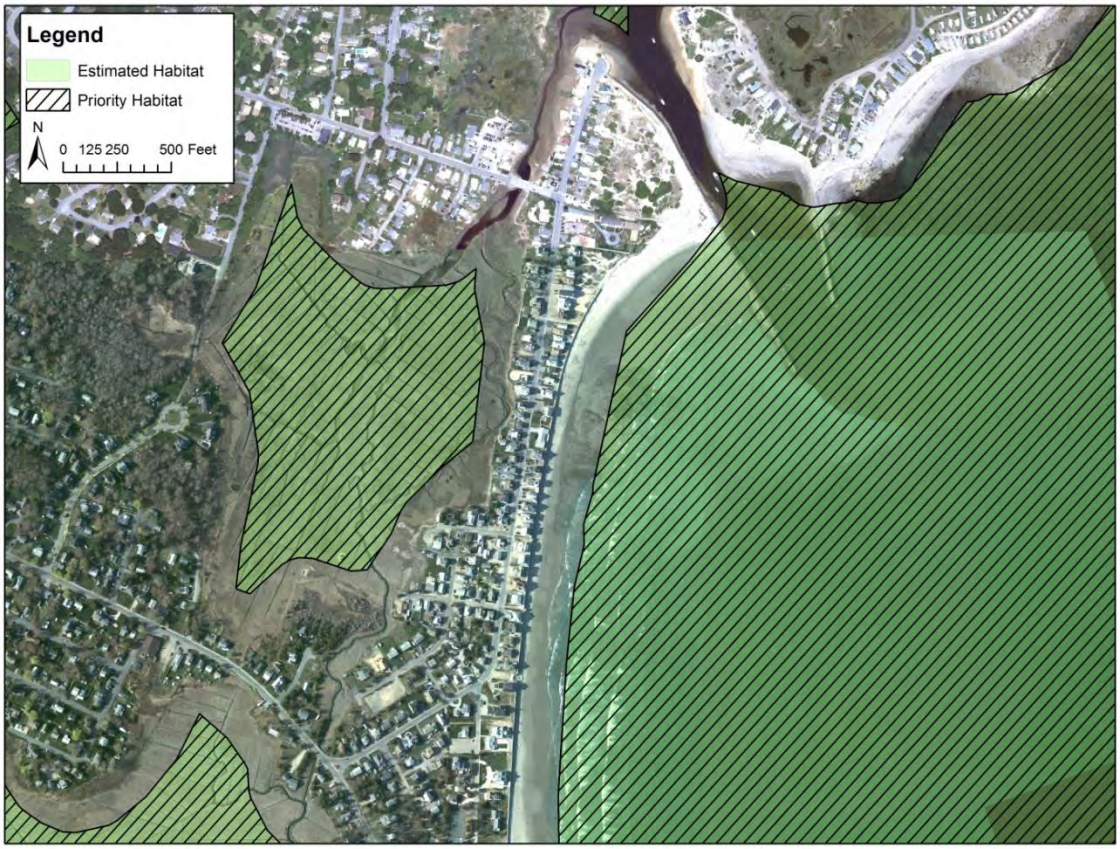


Figure 2-31. Natural Heritage and Endangered Species Program Estimated and Priority Habitat at Green Harbor Beach.

Information on historical shoreline change for Green Harbor Beach was obtained from the Massachusetts Shoreline Change Project (MSCP; Theiler et al. 2001), and updated with one recent year of aerial photography (2014). The MSCP compiled relative positions of at least five historical shorelines between 1844 and 2009 for all seaward facing coastal areas within Massachusetts. For this analysis, MSCP shoreline data from the following years was used: 1848, 1952, 1978, 2000, 2001, and 2008. Original sources for the historical shorelines were NOAA/NOS topographic maps, hydrographic maps, FEMA topographic maps, orthophotos, and aerial photographs. In addition, Woods Hole Group digitized and added shoreline position information for 2014. The high water shoreline positions for each year are depicted along with the transect locations where the shoreline change statistics were calculated in Figure 2-32. Both transect numbers and the rates of change (feet/year) from 1848 to 2014 and from 2000 to 2014 are shown in Figure 2-32. Table 2-6 provides a summary of the long-term rates of change from 1848 to 2014, as well as more recent shoreline change rates between 2000 and 2014.

The long-term (1848-2014) average rate of change for the entire Green Harbor Beach study area was 0.2 ft/yr, indicating a fairly stable beach. The short-term (2000-2014) average rate of change for the entire study area was -1.5 ft/yr. Starting approximately 500 feet south of the boardwalk, there is a concrete seawall for the entire length of the analysis area at Green Harbor Beach. This seawall was originally constructed during the

1930s by the Commonwealth of Massachusetts. The shoreline retreat rates observed in the southern portion of the beach will not continue indefinitely. Given that there is currently little to no dry high tide beach, it is likely that the seawall, if maintained, will prevent any further horizontal retreat of the shoreline in this area. Vertical erosion, however, has started to occur (Figure 2-33). Although obvious in photographs when structures which were previous at or below the beach surface are currently exposed or well above the beach surface, quantification of such change over the entire length of the beach could be measured through targeted low-tide LiDAR data or through field topographic surveys. If the beach profile is lowered enough, the stability and integrity of the seawalls will be threatened. The beach in front of the Bay Avenue seawall is already experiencing this vertical erosion, and may start to undermine the seawall, as it has already done to the access ramp (Figure 2-33).

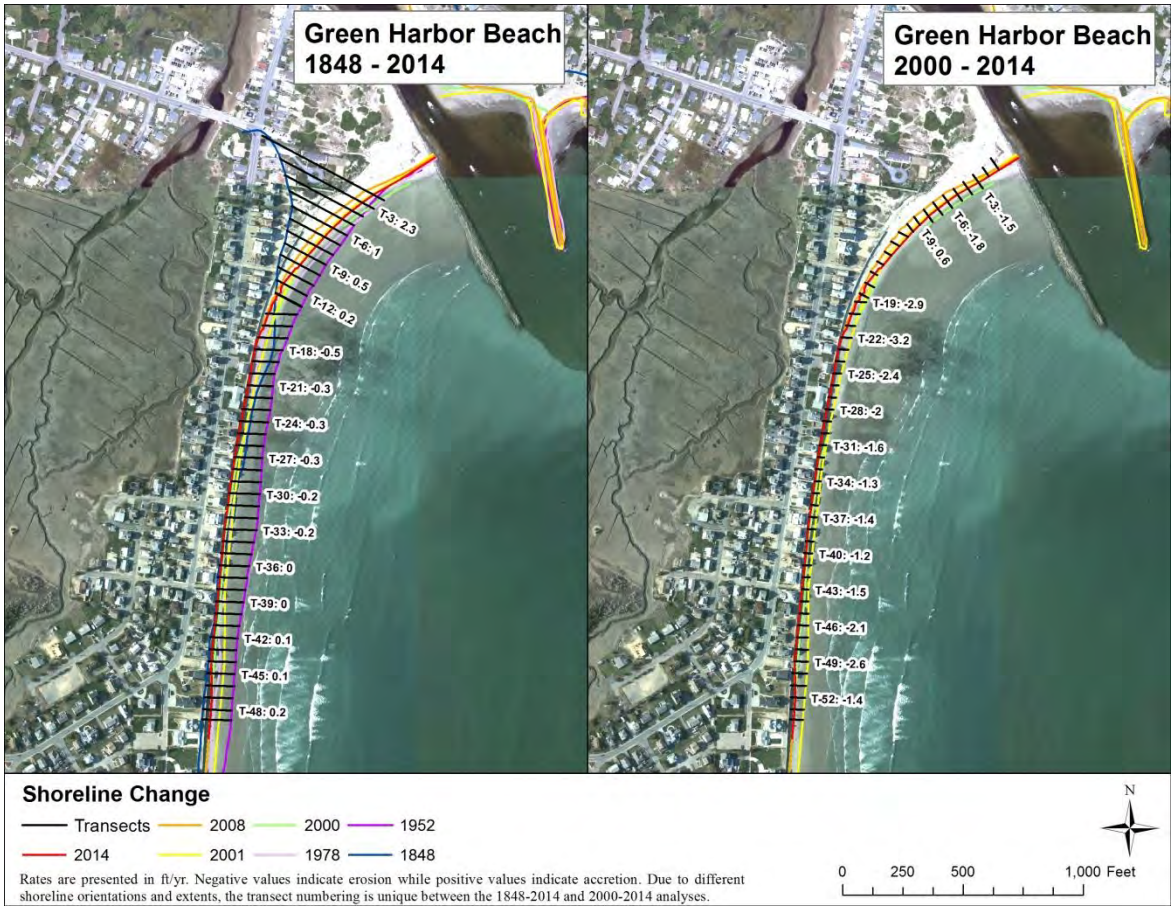


Figure 2-32. Long- and short-term shoreline change rates for Green Harbor Beach.

Figure 2-33. Vertical erosion and lowering of the beach elevation has caused exposure of the access ramp at the corner of Bay Ave and Bay St.

Table 2-6. Green Harbor Beach shoreline change rates.

Transect	Rate (ft/yr) 1848 - 2014	Transect	Rate (ft/yr) 1848 - 2014	Transect	Rate (ft/yr) 2000 - 2014	Transect	Rate (ft/yr) 2000 - 2014
T-1	0.3	T-35	-0.1	T-1	0.7	T-35	-1.4
T-2	3.1	T-36	0.0	T-2	0.4	T-36	-1.4
T-3	2.3	T-37	0.0	T-3	-1.5	T-37	-1.4
T-4	1.8	T-38	0.0	T-4	-1.6	T-38	-1.4
T-5	1.4	T-39	0.0	T-5	-1.8	T-39	-1.2
T-6	1.0	T-40	0.0	T-6	-1.8	T-40	-1.2
T-7	0.9	T-41	0.0	T-7	-1.6	T-41	-1.2
T-8	0.7	T-42	0.1	T-8	-1.6	T-42	-1.3
T-9	0.5	T-43	0.1	T-9	0.6	T-43	-1.5
T-10	0.4	T-44	0.1	T-10	0.6	T-44	-1.8
T-11	0.3	T-45	0.1	T-11	0.6	T-45	-2.0
T-12	0.2	T-46	0.1	T-12	0.7	T-46	-2.1
T-13	0.0	T-47	0.2	T-13	0.8	T-47	-2.2
T-14	0.0	T-48	0.2	T-14	0.0	T-48	-2.4
T-15	-0.2	T-49	0.2	T-15	-1.0	T-49	-2.6
T-16	-0.3			T-16	-2.3	T-50	-2.2
T-17	-0.4			T-17	-2.3	T-51	-1.8
T-18	-0.5			T-18	-2.3	T-52	-1.4
T-19	-0.4			T-19	-2.9	T-53	-1.4
T-20	-0.4			T-20	-2.6	T-54	-1.4
T-21	-0.3			T-21	-2.4		
T-22	-0.3			T-22	-3.2		
T-23	-0.3			T-23	-3.2		
T-24	-0.3			T-24	-2.8		
T-25	-0.3			T-25	-2.4		
T-26	-0.3			T-26	-2.2		
T-27	-0.3			T-27	-2.1		
T-28	-0.3			T-28	-2.0		
T-29	-0.2			T-29	-1.9		
T-30	-0.2			T-30	-1.9		
T-31	-0.3			T-31	-1.6		
T-32	-0.3			T-32	-1.3		
T-33	-0.2			T-33	-1.2		
T-34	-0.1			T-34	-1.3		

**Due to different shoreline orientations and extents, the transect numbering is unique between the 1848-2014 and 2000-2014 analyses.

Although the MSCP only incorporated shorelines dating back to the 1800s, it is worth noting that the Green Harbor shoreline looked remarkably different in 1794. The shoreline and coastal landforms of 1794 are shown in the red hatched areas in Figure 2-34, overlaid on the grey shoreline and coastal landforms of 1897.

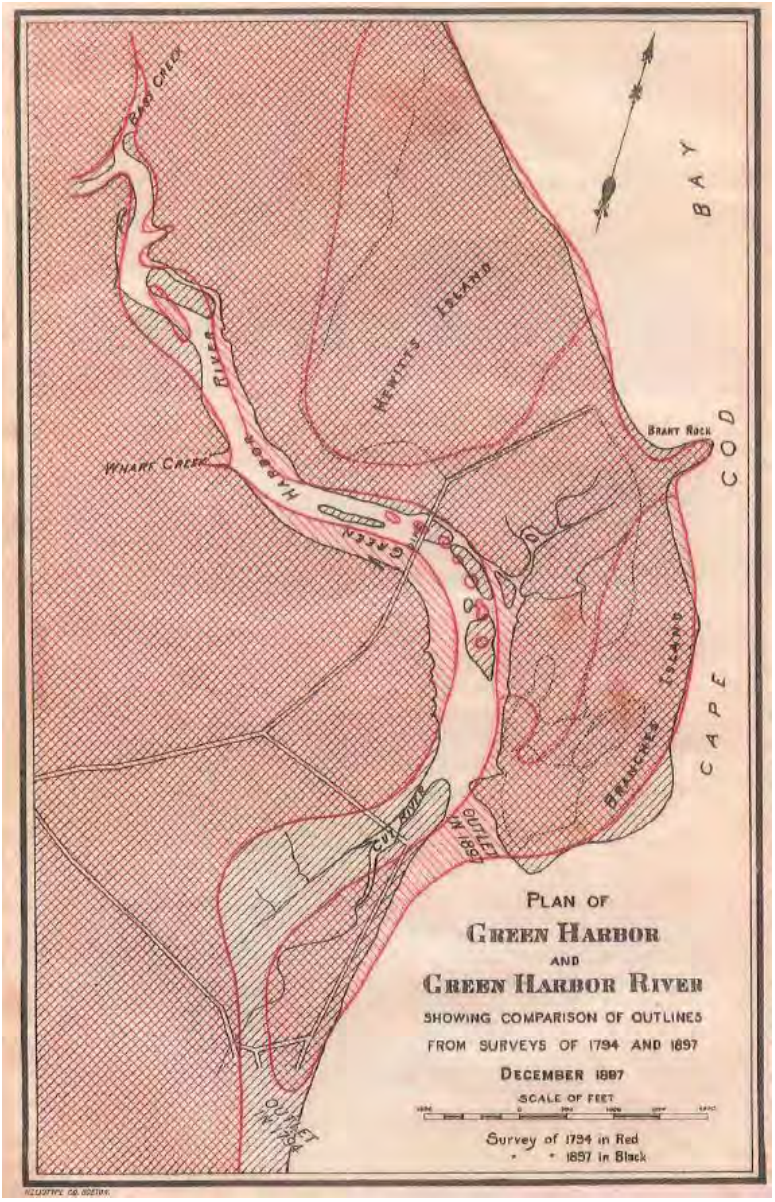


Figure 2-34. Major historical changes in the Green Harbor Inlet.

The average elevation of the Green Harbor Beach parking areas on Beach Street, Bay Avenue and Avon Street are approximately 9 ft, 11 ft, and 7.5 ft NGVD, respectively. The elevations along Bay Avenue from Green Harbor to Bay Street range from 9 to 12.5 ft NGVD. For the 100-yr storm event, FEMA Flood Insurance Rate Maps (FIRMs) indicate that the entire Coastal Beach and Coastal Dune at the main portion of Green Harbor Beach fall within a mapped velocity-zone (VE zone) with a Base Flood Elevation (BFE) of 16 ft or 17 ft NGVD, while the parking lots on Bay Avenue, Beach Street, and

Avon Street, fall within an AE zone with a BFE 16 (Figure 2-35). In addition, the entire salt marsh and tidal creek area behind the beach parking lot falls within an AE zone of with a BFE of 10-15 ft.

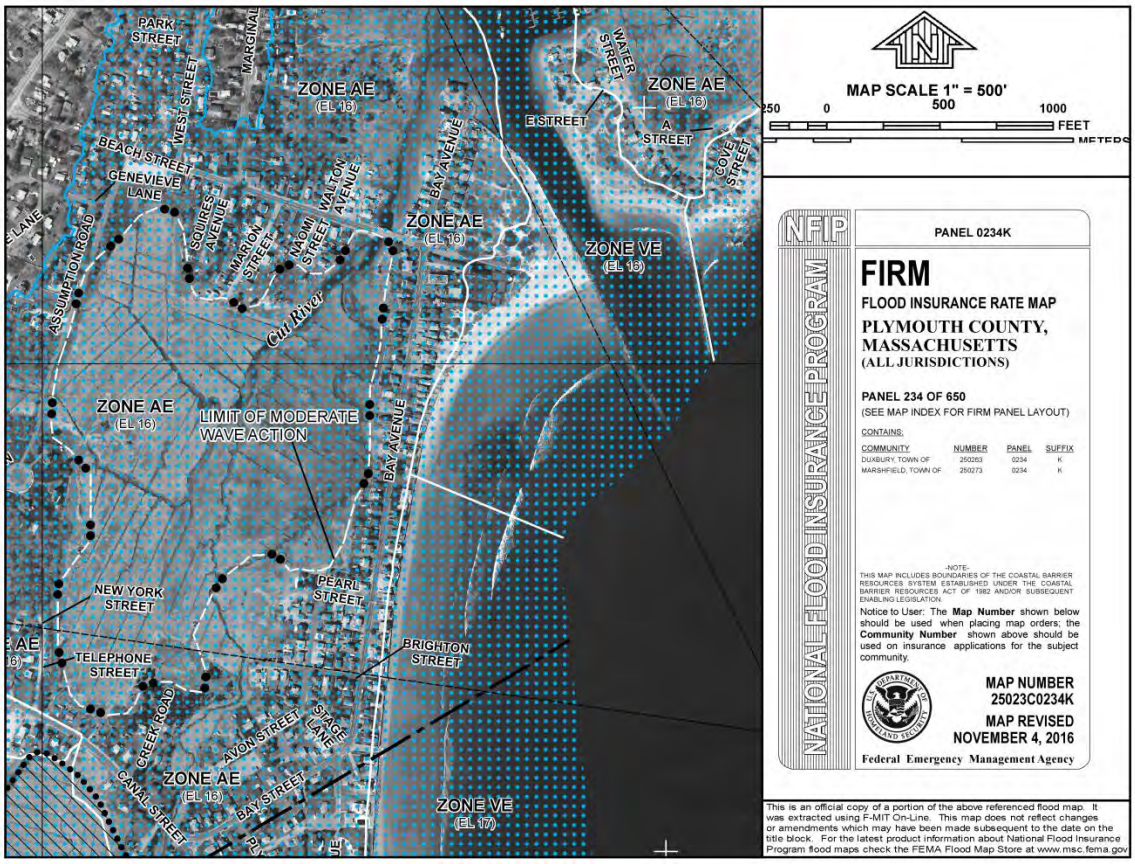


Figure 2-35. FEMA FIRM showing flood zone designations for Green Harbor Beach.

2.6.2 Anthropogenic Features

There are three separate Town-owned parking lots that serve Green Harbor Beach. There is a Town owned gravel lot approximately ¼ mile west of the water on Beach Street that can hold 35 cars. This parking area is monitored by a parking attendant and only provides parking for cars with a resident beach sticker. Although clear signage is present, and a wooden split rail fence bounds and defines the lot, this area can develop overflow issues, with beachgoers attempting to park in the lots of nearby businesses. Additionally, although it is a significant walk to the beach, there is no sidewalk present, and there is a safety hazard with pedestrians traveling between the beach and the Beach Street parking lot within the roadway. A similar sized dirt lot is also located on Avon Street, which can hold 35-40 cars and is also monitored by a parking attendant; this lot is also resident sticker only. The western edge of the lot is extremely close to the salt marsh, and with such low elevations in the parking lot (~7.5 ft NGVD) this lot experiences periodic

flooding. There is a low wooden rail fence around the lot in need of repair. There are no sidewalks from the Avon Street lot to the beach either. Due to the Avon Street lot's out-of-the-way location, this parking lot can become problematic in the evenings as it is often used as a party spot. To address this, police regularly patrol past this area. The third, and smallest, Town-owned lot is located where Beach Street terminates. This paved lot can only hold 10 cars (8 regular parking spaces and 2 handicapped spaces).

There is a port-a-potty installed at all three parking lot locations during the summer. There are also trash cans, a book box, informational signs, a bench, a dog bag station and a hot dog stand located at the smaller Bay Avenue lot in the summer (Figure 2-36).

Figure 2-36. Boardwalk entrance to Green Harbor Beach from Bay Avenue parking area.

There is a privately owned dirt lot on Beach Street (behind the Green Island Lobster Pound), which can hold 46 cars. The owners utilize this location as beach parking, where visitors can purchase a day parking pass for $15 on weekdays and $25 on weekends and holidays. This location provides restroom facilities adjacent to the parking lot. This private enterprise is useful in that it provides non-resident parking, and therefore access, to Green Harbor Beach, but is problematic because the revenue is not coming to the Town, and it is not guaranteed that this service will continue being provided in the future. This parcel was for sale recently, but the Town was not able to come up with sufficient funds to purchase the property. This property would have not only provided additional Town-owned parking for Green Harbor Beach, but it would have also provided public water access to the Cut River, which could be used for kayaking and paddle boarding. The existing dirt "ramp" to the water is badly eroded and would require stabilization if public use was planned. At the Town, it is uncertain whether the Town considered the

possibility of leasing the business/building in the front of the property, which could have provided additional revenue and helped to offset the overall cost of the property. It is important to note that the Cut River does flood this parking lot during high water conditions.

There are six (6) public access ways to Green Harbor Beach:

- The main entrance at the Bay Avenue lot has a board walk to the beach;
- Easement pathway along jetty from the northern dead end of Bay Ave;
- 3 easements between properties along Bay Ave; and
    - Between 152 and 148 Bay Ave
    - Between 68 and 64 Bay Ave
    - Between 46 and 40 Bay Ave (Figure 2-37)
    - All three have metal stairs to descend from the seawall, and are accessed from crosswalks on the street. The first access point (between 152 and 148 Bay Ave) is still somewhat sandy and has a narrow high tide beach, but the second two lead to predominantly cobble beaches that are not accessible at high tide.
- A ramp at the corner of Bay Ave and Bay St, which is barricaded, closed in the winter to help mitigate flooding, but contains a welcome sign, book box stand and trash can.

Figure 2-37. Green Harbor Beach access point on Bay Ave (between 46 and 40).

The boardwalk from the Bay Avenue parking lot to the beach is fenced along both sides (with chain link fence on one side and sand fence on the other), restricting public access to the boardwalk itself until you reach the beach. Nine additional sections of plastic ramp are installed in the summer to provide a firm surface directly onto the beach. The large undeveloped vegetated coastal dune area north of the path is under a land-court dispute concerning ownership. A wooden snow fence with additional "fingers" (i.e. sections of fence perpendicular to the beach) have been installed at the toe of the dune north of the

boardwalk to help trap additional sand and restore erosion caused by severe winter storms a few years ago. Following winter storm Nemo in 2013, sand was moved to this portion of the dune and beach grass was planted to help restore the storm damage. Additionally, the property boundaries for the four parcels south of the board walk extend to mean low water (MLW). To ensure public access, the Town has acquired an easement for use of the beach in this area. South of those properties, the Town owns the beach outright.

The easement pathway along the Green Harbor jetty from the northern end of Bay Avenue passes through an approximately 15 to 20-foot wide Town-owned easement along the revetment. The stone revetment is backed by a wooden bulkhead. Beach goers can get dropped off at the end of the road and walk between the houses and the inlet to get down to the beach. This area is popular for fishing, and also has a bench at the end of the road for viewing the harbor and inlet.

Two lifeguard stations are manned at Green Harbor Beach. The first is at the northern end of the beach near the jetty, while the second is stationed near the stairs located at the easement between 152 and 148 Bay Ave. Additional beach management activities at this location include the occasional need to remove seaweed. Although the Town prefers to simply thin out accumulated seaweed by raking to promote it being washed back into the ocean, a couple of years ago the seaweed accumulated on the beach so densely that it had to be mechanically removed using a "uke".

Figure 2-38. Green Harbor Beach (facing north).

3.0 MANAGEMENT STRUCTURE OF MARSHFIELD PUBLIC BEACHES

3.1 DEPARTMENT ROLES AND RESPONSIBILITIES

The management structure for public beaches within the Town of Marshfield involves a number different departments and personnel, each with different interests and responsibilities in managing the Town's beaches (Figure 3-1). These interests range from the daily operations of the beach and summer staffing, to facilities maintenance, to conservation and protection of natural resources. As part of this Beach Management Plan, the roles and responsibilities of the various departments in charge of managing the public beaches have been identified. This information can be useful in providing coordinated and effective management of the Towns public beach sites, and ultimately for meeting the goals stated in this plan for improving the quality of Marshfield Beaches. It does not, however, need to remain static. Roles and responsibilities can be redistributed, at which point, this section would be a useful starting point for streamlining operations in the future. A general organization chart and a brief list of department responsibilities is provided in Figure 3-1.

