Belle Isle Marsh

Environmental Inventory, Coastal Modeling, and Restoration Assessment

December 2022

PREPARED FOR:
Mystic River Watershed Association
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Acronyms

BIM	Belle Isle Marsh
EPA	Environmental Protection Agency
CZM	Coastal Zone Management
DCR	Department of Conservation and Recreation
DEM	Digital Elevation Model
DEP	Department of Environmental Protection
FBIM	Friends of Belle Isle Marsh
IPCC	Intergovernmental Panel on Climate Change
MC-FRM	Massachusetts Coastal Flood Risk Model
MLLW	Mean Lower Low Water
MHHW	Mean Higher High Water
MTL	Mean Tide Level
MyRWA	Mystic River Watershed Association
NAVD	North American Vertical Datum
NHESP	Natural Heritage & Endangered Species Program
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetlands Inventory
PWS	Professional Wetland Scientist
RTK	Real Time Kinematic
SAV	Submerged Aquatic Vegetation
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea Level Rise
TNC	The Nature Conservancy
USACE	United States Army Corps of Engineers
VDatum	Vertical Datum Transformation Tool
WHG	Woods Hole Group
MC-FRM	Massachusetts Coastal Flood Risk Model
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea level rise

Acknowledgments

Woods Hole Group would like to thank the funders, stakeholders, and community members for the collaborative effort which led to the development of this report. Funding was provided by MassBays, MA Department of Conservation and Recreation, Mystic River Watershed Association, Friends of Belle Isle Marsh, and The Nature Conservancy. Stakeholders who have followed the progress of this project include the City of Boston, City of Revere, Town of Winthrop, MBTA, MassDOT, and HYM. Community members across Boston, Revere, Winthrop, and beyond have contributed through participation in public meetings, and a community advisory group led by the Friends of Belle Isle Marsh.

EXECUTIVE SUMMARY

The Belle Isle Marsh Reservation, part of the Rumney Marsh Area of Critical Environmental Concern and owned primarily by the MA Department of Conservation and Recreation (DCR, Figure ES-1), has been dramatically impacted by anthropogenic influence to the detriment of today's and tomorrow's natural habitat and wildlife. Large areas of the marsh have been filled with sediment and landfill materials. The tidal and stormwater hydraulics have been obstructed by historic berms intended to exclude seawater. Critical habitat for the saltmarsh sparrow and other wildlife has been squeezed between coastal development and the rising ocean. Climate change threatens to worsen the ecological and sociological functions of Belle Isle Marsh, through sea level rise (SLR) and increased coastal storm severity. Such issues are detailed and addressed within this assessment to create a motivation and framework for marsh restoration to the benefit of the environment and communities.

Figure ES-1. Belle Isle Marsh ACEC Boundary and Assessment Study Area.

The quality of Belle Isle Marsh habitat is a function of marsh size, extent and duration of tidal flow, composition of native salt marsh plant communities, connectivity to other wetland complexes or upland habitats, and complexity of topography, tidal creeks, and salt pannes. An environmental inventory was prepared to map habitat distributions and observe hydraulic conditions, including tidal fluctuations, salinity, and water temperature throughout the marsh. Belle Isle Marsh contains the Belle Isle Creek (connecting Sales Creek to Boston Harbor), mudflat habitat, a wide low marsh platform, small areas of high marsh (supportive of saltmarsh sparrow nesting), transitional marsh areas containing extensive stands of *Phragmites*, and upland areas such as the main park supporting trails, forest, and grassland meadows.

A hydrodynamic model was developed to simulate tidal dynamics under existing conditions, assess future sea level rise conditions, and test potential restoration concepts. This modeling effort provided the following conclusions:

- Belle Isle Marsh hydraulics are predominantly forced by the ocean water entering at the southern inlet. This is evident by the fact that the marsh is relatively saline during high tides, and the high tides are able to efficiently propagate throughout the system.
- There is a predominant freshwater source at the apex of the salt marsh, from the Sales Creek tide gate connecting the marsh to the Suffolk Downs region. This tide gate opens once per tidal cycle, and causes freshening of the water salinity. This variability is present throughout all projected sea level rise scenarios (through year 2070). The freshwater signal is significantly flushed by a single tidal cycle, and weakens with increasing sea level rise scenarios.
- Low tide attenuation (i.e., tidal muting or dampening) is common across tidal creeks/low marsh platforms, marsh depressions (Rosie's Pond), and bermed areas due to channel geometry and restricting features that act to dampen the lowest tides.
- The L-Berm and the Key, two areas impacted by man-made berms, experience partial hydraulic disconnection between the main saltmarsh and the regions behind the berms. Existing breaches in the L-Berm provide hydraulic connection during spring high tides, which leads to the formation of salt marsh pannes that are infrequently flushed and maintain a relatively stable water level.
- Tidal drainage from depressions and bermed areas is slow during the ebb tide, and the flood tide returns to the system before these areas are sufficiently drained. This leads to ponding (i.e., stagnation), over-saturation, and plant die-off.
- Water velocities play an important role in sediment transport, and high ebb velocities can help to limit sediment deposition in the main channel or inlet. Velocities and sediment deposition were not found to be of critical concern within the marsh. Water velocities within the main channel were found to be typical of a marsh system under current and future (up to the year 2070) conditions.

In addressing the potential impacts of sea level rise on the marsh, habitat migration modeling was performed utilizing the Sea Level Rise Affecting Marshes Model (SLAMM). Field observations of tide levels throughout the marsh were incorporated to account for possible tidal attenuation. Sea level rise scenarios follow guidance from the Commonwealth of Massachusetts, and match the "High" sea level rise scenario, intended for planning of high-risk assets or areas. If sea level rise follows the "Intermediate" projection, the time horizons will shift approximately 30 years into the future. Belle Isle Marsh habitat changes with sea level rise is characterized in two phases:

- **Present day to 2070:** Shifts in habitat due to sea level rise include gains in estuarine open water (+43 acres), low marsh (+48 acres), and transitional marsh (+4 acres). The most significant corresponding losses occur in tidal flat (-26 acres) and upland (-57 acres). High marsh losses are observed at a smaller scale (-12 acres), however, this represents over 70% of its current footprint. The increases in low marsh and transitional marsh are only realistic if development retreats and open space is provided for this migration.
- **2070 to 2100:** Shifts in habitat due to sea level rise include gains in estuarine open water (+25 acres) and tidal flat (+118 acres). Significant corresponding losses occur in low marsh (-45 acres), high marsh (-4 acres), transitional marsh (-26), and upland (-67 acres). This represents a near

complete conversion of the existing marsh habitat to open water and mudflat. Low, high, and transitional marsh habitat attempt to migrate inland and upland, but will meet barriers in existing development, except in the L-Berm area where open space currently exists in the Reservation. Without action, the marsh is anticipated to be almost entirely lost to mudflat and open water.

Discussions held with steering committee members including DCR, Mystic River Watershed Association, Friends of Belle Isle Marsh, and The Nature Conservancy have identified a list of priorities of Belle Isle Marsh which would be beneficial to marsh health and function if targeted in future research, management, and restoration efforts:

- Existing resources and the natural condition of the marsh
- Habitat diversity and connectivity, food web support, and biodiversity preservation
- Water quality enhancement through sediment and nutrient cycling, chemical and metal retention, pathogen removal
- Storm surge and wave attenuation
- Stormwater conveyance and discharge
- Carbon storage for climate change mitigation
- Socio-economic services to humans such as aesthetics, natural heritage, recreation/ecotourism, education, physical and psychological health

Based on the results of literature review, data collection, existing and future conditions modeling, marsh migration modeling, stakeholder collaboration, and the above priorities, restoration alternatives across three time horizons were developed for eleven marsh management areas. Three "catalytic" restoration alternatives were developed and modeled to advance restoration and adaptation goals (Figure ES-2). Poor drainage of tidal water, loss of saltmarsh sparrow habitat, and SLR resilience in the three areas are the critical drivers for proposed conceptual restoration. Restoration concepts involve strategic dredging (cutting) and grading (filling) of the marsh. Cut and fill volumes across the three sites have the potential to be balanced through further planning and design, effectively minimizing the need for importing/exporting material. Sediment analysis (chemical and physical quality) and engineering design would be required to determine the permitting and construction feasibility of restoration. Observations from the development and modeling of restoration concepts include:

- **Rosie's Pond:** Rosie's Pond is characterized by a low marsh depression, containing stagnant water, poor drainage, and degraded marsh habitat. Rosie's Pond is proposed to be filled with appropriate marsh-building sediment and raised to the elevation of low marsh, while the outer fringes of the marsh are proposed to be raised to the elevation of high marsh. Due to the depression in Rosie's Pond being 2.8-3.1 ft lower than the preferred elevation of low marsh and a presumed lack of natural sediment input to the marsh system, filling of the marsh is proposed to allow low marsh habitat to thrive, while peripheral areas are proposed to support marsh migration. Existing and new tidal creeks are proposed to be dredged to increase tidal exchange and tidal/stormwater drainage from Rosie's Pond. Tidal hydraulic model results show that restoration achieves such goals, reducing stagnant water, improving flushing and consequently water quality, and creating an array of marsh habitat types which are inundated at an optimal frequency for survival.
- **L-Berm:** The L-Berm is characterized by a man-made berm and upland fill area which experiences minimal tidal exchange. Extended water residence times and poor drainage have led to the expansion of salt pannes, which leads to poor habitat quality and reduced high marsh habitat (of which the remainder supports saltmarsh sparrow). The L-Berm is proposed to be breached in three areas where minor breaches currently exist. Tidal channels are proposed through these

breaches to extend to salt pannes and through low marsh habitat, increasing tidal exchange and tidal/stormwater drainage. Tidal hydraulic model results show that restoration achieves such goals, improving the drainage through the L-Berm which today impounds water once it is overtopped by high tide. Flushing of salt pannes is anticipated to be improved by 80%, improving water quality and hopefully reducing salt panne expansion. Existing high marsh habitat is proposed to remain, while low marsh habitat is anticipated to convert to high marsh naturally with time as a result of the improved drainage/reduced ponding. The breached berms provide an opportunity for future-phase adaptive management with weir boards to control water levels under future SLR scenarios.

- **The Key:** The Key is characterized by a man-made berm which once acted as a barrier to tides to protect a low frequency radio range station. Now decommissioned, the un-maintained berm has breached, causing the area to experience limited tidal exchange through non-engineered breaches. As such, the Key is currently experiencing poor drainage and degraded marsh habitat. The Key is proposed to be filled with appropriate marsh-building sediment and raised to the elevation of high marsh. Tidal channels are proposed through two existing breaches, both of which will be significantly enhanced to create unrestricted tides between the Key and the main channel of Belle Isle Marsh. Existing and new tidal creeks are designed to increase tidal exchange and tidal/stormwater drainage. Tidal hydraulic model results show that restoration achieves such goals, reducing stagnant water, improving flushing and consequently water quality, and creating an isolated high marsh area which could support saltmarsh sparrow nest sites. The breached berms can be adaptively managed with weir boards to control water levels under future SLR scenarios.

The steering committee - which includes DCR, Mystic River Watershed Association, Friends of Belle Isle Marsh, and The Nature Conservancy - was instrumental in fundraising to secure resources for this environmental inventory, coastal modeling, and restoration assessment. While Mystic River Watershed Association provided support on project management, DCR was and remains the landowner, primary steward, and ultimate decision maker on any work done in Belle Isle Marsh. All members of the steering committee intend to continue to provide support as needed moving forward.

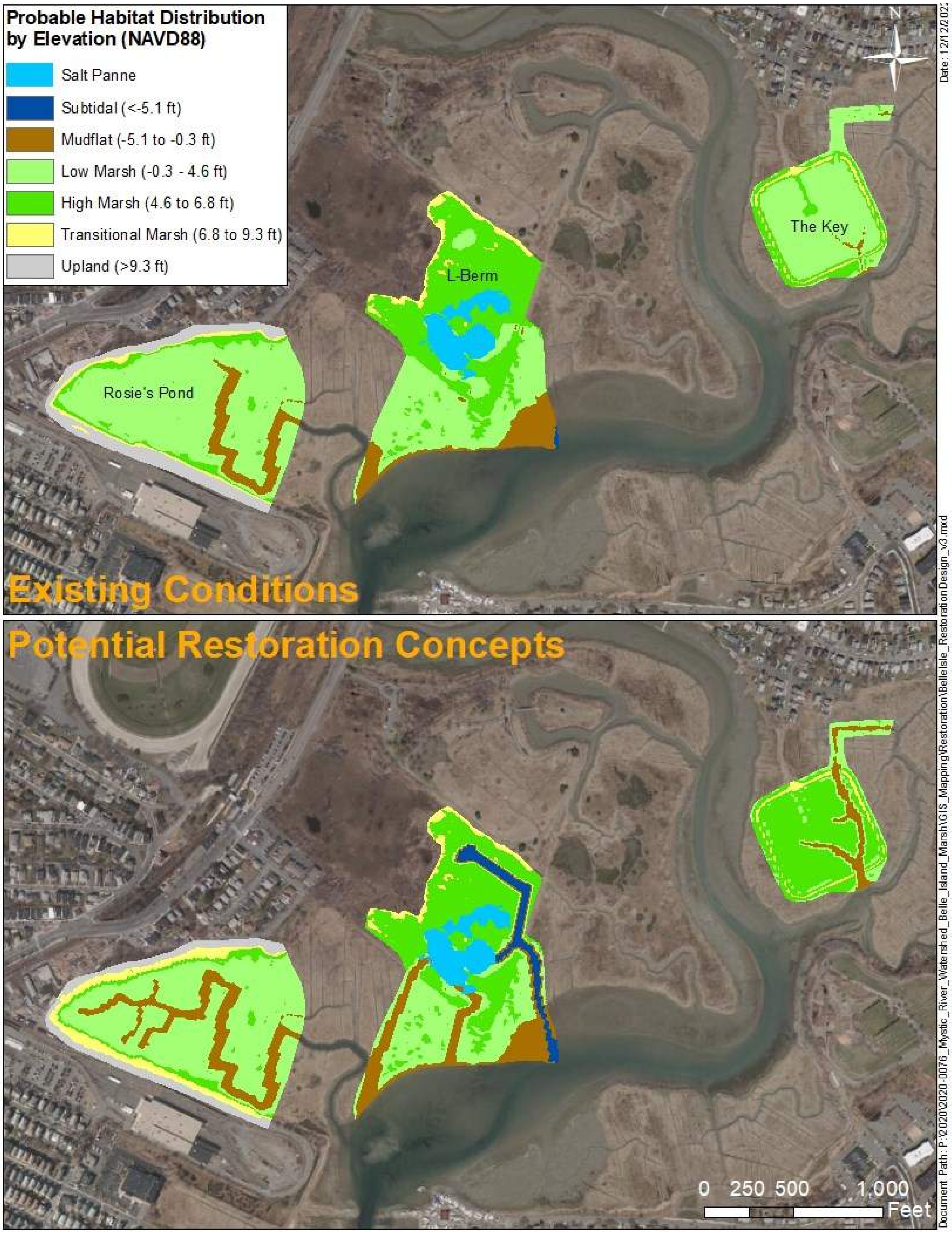


Figure ES-2. Existing and conceptual restoration habitat distributions based on tidal water levels and corresponding elevations. Due to man-made berms and ditches, ponding in existing conditions is impacting Rosie's Pond which is degrading to mudflat, the L-Berm which contains low marsh where high marsh should be, and the Key's which contains degraded low marsh below the optimal elevation.

1.0 INTRODUCTION

The Belle Isle Marsh (BIM) Reservation is an open space and wetlands preserve in northern Boston Harbor, within the communities of the City of Boston, City of Revere, and Town of Winthrop. Ownership of open space is segmented across different groups, with the Massachusetts Department of Conservation and Recreation (DCR) being the primary landowner, while Boston, Revere, and Winthrop own small pieces of the wetlands (Figure 1). The surrounding uplands contain critical infrastructure such as the Massachusetts Bay Transportation Authority (MBTA) Blue Line, evacuation routes, an electrical substation, affordable housing, and a public school, and support Environmental Justice communities.

Belle Isle Marsh is the largest remaining salt marsh in Boston Harbor, designated as a 359 acres Area of Critical Ecological Concern (ACEC) and supports approximately 266 acres of open space salt marsh wetland and transitional marsh habitat. Belle Isle Marsh provides habitat for over 250 bird species (seven listed as threatened or endangered), and serves as a coastal storm buffer to urban development. Finally, Belle Isle Marsh provides important open and recreational space for the public and delivers ecosystem services such as carbon sequestration.