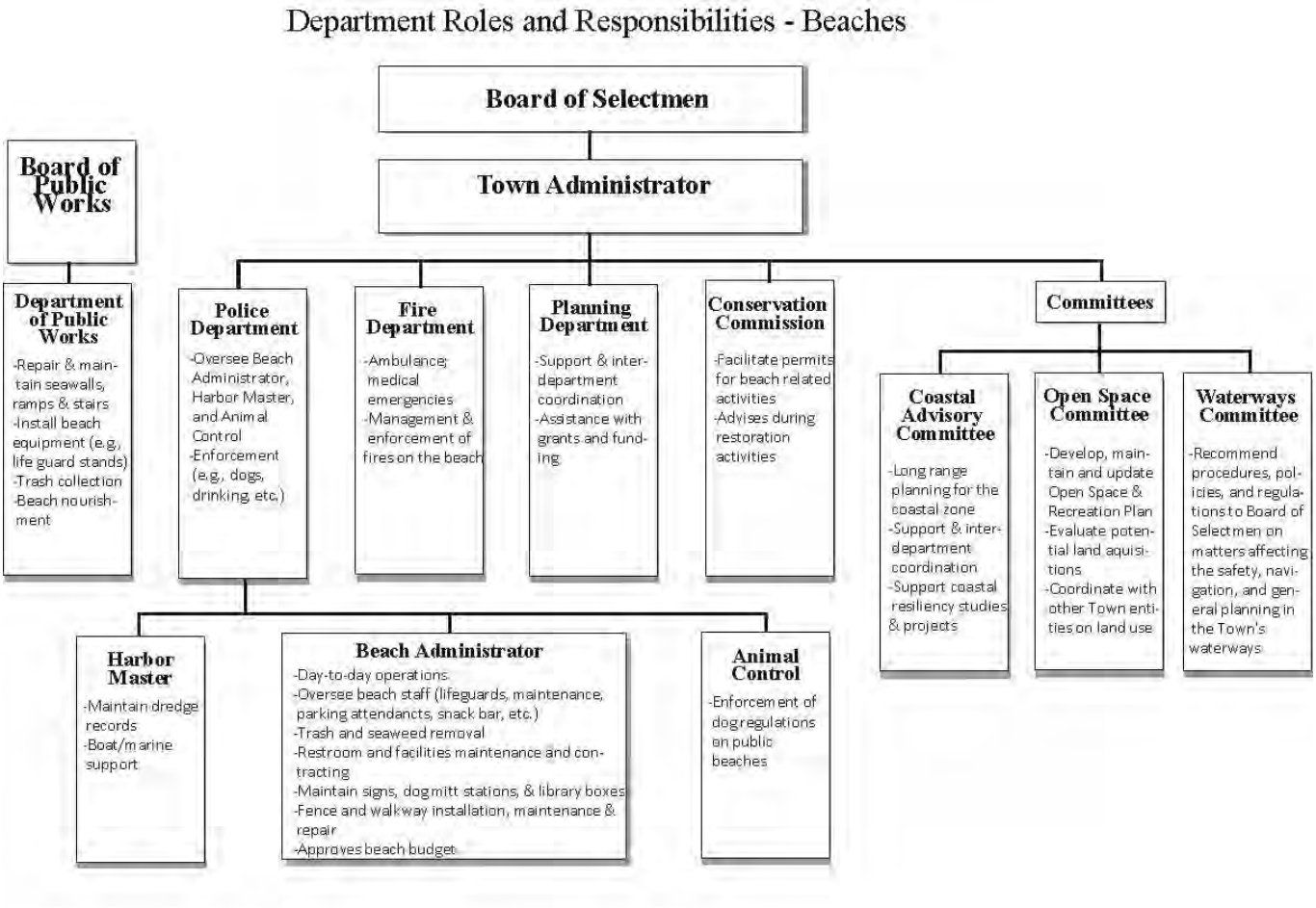


Figure 3-1. Town of Marshfield department roles and responsibilities for beach management.

3.2 PUBLIC BEACH REVENUE AND EXPENSES

Continued use and maintenance of the Town of Marshfield public beaches both as natural protective buffers to storm and wave damage, and as a an important recreational resource, is largely dependent on prudent financial management. As with most municipalities, the limited financial resources within the town must be carefully planned so that the necessary services and goods can be provided. To assess the adequacy of current financial management practices, and to help with long-range fiscal planning, a summary of the operating budget for the Town of Marshfield public beaches has been prepared as part of the Beach Management Plan.

Revenue generated by the public beaches comes from several different sources. The largest contribution (approximately 50% of beach revenue) comes from the sale of resident beach stickers, which currently cost $35. Additionally, approximately 30% of the total beach revenue is also generated through the daily parking fees collected from the Rexhame and Brant Rock Beach parking areas. Day use fees for Rexhame are $15 Monday through Friday, $20 on Saturday, Sunday and holidays, and $5 after 5:00pm. Day use fees for Brant Rock are $10 Monday through Friday, and $20 Saturday, Sunday and holidays. Over the past five years, total annual beach revenues have ranged from $247,712 to $321,672 per year. The third major contributing source to the Beach Administrator budget is the revenue generated from snack bar sales, which makes up approximately 20% of the department's revenue. A summary of public beach revenues generated between 2012 and 2016 is shown in Figure 3-2.

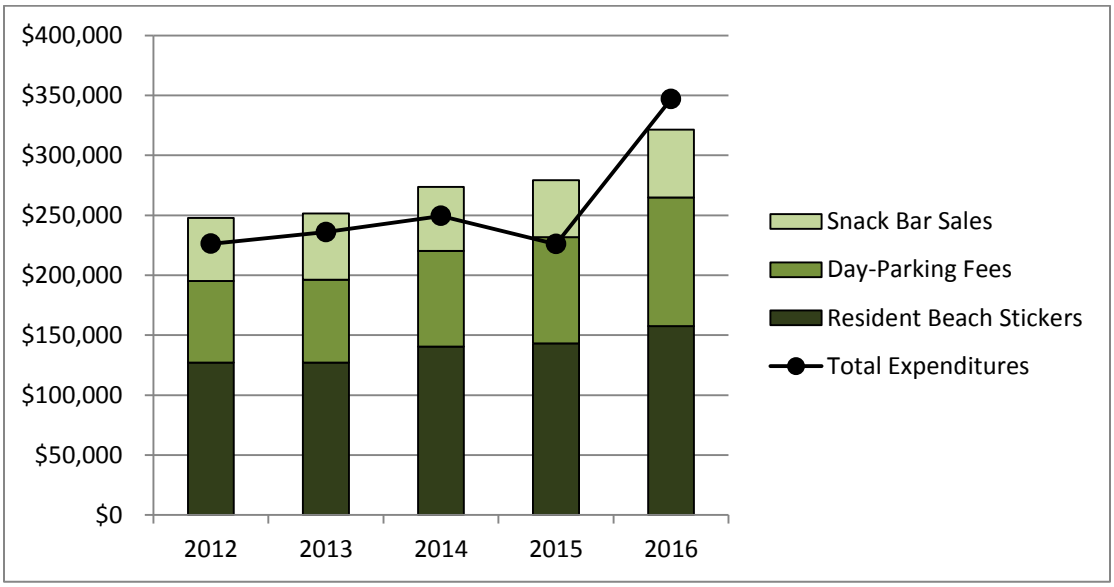


Figure 3-2. Overview of Beach Administrator revenue and expenses 2012-2016.

Total Beach Administrator expenditures for each year are also shown in Figure 3-2. Operational expenses associated with the public beaches can be attributed to a number of different categories, including permanent and seasonal staff wages, as well as operating

expenses for the department's beach management activities. In every year except 2016, the total revenue exceeded the total expenditures. In 2016, additional funding was leveraged from other Town budgets to complete a necessary extension to the Rexhame sewer system. That the revenue typically exceeds the expenditures results in a net financial gain for the department. However, this surplus is unlikely to be able to completely fund some of the newly proposed activities in Section 4. The Town of Marshfield may need to seek additional funding for additional or improved visitor facilities, strategic property acquisitions to develop additional parking areas, and/or funding for newly proposed recommended beach management activities described in Section 4.

4.0 RECOMMENDED MANAGEMENT ACTIVITIES

Information gathered and analyzed as part of the inventory of Marshfield beaches has been used to develop recommended management activities for the Town of Marshfield public beaches. These recommendations represent a balance between preserving and restoring the natural functions of the various natural resources, and providing a quality public beach resource for recreational purposes. As such, the competing interests of various stakeholders have been taken into consideration and protected to the extent possible.

In some cases, the management recommendations include activities that are already being implemented by the Town of Marshfield under existing management practices, and the course of action is simply to continue business as usual. In other cases, the management recommendations define new activities that will require change to existing practices. Some of the recommendations can be implemented immediately, while others will require long-term planning, as well as potential permitting and fundraising before they can be implemented. In some cases, staff and budget restrictions will prohibit certain recommendations from being implemented until additional funding can be obtained. Additionally, although responsibility for each recommendation is given to a certain department(s), it is not important which department ultimately gets assigned to the task, only that it gets done. Responsible parties listed for each activity are merely suggestions, and can be reassigned to better utilize staff members in other departments as the Town chooses to implement each recommendation.

Where possible, a schedule or frequency for implementation has been specified, as some activities require work on a routine or annual basis, while others are needed infrequently, for example only after storms. Although the management recommendations represent a thorough and comprehensive list of activities, the dynamic nature of the public beach sites necessitates a need for flexibility in future application. As such, the Beach Management Plan and associated recommendations should be considered a "living document" that must be reviewed and updated periodically to adjust to the changing conditions of the beaches.

The recommended beach management activities have been broken into 6 distinct categories. These include the following:

(1) management and planning level activities,
(2) routine monitoring activities,
(3) routine maintenance and improvement activities,
(4) restoration activities,
(5) education and outreach activities, and
(6) finance opportunities.

A brief description of each recommendation is provided below. Where possible, details are given on specific components of the recommendation including beach locations, responsible party, timing of implementation, purpose, relative priority, and pertinent regulations.

4.1 MANAGEMENT AND PLANNING LEVEL ACTIVITIES

Activity 4.1.1 Evaluate the Municipal Management Structure for Marshfield Public Beaches

Purpose: To identify measures that will improve the efficiency and allocation of resources, allocate personnel and funding for daily beach operations (i.e. lifeguards, parking attendants, trash removal, portable toilet service, etc.), streamline routine maintenance (i.e. maintain parking lots, install fencing, etc.), and prioritize capital improvements (i.e. beach nourishment, concession or amenity upgrades, land acquisition, etc.).

Existing Activities: The current management structure for Marshfield public beaches is outlined in Section 3 and is displayed diagrammatically in Figure 3-1.

Details:

1) Convene a meeting with responsible municipal departments to identify and discuss any shortcomings of the existing system.
2) Review management structure for public beaches used by other coastal Massachusetts towns as potential models.
3) Identify responsible departments and point persons for recommended new activities.
4) Identify potential new interdepartmental partnerships or reallocate responsibilities to produce a more effective and efficient beach management system and clearly define departmental roles.
5) Ensure someone is specifically tasked with tracking grant opportunities and preparing proposals to fund beach management activities.
6) Reassess the role of the Coastal Advisory Committee and determine whether its goals or responsibilities could be redirected to assist with any of the beach management activities listed below.
7) Consider the possibility of an external (citizen-lead) committee to focus on public education.
8) Implement changes in municipal management structure if determined to be beneficial.

Timing: 2018

Priority: Moderate

Responsibility: Town Administrator, Board of Selectman, Beach Administrator, Department of Public Works, Police Department, Fire Department, Recreation Department, Board of Health

Activity 4.1.2 Formally Adopt Specific Town Objectives and Goals for Preserving and Maintaining Beaches

Purpose: To clarify and solidify the Town's goals and objectives for preserving and maintaining their public beaches. Codifying these goals will facilitate projects in the future.

Existing Activities: Currently the Marshfield Master Plan addresses the overall needs, goals and objectives for the town. The 2015 update includes Natural, Historic and Open Space Resource Goals taken from the March 2010 Marshfield Open Space and Recreation Plan Update, none of these goals specifically addresses the management and preservation of Marshfield beaches

Details:

1) Develop a broad statement addressing the Town's commitment to improved management and preservation of Marshfield's coastal resources and beaches.
2) Example goals/statements: improve the quality of Marshfield's beaches; improve the quality of wetland, estuarine and other coastal resources; and improve public amenities and facilities at public beaches.
3) Planning Board adopts the newly developed language as part of next Master Plan update.

Timing: 2018-2020

Priority: Moderate

Responsibility: Planning Board, Planning Department

Activity 4.1.3 Establish a Beach Maintenance Record Keeping System

Purpose: Establish a record keeping system for beach maintenance activities, beach/dune restoration, inlet dredging activities, stairs and boardwalk reconstructions, and storm damages at each beach to maintain a history of work and storm response to guide future restoration and management decisions.

Existing Activities: Financial records pertaining to beach revenue and expenditures are currently kept by the Beach Administrator, but detailed records are not kept about specific maintenance activities. Individual departments maintain different levels of records for their specific beach-related actions. Photographs are taken of pre- and post-storm beaches and are stored electronically.

Details:

1) For all beach maintenance activities, document type of activity, materials needed, cost, dates of work, location and any outside contractors. Document each activity with photographs.
2) For all beach nourishment and/or dune restoration work, document dates of work, location, volume of sand, elevation and slope of fill, as well as source and quality of sand. Document each activity with photographs.
3) Continue to maintain records for any dredging work at Green Harbor Inlet, including dates and location of work, volume and quality of material dredged, placement location(s), and dredging/placement methodology.
4) Document all major coastal storms and associated beach impacts, by recording date and duration of storm, beach sites impacted, extent of erosion, and impacts to infrastructure. Flag high water marks as soon as possible after major storm events at all impacted beach sites. Survey and record the elevation of high water flags.
5) Identify responsible department to serve as a beach database manager who will acquire, update, and maintain necessary records.
6) A sample documentation Excel spreadsheet is provided in Appendix B.

Figure 4-1. Post-storm Brant Rock Beach (winter 2015).

Timing: Annually and post-storm

Priority: High

Responsibility: Harbor Master, Beach Administrator, Police Department, Department of Public Works.

Activity 4.1.4 Prepare Spring Letter to the Marshfield Conservation Commission

Purpose: Prepare an annual spring letter to the Conservation Commission describing the necessary beach activities required to open the public beaches to inform the Commission about required activities and provide them adequate information to ensure protection of wetland resources.

Existing Activities: Currently the Conservation Commission is contacted verbally or via email for permission for most routine work. Conservation permits are only pursued when necessary.

Details:

1) Conduct site visits to each beach in early March to identify necessary activities.
2) Identify the types of work, locations, schedule, and equipment needed, as well as the work methodology. The spring letter should reference the Marshfield Beach Management Plan, and describe all anticipated work. A sample letter is provided in Appendix B.
3) Provide an opportunity for a meeting and/or site visit with the Conservation Commission to discuss the upcoming work and determine if conservation permitting is required.

Timing: Annually in March or April

Priority: High

Responsibility: Beach Administrator, Conservation Commission

Activity 4.1.5 Prepare Fall Letter to the Marshfield Conservation Commission

Purpose: Prepare fall letter to the Conservation Commission describing activities undertaken during the previous year at each of the public beaches to inform the Commission of the required activities and resources protected, and to document compliance with any active permits. This would also serve as a useful summary document for the Beach Administrator to maintain in its own records.

Existing Activities: The Beach Administrator does not currently prepare a letter to the Conservation Commission summarizing the year's activities.

Details:

1) Provide a written description of all beach activities completed, including location, dates and duration, and equipment utilized. A sample letter is included in Appendix B.
2) Provide a written description of all anticipated winter beach construction and maintenance activities.

Timing: Annually in October or November

Priority: High

Responsibility: Beach Administrator, Conservation Commission

Activity 4.1.6 Maintain Active Conservation Permits for Work on Public Beaches

Purpose: To allow work within the resource areas and buffer zones on the Marshfield public beaches, as required by the Massachusetts Wetlands Protection Act and Town of Marshfield Article 37 Wetlands Protection By-Law, as well as associated state and federal wetland protection regulations.

Existing Activities: Currently copies of all permits are maintained in a file with the Conservation Department. A copy is also sent to the Massachusetts Department of Environmental Protection, as well as to each applicant.

Details:

1) Maintain an Excel database record of all conservation permits obtained for work on public beach sites, including issuing agency, permit and/or tracking number, dates of issuance and expiration, recording information, dates of any extensions, and certificates of compliance. Begin by entering all active permit information.
2) Maintain a file with hard copies of all permits, referenced plans, extension permits, and certificates of compliance. This can continued to be maintained by Conservation Department, as long as other pertinent departments (e.g., Beach Administrator, Department of Public Works) can review the file when needed.
3) Prepare all extension requests and applications for re-issuance 3 months prior to permit expiration.
4) Ensure the orders of condition, extension permits and certificates of compliance are requested, received and recorded.

Timing: As-needed.

Priority: High

Responsibility: Conservation Commission; Beach Administrator; Department of Public Works

Activity 4.1.7 Develop Pre- and Post-Storm Response Plans for Public Beaches

Purpose: To improve efficiency and minimize the risks of storm damage to wetland resources and public/private infrastructure, as well as to reduce adverse impacts to resources during post-storm clean-up.

Existing Activities: Currently the Beach Administrator works cooperatively with the Department of Public Works to remove all life guard stands, trash and recycle bins, and all beach-related equipment prior to a predicted storm. These items are stored at the highway barn. The Town of Marshfield currently has a Multi-Hazard Mitigation Plan (currently being updated - 2017), which outlines many suggestions for reducing potential hazard impacts, but does not specifically address activities concerning beaches.

Details:

1) Identify specific activities that must be performed in advance of an upcoming hurricane or major storm, such as removing all unsecured items from the beach and parking areas, closing storm closure panels at openings in sea walls to ensure that water does not pass through openings during storm events to minimize penetrations in sea walls, etc.
2) Develop a chain of command and specific responsible parties for all pre-storm activities. Emergency Operations should determine when action is necessary and alert responsible departments that they should perform their designated pre-storm duties. With pre-determined responsibilities, each department will be able to more efficiently perform the necessary activities.
3) Develop a list of important contact information local, state, and federal emergency management officials, utility suppliers for electricity and gas, local materials haulers, heavy equipment contractors, and tree trimming specialists. Update points of contact as necessary.
4) Although predicting the outcome and damage a storm will cause is difficult, it is helpful to have a series of plans outlined for likely situations. To the extent possible, develop plans and obtain advance approval for likely post-storm emergency response actions, such as removing sand from roads and parking lots, collecting and appropriately disposing of storm debris, and assess access structures (e.g. boardwalks, stairs, etc) and repair them as necessary. Advance approval would allow these activities to be performed quickly without permit. Also consider developing response plans for larger disasters (e.g., a breach at Rexhame Beach, collapse of a large portion of the seawall, etc.).
5) Incorporate all above information into the Marshfield Multi-Hazard Mitigation Plan update.

Timing: 2018

Priority: High

Responsibility: Emergency Management Agency; Town Administrator; Beach Administrator; Department of Public Works

Activity 4.1.8 Beach Staffing

Purpose: To provide regular staffed lifeguards, parking attendants, and beach maintenance crew at all public beaches for the safety and enjoyment of Marshfield beach goers.

Existing Activities: The Beach Administrator currently hires life guards, parking lot attendants, maintenance staff and snack shack staff. Staffed hours range from 7:00am to 7:00pm at Rexhame Beach to 9:30am to 4:30pm at all other beaches.

Details:

1) Consider the need to hire additional maintenance staff, or increase the available hours for current staff members. This would allow maintenance crews to remove trash and maintain facilities at all beaches, while allowing lifeguards to focus on guarding.
2) Consider the need to hire additional lifeguards and/or increase staff hours at Green Harbor until 7pm to allow facilities to remain open until then.

Timing: Annually

Priority: Moderate

Responsibility: Beach Administrator

Activity 4.1.9 Consider Potential Land Acquisition and Redevelopment Opportunities to Improve Public Beach Properties and Facilities

Purpose: Acquire additional land to support added beach visitor facilities (e.g., parking, restrooms, mobile venders, educational materials, mini-parks, etc.) for Marshfield's public beaches. The Marshfield Harbor, Rivers, and Waterways Management Plan includes a recommendation for "efforts to increase parking at Town beaches."

Existing Activities: The results of the online survey indicated that lack of parking and facilities were two of the respondents' biggest concerns (51% and 52% of respondents indicated that the current conditions did not meet their needs for parking and facilities, respectively; Appendix A). During the development of this Plan, various conceptual ideas for expansion of the Rexhame parking lot were developed. These conceptual plans were presented to the Marshfield Conservation Commission, and received favorable feedback. The conceptual plan for the preferred alternative, which would have removed the two seaward rows of parking lot to enhance the coastal dune, converted all pavement into a pervious parking lot, and revegetated and restored a series of paths and trampled areas in the dunes, while at the same time increasing the area of the parking lot by 70%, received negative feedback from state regulatory agencies. Because Rexhame is located on a barrier beach, the performance standards under the state Wetlands Protection Act do not allow for conversion of coastal dune to an area for parking.

The Town of Marshfield has considered additional land acquisition in the past, but has not been able to act on a property quick enough to see the purchase to fruition. Planning, budgeting and prioritizing will increase the likelihood of a successful transaction in the future, which could help meet the growing needs for additional beach parking and amenities.

Details:

1) Identify areas where additional land would be useful for parking, facilities, etc.
2) Discuss the potential for purchasing adjacent/nearby land with abutters, specifically the parcels on Beach Street on and adjacent to the Cut River (where the current Lobster Pound and privately run parking lot is), the Sea Rivers Trust parcel north of Rexhame Beach, and the lots on Ocean Street between Billings and Hutchinson Roads.
3) Investigate how other Towns handle property acquisition, particularly for parcels listed for above their assessed price; consider doing a cost-benefit analysis.
4) Additional and/or Town-owned under-utilized could be used for parking (especially for Fieldston and Sunrise Beach where public parking is essentially non-existent), mini-parks (at Brant Rock and Sunrise Beach, where park areas with shade structures, benches, and or landscaping could be developed to facilitate enjoyment of the beach in areas where use is limited at high tide), and locations for placement of additional beach facilities (i.e. portable toilets, mobile food vendors, educational signs, recreational/educational programming, kayak launches (Figure 4-2), etc.). See Figure 4-3 through Figure 4-6 for some examples of these parcels.

5) If it is determined that developing vacant Town-owned lots are not in the Town's best interest, consider selling these parcels and using the resulting revenue to make improvements elsewhere.

Timing: 2018-2020

Priority: Low

Responsibility: Town Administrator, Board of Selectmen, Beach Administrator, Planning Department

Figure 3-2. Targeted acquisitions could provide a public kayak launch on the Cut River.

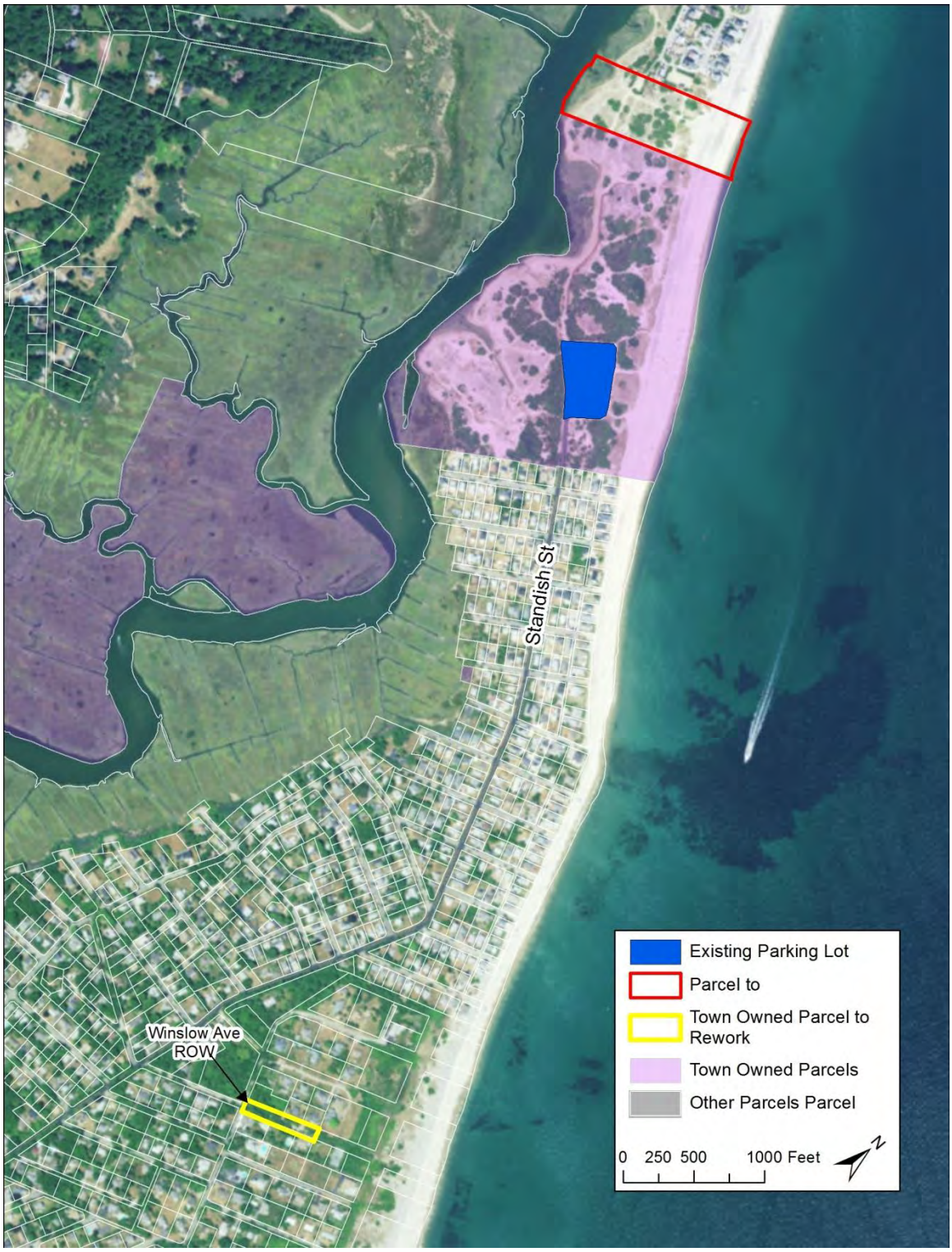


Figure 4-3. Potential parcels to acquire or rework in the Rexhame and Winslow Avenue Beach areas.

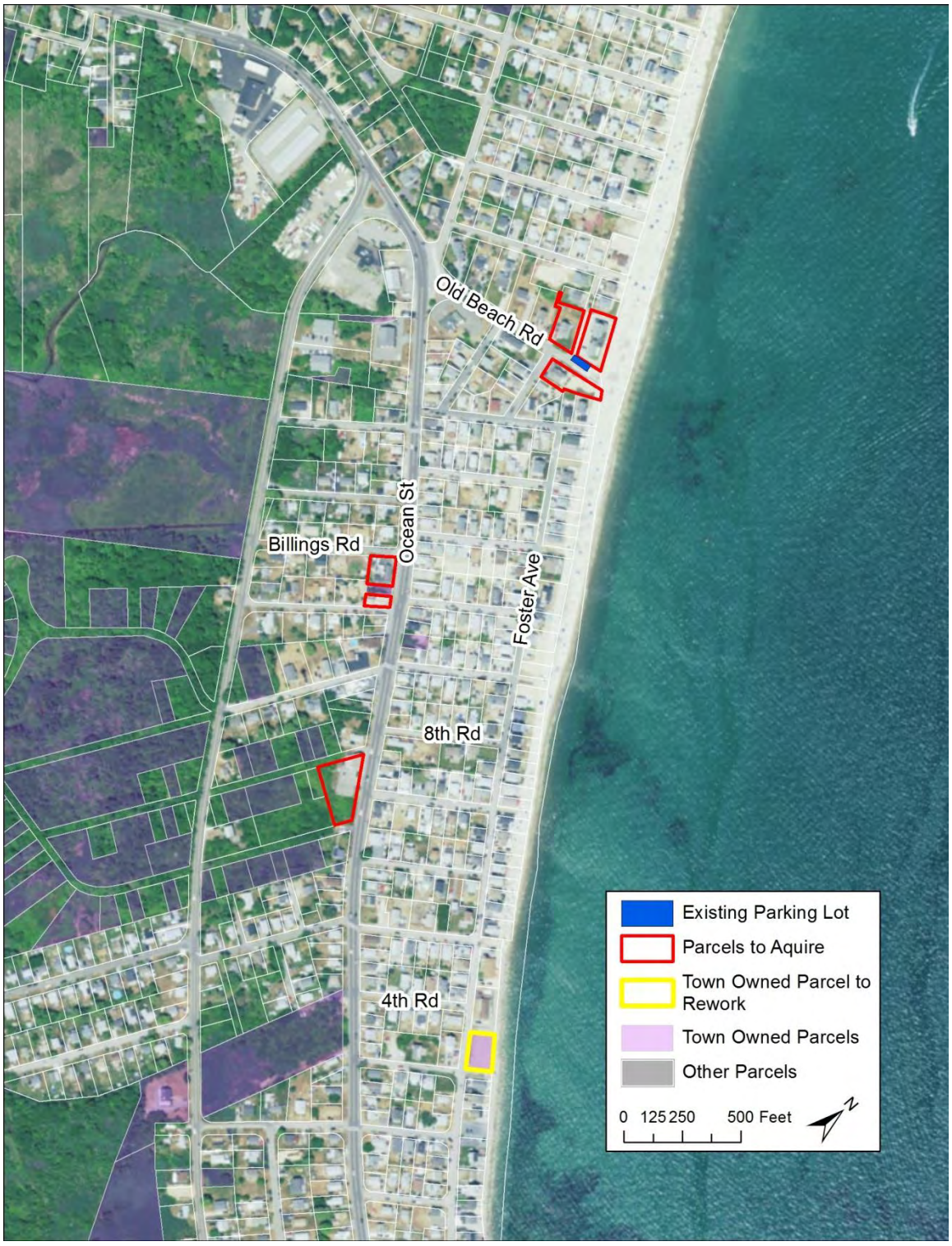


Figure 4-4. Potential parcels to acquire or rework in the Fieldston Beach area.

Figure 4-5. Potential parcels to acquire or rework in the Brant Rock Beach area.

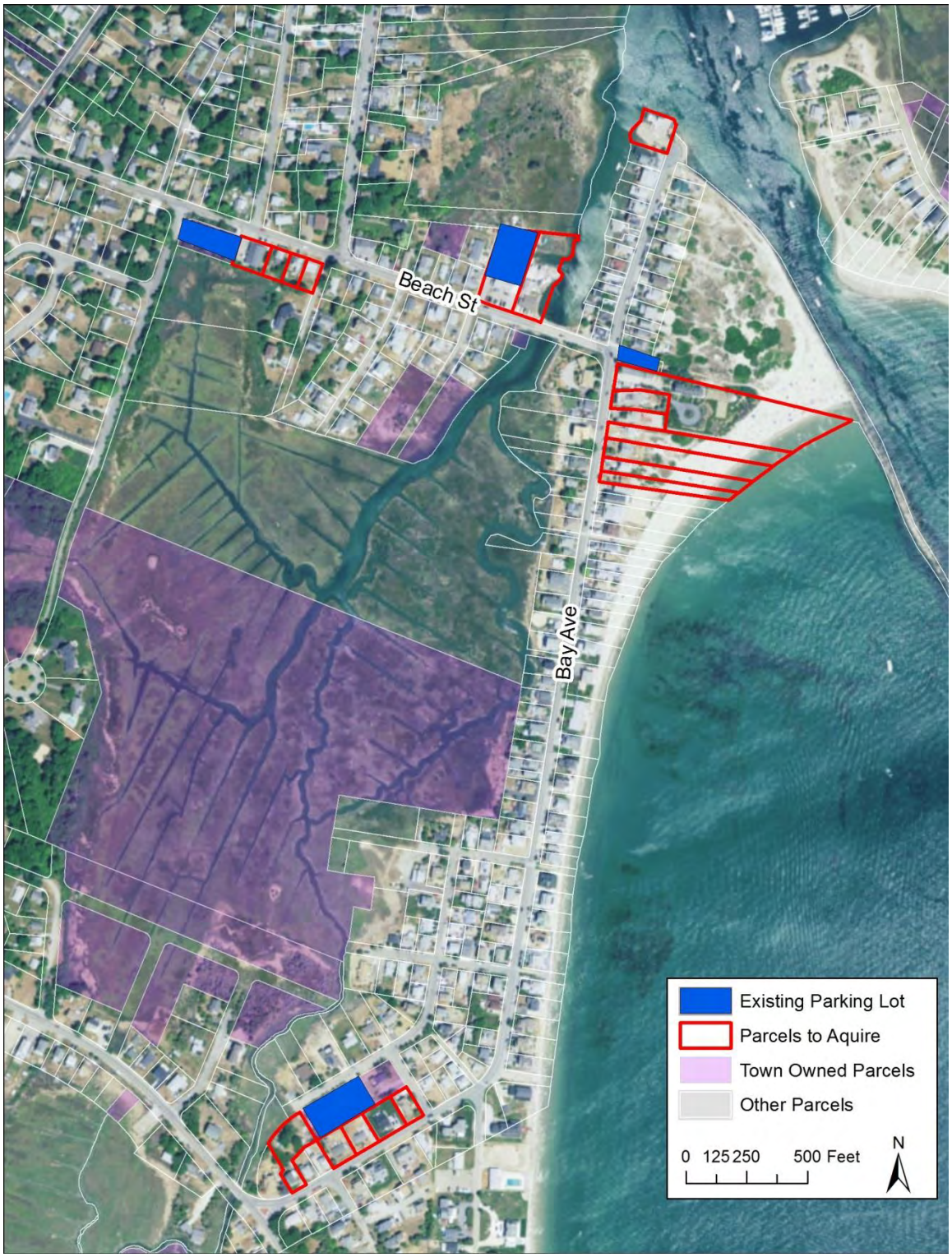


Figure 4-6. Potential parcels to acquire or rework in the Green Harbor Beach area.

Activity 4.1.10 Consider a Shuttle Bus from an Offsite Parking Location

Purpose: To utilize existing off-site Town infrastructure to increase visitor capacity for the public beaches.

Existing Activities: The Town of Marshfield does not have an off-site shuttle service. A question about potentially adding a shuttle service was included in the online public survey as part of the development of this report (Appendix A). There was not strong support for a shuttle service (only 30% of respondents indicated that they would consider using a summer weekend beach shuttle bus) when answers from all respondents are considered. However, when answers from only respondents that identified as a "Visitor" are considered, more than half of the respondents indicated that they would consider using a shuttle service to access Rexhame and/or Green Harbor Beaches.

Details:

1) Locate existing parking lots in downtown Marshfield that are under-utilized on weekends.
2) Evaluate funding sources to finance the operational costs. Determine appropriate shuttle fee.
3) Begin discussions with GATRA bus service. Ideally, a medium sized bus could have a regular shuttle route to Rexhame.
    a. This would accommodate (and capture the lost revenue from) visitors that are currently taking taxi services to the beach.
    b. This could also encourage day trippers to Marshfield to extend their visit, potentially increasing economic opportunities for other local businesses as well (e.g., restaurants).
4) In April and May, begin advertising that the shuttle service will be available.
5) Run the Rexhame shuttle service on weekends between Memorial Day to Labor Day.
6) Evaluate effectiveness of the shuttle service after the first year, to determine whether it will be continued the following year. If so, consider whether the shuttle program should be expanded, or if it could be improved in any way.

Timing: 2018

Priority: High

Responsibility: Town Administrator, Beach Administrator, Planning Department

Activity 4.1.11 Review and Update Beach Management Plan Periodically

Purpose: To ensure effective management of the public beaches by adjusting future management practices to respond to changing conditions and uses of the beaches.

Existing Activities: Prior to this document, the Town of Marshfield did not have a comprehensive Beach Management Plan.

Details:

1) Review past maintenance and restoration activities, as well as storm damage records.
2) Review and consider effectiveness of past management strategies.
3) Consider collecting public feedback in the form of an online survey to assess the effectiveness of updated beach management actions.
4) Update Beach Management Plan as necessary.

Timing: Every 10 years

Priority: High

Responsibility: Town Administrator, Beach Administrator, Department of Public Works, Planning Department, Conservation Commission, Fire Department, Police Department

4.2 ROUTINE MONITORING ACTIVITIES

Activity 4.2.1 Conduct Bi-Annual Beach Profile and Photographic Surveys at All Public Beaches

Purpose: To quantify long-term and seasonal changes in beach profile and shoreline location, and to identify when beach nourishment and dune restoration are needed.

Existing Activities: Photographic documentation has been collected in the past, but only as a post-storm measure. Photographs and profile data are not collected on a regular basis or at all locations.

Details:

1) Establish profile locations that can be resurveyed regularly for comparison.
2) Collect beach profiles at all public beach locations established as part of the Beach Management Plan. Survey the beach profiles bi-annually in the late winter (Mar. to Apr.) and early fall (Sept. to Oct.).
3) Ideally GPS or total station survey equipment would be used to collect horizontal (x,y) and vertical (z) positions along each beach profile, but low-tech methods could also be used by volunteer or beach associations to lower costs. Collect information regarding position of high water during the surveys, as well as breaks in slope, types of resource area, and extent of vegetation.
4) Maintain the survey data in an Excel spreadsheet. An example spreadsheet is provided in Appendix B.
5) Compare successive surveys to evaluate changes in elevation, volume and shoreline position. Review beach profile data on an annual basis to identify areas where beach width is consistently narrowing, or where dune width/height is compromised. Establish these areas as priority sites for beach nourishment and dune restoration.
6) Establish 2-4 sites at each beach for the collection of photographs that can be used to document visual changes. Collect the photography bi-annually along with the beach profile data. Document the dates and tide levels during the photography and maintain in a binder or electronic database. This information should be maintained with other beach related records noted in Activity 4.1.3.
    a. Note and photo-document dominant plant species and any invasive weeds to determine whether a revegetation, restoration, or invasive species removal project is needed.
    b. These 2-4 sites should also be photographed after a storm as part of Activity 4.1.3.
7) Long-term documentation can help clearly articulate a need when state and federal funding becomes available for coastal resiliency projects.

Timing: Bi-annually

Priority: Moderate

Responsibility: Beach Administrator, Department of Public Works, consultant, volunteers

Activity 4.2.2 Conduct Annual Condition Surveys of All Coastal Engineering Structures at the Public Beaches.

Purpose: To identify damaged or deteriorating seawalls, groins and jetties.

Existing Activities: Almost all seawalls in Marshfield are owned by the Town. The last comprehensive seawall conditions report was completed in August 2006, and is due for an update following recent and substantial improvements, including replacement of 33% of the Town's seawalls, and repair of rip rap revetments. The Town is responsible for all groins and jetties, with the exception of the Green Harbor jetties, which are owned and maintained by the U.S. Army Corps of Engineers. The Town monitors all structures regularly, although specific condition reports are not generated annually. Current permits typically do not allow maintenance once project is complete; subsequent work usually requires re-permitting.

Details:

1) Seawalls that have been damaged or show the need for repair following the annual condition survey should be repaired or replaced as necessary to continue to provide protection to the upland properties. Permitting should be pursued as needed to complete necessary repairs.
2) For any groin or jetty that is trapping sediment, document erosion and accretion rates on both sides of the shore perpendicular structures.
3) Collect photographs of structures during each survey.
4) All other groins and should be visually monitored.
5) Plan for seawall repairs and upgrades as called for by monitoring results.

Timing: Annually

Priority: Low

Responsibility: Department of Public Works

Activity 4.2.3 Update Shoreline Change Analysis with Additional Aerial Photography

Purpose: To identify and quantify long-term trends in shoreline change and to improve decisions regarding sediment management.

Existing Activities: The Town has not performed this analysis regularly in the past.

Details:

1) Review the CZM shoreline change database and updated analysis incorporating additional aerial photography from 2014. (An updated analysis with these years was completed as part of this Beach Management Plan.)
2) Continue to update the shoreline change analysis with new photographs as they become available, approximately every 5 years.
3) Use the updated shoreline change data to forecast erosion rates as the basis for planning restoration and beach nourishment opportunities.

Timing: Every 5 years

Priority: Moderate

Responsibility: Beach Administrator, Planning Department

Activity 4.2.4 Conduct Weekly Water Quality Sampling at all Public Beaches

Purpose: To ensure public safety and health of the community by conducting weekly inspections of water quality at all swimming beaches.

Existing Activities: In the past, the Marshfield Board of Health has conducted weekly water quality sampling at five (5) locations: Rexhame Beach, Fieldston Beach, Sunrise Beach, Brant Rock Beach and Green Harbor Beach. In 2017, due to staffing issues, the Beach Administrator is conducting the water sampling.

Details:

1) Collect water samples weekly at all beaches noted above.
2) Water samples are sent to an analytical laboratory for analysis of *Enterococcus sp.*
3) Post water quality results on the Board of Health and Marshfield Beaches websites to inform the public of any health concerns.
4) If results exceed recommended limit (>104 colonies/100ml for *Enterococcus*) post beach closure signs at any affected location and post a notification online.
5) If/when Winslow Beach becomes established as a 6th public beach location, water sampling should be conducted there as well.

Timing: Weekly, during the summer.

Priority: High

Responsibility: Board of Health

Activity 4.2.5 Conduct Shorebird Surveys

Purpose: To monitor and protect rare and endangered shorebird species.

Existing Activities: Mass Audubon currently monitors the shoreline in early spring, but no successful nests have been observed in the Town of Marshfield in recent years. One piping plover nest was observed in the Rexhame area in 2014, but did not produce any chicks. Additionally, one piping plover male was observed producing scrapes in the Rexhame area in May of 2016 and the area was temporarily fenced off, but when no further piping plover activity was observed that season, the fencing was removed.

Details:

1) Continue to utilize trained observers to monitor the beaches during the nesting season starting during the beginning of March.
2) The Conservation Commission will maintain a central database that includes all annual shorebird monitoring reports produced by MassAudubon.
3) If a nest is located, follow MassAudubon and NHESP protocol for reporting and required exclusionary fencing.

Timing: Annually

Priority: High

Responsibility: Conservation Commission, MassAudubon

4.3 ROUTINE MAINTENANCE AND IMPROVEMENT ACTIVITIES

Activity 4.3.1 Complete Pre-Season Activities Required to Open the Public Beaches

Purpose: To provide the services required to operate the public beaches.

Existing Activities: The Town of Marshfield annually completes a series of necessary activities to make the public beaches ready for summer visitors.

Details:

1) Advertise for and fill beach maintenance, parking attendant, life guard and snack bar positions.
2) Remove wooden barricades in beach access ramps.
3) Install seasonal metal staircases at Brant Rock Beach (2), and Monitor Road and Constitution Road along Fieldston Beach.
4) Move stored items (such as trash and recycle bins, surfboards, kayaks, and snow fencing) to their locations or storage.
5) Schedule plumber to turn the water on at Rexhame and the Comfort Station.
6) Clean Rexhame Beach snack bar and the Comfort Station near Brant Rock Beach. Conduct repairs and paint the buildings as necessary.
7) Place and service trash bins and recycling bins at all beach entrances.
8) Contract with portable toilet service and oversee pre-season placement of portable toilets at Rexhame Beach, Brant Rock Beach Dyke Road lot, and the three Green Harbor Beach parking areas by contractors.
9) Replace and install fencing as necessary.
10) Replace and install signs as necessary.
11) Place dog mitt and book boxes stations at beach entrances.
12) Install lifeguard stands and anchors at Rexhame Beach, Fieldston Beach, Sunrise Beach, Brant Rock Beach and Green Harbor Beach.
13) Install seaward sections of boardwalk at Green Harbor Beach.
14) Schedule the Board of Health to inspect the snack bar prior to opening.

Timing: Annually – May

Priority: High

Responsibility: Beach Administrator, Department of Public Works, Board of Health

Activity 4.3.2 Perform Maintenance of the Parking Areas at All Public Beaches

Purpose: To maintain and preserve existing parking lots, ensuring public safety and access, and minimizing the loss of sand from the beach.

Existing Activities: The Department of Public Works currently regrades the gravel lots, if needed. The Beach Administrator is responsible for sweeping sand from parking lots if accumulation is minor; when substantial amounts of sand have accumulated, the Department of Public Works will come to remove it. Beach staff relines the Rexhame parking lot when needed.

Details:

1) Sweep all paved parking lots and return clean sand back to the beach above the high tide line. Any sand that is contaminated with oil or grease, or mixed with trash or debris should be removed to an approved off site location. Any questions regarding sand contamination should be resolved using best management practices including stockpiling on the parking area, and a site meeting with the Department of Engineering supervisor, the Beach Administrator and/or the Conservation Commission.
2) Paint parking lines, directional arrows, and seal parking areas as needed.
3) Regrade natural surface parking areas at the beginning of the beach season, and as needed throughout the year to avoid the collection of rain water.

Timing: Annually and as needed.

Priority: Moderate

Responsibility: Beach Administrator, Department of Public Works, Conservation Commission

Activity 4.3.3 Install and Repair Fencing as Needed

Purpose: To maintain adequate fencing for public safety as well as for the protection of resource areas.

Existing Activities: The majority of the beach sand fencing is installed at Green Harbor and Rexhame Beaches to delineate pedestrian paths, protect vegetated dune areas, and to help trap sand on the seaward face of the dunes. There are also two small areas of planted beach grass that are protected by sand fencing at Fieldston Beach.

Details:

1) Conduct an inventory of damaged fencing in March or April.
2) Repair and/or replace fencing as needed. All work in the Coastal Dune and Coastal Beach areas should be performed by hand, and should avoid disturbance of existing vegetation.
3) Dispose of old fencing in an approved off site location.
4) Identify areas where fence installation would be beneficial, either for pedestrian management or to promote sand accumulation. With further development of Winslow Avenue Beach, fencing may be warranted to delinate the right of way access from the adjoining private yard.
5) Check all fencing daily for vandalism.

Timing: Annual – Spring; Daily during summer.

Priority: Moderate

Responsibility: Beach Administrator

Activity 4.3.4 Boardwalk and Stairway Maintenance and Repair

Purpose: To maintain public safety and access to the beach.

Existing Activities: The boardwalk Green Harbor Beach is repaired/replaced as necessary. Stairways are repaired/replaced as needed.

Details:

1) Inspect structures each year in late spring, prior to opening beaches, to assess the condition of all boardwalks and stairways.
2) Replace boardwalk planks or staircases as they become degraded, unsafe, or damaged.
3) Investigate whether a boardwalk, or MobiMat pathway would be beneficial for one of the Rexhame Beach access paths, to facilitate access to the beach. In the spring of 2017 the 3 main pathways to the beach were too steep and work was performed by-hand to create a more accessible pathway. This would be consistent with the Marshfield Master Plan recommendation PSF-9, which calls for the enhancement of "ADA accessibility to the Town's parks and beaches."
4) As the Winslow Avenue Beach site is further developed, consider the development of a bridge or boardwalk to cross the seasonally wet area within the access path.

Timing: Annually and as needed.

Priority: Moderate

Responsibility: Beach Administrator, Department of Public Works

Figure 4-7. Use of MobiMats would facilitate wheelchair access to Rexhame Beach.

Activity 4.3.5 Visitor Facilities Maintenance and Repair

Purpose: To maintain restroom and concession facilities in good working order.

Existing Activities: Responsibility for the maintenance, cleaning and repair of visitor facilities at Rexhame Beach (Snack Bar) and Brant Rock Beach (Comfort Station) falls to the Beach Administrator. Restrooms are portable toilets are locked after 4pm at Brant Rock locations and after 7pm at Rexhame and Green Harbor.

Details:

1) Investigate pricing and feasibility of additional visitor facilities for Green Harbor Beach, especially if additional property can be acquired in that area (e.g., constructing a full bathhouse with restrooms and changing rooms, portable trailer toilets, etc.).
2) Clean/maintain restrooms facilities daily. Coordinate pumping of portable toilets 1 to 2 times a week with the contractor.
3) Consider extending restroom hours until 7pm at all locations.

Timing: Daily/weekly throughout beach season.

Priority: Moderate

Responsibility: Beach Administrator

Activity 4.3.6 Clean Beaches – Remove Trash

Purpose: Remove trash and other debris from guarded public beaches during the summer swimming season to improve the quality and aesthetics of the beach environment.

Existing Activities: Beach raking does not currently occur at any beach. Trash is collected by hand daily by beach staff, usually life guards. Roads to Responsibility has provided additional part-time clean-up staff during busy times of the year. Seaweed is removed when necessary.

Details:

1) Consider hiring additional maintenance staff to collect and remove trash so lifeguards can focus on beachgoer safety.
2) Trash and recycling containers at all main beach entrances are checked and emptied daily by the Department of Public Works, for disposal at an off-site location.

Timing: Daily and as necessary between Memorial Day and Labor Day.