Historically, the marsh was wide, undeveloped, and hydraulically connected to Chelsea Creek and the greater Boston Harbor system. Today, anthropogenic impacts, environmental stressors, and climate change threaten the health, function, and co-benefits of the marsh. The marsh has been significantly altered by urban development, artificial fill, mosquito ditches, tidal creek management, stormwater outfalls, and more. Anthropogenic impacts have negatively impacted habitat extent, hydrology, sediment delivery, and nutrient loading patterns, leading to the degradation of the marsh and loss of habitat value. Additionally, the marsh is further threatened by climate change, including sea level rise (SLR) and increasingly intense coastal storms. Spring high tides have been observed to inundate the marsh platform, destroying the saltmarsh sparrow (a rapidly declining endemic species) nests. Upland development presents barriers to natural marsh migration. DCR, along with landowners and non-profit organizations, have worked for decades to manage and improve the condition of BIM. However, while some restoration initiatives have been proposed, few have been implemented. Today, there is a need for restoration to improve tidal hydraulics and marsh habitat. Furthermore, Belle Isle Marsh is at risk of becoming open water and mudflat in future decades due to sea level rise, eliminating its habitat, recreational, and coastal protection value. Monitoring and restoration strategies must be considered to manage the system for long term resilience.

This report presents the culmination of several technical studies intended to understand the existing environmental conditions (ecological and hydraulic), assess the present and future vulnerability of the marsh, develop restoration goals and alternatives, and model select, large-scale restoration concepts to determine how improvements to marsh health can be achieved. Information presented herein is intended to support restoration planning, permitting, and design. Greater detail on the technical studies which support this assessment, can be found in the following memos in the Appendix:

Appendix A: Task 1: Review Existing Conditions – Summary Memo

Appendix B: Task 2: Data Collection – Summary Memo

Appendix C: Task 3: Belle Isle Marsh Hydrodynamic Assessment – Summary Memo

Appendix D: Task 4: Belle Isle Marsh Sea Level Rise Affecting Marsh Migration – Summary Memo

Figure 1. Belle Isle Marsh ownership.

1.1 Study Area

Belle Isle Marsh is designated an ACEC for its significance in protection of wildlife habitat, flood control, prevention of storm damage, protection of land containing shellfish and fisheries, prevention of pollution, and protection of public water supplies. The designation further cites the relatively undisturbed nature of these resource areas within an otherwise heavily developed area as clear indication of their value. The marsh is part of a larger system, the Rumney Marshes ACEC, which includes the Saugus and Pines River Estuary and Belle Isle Marsh (Rumney Marshes ACEC Designation 1998).

The Belle Isle Marsh Reservation is a fragmented reservation, requiring a vehicle to get to the various satellite areas of the park from a management or visitor perspective. For this study, the marsh has been divided into management areas (Figure 2, Table 1), based on access, use, and habitat distribution. The landward boundary encompasses the open space areas within the Reservation, including Belle Isle Creek, the marsh system, and tributary streams, particularly Sales Creek. For greater detail, refer to Appendix A.

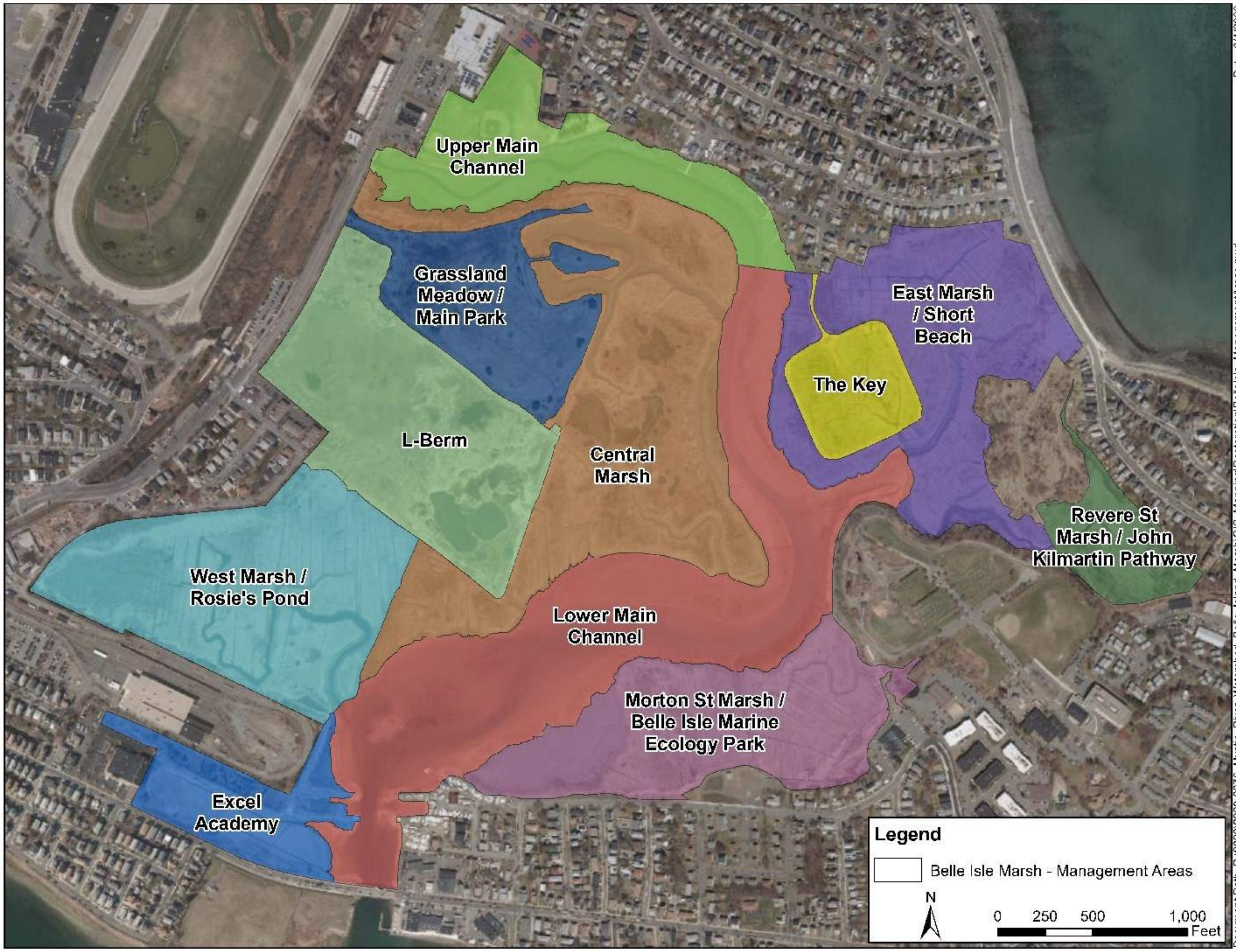


Figure 2. General boundaries of management areas in Belle Isle Marsh

Table 1. Summary of the management areas of Belle Isle Marsh

No.	Management Areas	Management Areas
1	Lower Main Channel	Belle Isle Inlet marks the downstream end of Belle Isle Creek. The waterway flows beneath the Saratoga Street Bridge, connecting East Boston to Winthrop. The height of this bridge is regulated by Massport to protect from interference with departing and arriving planes at Logan International Airport. A former train line crossed the main channel just upstream of Saratoga St, and can be identified by the abutment infrastructure which remains, as well as deteriorating wooden bridge piles in the channel. The concrete structures mark where the MA Water Resources Authority (MWRA) sewer line runs under the river (on its way to Deer Island). A boat yard in Winthrop occupies the upland adjacent to the abandoned train abutment on the south side of the channel. A launch ramp and dock extend to the main channel. Recreational and possibly commercial boating is a function of the main channel.
2	Upper Main Channel	The upper main channel of Belle Isle Creek is bounded by residential development and recreational fields on the northern shore, and an upstream boundary at the Sales Creek tide gate/outfall. Some residential homes have experienced flooding, such as during the 2018 winter storm series. Sales Creek tide gate flushes water into Belle Isle Marsh once each tidal cycle. Upstream flood levels are controlled by the Bennington Street Pump Station, owned and managed by DCR. This portion of the waterway is not tidal. Occasionally (approximately once in the last decade), there is a significant release of freshwater when heavy rains flood the Sales Creek catchment area. Future stormwater inputs are anticipated to increase with the construction of a 7,150 unit residential development in the former Suffolk Downs area (BPDA, 2020).
3	Excel Academy	This East Boston parcel is adjacent to the MBTA Orient Heights railroad maintenance yard. From the parking lot behind CVS and Excel Academy on Saratoga Street, there is a stone dust road along an MWRA easement. This site provides access to two "points" in Belle Isle Inlet that attract fisherman to this location. There is a trailhead behind Excel Academy. The trail is owned/maintained by DCR. There is a concrete structure at end of trail (and another across the river). Boston Natural Areas Network previously conducted restoration activities just north of main trail (along the MBTA fence line). Rip rap was added to create a path/viewpoint along with interpretive signs, and native salt marsh plantings. Prior to restoration the site was heavily contaminated with hazardous waste, lead and other heavy metals. It was filled with thousands of tons of brick and concrete. While the site was restored with native planting, much of the waste fill and riprap is being exposed due to the erosion of the bank from recent storms, including 2018 winter storms. This area is at risk of further erosion from storms and sea level

No.	Management Areas	Management Areas
		rise. Both Excel Academy and CVS have had serious littering and dumping infractions. This site continues to be one of the worst areas for trash in the reservation. DEP enforcement is ongoing. Salt marsh in this area is degraded, and likely experiences poor drainage through a culvert connecting to Belle Isle Creek.
4	West Marsh / Rosie's Pond	This area is primarily characterized by a low marsh platform, with fringing high and transitional marsh between the boundary of marsh and development. The marsh is scarred by historic ditching. An approximately 4 acres depression called "Rosie's Pond" occupies the western corner, adjacent to 1141 Bennington St/Austin Ave, and is characterized by degraded low marsh habitat. A proposal by Redgate for a housing development at 1141 Bennington St is underway. Austin Avenue provides access to the MBTA Orient Heights maintenance yard by an easement; DCR also has an easement to utilize a section of Austin Avenue. The salt marsh-Austin Avenue interface is characterized by broken fencing, overgrown vegetation, street runoff, and rock and gravel intrusion from occasional work along Austin Avenue. Ongoing illegal dumping occurs into the salt marsh at this location. Along Palermo Street, a small parcel was the site of a major dumping litigation still being enforced by the Commonwealth against D&M Auto Doctor. When the property sells, over 100 tons of concrete / asphalt material will need to be removed as part of the settlement. Once the debris is removed, habitat restoration may be needed.
5	Central Marsh	This area is characterized by a low marsh platform adjacent to Belle Isle Creek. The marsh is scarred by historic ditching. Salt pannes are present east of the reservation Main Park. Constructed as part of the Belle Isle Reservation Park in 1986, an artificial channel circles an island supporting the park's Tower. Edge erosion of the marsh has been observed here and along many of the larger tidal channels as well.
6	L-Berm	This section is located off Bennington Street, Leverett Avenue, and Lawn Avenue. Once marsh habitat, the area was filled and disconnected from tidal influence by a berm. The berm has since breached in a number of areas. At Lawn Avenue, DCR maintains a ~1-acre mowed grass area with apple trees and a lookout bench. An adjacent 1,200-foot long trail winds through a dense scrub thicket, over bog bridges and out to a small observation platform that overlooks a large section of salt pannes and salt marsh. In 2016, there was a significant horseshoe crab breeding population using the salt pannes for egg laying. The salt marsh within this area has some of the highest salt marsh plant diversity of the entire Belle Isle Marsh system: *Spartina alterniflora*, *Spartina patens*, *Distichlis spicata*, seaside goldenrod, and high tide bush (DCR staff noted that this is the only known high tide bush in the Reservation). Saltmarsh sparrow prefer the high marsh habitat of the L-Berm, and it is consequently the site of annual salt marsh sparrow nest monitoring (spring/summer) and bird banding (fall) activities coordinated by DCR. This area can be

No.	Management Areas	Management Areas
		seen from an elevated overlook platform extending to the berm. Stagnant water can be seen after a high tide penetrates behind the berm.
7	Grassland Meadow / Main Park	Accessed via Bennington Street, this 30-acre section of the Reservation is a historic landfill that was capped and landscaped. This area contains a 40-car parking lot, the reservation's main kiosk, a 20-foot tall observation tower, a large wooden bridge to the tower, a 12-acre capped grassland/wildflower meadow, park benches, roughly 1 mile of stone dust pedestrian trails, and two wooden boardwalks overlooking the marsh. This is one of the most heavily used areas by pedestrians, joggers, dogwalkers, and birdwatchers. A freshwater wetland adjacent to the parking lot drains by a pipe into the upper main channel, by the Sales Creek tide gate. DCR unclogs the north end of this pipe typically twice per year. Southwest of the main parking lot and boardwalk, there is an approximately 30-acre area of *Phragmites*, interspersed with upland patches of forest. One forested path, west of the freshwater wetland, is comprised largely of birches. There is a small freshwater pool in the salt marsh by a small southern walkway (by self-guided tour post #3). The central grassland meadow contains purple loosestrife in the southwest corner, but controlling the invasive crown vetch through targeted mowing is the primary issue. Japanese knotweed is also actively and successfully removed.
8	Morton St Marsh / Belle Isle Marine Ecology Park	This area is characterized by a low marsh platform, scarred by ditches, and backed by a low elevation Marine Ecology Park and residential community in Winthrop (Morton Street area). There is some ponding atop the marsh platform, even at low tide. A half-moon shaped area of mudflat and patchy, degraded salt marsh is located to the southwest. In 2018, with the help of a large grant from the State, the Town of Winthrop in partnership with DCR excavated existing contaminated material (including abandoned cars) from the upland site (once a junkyard), and developed a waterfront park with a lookout deck and ~¼ mile of boardwalk through the salt marsh. This area is owned in part by DCR and in part by Winthrop, and is managed by Winthrop. All of Morton Street was flooded during the 2018 winter storm series.
9	The Key	This 7-acre site is accessed by a gate on Summer Street in Beachmont (Revere) and along a long grass path. DCR's Office of Cultural Resources indicates that the site is the former site of a "low frequency radio range station." These stations were constructed throughout the United States between 1929 and the end of World War II to act as aeronautical beacons to assist pilots in navigating without relying on visual aids or compasses. Stations would emit four radio beams with unique dot-dash sounds that would allow for aircraft instrument flying. Later designs used an "Adcock vertical antenna array" consisting of four 134-foot-tall antenna towers erected on the corners of a 425 x 425 foot square, with an optional central tower for voice

No.	Management Areas	Management Areas
		transmission and homing, which characterizes this site. The development of "VHF omnidirectional range" (VOR) radio navigation systems led to the widespread decommissioning of low frequency radio range facilities in the 1970s, which also aligns with the disappearance of the towers at the site on old aerials and maps. A man-made 2,200 linear foot, square berm which encompassed the radio station remains in the marsh. Footings from the radio range station are still visible inside the bermed area. A kestrel box has been installed on a pole along the path to the berm. The square shaped berm is made of stone and has two breaches (one to the northeast and one to the southeast). This area was once the site of a planned multi-agency restoration project to breach the berm and restore the salt marsh within the interior, but the project was ultimately dropped. The northeast breach was the only place tides could enter the bermed area for a long time, but a southeastern section breached during a storm in 2018. Prior to the breach, the inner area had been largely unvegetated (only a small bit of salt marsh had existed in the northeast section where tidal water was able to come in and out). Since the 2018 breach, the interior area has almost entirely re-vegetated over the last 2 years. However, the western half of the Key still has significant pooling.
10	East Marsh / Short Beach	A low marsh platform, scarred by ditching, occupies this far edge of the marsh system, and is separated from the open ocean by the Winthrop Parkway and Short Beach. During events with significant storm surge and waves, flooding from Short Beach can either go around southern end of a concrete seawall or splash over the road itself and sheet flow into upper portions of the marsh.
11	Revere St Marsh / John Kilmartin Pathway	Acquired by DCR in 1993, the upland 23-acre site was heavily contaminated with historic fill, consisting predominantly of asphalt, granite and other stone material. In 2012, a 1-acre meadow site was somewhat restored with some of the fill removed and the installation of a stone dust pedestrian path and some park benches. The main access point is the 20-car Short Beach parking lot off Winthrop Avenue. At the southern end of this parcel is a footbridge that connects the property across the salt marsh to the Winthrop Cemetery, and ultimately to the new Belle Isle Marine Ecology Park. This area can also be accessed on foot from a pathway at the end of Bayou Street. This area includes one of the largest wooded parcels in the town of Winthrop, with one of the highest tree canopies. Although it's not vegetated with an ideal tree species assemblage (the property includes a lot of non-natives) it is still an important wildlife habitat. Several of the large aspens near the parking area are starting to die. It's unclear whether this is due to old age, saltwater intrusion, or other factors. Several swallow nest boxes are installed out on the salt marsh near the overlook.