Priority: Moderate

Responsibility: Beach Administrator

Activity 4.3.7 Clean Beaches – Remove Seaweed

Purpose: Remove substantial seaweed accumulations from guarded public beaches during the summer swimming season to improve the quality and aesthetics of the beach environment. This activity balances the desires of citizens to use the beaches for recreational purposes with the environmental impact of modifying the natural processes of beach dynamics and foraging habitat for shorebirds and wildlife.

Existing Activities: Beach raking has not previously been performed at any beach. Seaweed is removed when necessary. Minor accumulations of seaweed have been distributed by raking to facilitate its removal by the next tide. Major accumulations, such as at Green Harbor in 2017 (Figure 4-8), were collected and buried on-site by the Department of Public Works using excavators and bulldozers. Large scale seaweed removal has not been necessary at other beaches (i.e. Rexhame, Fieldston) for more than 10 years. In October 2017 a Seaweed Removal Policy was adopted by the Board of Selectmen, the details of which are outlined below.

Details:

1) Seaweed removal will occur only as necessary during the beach season (Memorial Day to Labor Day).
2) The decision about whether seaweed management is warranted at each site will be evaluated based on public needs (public swim beaches only), feasibility (access and available resources) and ecological impacts (adverse impacts to the interests under the Wetlands Protection Act and Regulations and Town Bylaw and Regulations). The Beach Administrator, the Superintendent of the Public Works and the Conservation Administrator shall confer with the Director of Public Health to make the decision to activate the best seaweed management cleanup activity.
3) Obtain the appropriate permits prior to seaweed removal (e.g., Order of Conditions, USACE Permit, and 401 Water Quality Certification).
4) Method of seaweed removal (when necessary):
    a. The primary means of seaweed removal will entail using a tractor with rake device to remove the seaweed,, minimizing the removal of sediment (i.e. sand, gravel, cobble).
    b. The secondary means of seaweed removal will be using a bulldozer and excavator to selectively collect and bury seaweed on the beach (Figure 4-9).
    c. As a last resort, seaweed will be collected for removal. The removed material will be disposed of at the Bourne Landfill or other approved sites and composted.

Timing: As necessary between Memorial Day and Labor Day.

Priority: Moderate

Responsibility: Beach Administrator, Department of Public Works, Board of Health, Conservation Commission, Town Administrator

Figure 4-8. Seaweed accumulated on Green Harbor Beach in June 2017.

Figure 4-9. Example of seaweed removal and on-site burial actions from the neighboring Town of Duxbury.

Activity 4.3.8 Sand Removal from Paved Pedestrian Paths

Purpose: To maintain full use pedestrian paths and improve public safety and aesthetics.

Existing Activities: Beach Administrator employees sweep paved and boardwalk access paths at Fieldston, Sunrise and Green Harbor to remove accumulated sand and stones.

Details:

1) Beach maintenance staff sweep paths and remove accumulated rocks each day.

Timing: Daily

Priority: Moderate

Responsibility: Beach Administrator

Activity 4.3.9 Vegetation Control at the Edges of the Parking Areas and Pathways

Purpose: To maintain full use the parking areas and pedestrian paths and to improve public safety.

Existing Activities: Beach staff sprays for poison ivy and poison sumac around the edges of the Rexhame and Green Harbor parking lots. Vegetation along the public access way at Winslow Avenue extension was originally cut by the Department of Public Works, but will need to be re-pruned when that site is fully established.

Details:

2) Targeted spraying of herbicide to control poison ivy and poison sumac in areas where needed, such as around parking lot edges. A conservation permit should be obtained prior to spraying within jurisdictional wetland boundaries.
3) Pruning should be limited to vegetation that overhangs or encroaches on the parking areas, sidewalks and access paths.
4) All work in dunes should be performed by hand and the clippings should be removed off site to an approved location. A conservation permit will be necessary prior to any pruning within jurisdictional wetland boundaries.

Timing: Annually and as needed.

Priority: Moderate

Responsibility: Beach Administrator, Department of Public Works

Activity 4.3.10 Development and Maintenance of Kayak Launch at Rexhame

Purpose: To provide access for small watercraft to launch in another section of the South River.

Existing Activities: Visitors currently carry kayaks down to the water's edge from the main Rexhame parking lot. The Marshfield Harbor, Rivers and Waterways Management Plan includes a recommendation for "the establishment of a kayak/canoe rental facility on the Town's waterways." The Town has also recently installed a kayak launch upstream on the South River, behind the CVS on Ocean Street (Figure 4-10).

Details:

1) Develop an earthen parking lot closer to the river, as part of a larger program to expand and enhance the Rexhame Beach parking lot (Figure 4-13) to allow easier access and control where boats are launched, eliminating erosion to other areas of the river bank and trampling of the salt marsh resource areas.
2) Install signage and rules concerning kayak launch.
3) Develop and carry out a monitoring plan to determine if the new boat launch and associated parking area is negatively affecting the marsh or other coastal resources.
4) If monitoring shows adverse impacts, consider redesigning or eliminating boat launch to avoid degradation to surrounding marsh.

Timing: 2018-2019

Priority: Moderate

Responsibility: Beach Administrator, Planning Department, Conservation Commission

Figure 4-10. South River kayak launch from upstream location.

4.4 RESTORATION ACTIVITIES

Activity 4.4.1 Initiate Program of Ongoing Beach Nourishment at Eroding Beaches

Purpose: To increase the ability of the Coastal Beaches to provide buffering against storms, flood control, and sediment to adjacent beaches, to mitigate erosion, and to enhance the recreational resource.

Existing Activities: Because much of the Marshfield shoreline is armored, beach nourishment has only been performed sporadically in a few places (e.g. Rexhame (Figure 4-12); all past work focused on the beach above mean high water). The Marshfield Master Plan, however, includes a recommendation that states the "Town should encourage the local re-use of dredged sediment," and the Marshfield Harbor, Rivers and Waterways Management Plan recommends "using a dredging method that would allow dredge spoil to be used for beach renourishment," and "pursuing permitting for shoreward expansion of the existing dredge material placement site at Green Harbor Beach and identification of a new secondary site near Rexhame Beach." Finally, the 2013 Sea-Level Rise Study concluded that "if beaches are not otherwise nourished and raised, there could be partial or complete loss of some ocean front beaches at high tides. In addition, the potential for increased frequency and intensity of storm events can also lead to additional deterioration of ocean front beaches." Nourishment is currently planned at Brant Rock Beach for Spring 2018.

Details:

1) Identify priority areas for beach nourishment activities and develop permit-level project designs.
2) Identify suitable sources of sand for beach nourishment programs, including sand from channel and harbor dredging, offshore dredging, and upland sources.
3) Explore opportunities for cooperation with other municipalities, private stakeholders, and state and federal agencies for the implementation of large-scale nourishment projects.
4) Establish coordination with the U.S. Army Corps of Engineering regarding potential beneficial reuse of sediment dredged from Green Harbor (Figure 4-11). Request early notification by the U.S. Army Corps of Engineers of future dredging so that the necessary agreements for beneficial reuse can be developed. Marshfield is currently undergoing a study funding by the CZM Coastal Resiliency Grants to investigate beneficial reuse; incorporate any recommendations from that study.
5) Identify potential funding sources for large-scale beach nourishment projects.
6) Secure permits in advance so when sand becomes available, work can start immediately.

Timing: 2018-2020

Priority: High

Responsibility: Town Administrator, Board of Selectman, Beach Administrator, Department of Public Works, Conservation Commission

Figure 4-11. Dredging in Green Harbor 2017.

Figure 4-12. Past nourishment activities at Rexhame Beach have focused on nourishing the beach rather than restoring the dune.

Activity 4.4.2 Monitor the Need for a Dune Restoration Program at Rexhame

Purpose: To ensure the ability of the Coastal Dunes to provide storm damage protection and flood control, periodic evaluations as to the need for a dune maintenance program should be performed ensure continued storm protection. Dune restoration should be coupled with beach nourishment activities.

Existing Activities: In the past, restoration at Rexhame has focused primarily on nourishing the beach. Current calculations evaluating dune performance in a Velocity Zone using the "540 Rule" show that there is currently a large enough sand reservoir in the primary frontal dunes to attenuate wave action during a 100-year storm; the area within the "sand reservoir" shown in Figure 4-13 is 928 square feet, which is greater than the 540 square feet needed for the dune to withstand a 100-year storm.

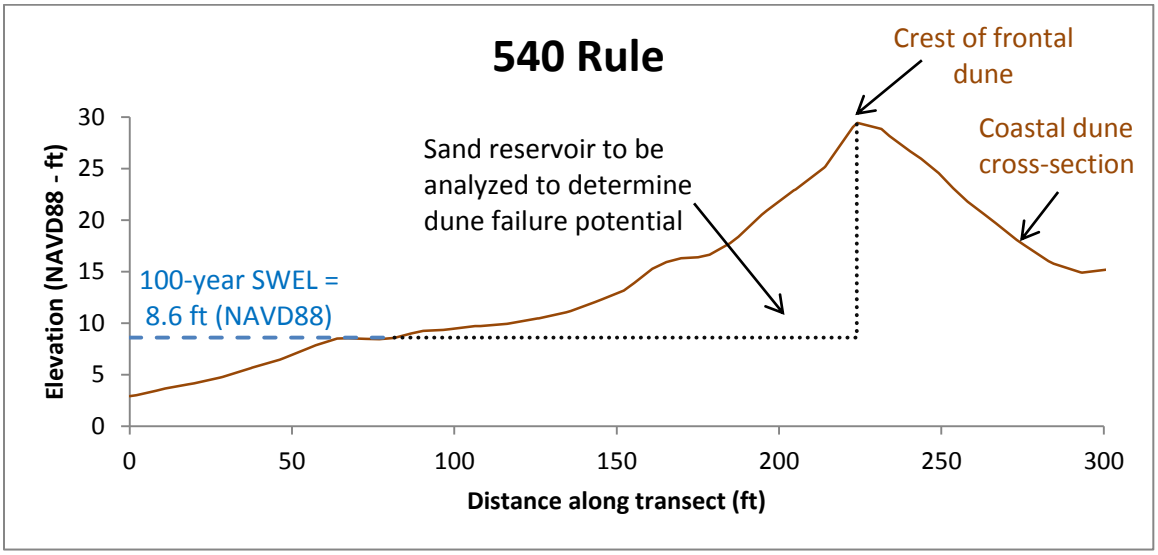


Figure 4-13. Assessment of the stability of the Rexhame dunes using the 540 Rule.

Details:

1) Periodically redo the analysis above. When the area within the "sand reservoir" begins to approach 540, continue with the following steps.
2) Secure permits in advance so work can start immediately when sand is available.
3) Identify suitable sources of sand that are compatible in size to the existing dune sands, including material from upland and dredging sources.
4) Facilitate the use of compatible sand sources generated from local dredging projects, both private and public. Applicants for private dredging projects should be made aware of beneficial reuse options on the town beach during the Conservation Commission review and permitting process. Acceptance of compatible dredge sediments should be confirmed through a letter to the applicant, with a copy to the Conservation Commission.
5) If a dune restoration program is warranted based on the topographic cross-sections and the 540 rule illustrated above, consider nourishing the back side of the dunes, and abandoning and/or relocating some of the parking lot. By nourishing the

landward side of the dune, newly placed sand and planted grasses are protected from winter storms. While the seaward side of the dunes may continue to erode, the additional width and/or height added to the dunes through landward nourishment will continue to provide protection to the parking lot and other infrastructure behind it.

6) Vegetate all newly restored dune areas with beach grass and protect with sand fencing.

Timing: 2018-2023

Priority: Moderate

Responsibility: Beach Administrator, Planning Department, Department of Public Works, Conservation Commission

Activity 4.4.3 Eliminate Unnecessary Dune Paths and Revegetate Bare Areas

Purpose: To minimize disturbance to the Coastal Dunes and Barrier Beach system and improve their ability to function as storm damage protection and flood control.

Existing Activities: Signs advising visitors to stay off the dunes are posted at Rexhame Beach. Fencing and old Christmas trees have been set out at Rexhame Beach to prevent access to or revegetate paths that have already formed. The Town of Marshfield Comprehensive Trails Plan recommends only limited access to the area of trails located between the South River Estuary and the Oceanside Rexhame Beach in order to protect and preserve the environments there.

Details:

1) Christmas trees will no longer be utilized for pedestrian control in the future. They do not provide the same stabilization benefits that living, rooted vegetation can provide, and can create a fire hazard. However, they were effective at reducing foot traffic through the dunes, and an alternative effective pedestrian control barrier will need to be found.
2) Eliminate unnecessary dune access paths by filling with dune compatible sand, revegetating with beach grass, bayberry and/or beach plum, installing fencing, and educational signage. In particular, it is particularly important to eliminate the footpath running along the crest of the dune and revegetate that area. The seaward edge of the dune where the crest is located is the most vulnerable area to storm surge and wave induced erosion. Healthy dune vegetation with established root systems is an important component of coastal dune resiliency.
3) Consider a larger scale restoration project to revegetate large bare areas, produced by heavy pedestrian traffic, in the area to the southwest of the main parking lot at Rexhame.
4) As Winslow Avenue Beach gets further developed, care will need to be taken to protect this otherwise stable and natural area.

Timing: 2018-2020

Priority: Moderate

Responsibility: Beach Administrator, Conservation Commission

4.5 EDUCATION AND OUTREACH ACTIVITIES

Activity 4.5.1 Update and Improve Website for Town of Marshfield Public Beaches

Purpose: To better disseminate information about Marshfield's public beaches, including locations, entrance fees, availability of lifeguards, water quality results, various recreational opportunities, and Town conservation efforts.

Existing Activities: Currently the Town website has a page devoted to Public Beaches and Conservation Areas under the Recreation Department, but only provides beach names and beach sticker pricing information. The Marshfield Police Department website (www.marshfieldpolice.org) has a webpage devoted to Marshfield's Beaches, which includes links to water testing results, rules and regulations, and a list of amenities at each beach.

Details:

1) Update the current Public Beaches and Conservation Areas website.
2) Update staff list on Beach Administrator link from main Town list of committees and commissions, and add link to main beaches website.
3) Designate a specific department or staff person to ensure the information on the web page remains current.

Timing: Ongoing

Priority: Moderate

Responsibility: Beach Administrator, Police Department

Activity 4.5.2 Assess Signage for all Public Beaches and Update as Necessary

Purpose: To improve the dissemination of important information regarding the beaches and to increase public safety.

Existing Activities: Numerous small informational signs (listing main beach rules) currently exist at all Marshfield public beach locations. Main entrances at Rexhame, Sunrise, and Green Harbor Beaches also have large sign boards that can be used to post additional information, such as water quality results and other rotating displays.

Details:

1) Given numerous access points at many of the Marshfield public beaches (e.g., Fieldston and Sunrise Beaches), prepare a comprehensive list of where additional signage would be useful. Identify strategic locations where signs will have the greatest impact and determine the number of signs needed at each beach.
2) Develop clear, highly visible, easily readable signs, using pictures and few words.
3) Prepare additional educational material (i.e. importance of coastal dunes, water quality issues, plant or wildlife identification, etc.) to post at larger sign boards.
4) Develop a plan to upgrade all signs as needed, using a consistent format and unified design across all public beach locations.
5) Install and replace signs as needed.

Timing: Ongoing

Priority: Low

Responsibility: Beach Administrator

Activity 4.5.3 Distribute Beach Information with Yearly Beach Stickers

Purpose: To better educate beach visitors about various rules, conservation measures and beach activities associated with public beaches in Marshfield.

Existing Activities: Beach rules are available on the Town website, and are distributed with the purchase of a yearly beach sticker.

Details:

1) Continue to distribute beach rules in printed form and/or electronically as a PDF if beach stickers can be purchased online.

Timing: Ongoing

Priority: Moderate

Responsibility: Beach Administrator

Activity 4.5.4 Develop Town Run Beach-Based Recreation and Educational Programs

Purpose: Provide recreational and educational opportunities at Marshfield public beaches. This is consistent with the Marshfield Open Space and Recreation Plan's Goal #3, which calls for providing "recreational opportunities for all age groups that are all persons accessible", as well as "expanding the quantity of access points for canoes and kayaks on the North, South and Green Harbor Rivers." Additionally, the Marshfield Harbor, Rivers and Waterways Management Plan includes a recommendation for "increased coastal and marine programming" and "promoting a calendar of water and beach related activities and events."

Existing Activities: The Recreation Department currently runs a variety of summer recreation programs, but none of them take place at the public beaches. There are, however, a number of privately run activities that take place at Rexhame Beach, including a surf camp organized by Levitate, a local surf shop, and a yoga class.

Details:

1) Consider whether to offer recreational and educational summer activities at public beaches. Activities already taking place, such as surfing and yoga, could be run by the Town instead of allowing private parties to utilize public areas, or the Town could request a fee from private parties running their programs on public beaches. Additional activities to consider include kayak and/or paddleboard rentals and or tours (see Activity 4.3.9), summer concerts, and coastal ecology day-camp.
2) Logistically, additional programs, especially on the weekends in the summer, would likely be contingent on additional parking.
3) If the Town decides to pursue organized beach related recreational and/or educational programming, advertise activities on the Town website, through fliers at major points in town, in local newspapers, and on social media.
4) Hire seasonal staff to run and administer programs.
5) Administer programs.
6) Solicit, collect and review feedback from participants (and/or parents of participants) to help improve programs in the future.

Timing: Annually

Priority: Low

Responsibility: Recreation Department, Beach Administrator

Activity 4.5.5 Consider Revising the Dog Policy for Public Beaches

Purpose: To protect public health and safety, and to eliminate negative interactions between dogs and other beachgoers.

Existing Activities: Leashed dogs are currently allowed on all Marshfield public beaches all year long, and mitt-stations are posted at main beach entrances to facilitate clean-up. Instances of off-leash dogs are common. Note: Addressing dogs on the beach was one of the top three issues respondents of the public survey listed as qualities of the public beach that need to be changed.

Details:

1) Consider limiting the hours and/or locations where dogs are allowed on the beach during the summer. For example, between September and June dogs could still be allowed on all beaches at all times, but during the beach season dog access could be limited to before 9 a.m. and after 4 p.m. and/or completely eliminated from particularly crowded locations (i.e. Rexhame Beach).
2) Consider hiring a designated staff member to monitor the beach for enforcement of dog regulations, as well as other rules. This would allow lifeguards to focus on ensure public safety in the water.
3) Issue citations for violations of dog regulations.

Timing: Ongoing

Priority: Moderate

Responsibility: Beach Administrator and Animal Control

4.6 FINANCE OPPORTUNITIES

Activity 4.6.1 Identify Opportunities for Pre- and Post-Disaster Funding for Projects from FEMA

Purpose: To secure funding for upgrades to the bathhouse/concession buildings, dune enhancement, etc. that will reduce the potential for storm damages.

Existing Activities: The Town of Marshfield, in accordance with existing federal guidelines and regulations, developed a Mutli-Hazard Mitigation Plan that was adopted by the Board of Selectmen and subsequently approved by The Federal Emergency Management Agency (FEMA) in 2005, and updated in 2013. Marshfield also participates in a Regional Emergency Planning Committee.

Details:

1. Update the Multi-Hazard Mitigation Plan as needed to remain eligible for FEMA grant funding.
2. Review needs on an annual basis and submit the necessary grant applications.
3. Research specific ideas for which FEMA Funding could be used. For example, if the Town of Marshfield engineers and builds a large-scale beach nourishment project, and monitors it regularly, FEMA Funding could be utilized to rebuild the beach if it badly damaged during a storm.
4. Utilize information available at the following FEMA web site to investigate grant opportunities - https://www.fema.gov/hazard-mitigation-assistance

Timing: 2018-2020

Priority: High

Responsibility: Town Administrator, Board of Selectmen, Planning Department, Beach Administrator, Department of Public Works, Marshfield Emergency Management Agency.

Activity 4.6.2 Identify Opportunities for Financial and Technical Assistance Through the Rivers and Harbors Grant Program

Purpose: To secure funding for various waterways-related projects that would benefit Marshfield public beaches.

Existing Activities: This grant funding is currently pursued as available.

Details:

1) Utilize information available from Massachusetts Department of Conservation and Recreation (DCR) to investigate grant opportunities. Typical projects qualifying for the program include: dredging of channels for navigation and tidal flushing; provision of public access; management activities for improving public access; water-dependent recreation or habitat enhancement for recreational purposes; beach nourishment for barrier beach maintenance, habitat enhancement or recreational purposes; coastal wetlands restoration; and shoreline erosion control protection.
2) Review needs on an annual basis and submit the necessary grant applications.

Timing: Annually

Priority: High

Responsibility: Town Administrator, Board of Selectmen, Planning Department, Beach Administrator, Department of Public Works

Activity 4.6.3 Identify CZM Resiliency Grant Funding Opportunities

Purpose: To secure funding for various coastal resiliency related projects that would benefit Marshfield public beaches.

Existing Activities: This grant funding has not been pursued by Marshfield in the past.

Details:

1) Utilize information available from the Massachusetts Office of Coastal Zone Management's (CZM) Coastal Resilience Grant Program (http://www.mass.gov/eea/agencies/czm/program-areas/stormsmart-coasts/grants/) to investigate grant opportunities for Marshfield related to a range of coastal resilience approaches—from planning, public outreach, feasibility assessment, and analysis of shoreline vulnerability to design, permitting, construction, and monitoring. Typical projects qualifying for the program include: vulnerability and risk assessments, public education and communication, development of local bylaws, adaptation plans and other management actions, redesigns and retrofits of coastal structures, and natural storm-damage protection techniques.
2) Review needs on an annual basis and submit the necessary grant applications.

Timing: Annually

Priority: High

Responsibility: Town Administrator, Board of Selectmen, Planning Department, Beach Administrator, Department of Public Works

Activity 4.6.4 Identify Seaport Economic Council Funding Opportunities

Purpose: To secure funding for various maritime and coastal related projects that would benefit Marshfield public beaches.

Existing Activities: This grant funding has not been pursued by Marshfield in the past.

Details:

1) Utilize information available from Seaport Economic Council (http://www.mass.gov/governor/administration/groups/seaporteconomiccouncil/programoverview/) to investigate grant opportunities for Marshfield related to a range of maritime and coastal projects. Typical projects qualifying for the program include: projects that promote economic growth related to coastal recreation and tourism, and coastal infrastructure projects necessary to promote economic growth within the Town.
2) Review needs on an annual basis and submit the necessary grant applications.

Timing: Annually

Priority: High

Responsibility: Town Administrator, Board of Selectmen, Planning Department, Beach Administrator, Department of Public Works

Activity 4.6.5 Increase Outreach to Local Community Groups for Potential Projects

Purpose: To promote local involvement in beach maintenance and conservation projects, while at the same time assisting the Town with capacity building.

Existing Activities: This has not been a common process in the past.

Details:

1) Approach local organizations (boy scouts troops, church groups, schools, etc.) to discuss the possibility of collaboration. For example, one survey respondent suggested that construction of horsefly boxes might be a good Eagle Scout and/or Boy Scout project.
2) Develop a new donation-based beach maintenance and improvement program. For example, this program could fund creation or replacement of boardwalks, where participants in the program can choose the inscription on each plank they fund.

Timing: As opportunities arise

Priority: Low

Responsibility: Town Administrator, Beach Administrator, Department of Public Works

Activity 4.6.6 Create a Summer Beach Management Internship

Purpose: To help increase personnel capacity for the Town of Marshfield to run beach related programs and management activities during the busy summer season.

Existing Activities: The Town of Marshfield does not currently run a Beach Management Summer Internship.

Details:

1) Consider what aspects of managing the public beaches could be improved by seasonal help, such as increased beach patrols, public education, recreational or educational programs at the beaches, etc., (see Activities 4.1.13, 4.3.1, 4.3.6, 4.3.7, and 4.6.4) and develop a scope of work for a summer intern
2) It would also be beneficial to the Town, as well as educational for the intern, if the internship also offered an opportunity for conducting a research project related to some aspect of beach management.
3) Determine which department or staff member will oversee the intern, since it will take considerable time and effort, especially initially to develop a position, and to training and supervising the intern.
4) If funding can be obtained, a modest stipend can be offered (i.e. $3,000-4,000 for the summer). If not, the internship could be advertised as an unpaid internship.
5) Advertise internship with local colleges and high schools (limit high school applicants to graduating seniors).
6) Hire and oversee summer intern during the summer.
7) Solicit, collect and review feedback from intern to help improve internship in the future.

Timing: Annually

Priority: Low

Responsibility: Town Administrator; Beach Administrator, Recreation Department, Department of Public Works

Activity 4.6.7 Consider an Increase in Beach Sticker or Parking Fees

Purpose: To help generate additional revenue for some of the management recommendations proposed in this report.

Existing Activities: The Town of Marshfield currently charges $35 for a resident beach sticker. Non-resident parking day passes are available for $15 (Monday-Friday), $20 (Saturday, Sunday, and holidays), and $5 after 5pm every day at the Rexhame Beach lot only. The online public survey found that more than 70% of respondents would support an increase in beach fees if used for beach improvements (Appendix A).

Details:

1) If recommended activities proposed in this report cannot be funded through the existing beach budget, consider increasing the price of resident beach stickers, perhaps by $5, to bring in additional revenue.
2) Creation of additional non-resident parking areas could also produce additional parking fee revenue.

Timing: 2018

Priority: High

Responsibility: Town Administrator, Beach Administrator, Planning Department

4.7 SUMMARY OF RECOMMENDED ACTIVITIES

Table 4-1. Summary of management and planning level activities.

#	Recommendation	Priority	Timing	Site Applicability	Existing Activity?
Management and Planning Level Activities					
3	Establish a Beach Maintenance Record Keeping System	High	Annually; post-storm	All	Yes/No
4	Prepare Spring Letter to the Marshfield Conservation Commission	High	Annually in March or April	All	No
5	Prepare Fall Letter to the Marshfield Conservation Commission	High	Annually in Oct. or Nov.	All	No
6	Maintain Active Conservation Permits for Work on Public Beaches	High	As-needed	All	Yes
7	Develop Pre- and Post-Storm Response Plans for Public Beaches	High	2018	All	Yes/No
10	Consider a Shuttle Bus from an Offsite Parking Location	High	2018	GHB, RB	No
11	Review and Update Beach Management Plan Periodically	High	Every 10 Years	All	No
1	Evaluate the Municipal Management Structure for Marshfield Public Beaches	Moderate	2018	All	No
2	Formally Adopt Specific Town Objectives and Goals for Preserving and Maintaining Beaches	Moderate	2018-2020	All	No
8	Beach Staffing	Moderate	Annually	All	Yes
9	Consider Potential Land Acquisition and Redevelopment Opportunities to Improve Public Beach Properties and Facilities	Low	2018-2020	All	Yes/No

Table 4-2. Summary of routine monitoring activities.

#	Recommendation	Priority	Timing	Site Applicability	Existing Activity?
Routine Monitoring Activities					
4	Conduct Weekly Water Quality Sampling at all Public Beaches	High	Weekly, during the summer	All	Yes
5	Conduct Shorebird Surveys	High	Annually	RB	Yes
1	Conduct Bi-Annual Beach Profile and Photographic Surveys at All Public Beaches	Moderate	Bi-annually	All	Yes/No
3	Update Shoreline Change Analysis with Additional Aerial Photography	Moderate	Every 5 Years	All	No
2	Conduct Annual Condition Surveys of All Coastal Engineering Structures at the Public Beaches.	Low	Annually	All	Yes

Table 4-3. Summary of routine maintenance and improvement activities.

#	Recommendation	Priority	Timing	Site Applicability	Existing Activity?
Routine Maintenance and Improvement Activities					
1	Complete Pre-Season Activities Required to Open the Public Beaches	High	Annually in May	All	Yes
2	Perform Maintenance of the Parking Areas at All Public Beaches	Moderate	Annually and as needed	GHB, BRB, FB, RB	Yes
3	Install and Repair Fencing as Needed	Moderate	Annually (spring); Daily (summer)	GHB, FB, RB	Yes
4	Boardwalk and Stairway Maintenance and Repair	Moderate	Annually and as needed	GHB, BRB, SB, FB	Yes
5	Visitor Facilities Maintenance and Repair	Moderate	Daily/weekly in summer	GHB, BRB, RB	Yes
6	Clean Beaches – Remove Trash	Moderate	Daily in summer	All	Yes
7	Clean Beaches – Remove Seaweed	Moderate	As necessary in summer	All	Yes
8	Sand Removal from Paved Pedestrian Paths	Moderate	Daily	GHB, SB, FB	Yes
9	Vegetation Control at the Edges of the Parking Areas and Pathways	Moderate	Annually and as needed	GHB, WAB, RB	Yes
10	Development and Maintenance of Kayak Launch at Rexhame	Moderate	2018-2019	RB	No

Table 7. Summary of restoration activities.

#	Recommendation	Priority	Timing	Site Applicability	Existing Activity?
Restoration Activities					
1	Initiate Program of Ongoing Beach Nourishment at Eroding Beaches	High	2018-2020	GHB, BRB, SB, FB, RB	Yes/No
2	Monitor the Need for a Dune Restoration Program at Rexhame	Moderate	2018-2023	RB	No
3	Eliminate Unnecessary Dune Paths and Revegetate Bare Areas	Moderate	2018-2020	RB	Yes/No

Table 4-5. Summary of education and outreach activities.

#	Recommendation	Priority	Timing	Site Applicability	Existing Activity?
Education and Outreach Activities					
1	Update and Improve Website for Town of Marshfield Public Beaches	Moderate	Ongoing	All	Yes
3	Distribute Beach Information with Yearly Beach Stickers	Moderate	Ongoing	All	Yes
5	Consider Revising the Dog Policy for Public Beaches	Moderate	Ongoing	All	Yes/No
2	Assess Signage for all Public Beaches and Update as Necessary	Low	Ongoing	All	Yes/No
4	Develop Town Run Beach-Based Recreation and Educational Programs	Low	Annually	RB	No

Table 4-6. Summary of finance opportunities.

#	Recommendation	Priority	Timing	Site Applicability	Existing Activity?
Finance Opportunities					
1	Identify Opportunities for Pre- and Post-Disaster Funding for Projects from FEMA	High	2018-2020	All	Yes
2	Identify Opportunities for Financial and Technical Assistance Through the Rivers and Harbors Grant Program	High	Annually	All	Yes
3	Identify CZM Resiliency Grant Funding Opportunities	High	Annually	All	No
4	Identify Seaport Economic Council Funding Opportunities	High	Annually	All	No
7	Consider an Increase in Beach Sticker or Parking Fees	High	2018	All	Yes
5	Increase Outreach to Local Community Groups for Potential Projects	Low	As opportunities arise	All	No
6	Create a Summer Beach Management Internship	Low	Annually	All	No

5.0 RELEVANT ENVIRONMENTAL STATUES, REGULATIONS AND PERMITS

A variety of environmental statutes and regulations apply to work on the Town of Marshfield public beaches. A summary relevant agencies, environmental statutes, regulations and permits is provided as below:

Agency: Marshfield Conservation Commission

Activities Subject to Regulation: Any activity within a resource area, or within 100 feet of a resource area, that will remove, fill, dredge, build upon, degrade, or otherwise alter an area subject to protection under the bylaw.

Regulations: Marshfield Wetlands Bylaw; Massachusetts Wetlands Protection Act

Application: Notice of Intent

Permit: Order of Conditions

Agency: Massachusetts Department of Environmental Protection - Wetlands

Activities Subject to Regulation: Any activity within a resource area, or within 100 feet of a resource area, that will remove, fill, dredge, or alter an area subject to regulation under M.G.L. c. 131, § 40.

Regulations: 310 CMR 10.00

Application: Notice of Intent (filed jointly with Marshfield Conservation Commission)

Permit: Order of Conditions (issued jointly by Marshfield Conservation Commission)

Agency: Massachusetts Division of Fisheries and Wildlife

Activities Subject to Regulation: Any activity within sites mapped as NHESP Estimated or Priority Habitat.

Regulations: 321 CMR 10.00

Application: MESA Project Review

Permit: MESA Project Review Decision

Agency: Massachusetts Environmental Policy Act Unit (MEPA)

Activities Subject to Regulation: Projects that exceed review thresholds listed in 301 CMR 11.03.

Regulations: 301 CMR 11.00 – 12.00

Application: Environmental Notification Form (ENF) or Environmental Impact Report

Permit: Certificate from the Secretary of Environmental Affairs

Agency: Massachusetts Department of Environmental Protection - Waterways

Activities Subject to Regulation: In general, any activities that require work below the mean high water line, or in Commonwealth Tidelands.

Regulations: 310 CMR 9.00

Application: Chapter 91 License or Permit application

Permit: Chapter 91 License/Permit

Agency: Massachusetts Department of Environmental Protection – Water Quality

Activities Subject to Regulation: Activities that involve the discharge of dredged or fill material, dredging, and dredged material disposal activities in waters of the Commonwealth.

Regulations: 314 CMR 9.00

Application: Water Quality application

Permit: Water Quality Certificate

Agency: US Army Corps of Engineers

Activities Subject to Regulation: In general, any activities that require work below the extreme high water line.

Regulations: 33 CFR 320-331, 40 CFR Part 230

Application: Programmatic General Permit or Individual Permit applications

Permit: Programmatic General Permit, Individual Permit

6.0 CONSISTENCY WITH OTHER LOCAL PLANS

6.1 MASTER PLAN

In 2015, the Town of Marshfield undertook the creation of a Master Plan with the goal of creating "a comprehensive framework for preserving and enhancing the Town's economic, natural, neighborhood, and cultural / historical resources through a series of actionable recommendations." The Master Plan includes a vision statement for the town stating both that, "Marshfield is and will continue to be a residential beach community", and that "There are several qualities that distinguish us from other residential communities. These qualities must be protected if we are to maintain and enhance our community character. Those qualities are the rivers, marshes, beaches, historic structures, historic sites, archeologically sensitive areas, agricultural areas, rural roads, villages and open space." Additionally, the plan cites the results of a Suffolk University Poll in stating that the most important reason residents initially move to Marshfield is for its beaches. The Master Plan also notes that residents in Marshfield are concerned both about the age and condition of the town seawall, and the conditions of the beaches in the face of climate change.

The master plan sets out a set of recommendations for the town moving forward. The recommendations relevant to the management of the town's beaches are included primarily in the Public Services and Facilities recommendations of the plan under the subheading "Reaction and Beaches." These recommendations include the following recommended actions:

> PSF-3. Ensure adequate staffing, programs, and facilities.
>
> PSF-4. Continue maintenance of existing parks. Many cities and towns establish routine maintenance plans that describe what is to be done at each park and ballfield on a revolving basis to address short-term maintenance issues and identify where repairs are needed so that they do not become long-term problems into the future. This can also help to extend the life of each field and minimize the effects of overuse and allow the fields to rest.
>
> PSF-5. Increase connectivity, includes sidewalks and bike paths. Improve bike paths and safe biking options. See Chapter 7 – Transportation and Mobility for more details.
>
> PSF-6. The Sea Level Rise Study recommends rebuilding the existing seawalls at least two feet higher to accommodate rising sea levels over next 25 years to help protect the Town's existing infrastructure. Storm closure panels at openings in sea walls should also be constructed that can be closed in advance of a storm to ensure that water does not pass through openings during storm events to minimize penetrations in sea walls. Additionally, the report recommends raising sections of several roadways to reduce flooding and maintain access to floodprone areas.
>
> PSF-7. Investigate, permit and develop off-shore breakwaters to aid in the protection of the shore line and beach nourishment efforts.

PSF-8. Look for opportunities to increase the recreational facilities in Town.

PSF-9. Enhance ADA accessibility to the Town's parks and beaches.

PSF-10. Ensure that recreation programming meets the needs of a changing demographic in Marshfield, particularly for the aging population.

Additional recommendations relevant to the Town's beaches are located in the Natural Resources - Recommendations section of the master plan and include the following recommendations:

Objective II – Encourage the improved management of the Town's beaches.

a. The Town should explore the potential benefits of developing a beach management plan that will (1) comprehensively identify beach management needs and issues throughout the Town, and (2) provide recommendations to strategically address those needs and issues.

Objective III – Encourage the local re-use of dredged sediment.

a. Work with the Department of Public Works, the Conservation Commission, the Coastal Advisory Committee, the Beach Administrator, the Harbormaster, and others as appropriate, to document and address the Town's beach nourishment needs.

6.2 MARSHFIELD OPEN SPACE & RECREATION PLAN

An update of Marshfield's Open Space & Recreation Plan was completed in March 2010. The plan includes the following list of keys goals created by the community in order to preserve Marshfield's open space from unmanaged growth and preserve its natural resources:

1. Protect lands within aquifer recharge areas.
2. Buffer and link protected lands for wildlife habitat.
3. Provide additional buffer and protection to the watershed areas surrounding the riverfront areas of the North, South, and Green Harbor Rivers.
4. Blaze, map, and maintain existing trails.
5. Create new trails.
6. Involve residents in managing open space.

The plan includes goals and objectives for the town to accomplish for its management of its open spaces. The following is the relevant section of the goals and objectives for beach management:

Goal 3. Provide recreational opportunities for all age groups that are all persons accessible.

Objectives:

1. Improve access and conditions on Conservation and Recreation Properties.

2. Expand the quantity of access points for canoes and kayaks on the North, South and Green Harbor Rivers.
3. Improve access to beaches and shorelines for all populations.

6.3 Town Of Marshfield Comprehensive Trails Plan

The Town's Comprehensive Trails Plan was completed in 2016. The plan includes maps of the Town's trail system as well as recommendations for the various trails throughout town. The plan recommends limited access to the area of trails located between the South River Estuary and the Oceanside Rexhame Beach in order to protect and preserve the environments there.

6.4 Marshfield Harbor, Rivers, And Waterways Management Plan

The Marshfield Harbor, Rivers, and Waterways Management plan was completed by the Marshfield Waterways Committee in 2014. The plan "provides recommendations to address safe navigation, natural resource protection, improvements to public access, safe recreational boating, protection of working waterfronts and related infrastructure, improvements to water quality, preparation for impacts from changes in sea level and climate, opportunities for collaboration, and clarification on fiscal issues with regard to waterways management." The plan includes an inventory and analysis of the beaches in the town, including a discussion of the CZM shoreline change study, and a table of the town's public beaches with the amenities and parking opportunities available at each beach. The plan also includes a list the dredging that has occurred at Green Harbor by the U.S. Army Corps of Engineers including the work that was accomplished and the quantity of material removed during each dredge operation. The plan also includes a short list of beach management rules and regulations. Finally, the plan also includes a large range of recommendations relevant to the town's beaches. These recommendations include (further details are available within the plan):

- Continue sand management activities to reduce the impact of aeolian sand transport in Green Harbor.
- Develop a plan to guide beach renourishment. As part of this plan, where feasible, use a dredging method that would allow dredge spoil to be used for beach renourishment.
- Pursue permitting for shoreward expansion of the existing dredge material placement site at Green Harbor Beach and identification of a new secondary site near Rexhame Beach. Particular locations for renourishment include Rexhame Beach, Hewitt's Point, and Burke's Beach.
- Identify new launch facilities, specifying the potential amenities each site might offer (e.g., parking, restrooms, picnic tables). Potential locations include at the Rexhame Beach parking lot and the end of Ireland Road. Explore opportunities to improve recreational fishing access, including opportunities linked to State funds (e.g., MA DMF).
- Encourage the establishment of a kayak/canoe rental facility on the Town's waterways. Explore the interest in and opportunities, benefits and liabilities of a publicly- vs. privately-operated facility.

- Support Town efforts to increase parking at Town beaches, as appropriate.
- Increase the coastal and marine programming and events for residents and visitors.
- Develop, maintain, and promote a Town calendar of water and beach related activities and events to draw people to the Town's waterfronts and waterways.

6.5 SEA LEVEL RISE STUDY – DUXBURY, MARSHFIELD, SCITUATE, MA

In 2013, Marshfield, as well as its' neighboring communities of Duxbury and Scituate had a study preformed to ascertain the possible effects of sea-level rise. As coastal communities, climate change and sea level rise is of critical concern to all three communities. The projects three stated goals were to:

1. Produce high-quality maps and graphics showing the extent and magnitude of sea level rise and storm surge vulnerability within the three towns, focusing on public infrastructure.
2. Identify adaptation strategies that will help to mitigate the long-term effects of sea level rise and storm surge.
3. Educate the public, town officials and state legislators about those projected impacts and anticipated increased frequency of extreme events so that the towns can make informed decisions that will avoid future costly impacts to public and private property.

In discussing the beaches in Marshfield, the study states, "if beaches are not otherwise nourished and raised, there could be partial or complete loss of some ocean front beaches at high tides. In addition, the potential for increased frequency and intensity of storm events can also lead to additional deterioration of ocean front beaches." The study also includes a list of adaptation recommendations for the town in order to become more resilient in the face of rising sea levels, which includes recommending nourishing the beaches in Marshfield.

7.0 NEXT STEPS

This Beach Management Plan incorporates numerous recommendations for beach management activities (Section 4). Included with each recommended activity and action item is information related to the purpose, existing activities, details of implementation, timing, priority, and responsibility. Summary tables of the recommended activities at the end of Section 4 should help municipal staff review various activities in a single location, and assist in ultimate implementation. Priorities for each recommendation were developed through internal working group meetings with integral beach management staff. However, the final priorities may be redefined by responsible Town departments and department heads. In this regard, the beach management plan is a working document that we present to the Town for review and action.

With this document, and inter-departmental agreement on the prioritization of activities, an action plan with concrete next steps, permitting requirements, and funding commitments can be developed by the Town. We also recommend that the Town develop an implementation schedule based on their priorities and available resources.

Following the completion of the final Beach Management Plan document, it is anticipated that the Town of Marshfield will proceed with filing a Notice of Intent (NOI) with the local Conservation Commission to permit the beach management activities. Woods Hole Group's approach to preparing the Plan will facilitate this process, as the document will provide the necessary information needed by the Commission to permit the routine beach management activities.

One of the obvious constraints to implementing the recommendations outlined in the management plan is the availability of finances. Several of the recommendations above (Section 4.7) address avenues to raise funds for more proactive management and restoration of Town of Marshfield beaches, or increase capacity, such as through partnerships or internships.

8.0 REFERENCES

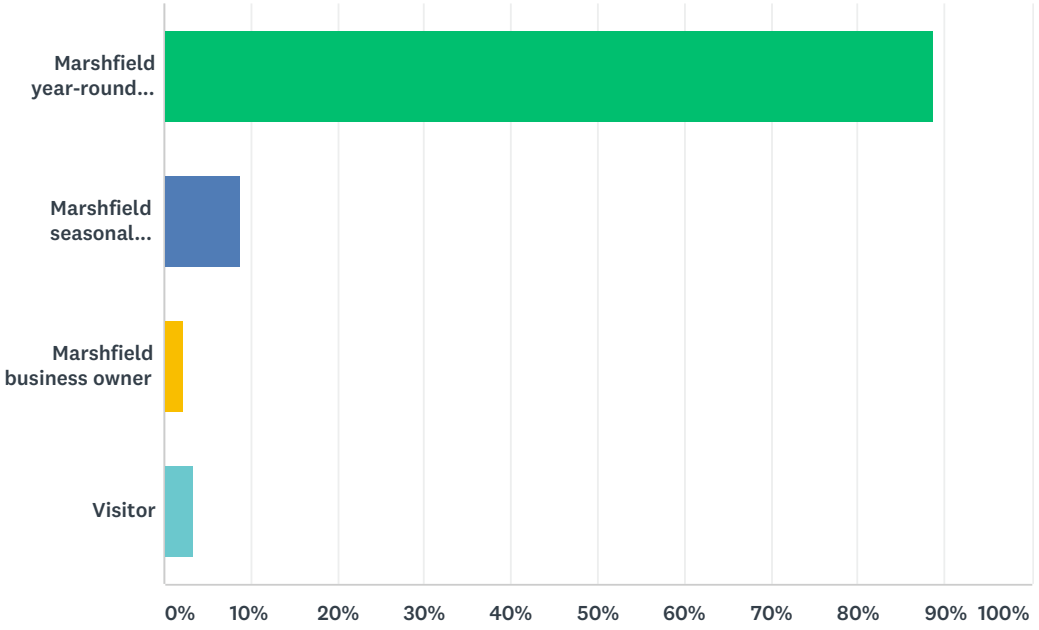
NHESP. 2008. MassGIS Data – NHESP Priority Habitats of Rare Species. October 2008. http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/prihab.html

Theiler, E.R., J.F. O'Connell, and C.A. Schupp. 2001. The Massachusetts Shoreline Change Project: 1800s to 1994, Technical Report.

APPENDIX A: ONLINE PUBLIC SURVEY

Q1 Please select as many as apply. I am a _____

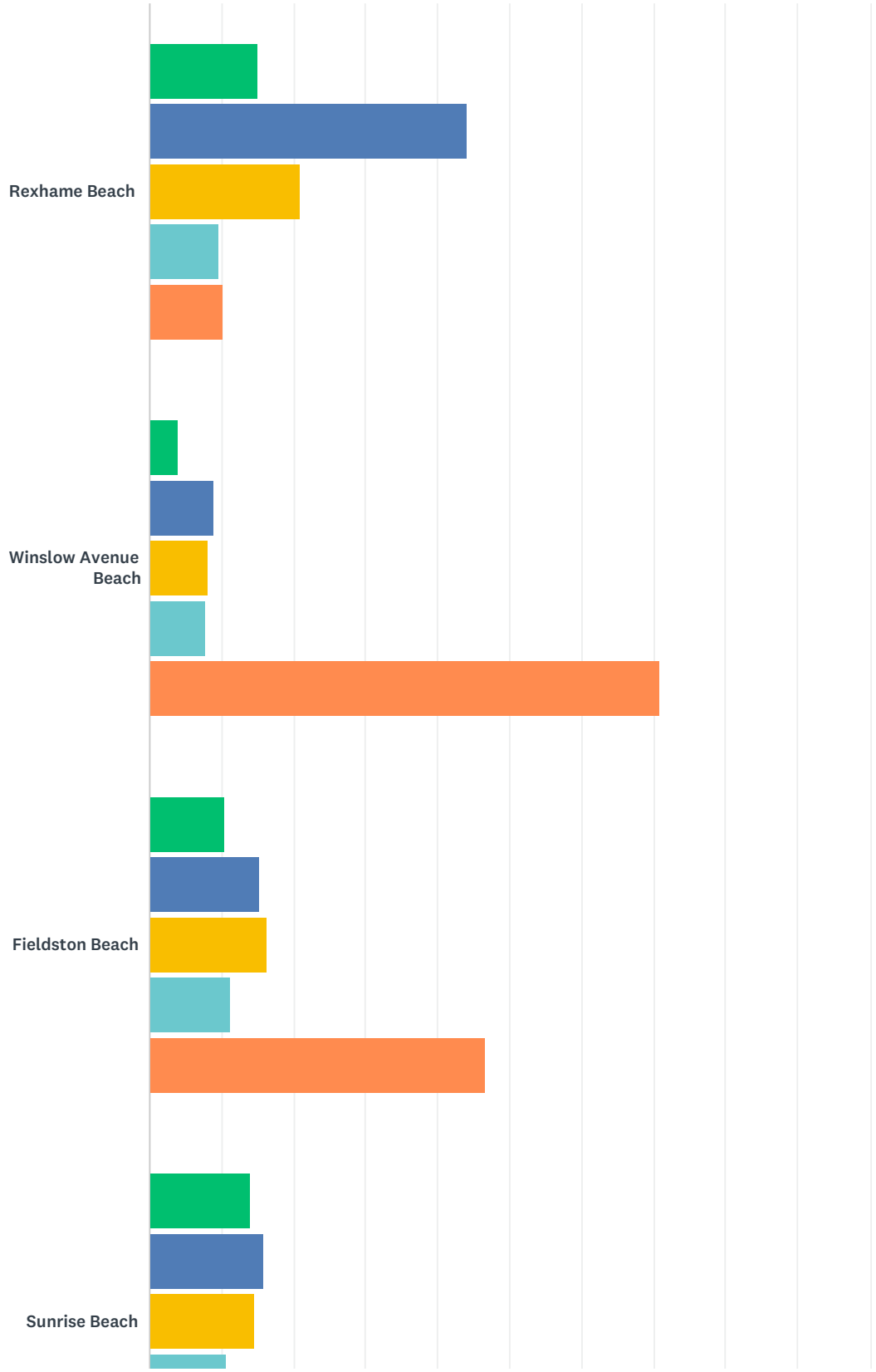
Answered: 1,303 Skipped: 8

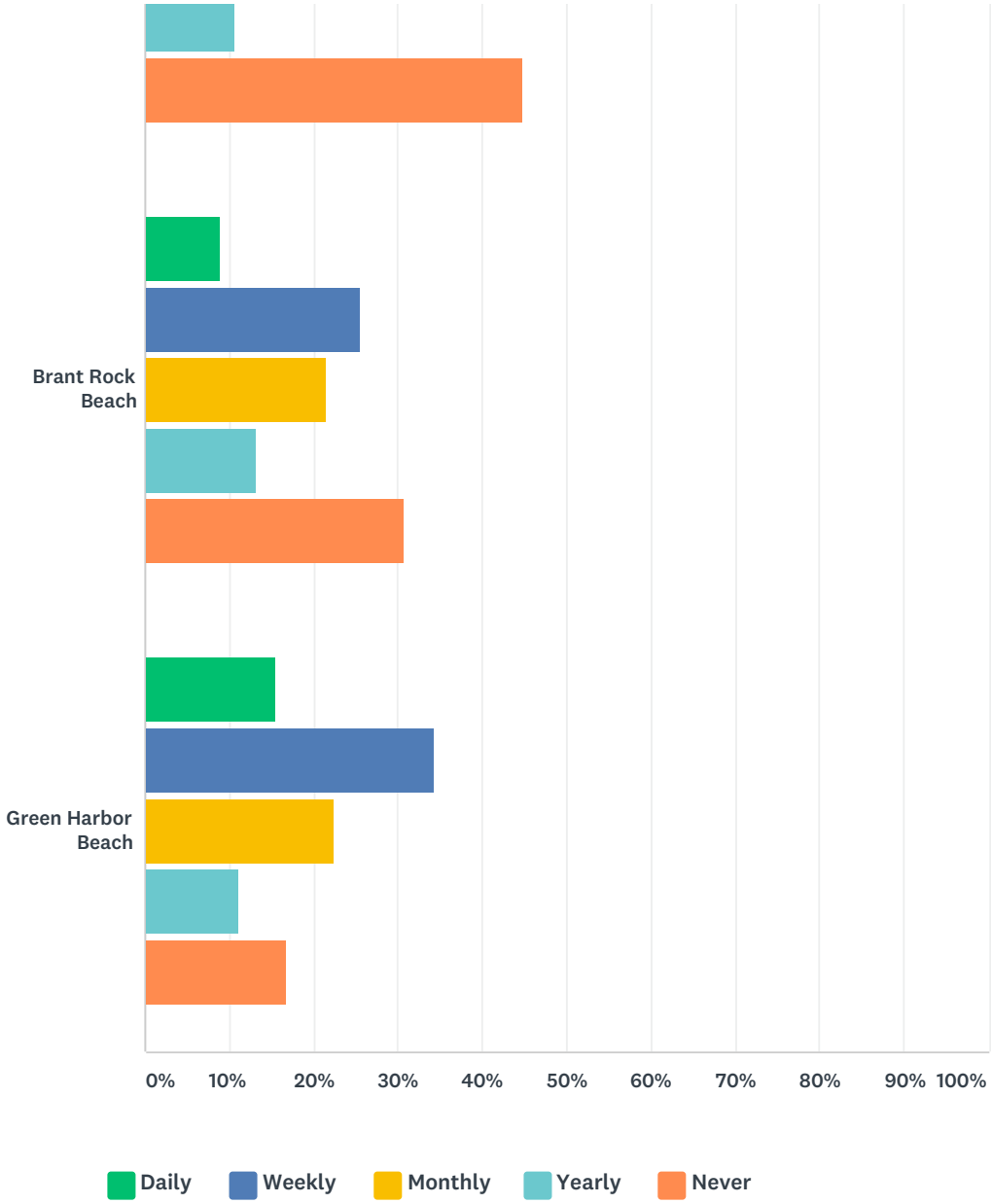


ANSWER CHOICES	RESPONSES	
Marshfield year-round resident	88.64%	1,155
Marshfield seasonal resident	8.75%	114
Marshfield business owner	2.38%	31
Visitor	3.38%	44
Total Respondents: 1,303		

Q2 How frequently do you visit Marshfield's public beaches during the summer?