1.2 Site History

Belle Isle Marsh has a long history of ecological function and human uses. Previously part of the wider Chelsea Creek and Boston Harbor tidal and salt marsh estuarine system (Figure 3), the area has been filled and developed to create today's Belle Isle Marsh system. A timeline of the evolution of Belle Isle Marsh is summarized in Table 2. Further detail can be found in Appendix A.

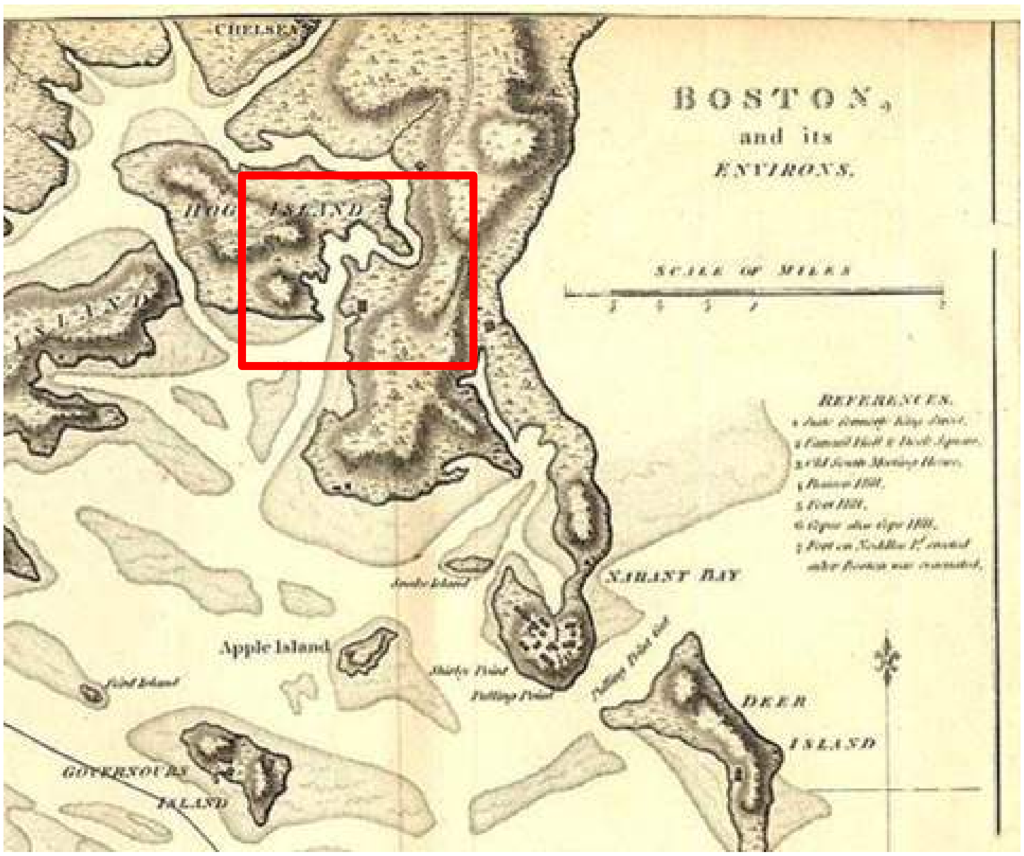


Figure 3. Map of north Boston Harbor pre-development, Belle Isle Marsh is located in the vicinity of the red box.

Table 2. Summary of Belle Isle Marsh history.

Year	Activity
Pre-1600s	Once named Hoggs Island, the area was connected with Rumney Marsh by the Chelsea River, Mill Creek, and Sales Creek. Based on consultation with the Boston City Archaeologist, Joe Bagley, there are currently no recorded historical or archaeological sites within the Belle Isle Marsh site. However, the site likely had a long history of Native American use. Undisturbed portions of the marsh are considered to possess archaeological sensitivity for ancient and/or historical period archaeological resources (see Section 1.3).
1600s-1800s	New England colonization used the site predominately for livestock and agriculture like most saltmarshes during this period.

Year	Activity
1800s-1900s	Sometimes called Breed's Ilse or Belle Isle. Wetlands were filled, a landfill created, and development encroached on the marsh. This continues to be a source of non-point source pollution to the marsh and watershed.
1920s	A refuse dump was created in the marsh to relieve Boston's growing waste problem. The wetlands were systematically filled. Based on cores, fill material was likely earthen material, perhaps from nearby dredging, rather than refuse. The landfill area extends from Belle Isle Marsh across Bennington St, the MBTA Blue Line, and Suffolk Downs Racetrack.
1930s	Mosquito ditching is implemented in a grid pattern to drain water from the entire marsh surface, eliminating salt pannes and small tidal creeks. Mosquitoes continued to breed on the moist marsh surface, but killifish were no longer present to consume mosquito larvae, one of their preferred food sources. As a result, mosquito populations increased. Additionally, a 7,000 ft long earthen berm (referred to as the L-Berm) was constructed separating 52 acres of salt marsh from tidal inundation.
1941	A rock berm was constructed in a square geometry around 7 acres (the Key) to protect a low frequency radio range station from tidal inundation.
1952-1971	East of Bennington Street, the Suffolk Downs Drive-in Theatre is built and open to the public. Once closed, the property is abused as a general dumping ground.
1975	With support from the Friends of Belle Isle Marsh (FBIM), 152 acres of Belle Isle Marsh is acquired by the Metropolitan District Commission (later renamed as DCR) for protection and management as the last remain saltmarsh in Boston.
1980-1986	Belle Isle Marsh Reservation Park was designed, constructed, and opened. Landforms were dredged and graded (spoils were placed over the drive-in site), and infrastructure was installed.
1988	Belle Isle Marsh is designated an ACEC. Water quality monitoring reveals severe pollution. For example, operations at the Bennington Street pump station included major discharge events that significantly affected water quality and caused fish kills.
1978-1989	Surveys identified that illegal filling of wetland still occurring.
1990s-2002	Open Marsh Water Management (OMWM) implemented for mosquito control and to restore lost habitat. This involves the systematic plugging of grid ditches and the re-establishment of salt pannes and small meandering tidal creeks in order to bring killifish back onto the marsh surface. For example, a 5-acres OMWM site adjacent to the path from Summer St to the Key was implemented by the Northeast Massachusetts Mosquito Control and Wetlands Management District in 1993.
mid-2000s	The "Belle Isle Fish Co." site remediation and salt marsh restoration project restored approximately 1.5 acres of salt marsh located off Saratoga Street in Boston bounded by Belle Isle Inlet to the east, the MBTA Orient Heights Maintenance Yard on the west, and the DCR's Belle Isle Reservation to the north and south.
1990s-Present	DCR has diligently worked to protect and acquire abutting parcels from various municipalities and private landowners, both from purchasing land and pursuing land deeded to the Commonwealth for conservation purposes. As of December 2019, DCR owns 233 acres of the 359-acre ACEC. The reservation park is currently managed by Sean Riley of DCR.

1.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Based on consultation with the Boston City Archaeologist, Joe Bagley, there are currently no recorded historical or archaeological sites within the Belle Isle Marsh site. However, very few targeted surveys have been conducted to date, and the entire marsh has yet to be surveyed. Undisturbed portions of the marsh are considered to possess archaeological sensitivity for ancient and/or historical period archaeological resources.

According to the Boston City Archaeologist, the marsh is "sensitive for archaeological resources", meaning that it is likely that there are unrecorded historic and Native archaeological sites present there because of the ecological conditions of the site, which would have been attractive for millennia. Given ongoing sea level rise, this area would have been dry habitable land no less than 3,000 years ago, and evidence of Native habitation, including shell middens, have been found in similar areas throughout the state. For example, a Native site was found in Charlestown during the big dig (Joe Bagley, personal communication, 2020). This site provided evidence of a 3,000-5,000 year old Native habitation near the shoreline of what had been a similar salt marsh area but was subsequently was drowned by rising seas and found intact under a later peat deposit along the shore. Bagley agrees that this site displays characteristics similar to other areas where Native cultural remains have been found, however in a recent low tide site walk (November 2020), Bagley did not observe any evidence of shell middens eroding from the shore or exposed areas where the soil had been disturbed near tree plantings or where animals had been digging.

There may be Native cultural remains or evidence of 18^{th} – 19^{th} century salt marsh hay harvesting activities that have been covered by fills that are both preserving and preventing visibility to potential archaeological/historical deposits. Bagley concluded that within the Belle Isle Marsh Reservation property, the most likely site for Native resources is on the main, larger land mass, with a possibility for similar resources on the smaller one with the lookout tower.

DCR cultural resource staff suggest a more comprehensive cultural resources assessment as project planning proceeds. The cultural resource assessment would include comprehensive background research to develop detailed ancient and historical period contexts, and an archaeological sensitivity assessment specific to the marine and terrestrial portions of BIM, including upland, intertidal, and inundated areas, and the preliminary impact areas. The cultural resource assessment should incorporate previous relevant research contained in multiple other archives and repositories, including but not limited to, DCR's Office of Cultural Resources, the Massachusetts Historical Commission MACRIS Inventory, and multiple Local Historical Commissions and Societies. A synthetic program of marine and terrestrial archaeological field methodologies that consider historical research, geotechnical, and geophysical data to identify submerged paleo-landforms, archaeological sites under deep fill deposits, and within wetlands (e.g. in association with peat deposits), will likely be required to adequately sample and evaluate the complete site for archaeological sensitivity.

Any adaptations planned for the park to increase its coastal resiliency should be reviewed by DCR's archaeologist and Native tribal representatives. Intact archaeological resources and indigenous cultural landscapes within the marsh likely reflect thousands of years of indigenous land use. Early consultation with tribal partners including the Massachusetts Commission on Indian Affairs (MCIA) will help determine how to ensure identification, protection, and preservation of indigenous sites as project planning proceeds.

Furthermore, the reservation includes intertidal and subtidal areas, and historical naval battlefields (e.g. Revolutionary War Period Battle of Chelsea Creek). Additionally, Winthrop Parkway is listed in the National Register of Historic Places (MACRIS inventory number: REV.E) just east of Belle Isle Marsh and separates the marsh from the Atlantic Ocean. The parkway was constructed between 1909 and 1919 and is now part of Route 145 between Elliot Circle and the Revere-Winthrop line.

Potential impacts can be mitigated by archaeological survey in areas of proposed ground disturbance to test if there are surviving archaeological deposits prior to the work beginning. If identified, additional surveys can document and recover the site before the work continues, or plans can be modified to avoid disturbances.

1.4 PRESENT AND FUTURE MANAGEMENT PRACTICES

Belle Isle Marsh Reservation is a popular recreation area where visitors take part in hiking, boating, fishing, and bird watching activities. The upland main park provides open space for passive recreation, including picnic tables, a watch tower, and a series of accessible trails/boardwalks. Other trails are maintained around the reservation in areas such as by the Excel Academy, the John Kilmartin Pathway by Short Beach, and the Belle Isle Marine Ecology Park.

In addition to passive recreation, educational outreach and on-site programing have been a primary goal of DCR at the Belle Isle Marsh Reservation. DCR currently runs approximately 40 free public programs each year inside the reservation with the target of enhancing public awareness of local ecology and wildlife stewardship. To accomplish this, DCR partners with a number of sister organizations, including the Friends of Belle Isle Marsh, MassAudubon, the Trustees of Reservations, The Nature Conservancy, Essex County Greenbelt, Northeast Wetland Restoration, Saugus River Watershed Council, Harborkeepers, MassWildlife, EPA, Brookline Bird Club, Mystic River Watershed Association and the New England Aquarium. With these various partners, DCR has been able to increase public outreach for the reservation by offering joint programming, volunteer field work opportunities, or restoration partnerships.

Management, maintenance, and cleanup of Belle Isle Marsh is generally handled by DCR, regardless of the ownership boundaries within the reservation. Other landowners, municipalities, non-profit organizations and stakeholders include: City of Revere, Town of Winthrop, City of Boston, MA Water Resources Authority (MWRA), MBTA, Massport, Natural Areas Network, Friends of Belle Isle Marsh, MassAudubon, the Trustees of Reservations, The Nature Conservancy, Essex County Greenbelt, Northeast Wetland Restoration, Saugus River Watershed Council, Harborkeepers, MassWildlife, EPA, Brookline Bird Club, Mystic River Watershed Association and the New England Aquarium.

The current management of the salt marsh largely consists of annual saltmarsh sparrow monitoring, with nest monitoring in the spring and summer, bird banding in the fall, and invasive species removal. Mosquito Control treats the salt pannes with *Bacillus thuringiensis* (BT), a bacterial larvicide, however rain decreases the effectiveness of this insecticide. Mosquitoes will likely be an ongoing problem if the region's weather continues to trend towards a wetter warmer climate (Sean Riley, 2020).

Restoration within the marsh has been performed and proposed. The "Radio Tower Dike/OMWM Area" project located on both sides the pathway/dike to the Key was the site of a 5-acre Open Marsh Water Management (OMWM) project completed by the Northeast Massachusetts Mosquito Control and Wetlands Management District in 1993. The Rumney Marsh Salt Marsh Restoration Plan (MA Wetland Restoration Program and MA Department of Environmental Management, 2002) identified a list of potential restoration projects across Rumney Marsh and Belle Isle Marsh, totaling 131 acres. While most of the sixteen projects were proposed within the Rumney Marsh, two projects were identified in Belle Isle Marsh, the first of which was implemented:

- The "Belle Isle Fish Co." project proposed to restore approximately 1.5 acres of salt marsh located off Saratoga Street in Boston bounded by Belle Isle Inlet to the east, the MBTA Orient Heights

Maintenance Yard on the west, and the DCR's Belle Isle Reservation to the north and south. The site contained substantial soil contamination. Boston's Environment Department and Parks Department worked to develop a site remediation and salt marsh restoration plan. The City of Boston led and completed construction in the mid-2000s. The project involved the removal of approximately 7,000 cubic yards of fill, capping of contaminated hot spots, and restoration of salt marsh in the excavated area and creation of coastal bank and grassland habitat on the capped area. The project reconnected large areas of fragmented marsh and helped to improve surface water run-off from the adjacent industrial area. The site is now managed as a natural area for passive recreation.

- The "Sales Creek/Bennington Street" project proposed to restore 6 acres of wetland at the Intersection of Sales Creek and Bennington St. A standard flapper type tide gate prevents tidal flow from going upstream into Sales Creek, although some leakage may occur at Bennington Street and at a culvert under Route 1A which drains to Chelsea Creek. It may be possible to modify the standard flapper type tide gate at Bennington Street to include a Self-Regulating Tide Gate to introduce controlled tidal flow to Sales Creek to help control *Phragmites* and improve its ecology, habitat value, and flushing characteristics. This project has not been implemented.

2.0 EXISTING ENVIRONMENT

This section summarizes the existing environment of Belle Isle Marsh, including topography and bathymetry (topobathy), water levels, tidal circulation, water quality, sediment characterization, wildlife, and wetland habitat. Greater detail of the existing environment can be found within the appendices.

2.1 TOPOBATHY

On November 25, 2020, Woods Hole Group conducted a targeted topographic survey using an RTK GPS to 1) collect detailed elevation information for key site features, and 2) validate and refine the publicly available U.S. Army Corps of Engineers 2018 LiDAR data for the site. On March 11, 2021, Woods Hole Group conducted a bathymetric survey using an echo sounder paired with a survey grade Real Time Kinematic (RTK) GPS interfaced through Hypack software to collect detailed elevation information within the tidal channels. Due to occasional shallow depths and the narrow tidal creeks, the boat-based survey was unable to capture the elevation details within the smaller tidal channels. To supplement, Woods Hole Group Coastal Scientists collected elevation information along targeted channel cross sections on March 31, 2021 to fill data gaps. Bathymetric data was unavailable for the salt pannes, and reasonable estimates to represent these regions based on water surface elevation data from the pressure gauge instrumentation deployment were applied to the DEM.