Answered: 1,304 Skipped: 7

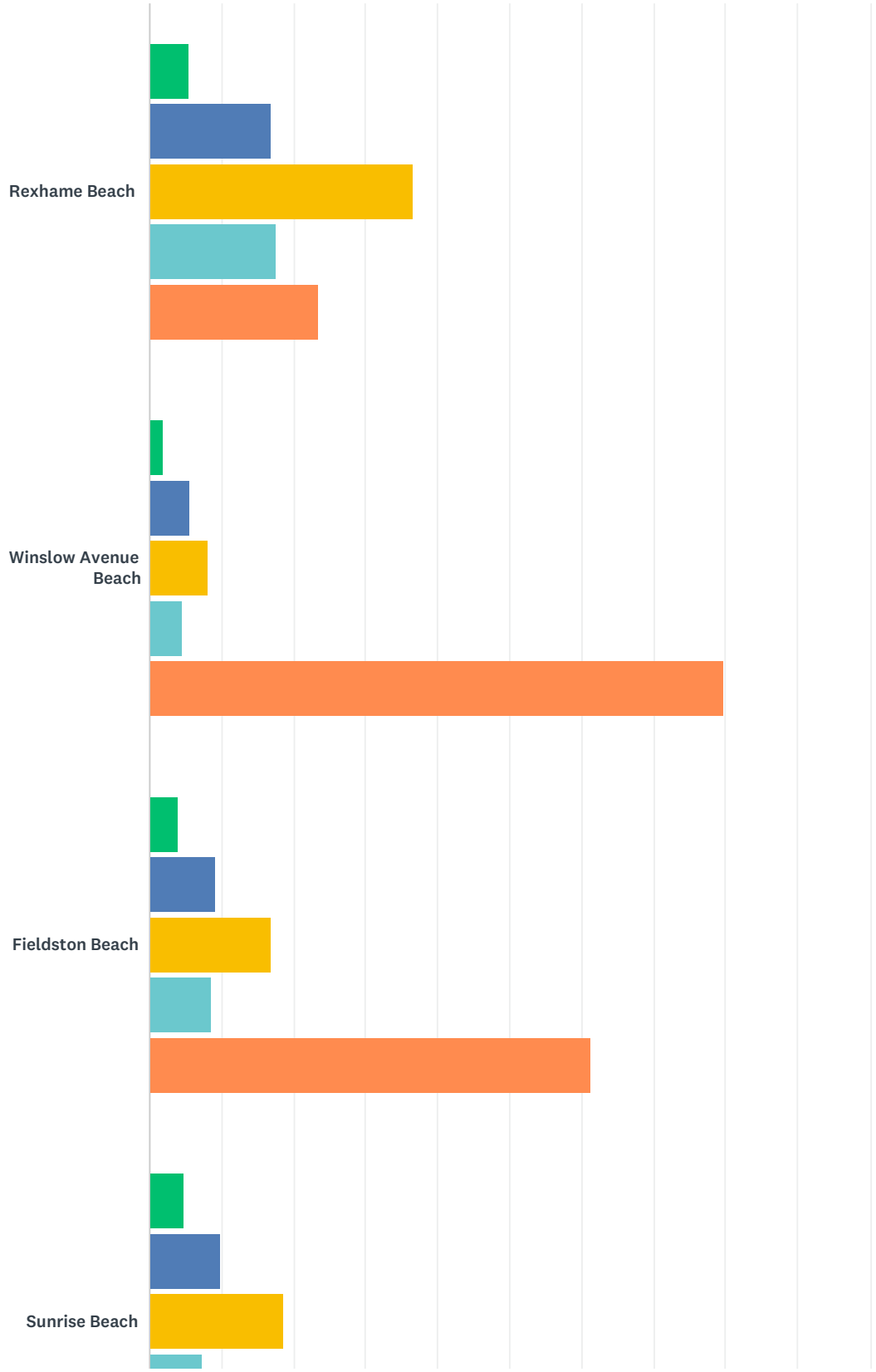


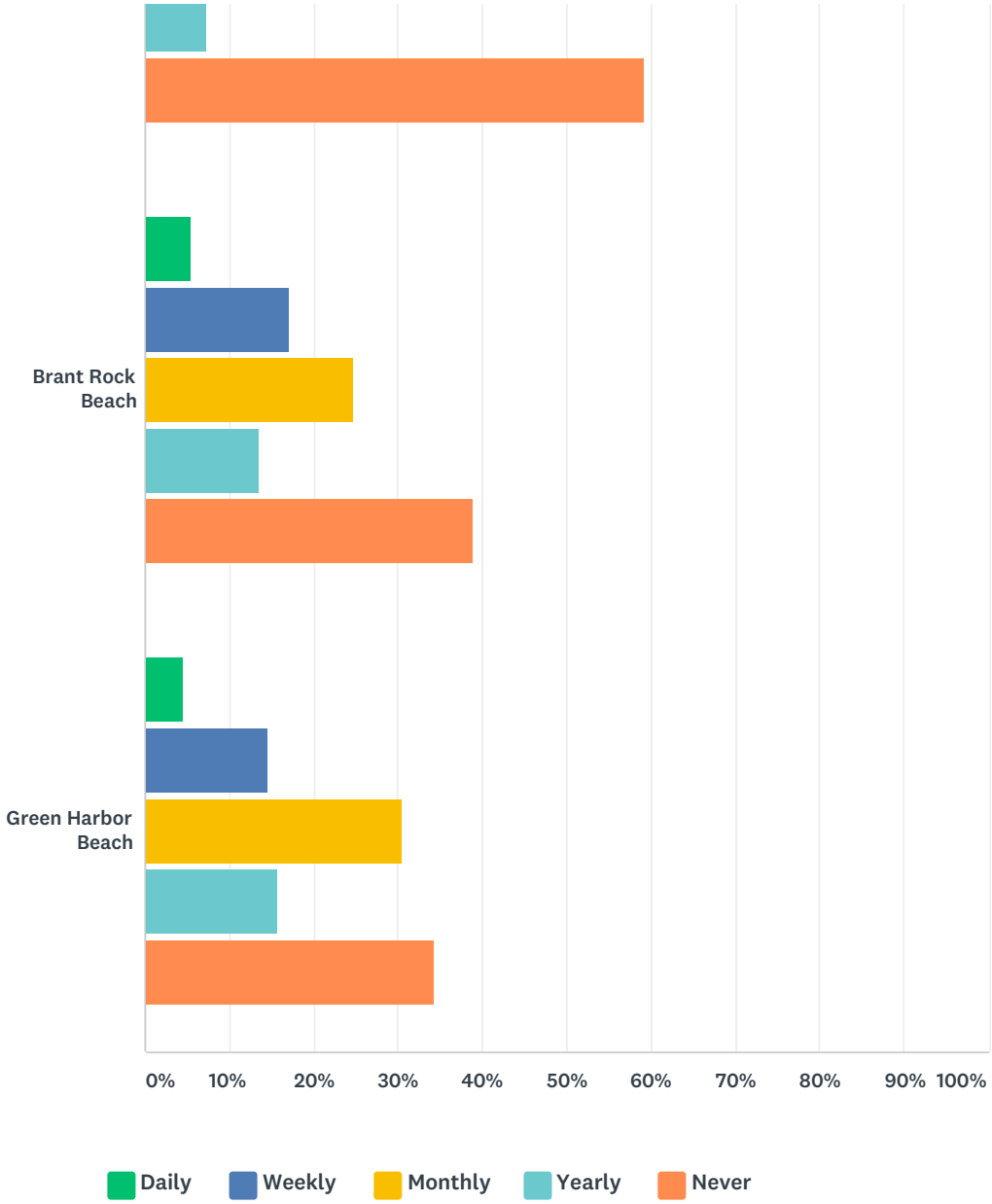


	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER	TOTAL
Rexhame Beach	14.97% 174	44.23% 514	20.91% 243	9.64% 112	10.24% 119	1,162
Winslow Avenue Beach	4.06% 38	9.08% 85	8.23% 77	7.80% 73	70.83% 663	936
Fieldston Beach	10.56% 106	15.24% 153	16.24% 163	11.25% 113	46.71% 469	1,004
Sunrise Beach	13.99% 143	15.95% 163	14.68% 150	10.67% 109	44.72% 457	1,022
Brant Rock Beach	8.92% 92	25.61% 264	21.53% 222	13.09% 135	30.84% 318	1,031
Green Harbor Beach	15.45% 174	34.37% 387	22.29% 251	11.19% 126	16.70% 188	1,126

Q3 How frequently do you visit Marshfield's public beaches in the off-season (October - May)?

Answered: 1,302 Skipped: 9

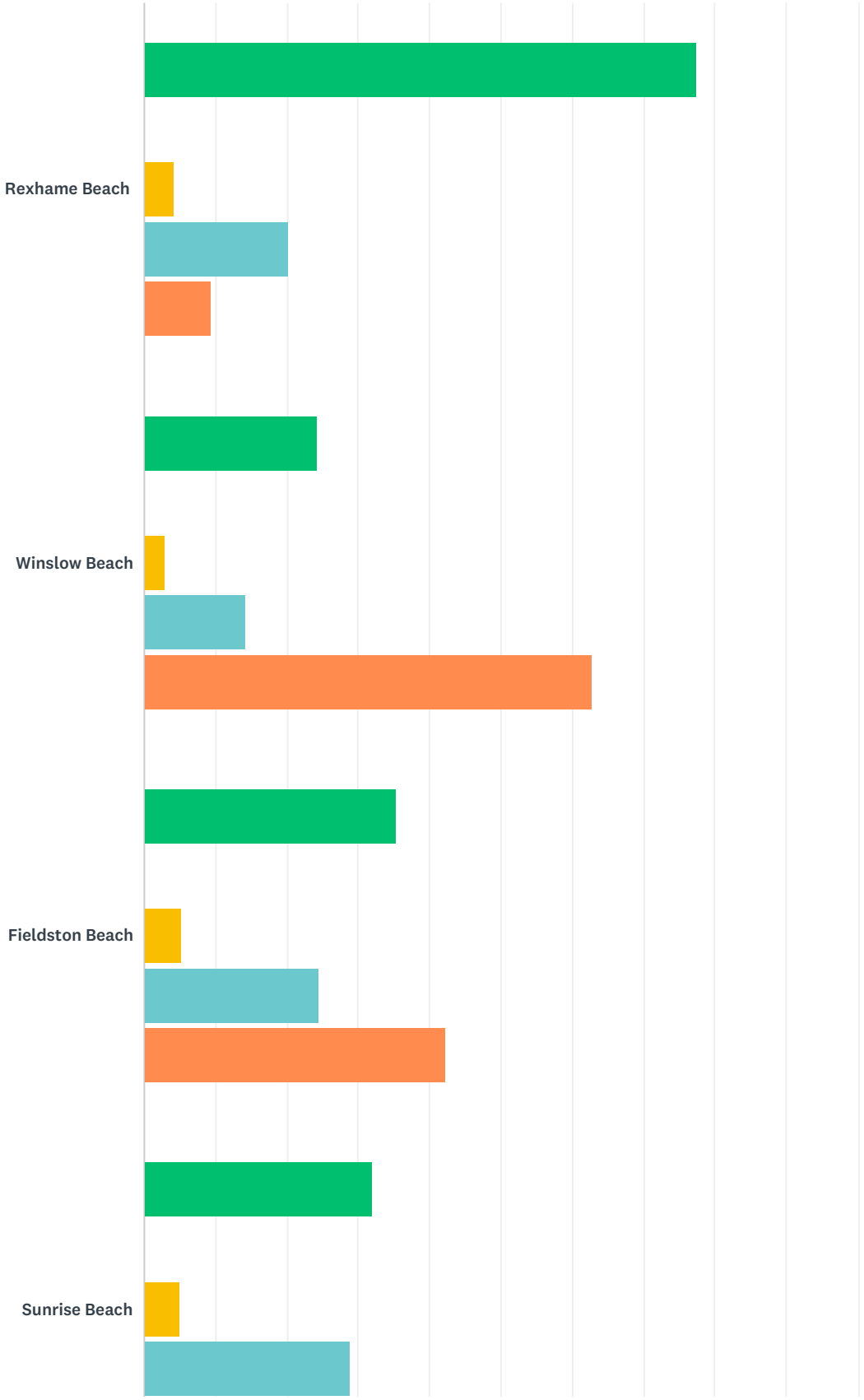


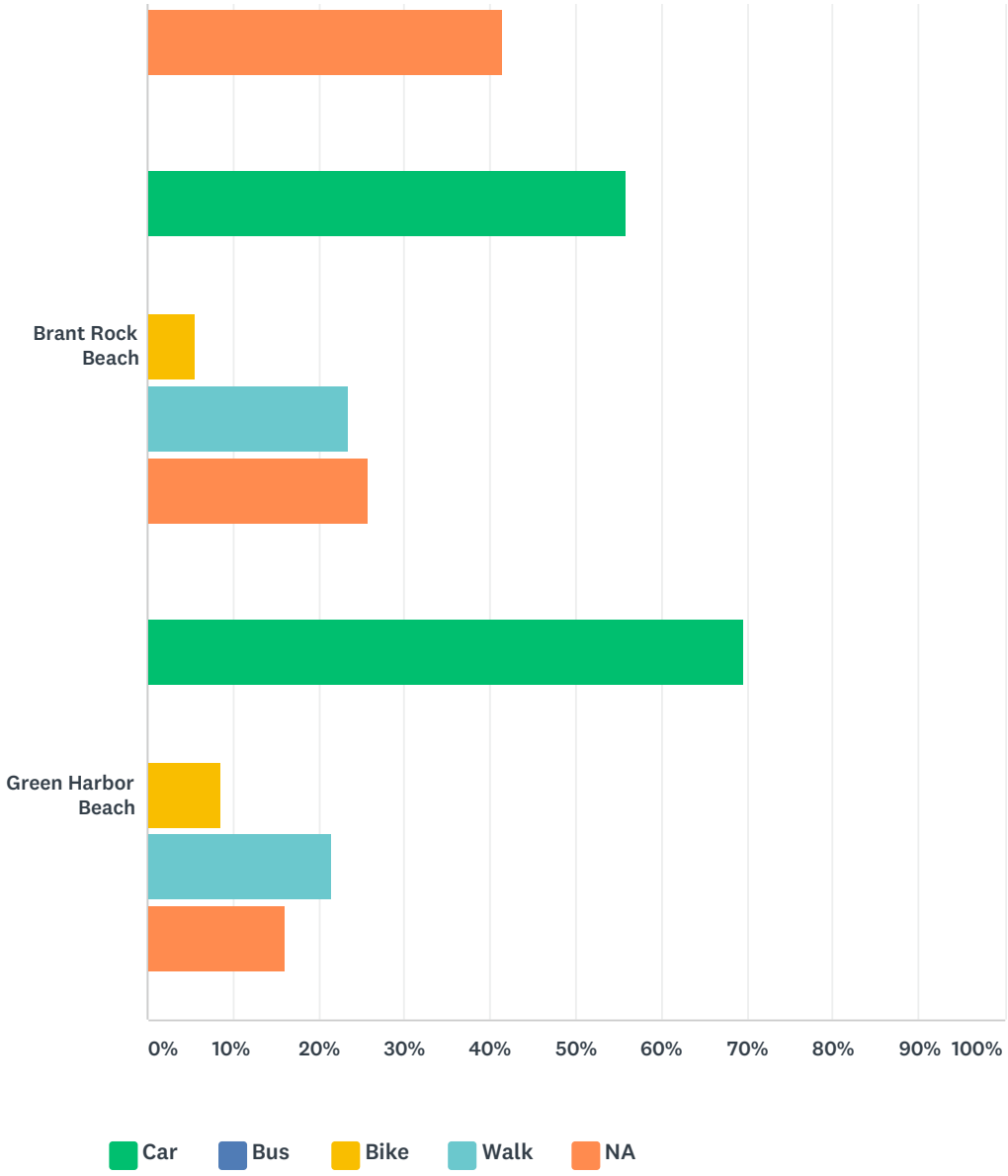


	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER	TOTAL
Rexhame Beach	5.37% 60	17.01% 190	36.62% 409	17.64% 197	23.37% 261	1,117
Winslow Avenue Beach	1.96% 18	5.67% 52	8.07% 74	4.69% 43	79.61% 730	917
Fieldston Beach	4.03% 39	9.31% 90	16.96% 164	8.48% 82	61.22% 592	967
Sunrise Beach	4.88% 48	9.86% 97	18.60% 183	7.42% 73	59.25% 583	984
Brant Rock Beach	5.52% 56	17.24% 175	24.73% 251	13.50% 137	39.01% 396	1,015
Green Harbor Beach	4.60% 50	14.73% 160	30.57% 332	15.75% 171	34.35% 373	1,086

Q4 How do you get to the beaches you visit?

Answered: 1,308 Skipped: 3





	CAR	BUS	BIKE	WALK	NA	TOTAL RESPONDENTS
Rexhame Beach	77.34% 894	0.00% 0	4.24% 49	20.33% 235	9.52% 110	1,156
Winslow Beach	24.25% 217	0.00% 0	3.02% 27	14.30% 128	62.68% 561	895
Fieldston Beach	35.27% 346	0.00% 0	5.30% 52	24.46% 240	42.30% 415	981
Sunrise Beach	31.95% 315	0.10% 1	4.97% 49	28.80% 284	41.48% 409	986
Brant Rock Beach	55.84% 574	0.19% 2	5.64% 58	23.35% 240	25.68% 264	1,028
Green Harbor Beach	69.72% 776	0.27% 3	8.54% 95	21.47% 239	16.17% 180	1,113

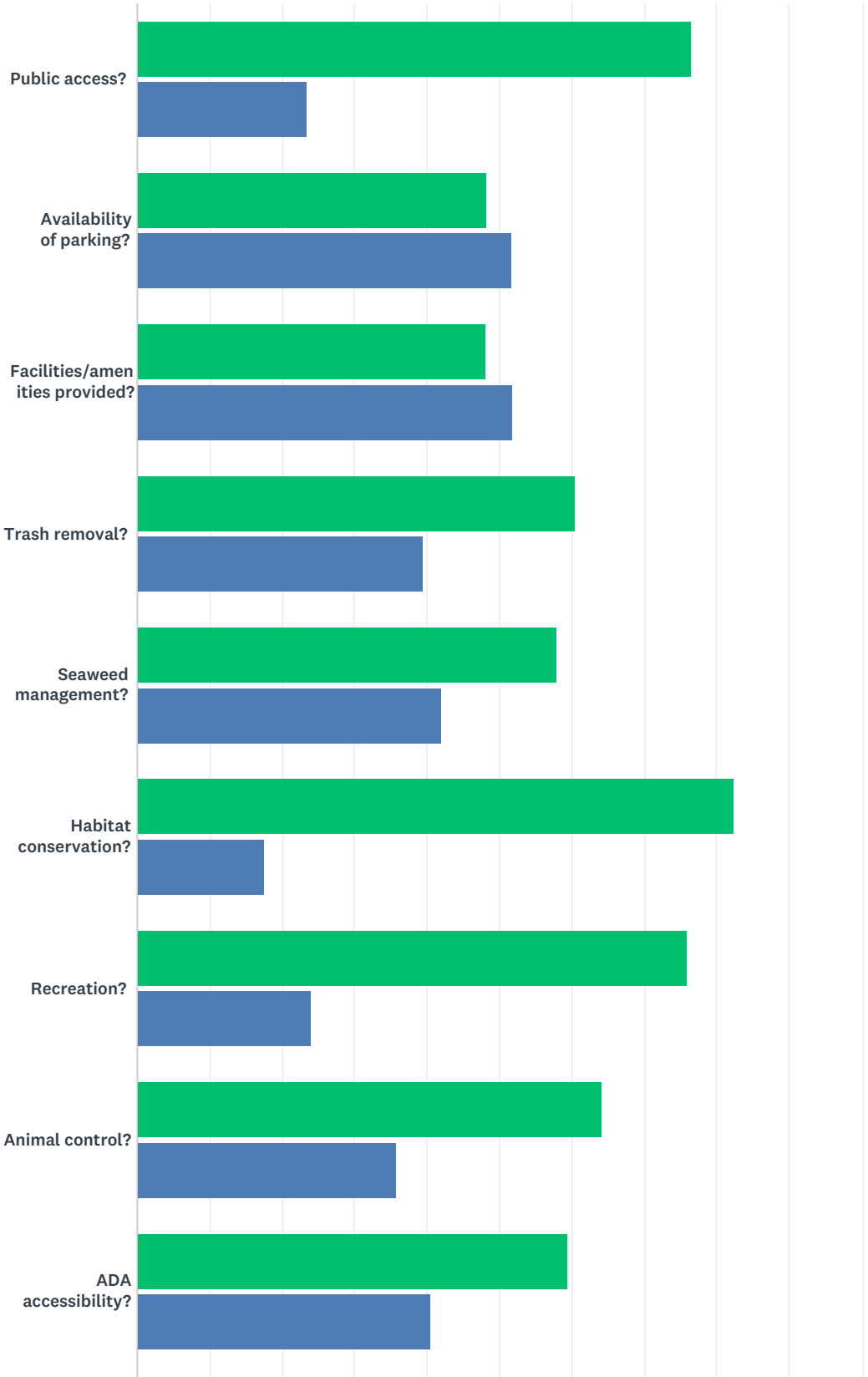
#	OTHER (PLEASE SPECIFY)	DATE
1	and bike to rexhame	4/25/2017 11:13 AM