The combined topobathymetric DEM created from USACE 2018 LiDAR and field surveys is presented in Figure 4. This DEM was utilized in both hydrodynamic modeling (Appendix C) and marsh migration modeling (Appendix D). Belle Isle Marsh channel elevations ranged from 1.5 to -23 ft NAVD88. Elevations in the southern portion of the thalweg are deeper, ranging from -10 to -15 feet NAVD88 north of Saratoga Street, with the deepest soundings around the marina at the southern end of the survey area. The northern portion of the thalweg is shallower, ranging from approximately -8 to -2 feet NAVD88.

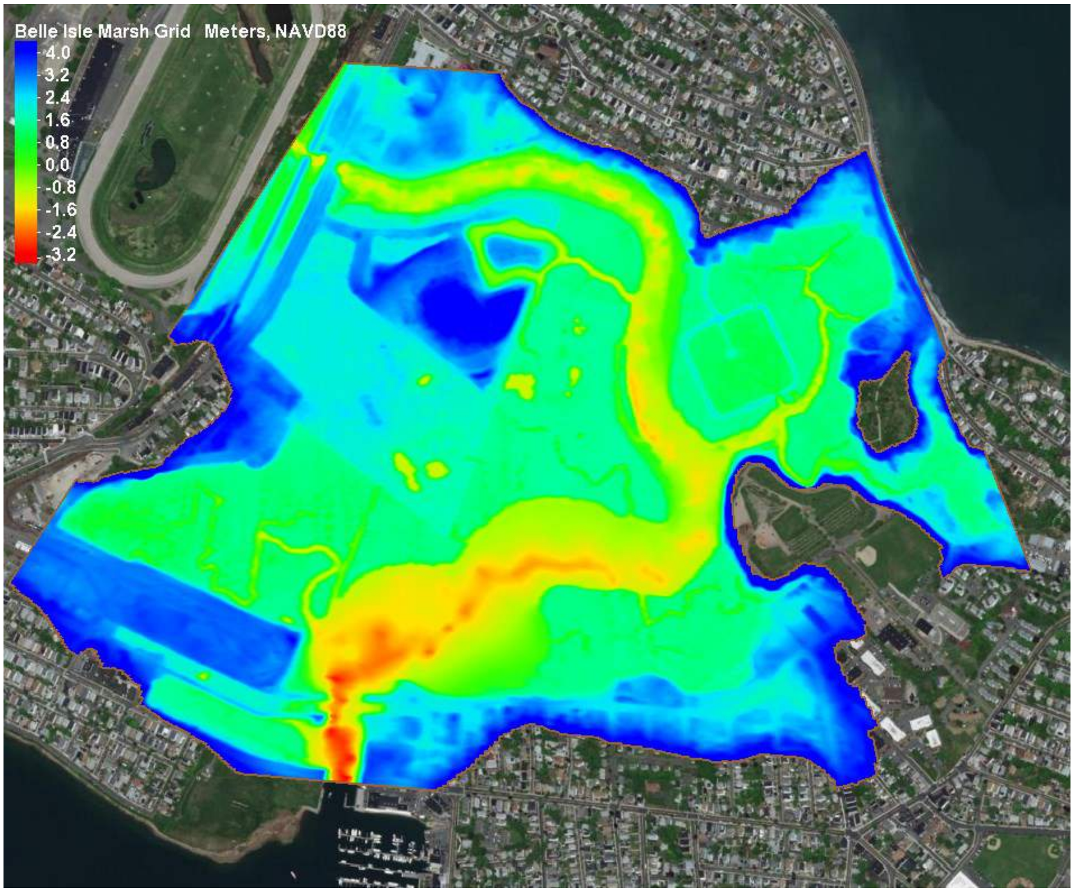


Figure 4. Topography and bathymetry of the Belle Isle Marsh (m NAVD88). Red and yellow represent low elevations typical of channels, green represents higher elevations typical of marshes, and blue represents elevations typical of upland areas.

2.2 WATER LEVELS

Woods Hole Group deployed 7 tide gauges and 5 salinity/temperature gauges (Figure 5) throughout Belle Isle Marsh between the period of November 9 to December 21, 2020 (42 days) to measure site-specific tidal information across a full spring and neap tidal cycle. Water levels and tidal datums from two sites in the main channel representing the Belle Isle Inlet and Sales Creek tide gate are compared against the Boston Harbor tide gauge which has been operating since 1921 (Table 3).Table 4 and Figure 6 present water levels at each of the seven tide gauge stations distributed across the marsh. Key results include:

- The main channel demonstrated efficient propagation of tidal flows from the Belle Isle Inlet (tidal range of 9.7 ft) up to the Sales Creek tide gate (tidal range of 9.4 ft), with only minor tidal attenuation of the low tide and increase of high tide levels, likely representing an influx of freshwater from Sales Creek.
- Water levels throughout the low marsh plain (BI-3, BI-6, B-7) experience attenuation primarily with regard to low tide. This is a consequence of streambed elevations and drainage efficiency. The high tide is able to fully propagate up tidal creeks, unconstrained by channel morphology. However, during the outgoing (ebb) tide, drainage of the low marsh plain through tidal creeks is not efficient. Before drainage from the upper marsh can be completed, the next incoming (flood) tide arrives and begins the cycle over. This has consequences which are discussed in Section 3.0.

- Two areas characterized by artificial berms, the L-Berm and Key, experience the greatest low tide attenuation. These areas were observed to severely limit tidal penetration, generally only becoming inundated by the high tide. The L-Berm serves as a barrier to tides, however, once the tide rises high enough to overtop the berm, the area floods extensively and then drains very slowly through the minor natural breaches which exist. Similarly, the Key does flood at high tide, but the narrow channel at its one breach point leads to slow, poor drainage conditions.
- Precipitation did not appear to have an impact on water surface elevations at any of the stations.

Table 3. Present Day Tidal Datums Boston Harbor (ft NAVD88):

Tidal Datums		Belle Isle Inlet[1]	Sales Creek Tide Gate[2]	Boston Harbor[3]
Annual Probabilistic Water Surface Elevation (WSE)[4]	0.5% WSE	-	-	9.5
	1% WSE	-	-	9.3
	2% WSE	-	-	9.1
	10% WSE	-	-	8.2
Highest Astronomical Tide	HAT	-	-	6.82
Mean Higher High Water	MHHW	5.1	5.2	4.98
Mean High Water	MHW	4.6	4.7	4.54
Mean Tide Level	MTL	-0.3	0.0	0.17
North American Vertical Datum 1988	NAVD88	0.0	0.0	0.0
Mean Low Water	MLW	-5.1	-4.7	-4.95
Mean Lower Low Water	MLLW	-5.4	-4.9	-5.3
Tide Range from MLW to MHW	Tide Range	9.7	9.4	9.49

[1]Tidal datums represent observations from BI-1 (downstream of Saratoga St bridge) from Nov-9 to Dec-21, 2020.
[2]Tidal datums represent observations from BI-4 (downstream of Sales Creek tide gate) from Nov-9 to Dec-21, 2020.
[3]Tidal datums represent observations from Boston Harbor Tide Gauge (NOAA Station 8443970) centered on 2008.
[4]Probabilistic WSE's were derived from the MC-FRM at a location between Belle Isle Inlet and Logan Airport (Bosma et al., 2021).

Table 4. Tidal datums at all water level monitoring stations (ft NAVD88).

Datum	BI-1	BI-2*	BI-3	BI-4	BI-5	BI-6	BI-7
	Belle Isle Inlet	The Key	John Kilmartin Pedestrian Bridge	Sales Creek Tide Gate	L-Berm	Rosie's Pond Tidal Creek	Short Beach Tidal Creek
MHHW	5.1	5.7	5.1	5.2	5.6	5.2	5.2
MHW	4.6	5.2	4.6	4.7	5.6	4.6	4.6
MTL	-0.3	3.9	3.3	0.0	5.6	1.7	0.9
MLW	-5.1	2.6	2.1	-4.7	5.5	-1.2	-2.8
MLLW	-5.4	2.6	2.1	-4.9	5.5	-1.2	-2.8
Tide Range	9.7	2.6	2.5	9.4	0.1	5.8	7.4

**BI2 did not record a full spring neap tidal cycle; datums are approximate.*

Figure 5. Tide gauge locations for seven deployed tide gauges in Belle Isle Marsh from Nov 9 – Dec 21, 2020. Salinity and temperature gauges were installed at stations BI1, BI2, BI3, BI4, and BI5.

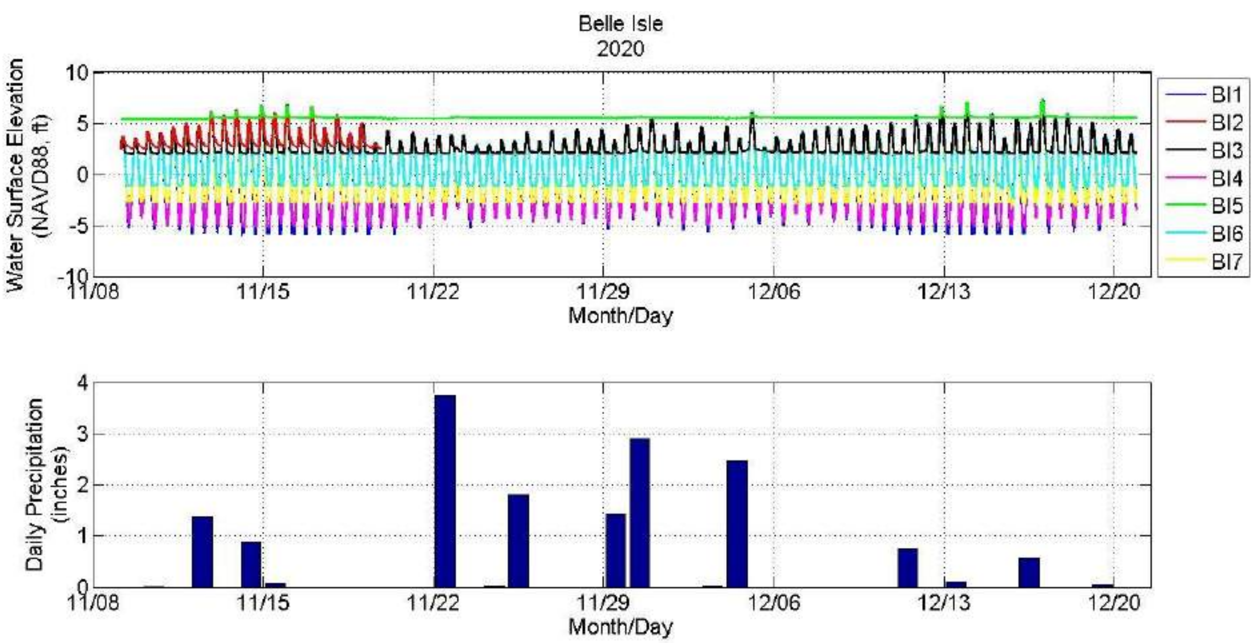


Figure 6. Time-series of water surface elevations (NAVD88, ft) at all 7 tide gauge stations (top) and the daily precipitation (inches) recorded at Logan International Airport (bottom).

2.3 TIDAL CIRCULATION

The Environmental Fluid Dynamics Code (EFDC) model was utilized to assess existing and future hydrodynamic conditions within Belle Isle Marsh (see Appendix C). The primary forcing of tidal circulation in Belle Isle Marsh is Belle Isle Inlet, through which tidal flows from Boston Harbor flow into and out of the main channel. The downstream inlet is fixed in position by the Saratoga Street Bridge, while the upstream boundary ends at the Sales Creek tide gate beneath Bennington Street (a total distance of 1.4 miles). The marsh is relatively saline during high tides, indicating that ocean-sourced water propagates efficiently throughout the system at high tide. The two major tributaries of Belle Isle Inlet are Sales Creek to the west and Short Beach Creek to the east. Sales Creek flows into Belle Isle Inlet from the west side of Bennington Street. Sales Creek formerly connected with the Chelsea River, but the upper portion of this system is now partially buried and channelized.

Salinity in Belle Isle Marsh is highly variable, and ranges from 31.5 PSU at the inlet opening to Boston Harbor, to at times 3 PSU at the Sales Creek tide gate. Freshwater is introduced into the system through groundwater flow, surface runoff, and the tide gate at Sales Creek connecting the saltmarsh to the Suffolk Downs region, and upper Sales Creek. The tide gate releases fresh water once per tidal cycle, freshening the system on the ebb tide. Freshwater flows directly into the main channel and quickly spreads to adjacent low-lying areas, corresponding with a high density of *Phragmites* in such areas. During precipitation events, the whole marsh experiences a freshwater flux that is the most evident on the low marsh platforms. This effect is visible during precipitation events in all out-years. A low salinity signature is quickly mixed and dissipated by the following high tide.

Tidal velocities within the marsh were found to be highest within the main channel where the channel morphology is constrained by existing or remnant structures including the Saratoga Street Bridge and an area adjacent to the Winthrop boat yard and MBTA Orient Heights railyard which contains deteriorated piles and abutments which used to support a historic rail line. Maximum velocities during spring flood and ebb tides range between 3-4 ft/s in these areas (Figure 7 and Figure 8, respectively). Ebb tidal flows typically exceed flood tidal flows (ebb-dominated estuary). Within Belle Isle Marsh, the main channel was found to have tidal velocities near 1-2 ft/s. Furthermore, the tidal creeks and bermed areas of Belle Isle Marsh experience low velocity tidal flows less than 1 ft/s. Low tide attenuation indicative of poor drainage is observed throughout tidal creeks, the low marsh plain, and the bermed areas of the L-Berm and the Key. Rosie's Pond, the L-Berm, and the Key retain water at most times, even while tides within the main channel recede. The L-berm and the Key experience partial hydraulic disconnection between the main saltmarsh and the regions behind the berms. Existing breaches in the berms provide hydraulic connection during high and spring tides, which leads to the formation of salt pannes that are affected by spring high tides only and maintain a relatively stable water level.

The spring high tide extent was modeled and is depicted in Figure 9. A spring high tide under present day sea levels is anticipated to inundate all existing marsh habitat, and most areas currently inhabited by phragmites and considered to be transitional habitat, including inland of the L-Berm.

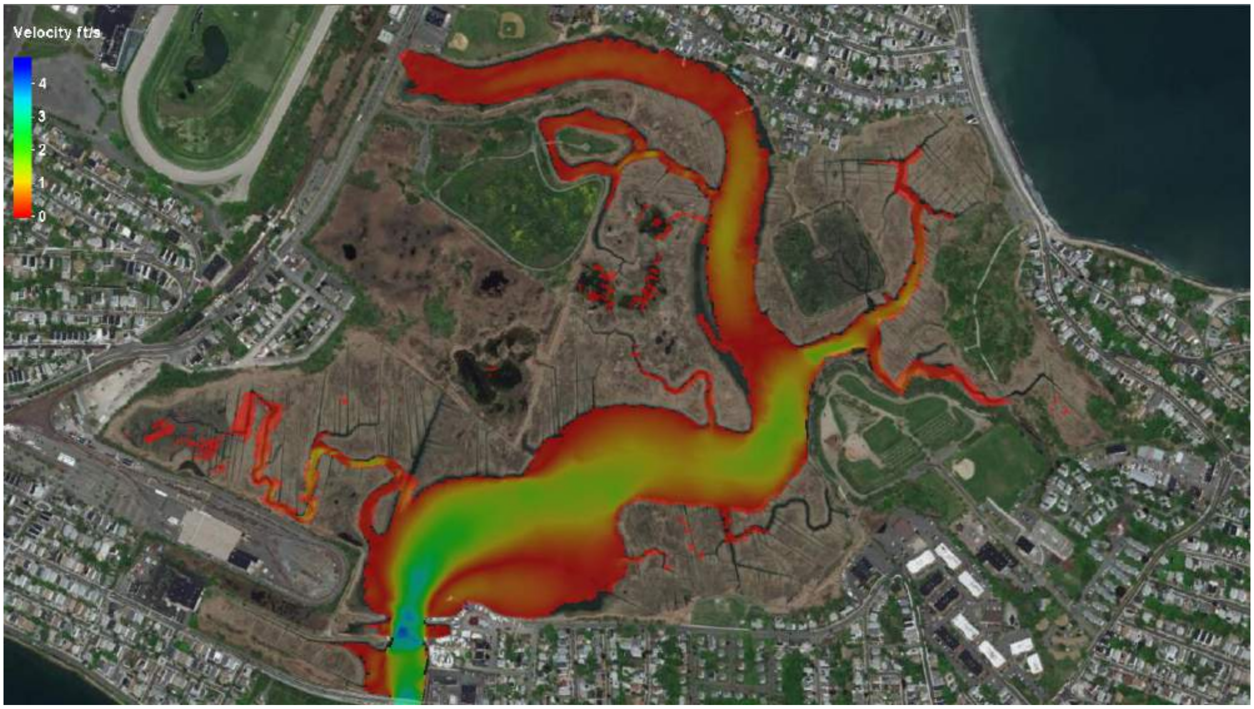


Figure 7. **Existing Modeled Velocities, Typical Spring Tide Flood. Velocities are reported in feet/second, with high velocities indicated in blue.**