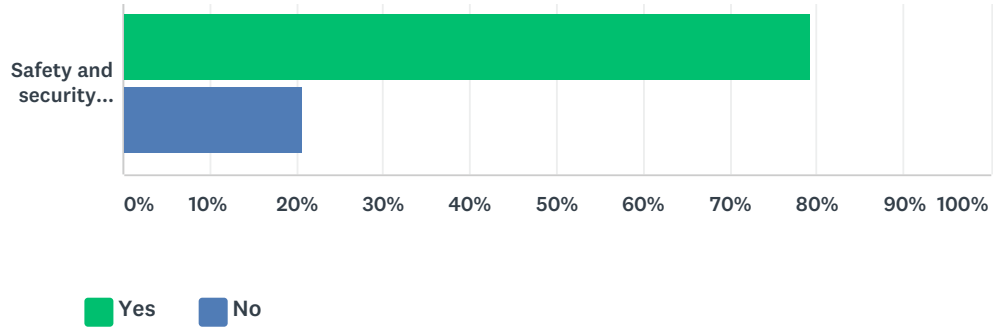
2	I am a new resdent and are not really set, there were so many beaches in the area. I will be exploring them all	4/25/2017 10:15 AM
3	Park and ride bike	4/25/2017 10:09 AM
4	By BOAT	4/22/2017 9:21 AM
5	I live on the ocean at Ocean Bluff and all residents need repair of RipRip before OUR LAND WASHES AWAY !!!! Use $$$$$ FOR securing our land !!! It was a SIN to build cament sidewalks on rt 139 going to the new park at Green Harbor --I have yet to see ANYONE use this ---Why don't you help us on OCEAN BLUFF MORE IMPORTANT THAN SIDEWALKS DISCUSSING USE OF $$$$ Leahy 556 ocean st OcEAN BLUFF	4/21/2017 2:47 PM
6	wheelchair	4/20/2017 5:05 PM
7	Boat	4/19/2017 11:44 PM
8	Wish there were bike racks, so we could secure our bikes at the beach	4/6/2017 6:11 PM
9	Live near Humarock beach	4/5/2017 11:42 AM
10	humarock Beach - we walk	4/4/2017 6:51 PM
11	Humarock-walk	4/3/2017 11:33 AM
12	Ocean Bluff Shepard ave beach walk Daily	4/3/2017 10:51 AM
13	wheelchair we've had to go to duxbury drive on because marshfield beaches are not wheelchair accessible, we used to go daily to marshfield beaches when our 16 yo son could walk	4/3/2017 9:07 AM
14	Parked on esplade and went for long walk	4/2/2017 10:08 AM
15	motorcycle	4/1/2017 2:51 PM
16	boat	4/1/2017 1:22 PM
17	Drive to a friends and walk from there.	4/1/2017 12:28 PM
18	i'm a huge recycler & want to see more bins for that with large signs showing people where to drop their goods. Trash Vs Recycling. also people should take their trash & recycable items home & discard- it's their responsibility	4/1/2017 11:59 AM
19	I have a beach bike and have been enjoying the new Winslow st access. I walk the same route to with the dog and pick up after	4/1/2017 10:55 AM
20	Winslow ave needs pathway!!	4/1/2017 9:02 AM
21	Humarock	4/1/2017 8:23 AM
22	Assist with transport	4/1/2017 7:12 AM
23	Run	3/31/2017 8:16 PM
24	Run	3/31/2017 8:03 PM
25	I can't believe that Winslow Ave is a public beach!	3/31/2017 8:01 PM
26	shephard ave beach	3/31/2017 2:12 PM
27	live near Humarock, so walk that beach daily	3/31/2017 12:12 PM
28	We live on the beach in the summer	3/30/2017 9:48 AM
29	We have friends who live near sunrise so we park there.	3/30/2017 9:47 AM
30	Park at families houses and walk to some	3/29/2017 9:02 PM
31	Go to Brant Rock when visiting BR business. Dinner at Haddad's, ice cream cone, etc.	3/29/2017 5:46 PM
32	Rocks are making the beach inaccessible now	3/29/2017 5:35 PM
33	Walk on the beaches often.	3/29/2017 10:04 AM
34	also drive to rexhame parking lot	3/29/2017 7:53 AM
35	Live near humarock, so walk there daily	3/28/2017 9:26 PM
36	park at friend's house	3/28/2017 7:47 PM

37	Sometimes I will kayak from Brant Rock to Green Harbor.	3/28/2017 7:43 PM
38	Cab	3/28/2017 7:17 PM
39	I live on the other side of south river so we kayak over from our property.	3/28/2017 5:49 PM
40	I walk to humarock beach	3/28/2017 3:06 PM
41	own property at beach	3/28/2017 2:24 PM
42	Senior bus	3/28/2017 2:13 PM

Q5 Do the current town beaches and beach management practices meet your needs in terms of:

Answered: 1,295 Skipped: 16

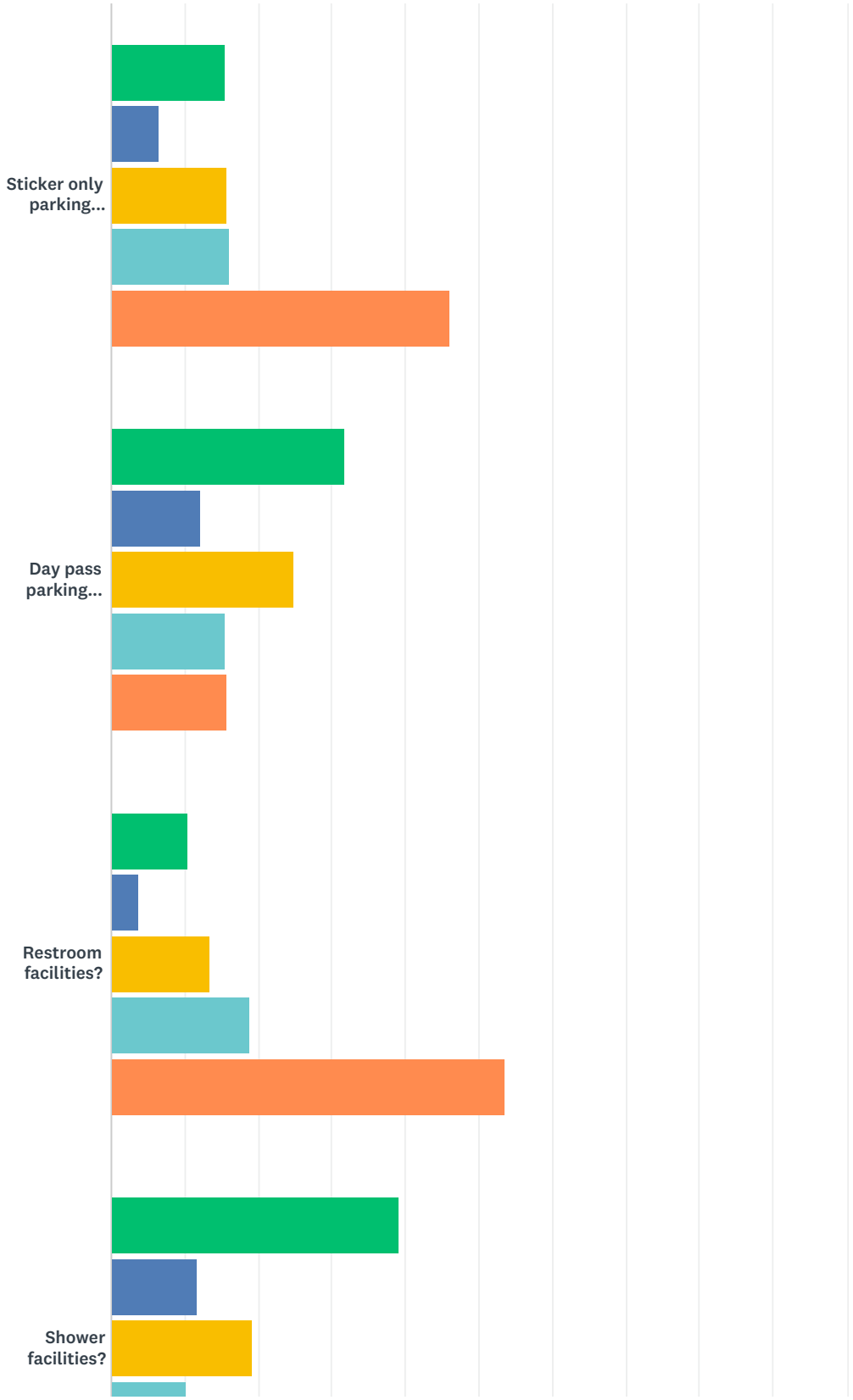


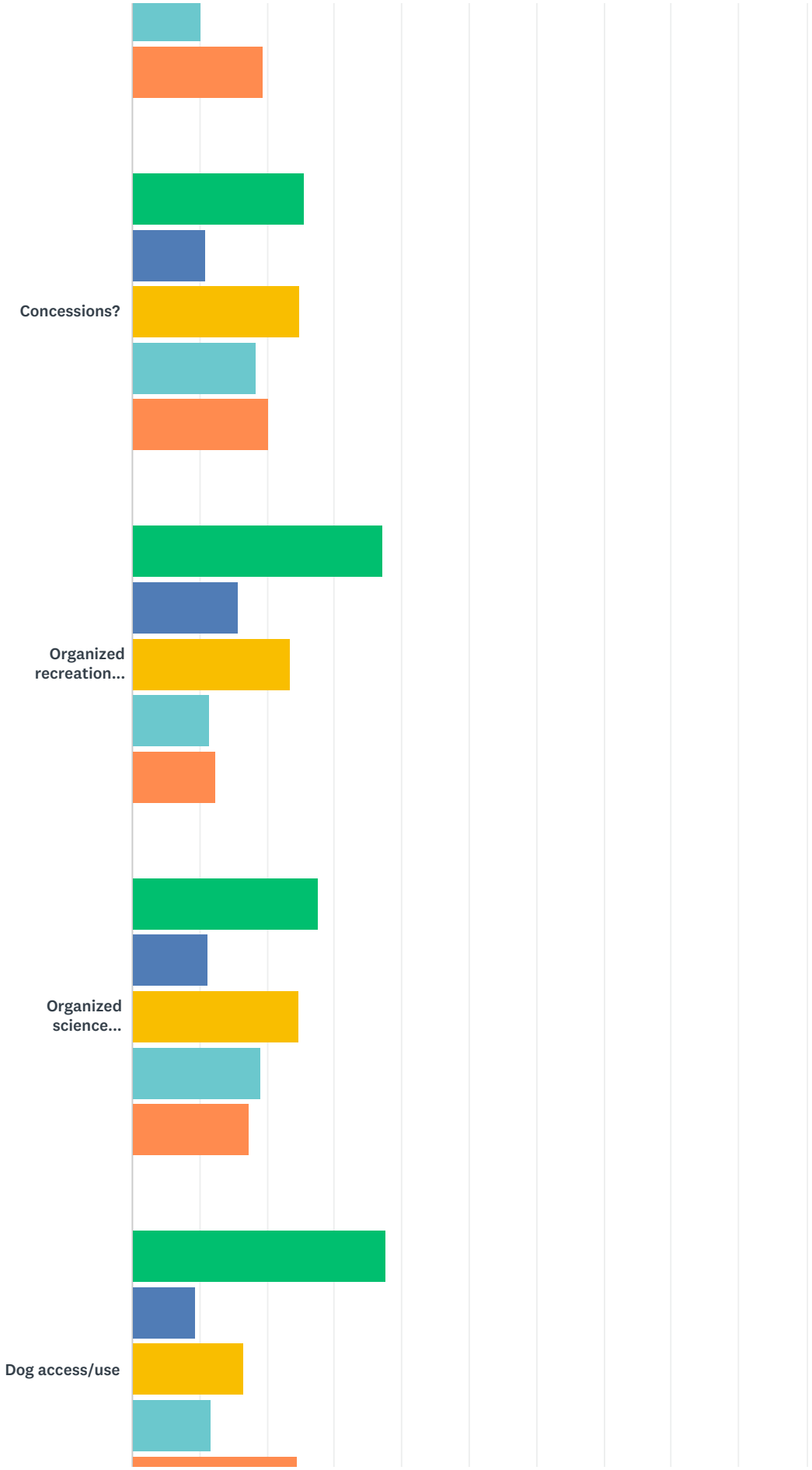


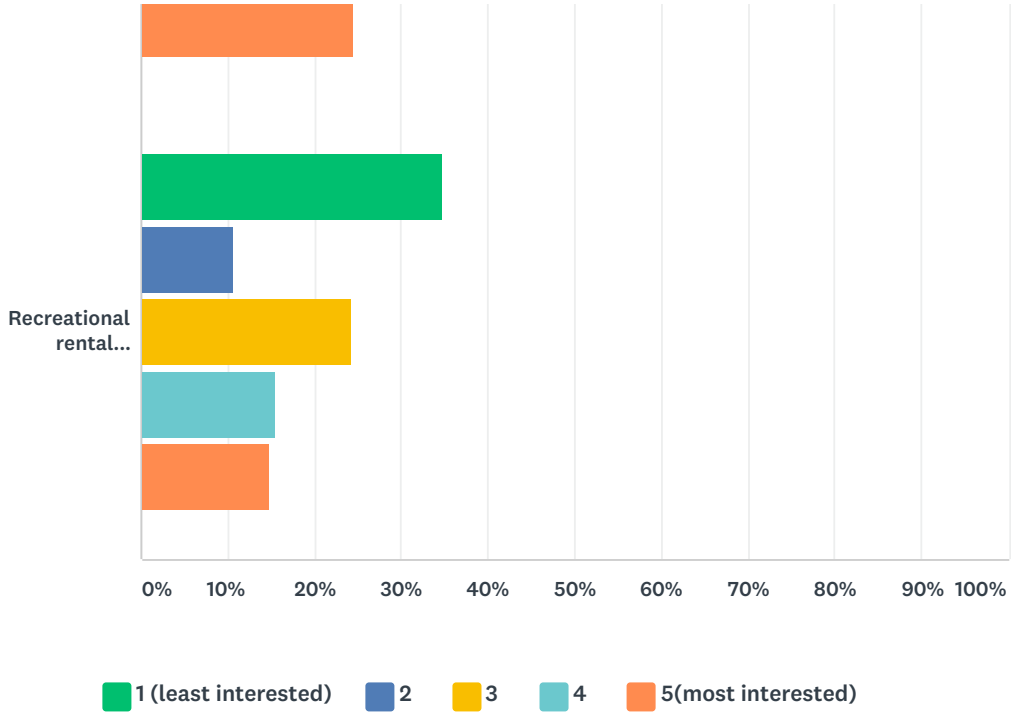
	YES	NO	TOTAL
Public access?	76.67% 966	23.33% 294	1,260
Availability of parking?	48.41% 607	51.59% 647	1,254
Facilities/amenities provided?	48.04% 589	51.96% 637	1,226
Trash removal?	60.51% 757	39.49% 494	1,251
Seaweed management?	57.95% 707	42.05% 513	1,220
Habitat conservation?	82.36% 985	17.64% 211	1,196
Recreation?	75.92% 908	24.08% 288	1,196
Animal control?	64.14% 794	35.86% 444	1,238
ADA accessibility?	59.38% 671	40.62% 459	1,130
Safety and security enforcement?	79.35% 953	20.65% 248	1,201

Q6 How interested are you in having the following activities and services available at Town beaches?

Answered: 1,298 Skipped: 13



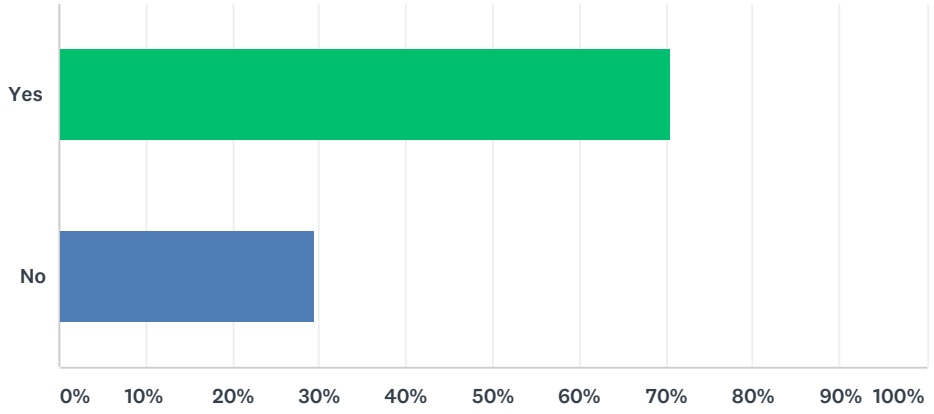

Concessions?
Organized recreation...
Organized science...
Dog access/use



	1 (LEAST INTERESTED)	2	3	4	5(MOST INTERESTED)	TOTAL
Sticker only parking (resident only)?	15.55% 197	6.55% 83	15.79% 200	16.18% 205	45.94% 582	1,267
Day pass parking (visitor)?	31.71% 396	12.09% 151	24.90% 311	15.53% 194	15.77% 197	1,249
Restroom facilities?	10.47% 134	3.83% 49	13.44% 172	18.75% 240	53.52% 685	1,280
Shower facilities?	39.18% 494	11.74% 148	19.35% 244	10.31% 130	19.43% 245	1,261
Concessions?	25.61% 325	10.87% 138	24.82% 315	18.36% 233	20.33% 258	1,269
Organized recreation activities?	37.20% 471	15.72% 199	23.38% 296	11.45% 145	12.24% 155	1,266
Organized science programs?	27.68% 348	11.38% 143	24.66% 310	18.93% 238	17.34% 218	1,257
Dog access/use	37.74% 480	9.43% 120	16.59% 211	11.71% 149	24.53% 312	1,272
Recreational rental services?	34.83% 442	10.64% 135	24.27% 308	15.45% 196	14.81% 188	1,269

Q7 Would you support an increase in beach fees if used for beach improvements?

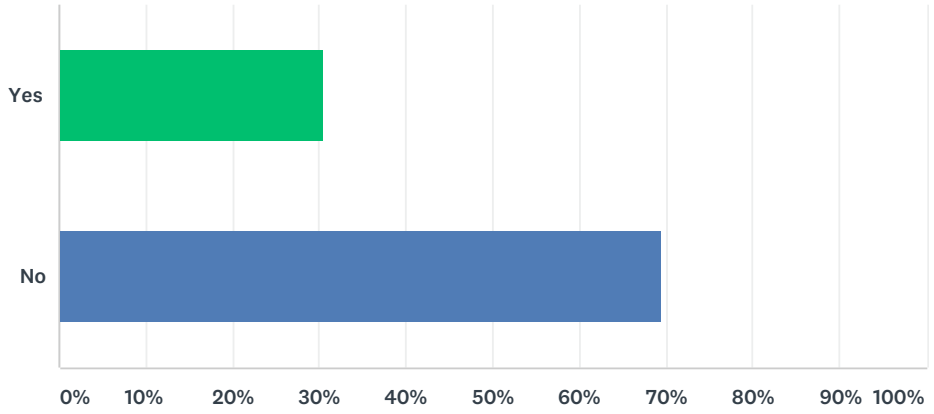
Answered: 1,298 Skipped: 13



ANSWER CHOICES	RESPONSES	
Yes	70.42%	914
No	29.58%	384
TOTAL		1,298

Q8 Would you consider using a summer weekend beach shuttle bus that would run to/from Rexhame beach and/or Green Harbor beach with 30 minute headway?

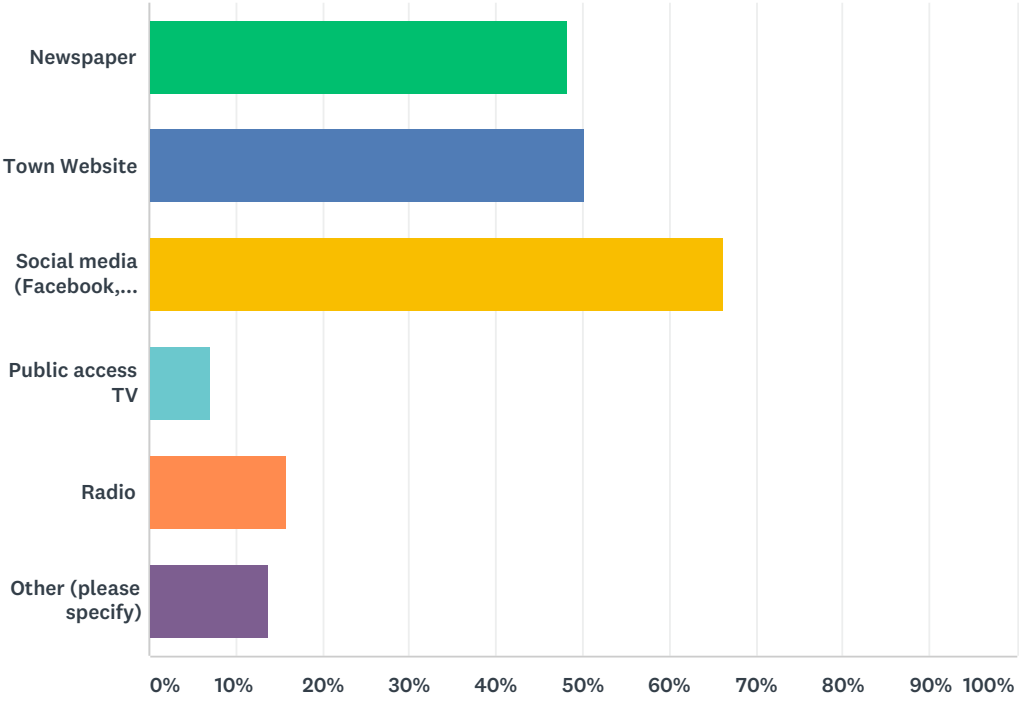
Answered: 1,293 Skipped: 18



ANSWER CHOICES	RESPONSES	
Yes	30.47%	394
No	69.53%	899
TOTAL		1,293

Q9 What is the best way to disseminate information to you about Beach Management Plan project updates and information about changes to existing beach management practices?