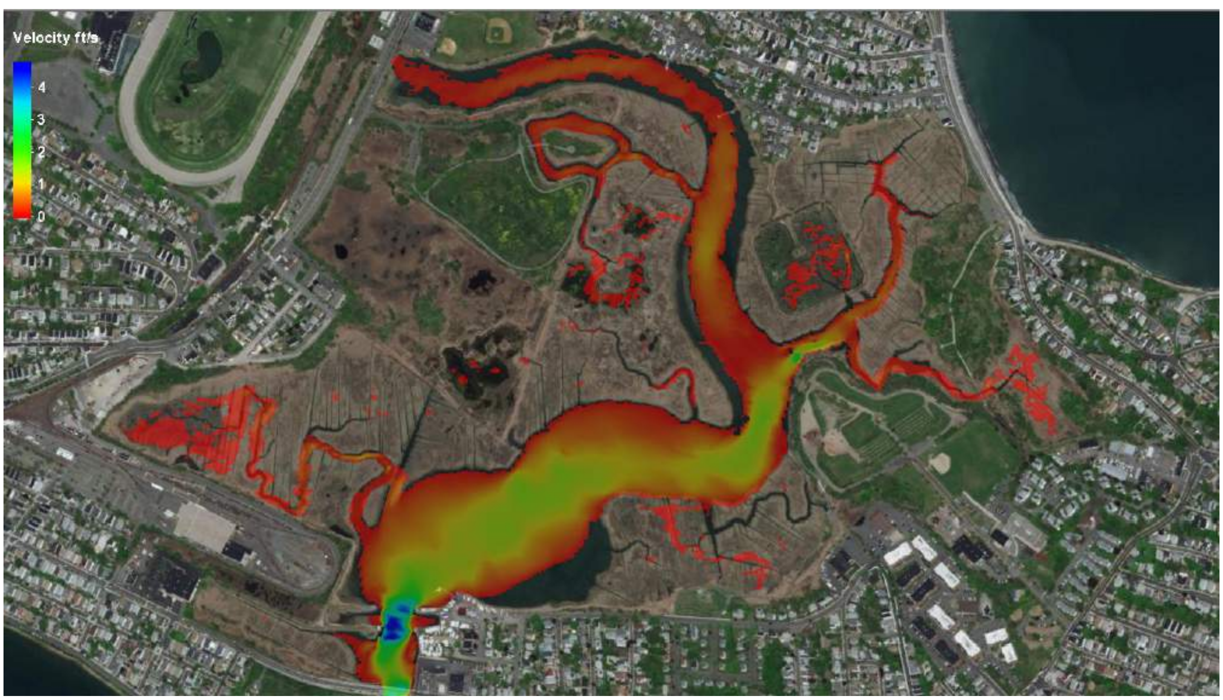


Figure 8. **Existing Velocities, typical Spring Tide Ebb. Velocities are reported in feet/second, with high velocities indicated in blue.**

Figure 9. Present day spring high tide flooding maximum extent at Belle Isle Marsh.

2.4 WATER QUALITY

Water quality monitoring has been performed periodically within the marsh. A past report (Colarusso, 1988) concluded that there were many water quality problems in Belle Isle Marsh (see Section 0). Additionally, MyRWA has performed water quality monitoring throughout Belle Isle Marsh since 2004 (see Section 2.4.2).

The U.S. Environmental Protection Agency (EPA) in collaboration with MyRWA issues a water quality report card for the Mystic River Watershed, including Belle Isle Marsh, each year. In 2021, Belle Isle Inlet received a grade of B- (~70% compliance), down from a B (~78% compliance) in 2020 and B+ (~84% compliance) in 2019 (https://mysticriver.org/epa-grade). The grade is based on how frequently waterbodies meet bacteria standards for swimming and boating. The grades are calculated using a three-year rolling average, allowing for a more complete and accurate assessment of recent water quality that addresses weather variability from year to year.

Furthermore, MassDEP classifies Belle Isle Inlet as SA waters, defined as:

> *These waters are designated as an excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. In certain waters, excellent habitat for fish, other aquatic life and wildlife may include, but is not limited to, seagrass. Where designated for shellfishing in 314 CMR 4.06(6)(b), these waters shall be suitable for shellfish harvesting without depuration (Approved and Conditionally Approved Shellfish Areas). These waters shall have excellent aesthetic value. (*Source: Code of Massachusetts Regulations, CMR 314. https://www.mass.gov/doc/314-cmr-400/download)

Water Quality Criteria for SA waters include:

- Dissolved Oxygen (DO) greater than or equal to (>=) 6.0 mg/L
- Temperature less than or equal to (<=) 85 F, a maximum daily mean of less than 80 F, and a maximum Temperature change (Δ) due to a discharge <= 1.5 F
- pH between 6.5 - 8.5 Standard Units (SU) and less than Δ0.2 SU outside the natural background range
- Enterococci Bacteria threshold is a geometric mean <= 35 colonies/mL
- Chlorophyll recommended threshold level of 5 ug/L (unofficial, but noted in DEP documents)

Despite the SA classification, MassDEP further describes the Belle Isle Inlet as Impaired. In other words, it does not meet MassDEP water quality criteria. MassDEP notes impairments including:

- Fecal Coliform bacteria,
- PCBs in fish tissue, and
- "Cause Unknown – contaminants in fish/shellfish."

2.4.1 Belle Isle Marsh Reservation Water Quality Monitoring Program, 1988

In 1988, Philip Colarusso prepared a Belle Isle Marsh Reservation Water Quality Monitoring Program report. A summary of water quality conditions is provided below for key parameters:

- Water clarity: In general, water clarity decreases as water comes in from the harbor and disperses throughout the marsh. After operation of the pumping station, water clarity was reduced to zero and remained in this condition at most sites in the marsh for several days after.

- Dissolved oxygen: DO concentrations varied greatly throughout the site, with concentrations decreasing as you move upstream. The lowest DO concentrations were near the Bennington Street pump station. After wet weather, dissolved oxygen concentrations decreased throughout the marsh due to the influx of organic matter (e.g., pet waste). Low dissolved oxygen concentrations are probably responsible for the fish kills experienced within Belle Isle Marsh.

- Fish Kills: During the summer of 1988, there were three incidences of extensive fish kills. The first occurred in the isolated pools of water out in the lower marsh during a hot, dry period of weather. These isolated pockets of water heat up and the degradation of organic matter in the pools results in dangerously low dissolved oxygen levels. An occurrence like this is natural during hot, dry summer conditions. The other two fish kills were higher causes for concern. Both resulted after the operation of the pumping station and significant discharge into the marsh, which had a high organic matter content.

- Coliform Bacteria: High levels of coliform were found at the Bennington Street sample site at all times. Concentrations were found to be higher after wet weather, so much so that they were too high to count, even with a dilution factor of 100. Sales Creek was determined to be the major source of coliform, with the storm drain that empties into this area also contributing varying amounts. Based on further analysis, it was determined that the majority of the problem already exists in Sales Creek before it enters Suffolk Downs (i.e., the source of the high coliform from upstream of Suffolk Downs). Most other sample sites throughout Belle Isle Marsh had coliform levels that fell within the normal range. It appears that Boston Harbor did not significantly contribute to the coliform counts within Belle Isle Marsh.

- Oil: The storm drain that empties into the Bennington Street site has a continuous oil slick associated with it, cause by street runoff. Oil also emanates from the creosote piling on the Island Bridge. Oil and gas also originate from boat use in the estuary.

2.4.2 Belle Isle Marsh Reservation Water Quality Monitoring Program, 2004-2019

The following figures (Figure 11 through Figure 19) represent water quality data obtained by MyRWA within Belle Isle Marsh from 2004 to 2019. Water quality monitoring locations vary in space, time, and frequency. All monitoring stations are depicted in Figure 10. The complete data set from which water quality figures were prepared is included as Appendix E to this assessment.

MyRWA's sampling and testing effort evaluates parameters including: Temperature, Salinity, Total Suspended Solids, Dissolved Oxygen (DO), NO23 (Nitrite-Nitrate), NH_3 (Ammonia), Total Phosphorous, and ENT (Enterococcus), the results of which are depicted in the below figures. Other water quality parameters were measured infrequently and are not presented here, including: Salinity, Chlorine, ECOLI, FCOLI, SPCOND, and Surf_Anionic. Key takeaways include:

- DO regularly triggers MassDEP thresholds for SA classified waters. About 25% of the DO data are below the threshold value of 6 mg/L.
- About 63% of the Enterococcus data exceed the bacteria threshold value for waters with shellfish (28 mpn/100 mL).

Figure 10. MyRWA Water Quality Monitoring Stations in Belle Isle Marsh.

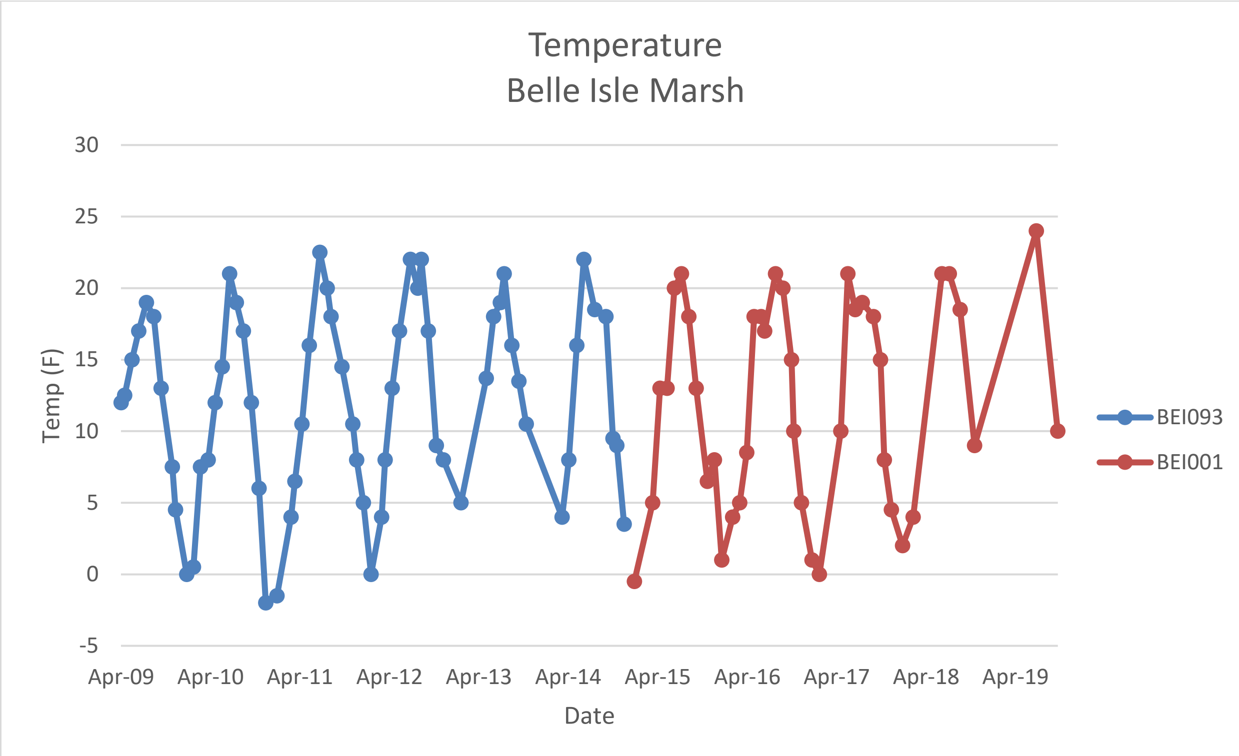


Figure 11. Temperature measurements in Belle Isle Marsh.

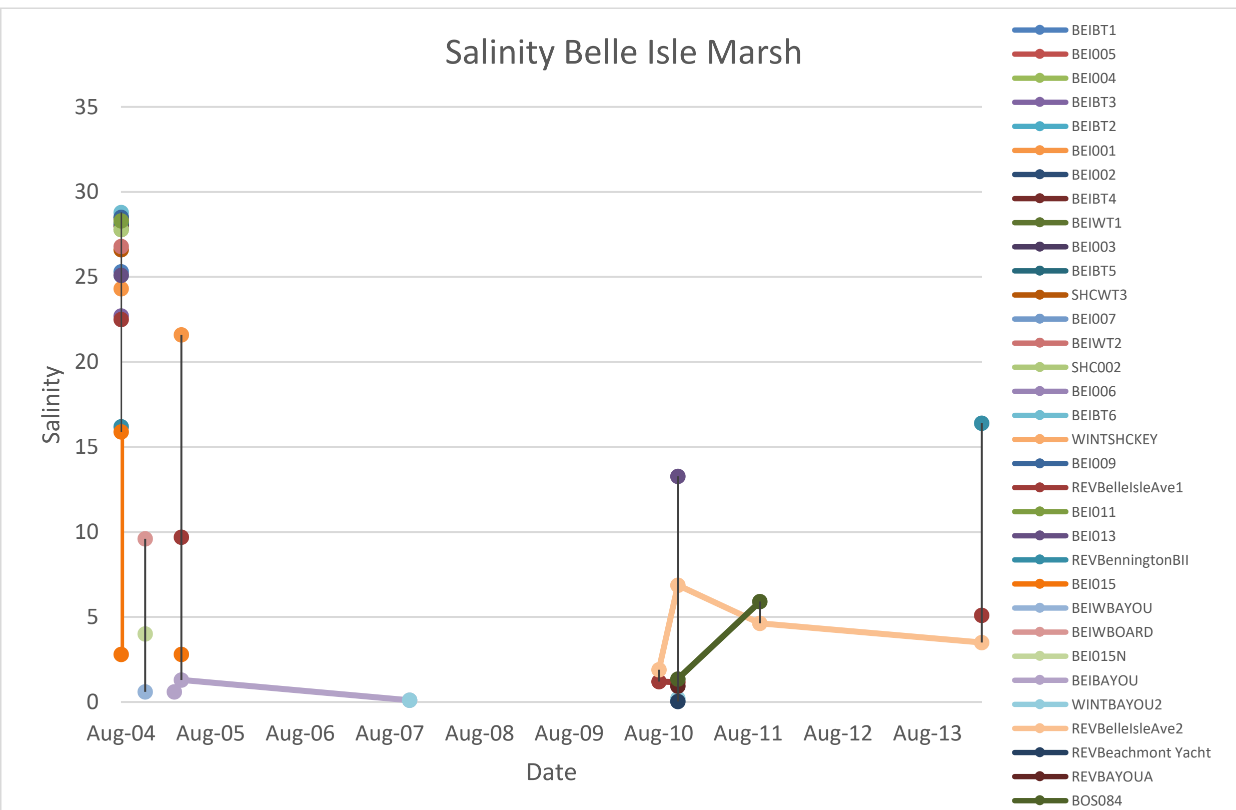


Figure 12. Salinity measurements in Belle Isle Marsh.