Answered: 1,296 Skipped: 15



ANSWER CHOICES	RESPONSES	
Newspaper	48.38%	627
Town Website	50.15%	650
Social media (Facebook, Twitter)	66.28%	859
Public access TV	7.18%	93
Radio	15.82%	205
Other (please specify)	13.89%	180
Total Respondents: 1,296		

#	OTHER (PLEASE SPECIFY)	DATE
1	Email	8/14/2017 4:23 PM
2	Email subscription	7/1/2017 9:13 AM
3	email	4/25/2017 11:58 AM
4	mailing	4/25/2017 11:44 AM
5	library, mailing, and sticker	4/25/2017 10:15 AM
6	Help from town engineers , selectmen to get help repairing to secure our homes along Ocean BLUFF few homes lost land from Ocean storms --forget restrooms & showers!!! Saver homes NOW !!!	4/21/2017 2:47 PM

Q10 Please answer the following open-ended questions:

Answered: 1,001 Skipped: 310

ANSWER CHOICES	RESPONSES	
What existing features/qualities about the public beaches do you enjoy?	81.42%	815
Are there existing features/qualities about the public beaches that you think need to be improved or changed? If so, how?	86.61%	867
Are there features/qualities you would like to see at the public beaches that don't currently exist?	69.03%	691
Any other additional comments?	47.25%	473

#	WHAT EXISTING FEATURES/QUALITIES ABOUT THE PUBLIC BEACHES DO YOU ENJOY?	DATE
1	Life guards	8/14/2017 4:23 PM
2	access to the water, salt air and the sights and sounds. It's a treat to live near the ocean	7/22/2017 10:12 AM
3	The natural beauty	7/10/2017 9:04 AM
4	Not too over crowded	7/1/2017 9:13 AM
5	Family time on beach	6/15/2017 8:47 AM
6	the freedom and the beauty of our beaches	5/15/2017 10:56 AM
7	non - they are nothing but a shitting place for unleashed dogs and dog owners	4/27/2017 7:41 PM
8	Restrooms	4/25/2017 7:16 PM
9	reasonable annual fee for use, lifeguards availability of parking most of the time	4/25/2017 12:19 PM
10	the easy access and clean	4/25/2017 12:09 PM
11	i used to enjoy the beaches and the gradual slope to get into the water. i loved everything about them.	4/25/2017 12:07 PM
12	the beauty and wild life	4/25/2017 11:58 AM
13	cleanliness	4/25/2017 11:55 AM
14	the snack bar in rexhame	4/25/2017 11:54 AM
15	beauty	4/25/2017 11:49 AM
16	recreation: walking/running, surfing, swimming	4/25/2017 11:46 AM
17	the natural setting and the ability to enjoy without the beaches being commercialized	4/25/2017 11:44 AM
18	i love the boardwalk at burkes beach	4/25/2017 11:39 AM
19	parking and access	4/25/2017 11:35 AM
20	water	4/25/2017 11:34 AM
21	i enjoy the clean sand and water. i also appreciate thw winslow street beach and the access for walkers. also enjoy walking thru the dunes to humarock	4/25/2017 11:31 AM
22	the fact that one can access the river and the beach at rexhame	4/25/2017 11:26 AM
23	their natural beauty	4/25/2017 11:24 AM
24	peacefullness and beauty	4/25/2017 11:18 AM
25	bathroom cleanliness	4/25/2017 11:13 AM
26	close and small community	4/25/2017 11:11 AM
27	being able to park and walk along the ebach without restriction	4/25/2017 11:08 AM
28	swimming at green harbor beach	4/25/2017 11:05 AM

APPENDIX B: EXAMPLE DOCUMENTS

Record of Beach Maintenance Activities					
Dates	**Activity**	**Location**	**Materials Required**	**Cost**	**Contractor**

Record of Restoration, Beach Nourishment and Dredging Activities									
Dates	**Activity**	**Location**	**Volume (cu yards)**	**Sand Source**	**Elevation and Slope of Fill**	**Construction Methodology**	**Cost**	**Contractor**	**Additional Information**

Record of Storms							
Date	**Duration of Storm**	**Beach Sites Impacted**	**Extent of Erosion**	**Impacts to Infrastructure**	**Elevation of High Water**	**Necessary Maintenance Post-Storm**	**Additional Information**

Beach Profile Records - Examples

Example Beach #1

Begin Pt: <Begin Point ID>

Dist (ft)	Elev (m)	Elev (ft,NGVD)	Description
0	1.847	6.05816	parking lot
15.2	2.072	6.79616	parking lot
23	2.094	6.86832	edge of parking lot/beach
76.5	2.094	6.86832	beach
132.2	1.883	6.17624	beach
167.1	1.74	5.7072	beach
175.3	1.754	5.75312	beach
185.5	1.623	5.32344	beach
197.6	1.233	4.04424	beach
212.5	0.808	2.65024	beach
243.2	0.279	0.91512	beach
265.7	-0.125	-0.41	beach

Example Beach #2

Begin Pt: <Begin Point ID>

Dist (ft)	Elev (m)	Elev (ft,NGVD)	Description
-144.3	-0.254	-0.83312	marsh
-133.1	0.097	0.31816	marsh
-120.2	0.608	1.99424	marsh
-105.6	1.679	5.50712	upland
-92.4	2.528	8.29184	upland
-87.9	3.357	11.01096	upland
-85.7	3.531	11.58168	upland
-77.4	3.659	12.00152	upland
-65.9	3.976	13.04128	upland
-59.7	4.284	14.05152	upland
-46	4.15	13.612	road embankment
-32.1	4.312	14.14336	road
-9.3	4.539	14.88792	road
-7.3	4.709	15.44552	road
0	4.774	15.65872	sidewalk
9.3	3.92	12.8576	dune
41.9	3.807	12.48696	dune
48.8	3.381	11.08968	dune
59.3	3.511	11.51608	dune
70.4	3.271	10.72888	dune
91.4	3.42	11.2176	dune
111.4	3.683	12.08024	dune
130.6	3.554	11.65712	dune
131.7	2.722	8.92816	dune
134.2	2.324	7.62272	dune
137.7	2.075	6.806	toe dune

Beach Profile Records - Examples

149.3	1.859	6.09752	beach
163	1.805	5.9204	beach
173.6	1.843	6.04504	beach
181.7	1.639	5.37592	beach
192.9	1.255	4.1164	beach
203.8	0.978	3.20784	beach
214	0.573	1.87944	beach
232.7	-0.156	-0.51168	beach
250.1	-0.536	-1.75808	land under the ocean
273.4	-0.295	-0.9676	land under the ocean
289.9	-0.462	-1.51536	land under the ocean

Example Beach #3

Begin Pt: <Begin Point ID>

Dist (ft)	Elev (m)	Elev (ft,NGVD)	Description
0	3.651	11.97528	parking lot
0.7	3.194	10.47632	dune
3.3	3.627	11.89656	dune
8	3.609	11.83752	dune
15.7	4.034	13.23152	dune
23.3	4.855	15.9244	dune
29.4	4.88	16.0064	dune
36.2	5.011	16.43608	dune
40.9	5.117	16.78376	dune
45.3	5.014	16.44592	dune
53.1	4.559	14.95352	dune
60.7	4.002	13.12656	dune
68.5	3.832	12.56896	dune
72.6	3.782	12.40496	beach
74.7	3.536	11.59808	beach
78.8	3.313	10.86664	beach
99.5	3.167	10.38776	beach
128.9	2.832	9.28896	beach
151.8	2.157	7.07496	beach
172.7	1.491	4.89048	beach
181	1.315	4.3132	beach
189.6	1.038	3.40464	beach
198.2	0.831	2.72568	beach
224.3	0.389	1.27592	beach
246.7	-0.126	-0.41328	beach

Sample Spring Notification Letter

March 15, 2018

Marshfield Conservation Commission
Marshfield Town Hall
870 Moraine St # 205
Marshfield, MA 02050

Dear Commissioners,

The Beach Commission and the Department of Public Works have identified the following activities that will be necessary in order to open the Town of Marshfield beaches for the upcoming summer season:

Sand Fence Repair/Installation – Rexhame Beach, Green Harbor Beach
Boardwalk Repair – Green Harbor Beach
Parking lot sweeping – Rexhame Beach lot
Parking lot regrading – Brant Rock Beach Dyke Road lot

We anticipate starting these activities within the next two weeks. If the Commission would like to view any of the areas where the work is planned, please contact the Beach Commission so that a site visit can be scheduled.

Sincerely,

Director of Beach Commission

Sample Fall Notification Letter

October 15, 2018

Marshfield Conservation Commission
Marshfield Town Hall
870 Moraine St # 205
Marshfield, MA 02050

Dear Commissioners,

The Beach Commission and the Department of Public Works have successfully completed the following activities to maintain the Town of Marshfield beaches during the 2018 summer season:

Sand Fence Repair – 100ft of sand fence repaired by hand at Rexhame Beach along the pedestrian paths through the coastal dune from April 1-5, 2018.

Sand Fence Installation – 500ft of sand fence was installed to reduce erosion and eliminate unwanted pedestrian paths on the seaward side of the coastal dunes at Rexhame Beach from April 20-29, 2018.

Boardwalk Repair – Broken and/or degraded planks were replaced on the boardwalks at Green Harbor Beach from May 3-7, 2018.

Parking Lot Sweeping – The parking lot at Rexhame Beach was swept on May 7, 2018. Clean sand was returned to the beach above the high water line.

In addition, we have identified the following activity and anticipate performing this activity during the 2018-2019 winter season:

Beach Nourishment – Sunrise and Fieldston Beaches

If the Commission would like to view the areas where the work is planned, please contact the Department of Natural Resources so that a site visit can be scheduled.

Sincerely,

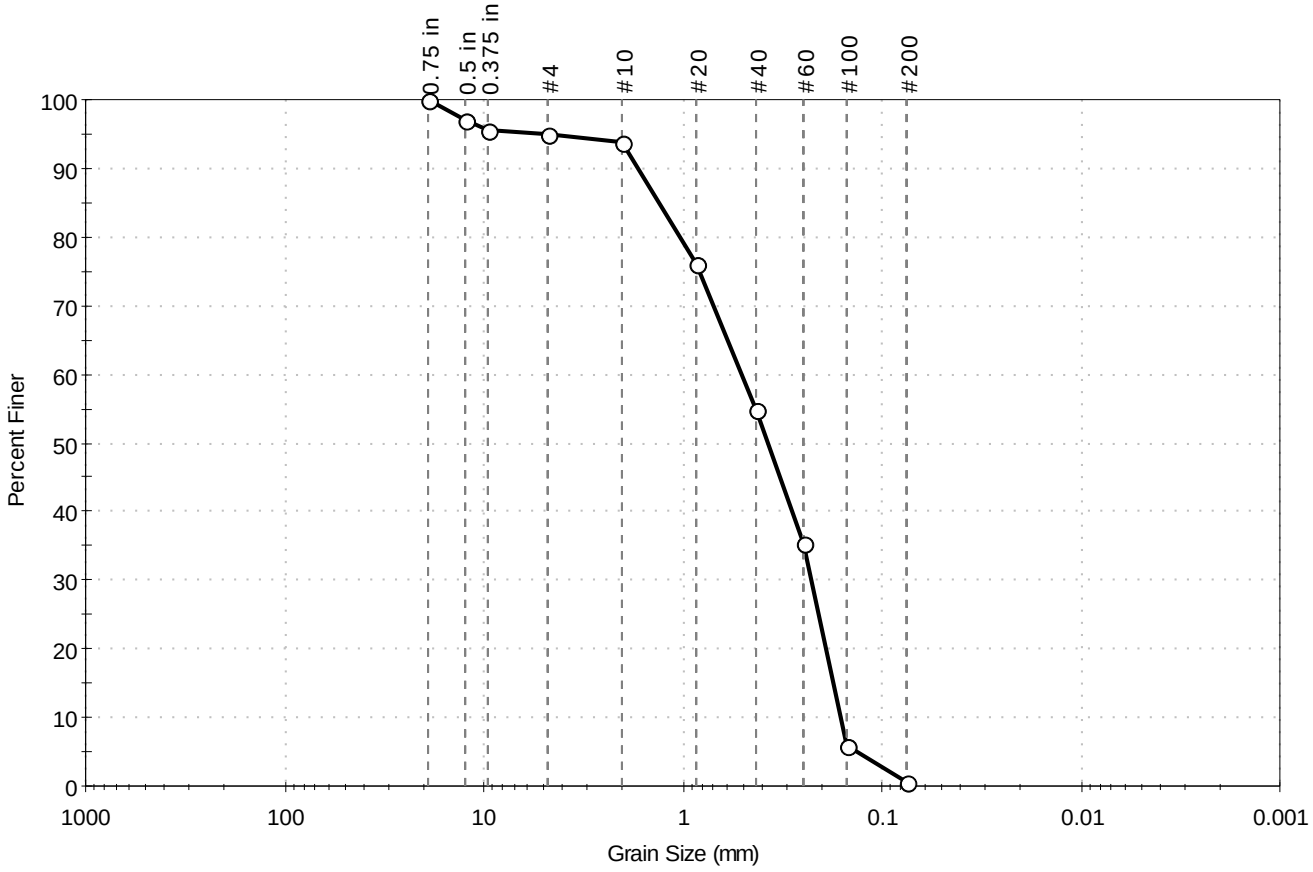
Director of Beach Commission

APPENDIX C: GRAIN SIZE ANALYSIS RESULTS

Figure C-1. Grain size sampling locations.

Client:	Woods Hole Group				
Project:	Marshfield BMP				
Location:	Marshfield, MA			Project No:	GTX-306822
Boring ID:	---	Sample Type:	bag	Tested By:	GA
Sample ID:	Green Harbor	Test Date:	08/14/17	Checked By:	jdt
Depth :	---	Test Id:	419588		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	5.1	94.2	0.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	96		
#4	4.75	95		
#10	2.00	94		
#20	0.85	76		
#40	0.42	55		
#60	0.25	35		
#100	0.15	6		
#200	0.075	0.7		

Coefficients

D_{85} = 1.3039 mm	D_{30} = 0.2279 mm
D_{60} = 0.5037 mm	D_{15} = 0.1758 mm
D_{50} = 0.3729 mm	D_{10} = 0.1613 mm
C_u = 3.123	C_c = 0.639

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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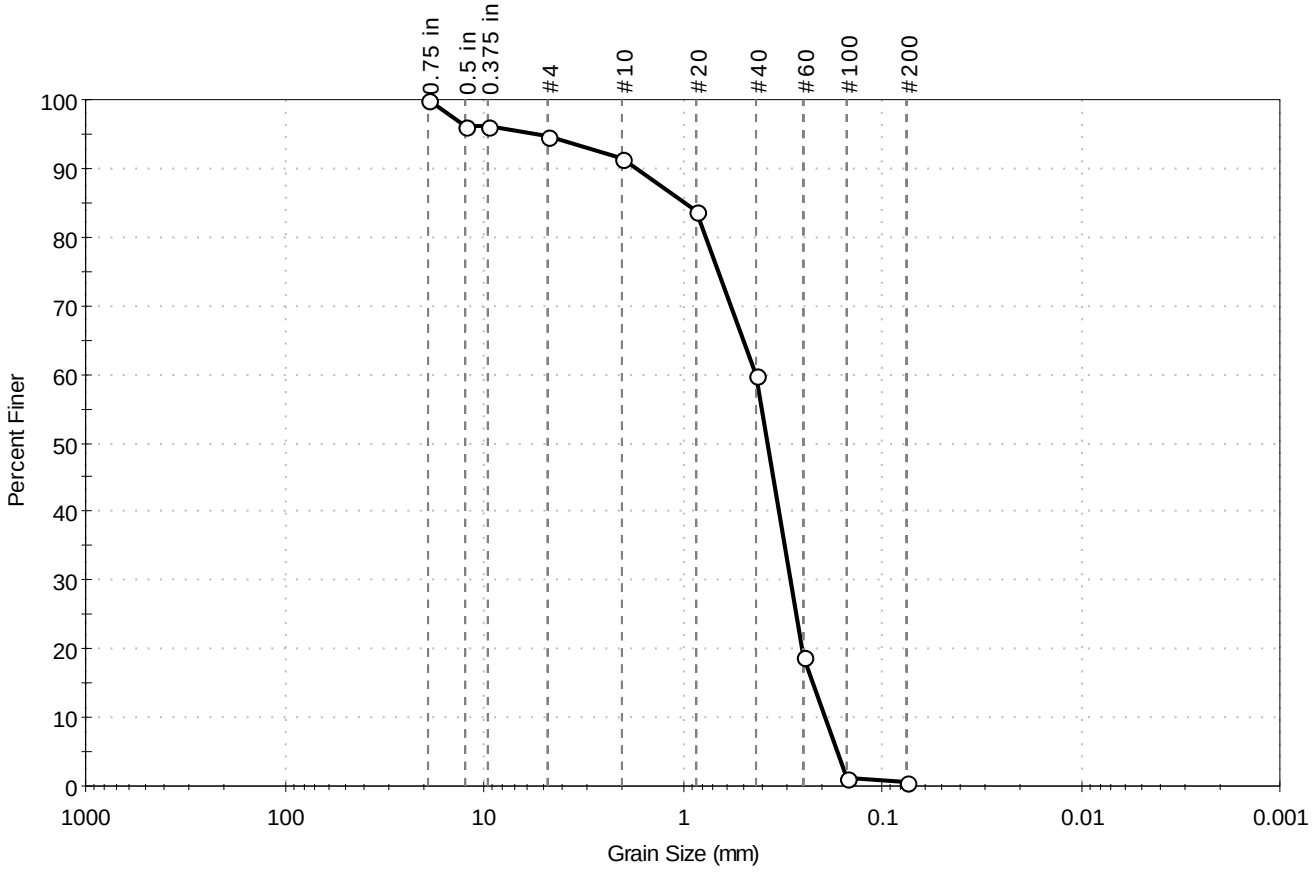
Client:	Woods Hole Group				
Project:	Marshfield BMP				
Location:	Marshfield, MA			Project No:	GTX-306822
Boring ID:	---	Sample Type:	bag	Tested By:	GA
Sample ID:	Fieldston/Sunrise	Test Date:	08/14/17	Checked By:	jdt
Depth :	---	Test Id:	419589		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	5.4	93.9	0.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	96		
#4	4.75	95		
#10	2.00	92		
#20	0.85	84		
#40	0.42	60		
#60	0.25	19		
#100	0.15	1		
#200	0.075	0.7		

Coefficients

D_{85} = 0.9687 mm	D_{30} = 0.2889 mm
D_{60} = 0.4250 mm	D_{15} = 0.2243 mm
D_{50} = 0.3737 mm	D_{10} = 0.1942 mm
C_u = 2.188	C_c = 1.011

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

Sample / Test Description

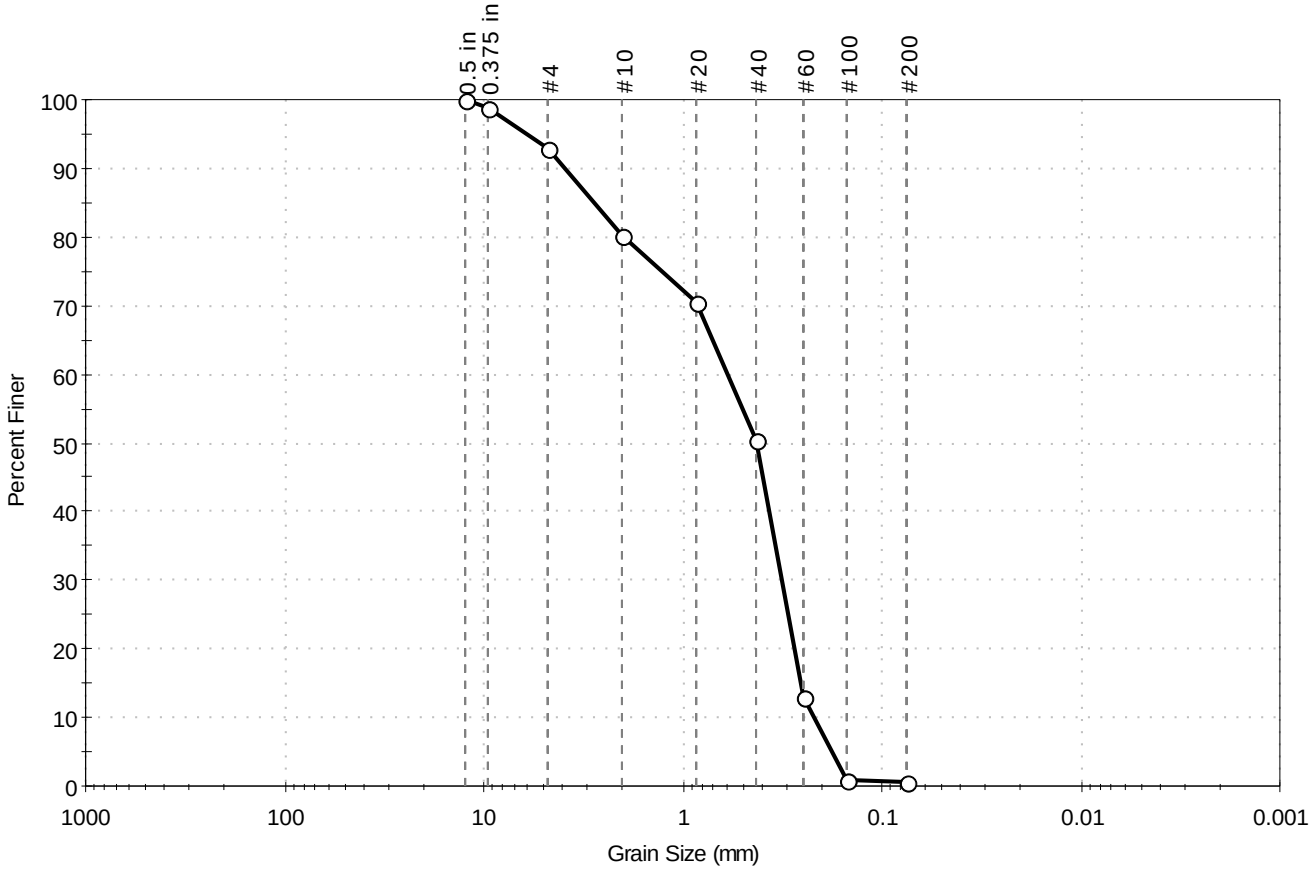
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

printed 8/15/2017 1:15:38 PM

Client:	Woods Hole Group				
Project:	Marshfield BMP				
Location:	Marshfield, MA			Project No:	GTX-306822
Boring ID:	---	Sample Type:	bag	Tested By:	GA
Sample ID:	Brant Rock	Test Date:	08/14/17	Checked By:	jdt
Depth :	---	Test Id:	419590		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	7.0	92.5	0.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	93		
#10	2.00	80		
#20	0.85	71		
#40	0.42	50		
#60	0.25	13		
#100	0.15	1		
#200	0.075	0.5		

Coefficients

D_{85} = 2.7702 mm	D_{30} = 0.3184 mm
D_{60} = 0.5904 mm	D_{15} = 0.2576 mm
D_{50} = 0.4224 mm	D_{10} = 0.2208 mm
C_u = 2.674	C_c = 0.778

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

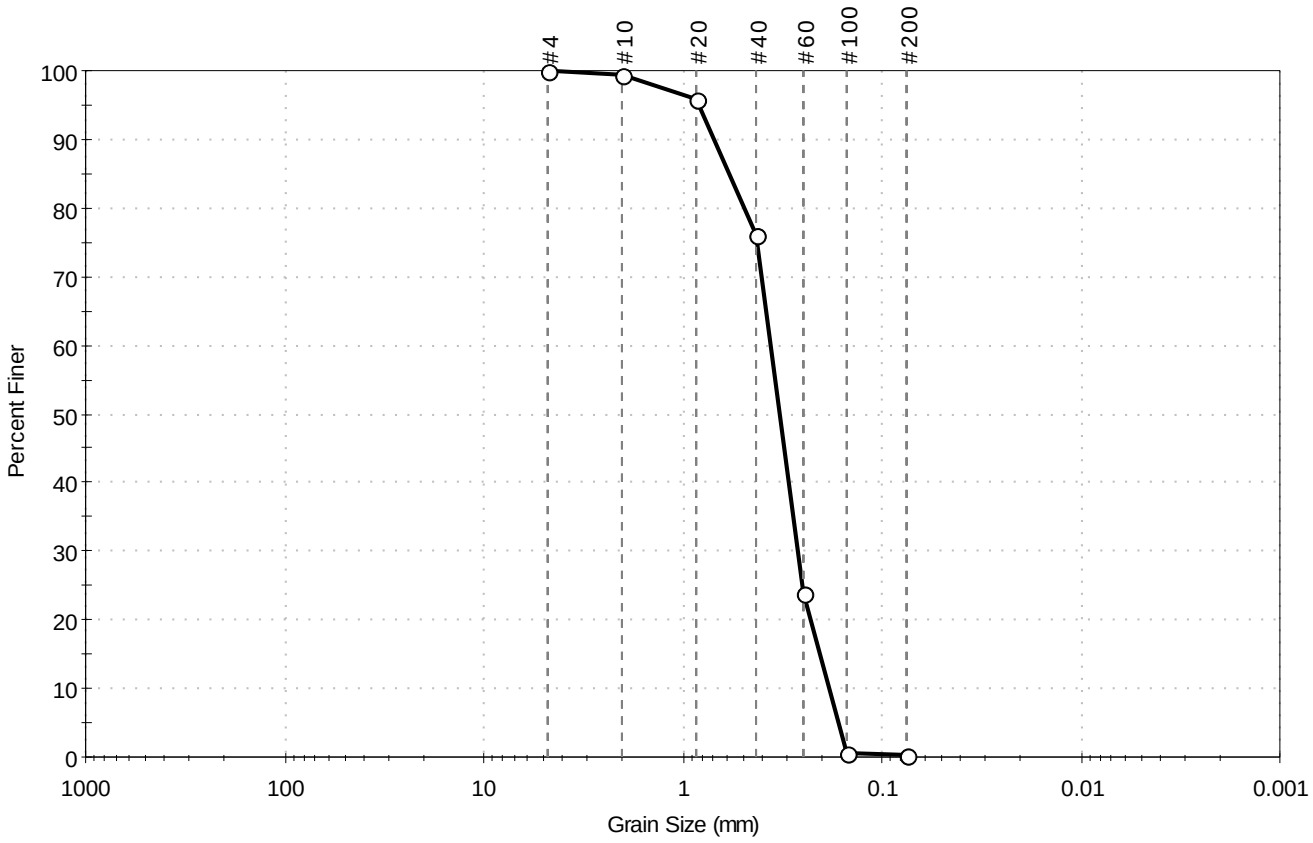
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Woods Hole Group				
Project:	Marshfield BMP				
Location:	Marshfield, MA			Project No:	GTX-306822
Boring ID:	---	Sample Type:	bag	Tested By:	GA
Sample ID:	Rexhame	Test Date:	08/14/17	Checked By:	jdt
Depth :	---	Test Id:	419591		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	99.8	0.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	96		
#40	0.42	76		
#60	0.25	24		
#100	0.15	1		
#200	0.075	0.2		

Coefficients

D_{85} = 0.5832 mm	D_{30} = 0.2664 mm
D_{60} = 0.3613 mm	D_{15} = 0.2060 mm
D_{50} = 0.3264 mm	D_{10} = 0.1844 mm
C_u = 1.959	C_c = 1.065

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---