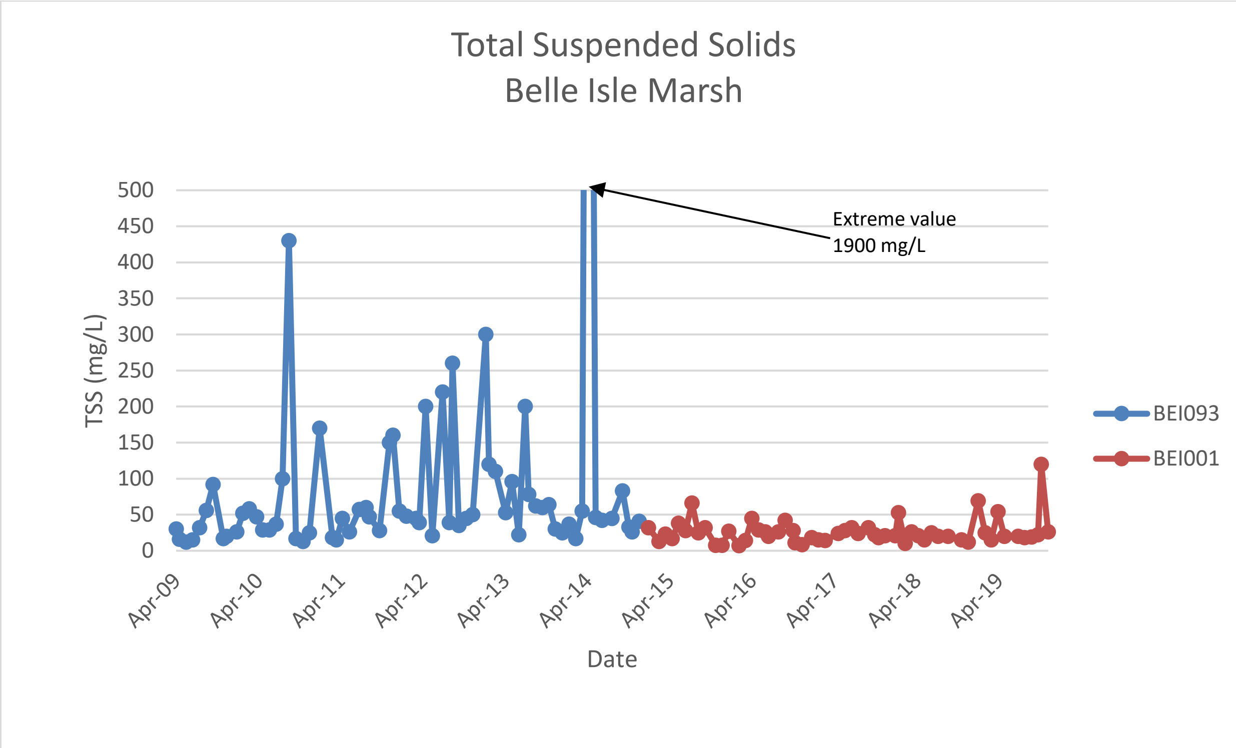


Figure 13. Total Suspended Solids measurements in Belle Isle Marsh.

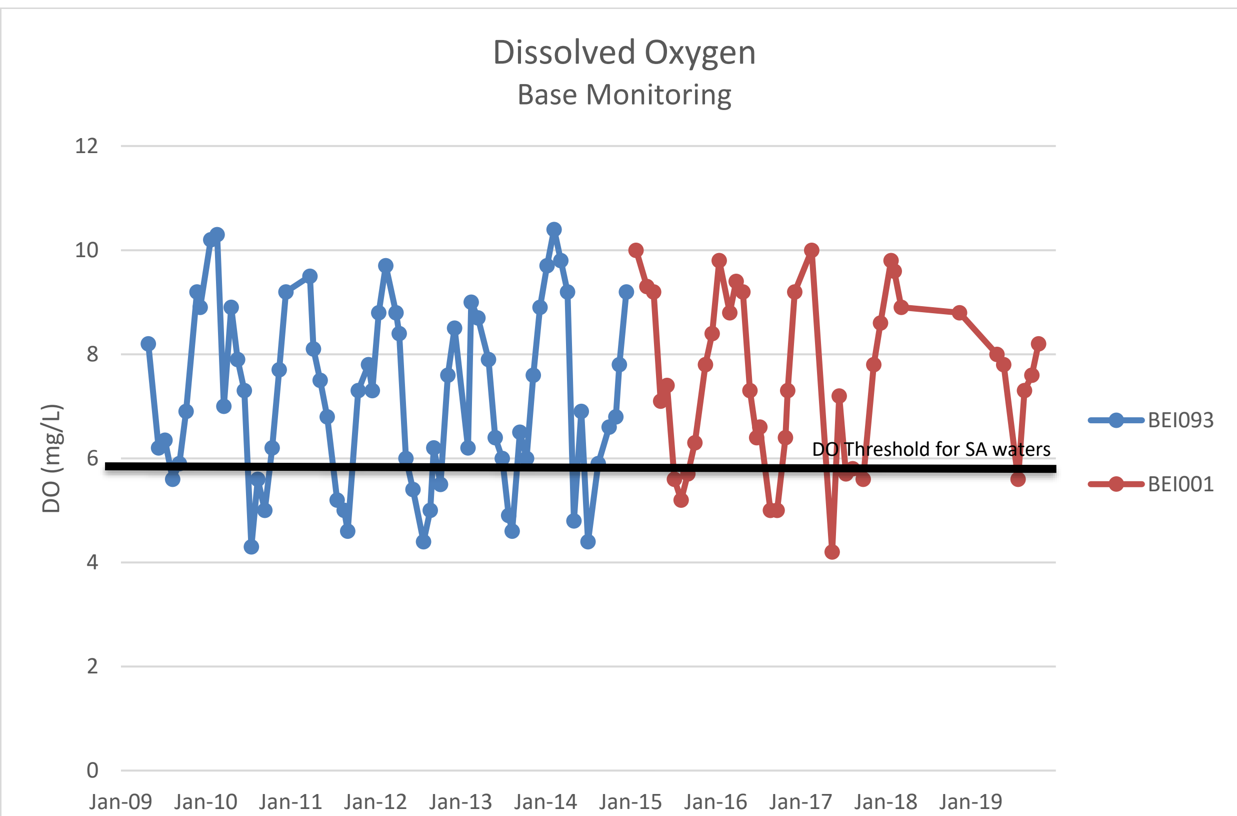


Figure 14. Dissolved Oxygen (Base Monitoring) measurements in Belle Isle Marsh.

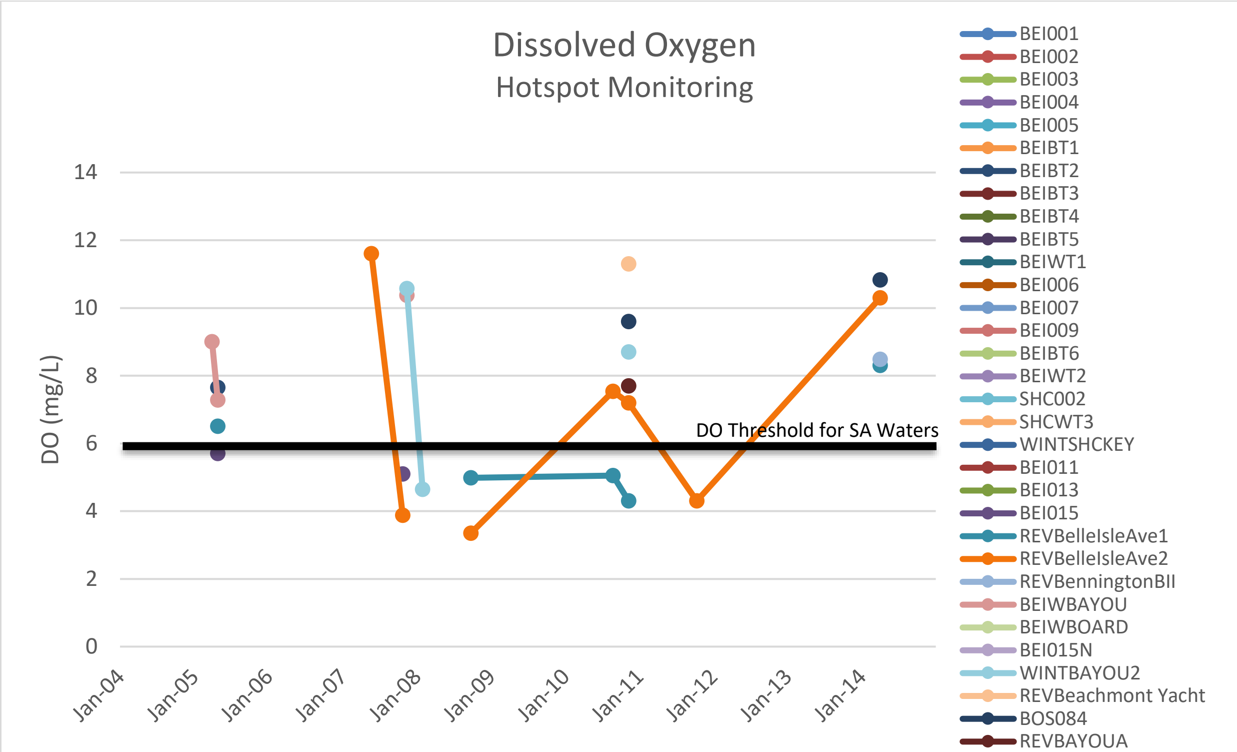


Figure 15. Dissolved Oxygen (Hotspot Monitoring) measurements in Belle Isle Marsh.

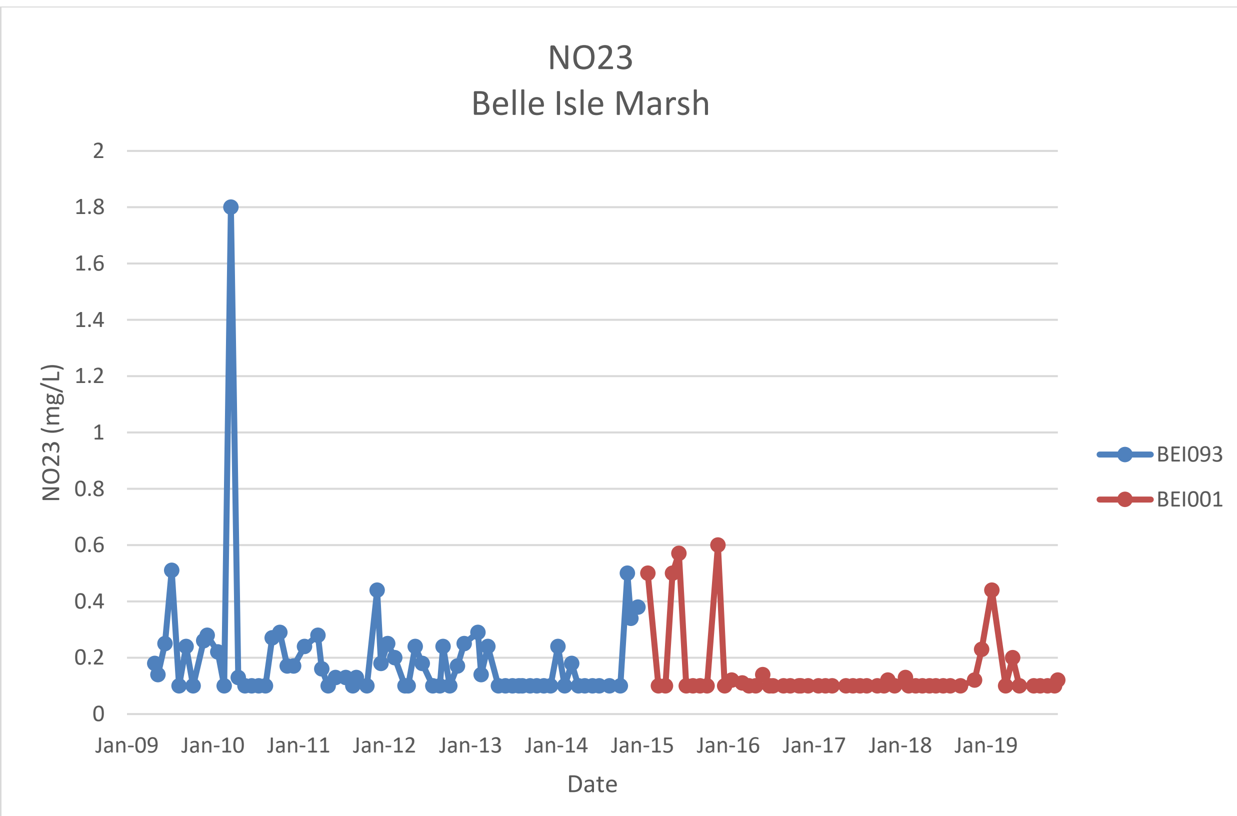


Figure 16. NO23 (Nitrite-Nitrate) measurements in Belle Isle Marsh.

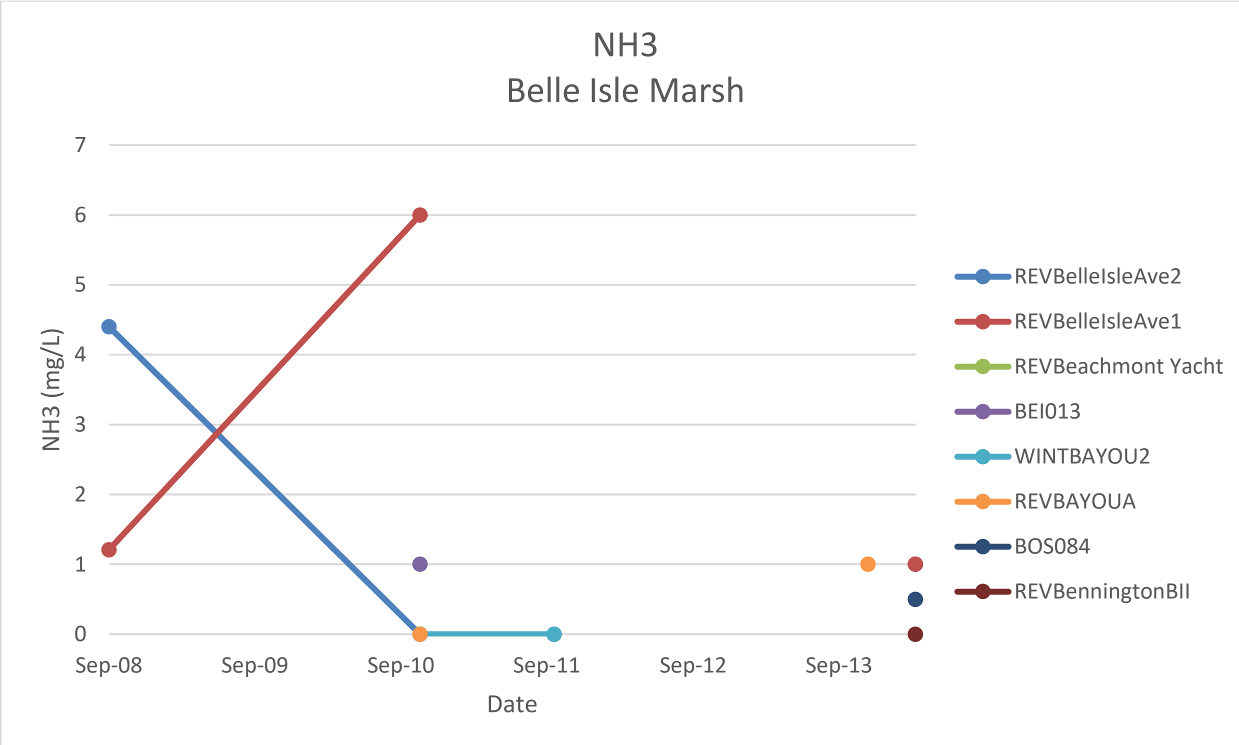


Figure 17. NH_3 (Ammonia) measurements in Belle Isle Marsh.

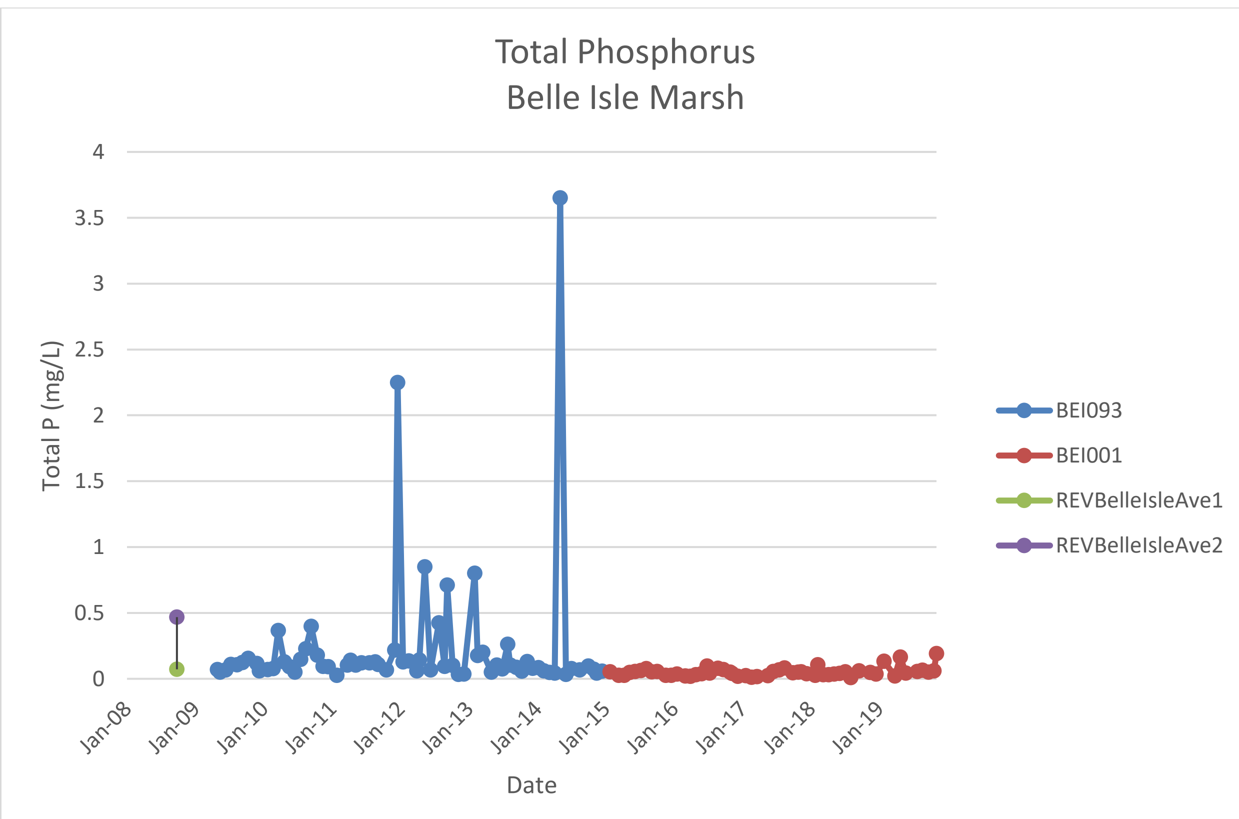


Figure 18. Total Phosphorous measurements in Belle Isle Marsh.

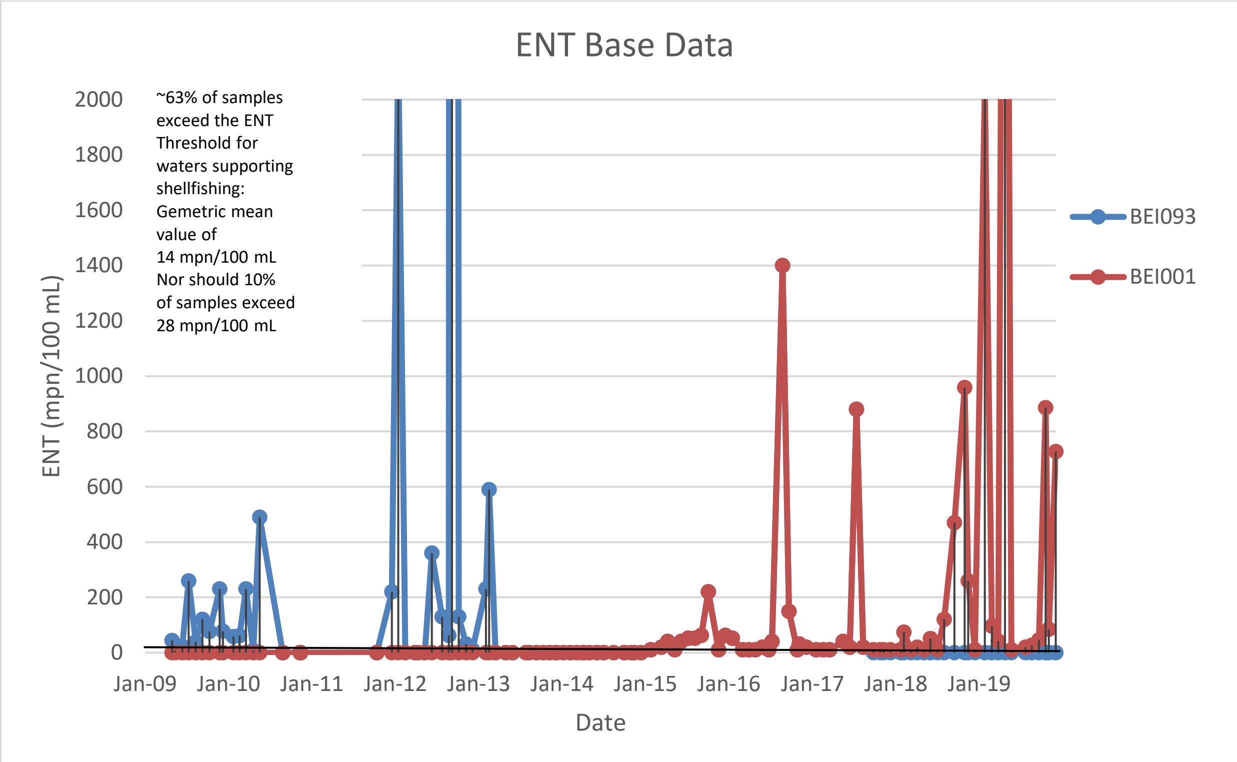


Figure 19. ENT (Enterococcus) Base Data measurements in Belle Isle Marsh.

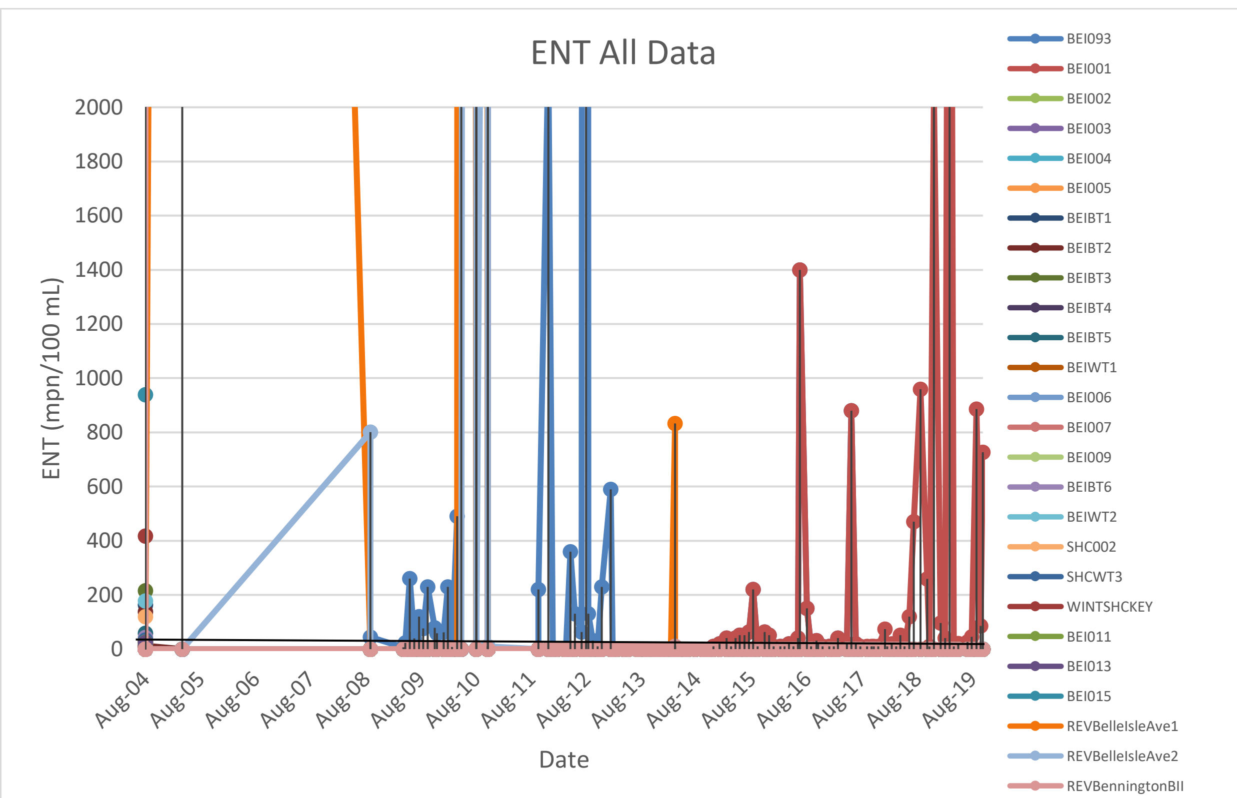


Figure 20. ENT (Enterococcus) All Data measurements in Belle Isle Marsh.

2.5 SEDIMENT CHARACTERIZATION

On October 28, 2020, Woods Hole Group collected 7 sediment samples throughout Belle Isle Marsh (Figure 21) to characterize the existing conditions within the tidal channels. The marsh platform and higher elevation areas were not sampled. Samples were tested for grain size. The results are summarized in Table 3 and detailed in Appendix B. Results generally reveal a marsh system with little cobble or gravel material, and sand material only contained within higher velocity zones of the main channel at Belle Isle Inlet (SED-1 and SED-2). Upper reaches of the main channel and within tidal creeks contained softer, finer grained sediments containing predominantly silts and clays (SED-3 through SED-7). Locations SED-5 and SED-6 contained a higher concentration of tight organic matter.

Figure 21. Sediment sampling locations, October 28, 2020.

Table 3. Summary of sediment sample grain size analysis.

Sample ID	Cobble	Gravel	Sand	Silt/Clay	Median Grain Size (d50)
SED-1	0%	16%	51.7%	32.3%	0.1242 mm
SED-2	0%	2.9%	63.2%	33.9%	0.1810 mm
SED-3	0%	0.1%	2.7%	97.2%	0.0125 mm
SED-4	0%	0.7%	1.1%	98.2%	0.0044 mm
SED-5	0%	0%	5.6%	94.4%	0.0057 mm
SED-6	0%	0%	11.2%	88.8%	0.0082 mm
SED-7	0%	1.7%	17.9%	80.4%	0.0063 mm

2.6 WILDLIFE

Wildlife within Belle Isle Marsh is summarized here. Greater detail can be found within Appendix A, as well as Sean Riley (2020) and MA WRP and MA DEM (2002).

Fish and Marine Invertebrates

Typical of an estuarine system, Belle Isle Marsh contains critical resource areas for both resident and transient fish species. Year-round resident fish species in the salt pannes and creeks of Belle Isle Marsh include mummichogs (*Fundulus heteroclitus*), killifish (*Fundulus spp*.), three-spined sticklebacks (*Gasterosteus aculeatus*), and four-spined sticklebacks (*Apeltes quadracus*). Additional fish include American eel, winter flounder, and striped bass which pass through seasonally. These species play a crucial role in the salt marsh food web. As prey species for larger fish and birds and consumers of detritus, vegetation, and smaller fish, they represent an important link in the maintenance of trophic structure relationships. Soft-shell clam (*Mya arenaria*) and blue mussel (*Mytilus edulis*) are the most common shellfish found within Rumney Marsh and Belle Isle Marsh (MA WRP and MA DEM, 2002). Additionally, ribbed mussels, salt marsh snails, chink snails, horseshore crab, green crab, hermit crab, filler crab, glass shrimp, amphipods, isopods, periwinkles, and mud dog whelks have been observed (Riley, 2020). The main channels and tidal creeks/ditches contain oligochaetes and the polychaete, *Streblospio benedictii*, to be the dominant taxa, accounting for 89-93% of all individuals found in those locations. The dominance of these two taxa is characteristic of the intertidal fauna in Boston Harbor. Samples from the salt pannes found a reduced number of organisms (MA WRP and MA DEM, 2002). The 1988 water quality monitoring effort noted that aquatic species diversity in the marsh is extremely low; there are several species that should be abundant in the salt marsh, but do not exist in the marsh.

Insects

Little to no official studies or surveys of the reservation's insect populations have been completed to date. Commonly viewed species within the reservation include: Green Darners, Calico Pennant, Seaside Dragonlet, Monarch Butterfly, Tiger Swallowtail, Black Swallowtail, Cabbage White, Orange Sulphur, Painted Lady, Northern Crescent, Bumble Bees, European Honey Bee, Carpenter Bees, Sweet Bees, Yellow Jackets, various Wasp species, Praying Mantis, Milkweed Beatles, Saltmarsh Mosquito, numerous ant species, Ladybugs and many more. The Belle Isle Meadow is very important to local bee and butterfly populations as it is the only large foraging habitat in the surrounding towns and cities. During peak bloom of the meadow, hundreds of thousands of bees and butterflies can be observed. In recent years, Saltmarsh Mosquitos have seemed to have total proliferation in the reservation. From June through mid-October, staff typically have to work in full mosquito suits to be able to perform their daily tasks. Patrons are not able to walk in the reservation somedays as the mosquitos are so voracious.

Birds

Records for birds at Belle Isle Marsh date back to 1975, as it has long been a heavily birded site by naturalists with 258 total species being viewed in the Reservation. In 2019, species observed to breed in the marsh include: least bittern, Virginia rail, saltmarsh sparrow, savannah sparrow, osprey, willet, bobolink, brown thrasher, American kestrel, American woodcock, killdeer, chipping sparrow, black-capped chickadee, common yellow-throat, yellow warbler, Baltimore oriole, warbling vireo, American robin, red-winged blackbird, European starling, American black duck, mallard, belted-kingfisher, song sparrow, spotted sandpiper, northern flicker, tree swallow, barn swallow, northern rough-winged swallow, willow flycatcher, American goldfinch, mourning dove, downy woodpecker, cedar waxwing, eastern kingbird, northern cardinal, common grackle, and house sparrow. Additional breeding birds in the Rumney Marsh ACEC are glossy ibis, great egret, meadowlark, greater and lesser yellowleg, sharp-tailed sparrow, common tern, killdeer, and red-tailed hawk. A partial listing of migrants and winter visitors includes least bittern, short-eared owl, snowy owl, blue-wing teal, hudsonian godwit, osprey, bufflehead, northern harrier, peregrine falcon, common loon, black-bellied and semi-palmated plover, common eider, greater and lesser scaup, and red breasted and hooded merganser. Based on conservation status, the most vulnerable species that use and or breed at BIM are listed in Table 5. A complete collection of historic bird data in Belle Isle Marsh can be found on E-bird: https://ebird.org/hotspot/L207348.

Table 5. Vulnerable bird species which inhabit Belle Isle Marsh

Species	MA Natural Heritage Endangered Species Program (NHESP) Designation
Least Bittern	Breeding, Endangered
Virginia Rail	Breeding, Conservation interest
Saltmarsh Sparrow	Breeding, Special Concern
Bobolink	Breeding, Conservation interest
Brown Thrasher	Breeding, Conservation Interest
Willet	Breeding, Conservation Interest
Savannah Sparrow	Breeding, Conservation Interest
American Kestrel	Breeding, Conservation Interest
King Rail	Nonbreeding, Endangered
Short-eared Owl	Endangered, over wintering
Northern Harrier	Threatened, over wintering
Least Tern	Special Concern, local breeder, daily use
Common Tern	Special Concern, local breeder, daily use
American Oystercatcher	Conservation interest, local breeder, daily use
Great Egret	Conservation interest, local breeder, daily use
Snowy Egret	Conservation interest, local breeder, daily use

Importantly, the saltmarsh sparrow is known to nest within Belle Isle Marsh, exclusively within high marsh habitat, and predominantly high marsh located behind the L-Berm (Figure 22). Saltmarsh sparrow is the only species of breeding bird endemic to the saltmarshes of the Northeast. Birds arrive in early to mid-May and begin nesting by late May to early June. Saltmarsh sparrow is particularly threatened, as predation pressure and habitat loss have decreased the population by 87% since 1998. Sea level rise is anticipated to further reduce reproductive success and exacerbate population decline, as high marsh habitat is squeezed out between the ocean and development (MA Division of Fisheries & Wildlife, 2020).

Figure 22. Left – Saltmarsh sparrow (Riley, 2020). Right – Saltmarsh sparrow typical nesting habitat, occupying high marsh habitat, inland of the L-Berm and salt pannes.

Mammals and Reptiles

Mammal species known to inhabit Belle Isle Marsh include, but are not limited to, raccoon, muskrat, meadow vole, striped skunk, Virginia opossum and harbor seal (MA WRP and MA DEM, 2002). Since 2002, the Belle Isle Marsh Reservation Park Supervisor has noted that mink, gray squirrel, eastern cottontail, eastern mole, white-footed mouse, brown rat, meadow vole, house mouse, meadow jumping mouse, long-tailed weasel, fisher, and eastern coyote are also present at the site. White-tailed deer, red squirrel, and eight bat species have been noted, but are infrequent. Red fox have been extirpated from the park for about a decade.

Reptiles and amphibians, including garter snake, little brown snake, smooth green snake (infrequent), and American toad are limited in the marshes because of the small amount of available habitat and are found mostly on the fringes of the reservation in the uplands or in freshwater areas.

2.7 WETLAND HABITAT

2.7.1 Habitat Distribution

Habitat distribution within Belle Isle Marsh was mapped through a combination of aerial photo interpretation, a review of the most recent MassDEP wetland layer, and a survey by Woods Hole Group (October 12, 2020) to ground truth remotely generated wetland cover type. The outer edge of the salt marsh was refined in many cases to capture more site-specific details and to account for erosion of the marsh platform that has occurred. Wetland and habitat categories were also refined to provide more detailed information about the vegetative communities present within the Belle Isle Marsh site. Habitats within Belle Isle Marsh include primarily open water (subtidal channels and salt pannes), mudflat, low marsh, high marsh, transitional marsh (primarily *Phragmites*), some beach/rocky shoreline, and upland areas such as the main park. A final wetland cover type map was developed across the marsh (Figure 23). Habitat acreages are quantified in Table 6.

Table 6. Wetland cover type and acreages.

Wetland Cover Type	Habitat Type	Acreage
Forest	Upland	2.9 acres
Rocky/Structure		0.4 acres
Shrubs	Transitional Marsh	0.7 acres
Phragmites		34.0 acres
Open Water Panne	Salt Panne	5.5 acres
High Salt Marsh	High Marsh	17.4 acres
Low Salt Marsh	Low Marsh	121.4 acres
Beach	Mudflat	1.6 acres
Mudflat		65.8 acres
Open Water Channel	Subtidal	16.7 acres
Total		**266.4 acres***

**Note that the Belle Isle Marsh ACEC boundary extends beyond mapped wetland cover types, and totals 359 acres.*

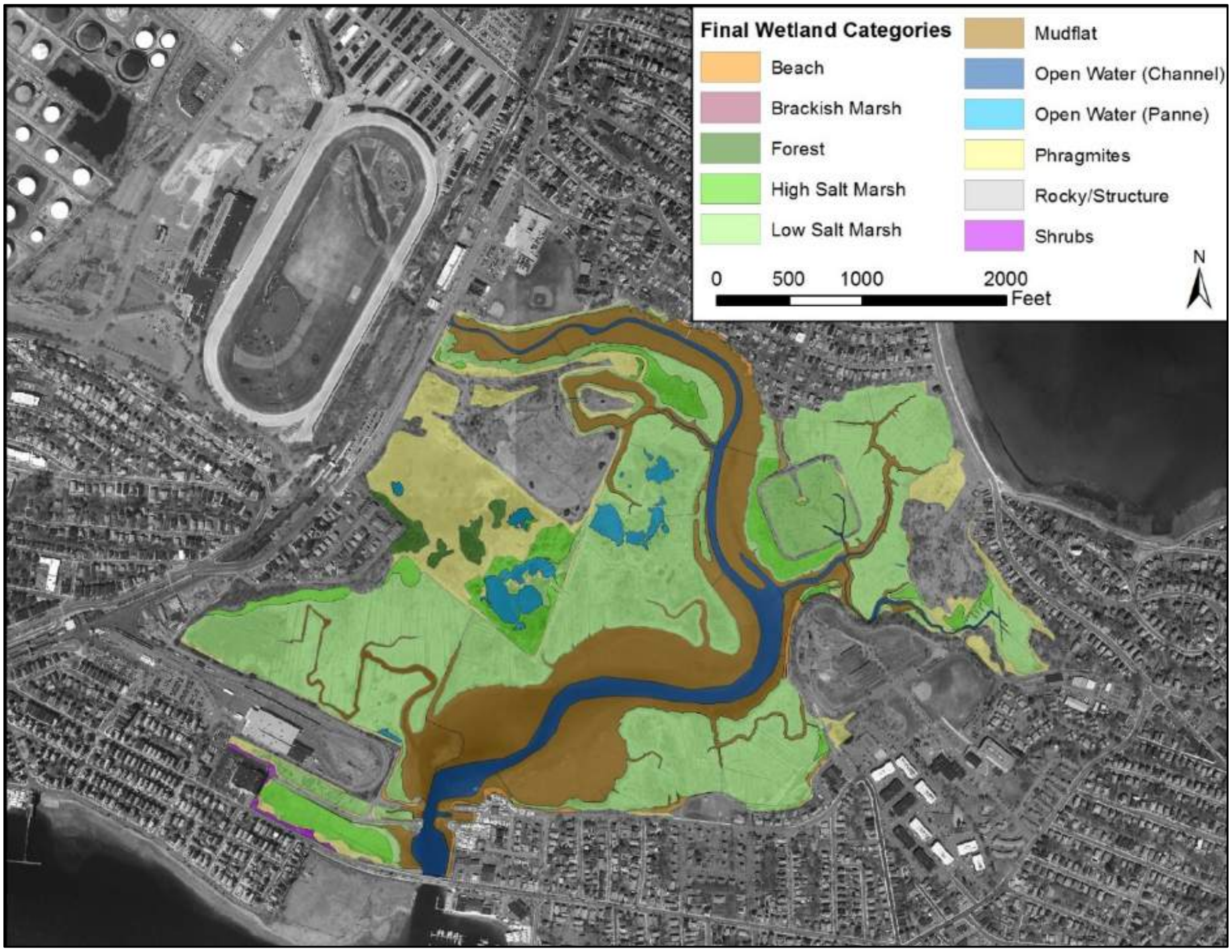


Figure 23. Final wetland cover type map based the National Wetlands Inventory and field-based ground truthing.

2.7.2 Habitat Elevations

Wetland habitat distribution is primarily dependent upon the tidal wetting period of marsh habitat. Areas which are submerged the majority of the day typically do not support salt marsh vegetation (i.e., subtidal or mudflat), whereas areas wetted less frequently may support salt tolerant vegetation such as *Spartina alterniflora* (typical of low marsh) or *Spartina patens* (typical of high marsh), and more. Above the high tide line, less salt tolerant species can begin to establish, and these transitional areas within Belle Isle Marsh are often occupied by *Phragmites* and other transitional marsh species (Costa, 2017).

Due to the relationship between wetting period, tidal datum, and elevation, habitat types can be described by an elevation range for growth, assuming a full tidal range is present. Habitat elevation ranges and their corresponding tidal datum in Belle Isle Marsh are presented in Table 7, and schematically depicted in Figure 24 (Stevens et al., 2022).

Table 7. Belle Isle Marsh habitat elevation ranges and corresponding water level.

Wetland Habitat Type	Approximate Elevation Range (ft, NAVD88)	Corresponding Water Level Datum
Upland	> 9.3	Above 1% WSE[1]
Transitional Marsh	6.8 to 9.3	HAT to 1% WSE[1]
High Marsh	4.6 to 6.8 (mean BIM EL is 4.8)	MHW to HAT
Low Marsh	-0.3 to 4.6 (mean BIM EL is 4.4)	MTL to MHW
Mudflat	-5.1 to -0.3	MLW to MTL
Open Water Channel (Subtidal)	< -5.1	Below MLW

[1]WSE = Water Surface Elevation

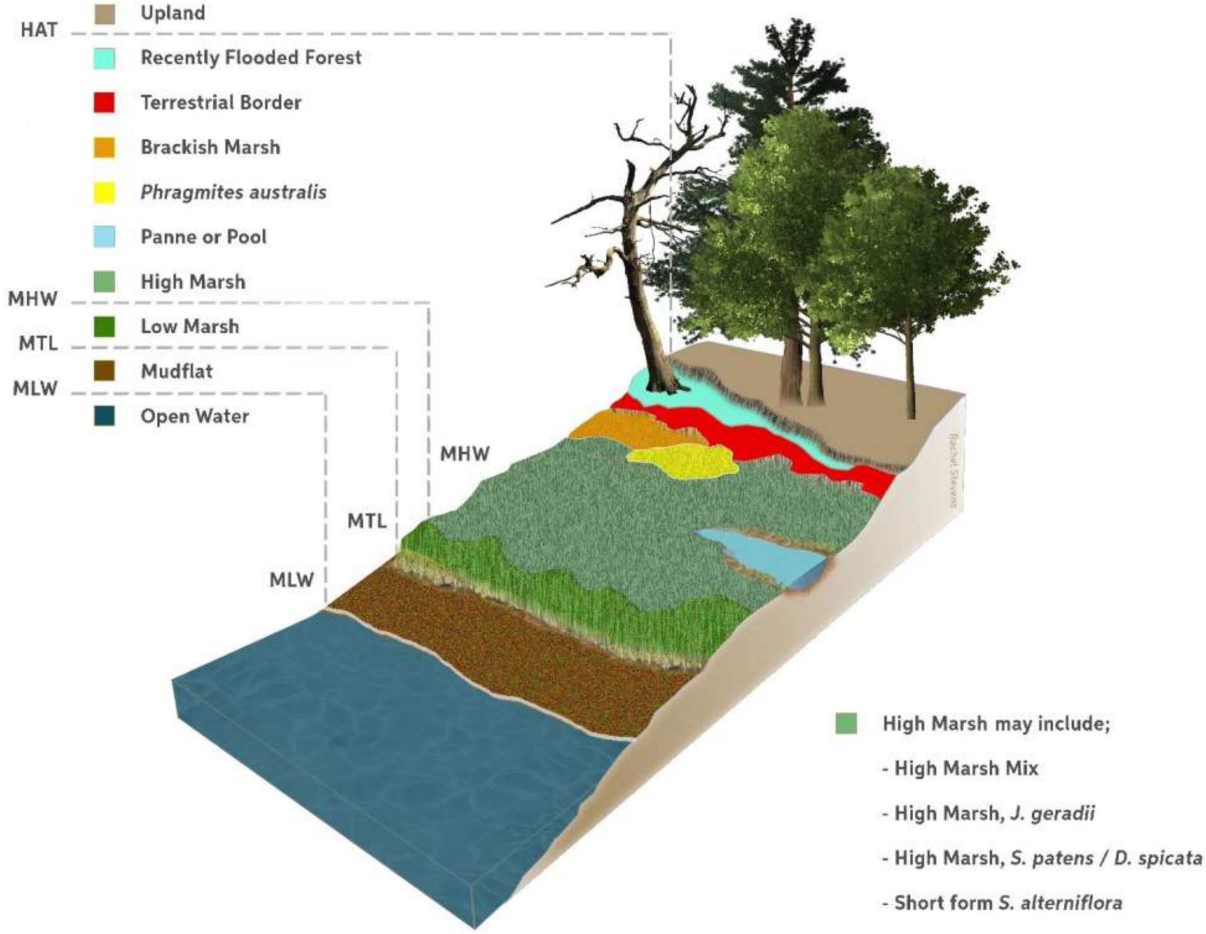


Figure 24. Saltmarsh habitat distribution by tidal datum (Stevens et al., 2022).

2.7.3 Habitat Descriptions

Below is a brief description of wetland types important to saltmarsh evaluation and potential restoration.

Open Water Channel or Subtidal

The open water channel of Belle Isle Marsh is generally representative of subtidal conditions. The majority of open water channel area is in the main channel (Belle Isle Creek), which extends from Belle Isle Inlet (Figure 25) to the upstream boundary of Sales Creek at Bennington Street (Figure 26). The main channel serves as the pathway for fish and marine invertebrates into the estuary, where they feed and often breed. Few dendritic channels within Belle Isle Marsh are characterized as open water. The tide range within the main channel is slightly muted as compared to the tide range of Boston Harbor. See Section 2.2 for a detailed discussion of water level datums in Belle Isle Marsh.

Figure 25. View of Belle Isle Inlet from Saratoga Street bridge (Google Earth, November 2021).

Figure 26. View of the upstream boundary of Belle Isle Creek, abutting the Sales Creek tide gate and Bennington Street.

Open Water Panne or Salt Panne

There are several large salt pannes located across the low marsh and bermed areas of Belle Isle Marsh. Salt pannes located inland of the L-Berm are of particular interest as they have been observed to be expanding over time and are encroaching on saltmarsh sparrow nesting habitat (Figure 27). While salt pannes represent poor drainage, oversaturation, and consequent saltmarsh plant die-off, these open water areas are also highly valuable to the reservation's wildlife. Breeding and migratory birds use the pannes for seasonal foraging. At high tide when most of the estuary is submerged, Belle Isle's salt pannes represent some of the only available feeding habitat for birds in the surrounding areas (especially in summer when beaches are busy with visitors). Historically, the salt pannes behind the L-Berm have also served as breeding habitats for various fish and invertebrates, including horseshoe crab.

Figure 27. Mixed species high salt marsh community (e.g., *Distichlis spicata*, *Spartina patens*, etc.) intermixed with open water pannes, and patches of *Phragmites australis* behind the berm immediately south of the main Belle Isle Reservation.

Mudflat

Mudflat within Belle Isle Marsh is located adjacent to subtidal areas, such as the main channel (Figure 28), as well as within tidal creeks and mosquito ditches. During low tide, exposed mudflats serve as foraging grounds and refuge for migratory shorebirds and wading birds, especially during spring and summer. These birds move to the saltmarsh/salt pannes, or nearby beaches when the tide submerges mudflat. The tidal creek network follows natural, dendritic patterns as well as man-made patterns. Tidal creeks extend, for the most part, into all reaches of the marsh. However, their size and ability to drain tidal and stormwater is often impaired by historic berms, elongated channels which follow mosquito ditches, and limited width/depth. Mudflat area has been noted by the Belle Isle Marsh Supervisor to be expanding in many areas due to calving and collapse of the marsh platform. Tidal flows pull sediment from the base of the marsh platform, causing instability and collapse. Poor vegetative health can contribute to increased erosion. In particular, portions of the marsh in Winthrop have been noted to convert to mudflat rapidly.

Figure 28. Mudflat is present across the main channel from the Belle Isle Reservation (at the end of Crystal Avenue in Revere).

Low Marsh

The majority of Belle Isle Marsh is classified as low marsh habitat, primarily occupied by salt marsh cordgrass (*Spartina alterniflora*). The low marsh exists as a relatively flat, peat marsh platform (i.e., plain), segmented by the main channel, tidal creeks (Figure 29), mosquito ditches, artificial berms, and development. Certain areas of low marsh are healthier than others. For instance, low marsh in the western reach, known as Rosie's Pond, is a marsh depression often retaining water due to poor drainage and not drying out between tidal cycles, resulting in poor vegetative growth. The Key is categorized as low marsh, and too experiences poor drainage and patchy marsh vegetation. Low marsh area behind the L-Berm exists at an elevation more typical of high marsh, however, because of poor drainage through breaches in the L-Berm, oversaturation restricts vegetation types to *Spartina alterniflora* which can withstand such saturation and salinity. While habitat elevation ranges may cover a large vertical extent, optimal elevations exist where plant types can thrive. Within Belle Isle Marsh, low marsh vegetation is typically found to thrive around 4.4 ft NAVD88.

Figure 29. Tidal creek edges dominated by low salt marsh (i.e., Spartina alterniflora).

High Marsh

Saltmarsh plants can live in freshwater, and depend on salinity to kill invasive species and freshwater wetland species. High marsh areas are typically occupied by salt meadow grass (*Spartina patens*) and spike grass (*Distichilis spicata*) (Figure 30). Other saltmarsh species present include glasswort (*Salicornia europaea*), spear saltbush (*Atriplex patula*), black grass (*Ophiopogon planiscapus*), sea lavender (*Limonium*), and dwarf saltwort (*Salicornia bigelovii*). High tide bush (*Iva frutescens*) is not abundant in the marsh, but recent restoration plantings have introduced more to Belle Isle. As previously discussed, high marsh is the only habitat type which supports saltmarsh sparrow nesting, with the high marsh behind the L-Berm being a favored location for the species. In Belle Isle Marsh, high marsh vegetation is typically found to thrive around 4.8 ft NAVD88.

Figure 30. A large section of high salt marsh (*S. patens* and *D. spicata*) adjacent to Excel Academy.

Transitional Marsh (e.g., *Phragmites)*

Large extents of common reed (*Phragmites*) are found in transitional marsh areas, the majority of which is located behind the L-Berm (Figure 31). Freshwater ponds in this area do support a number of species of rare and common nesting birds. This area is functioning as a freshwater marsh which is only intermittently inundated by a spring high tide. *Phragmites* typically occupies saturated areas, however, salinities greater than 15-16 PSU create conditions which would inhibit the recruitment of species like *Phragmites*. Other *Phragmites* stands exist on the fringe of the marsh and upland development, as well as adjacent to the Sales Creek tide gate which inputs freshwater pulses.

Other transitional marsh areas (verging on upland habitat) are occupied by scrub thicket habitat, supporting bayberry (*Myrica*), staghorn sumac (*Rhus typhina*), juniper (*Juniperus*), tree of heaven (*Ailanthus altissima*), Asiatic bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*), and Japanese honeysuckle (*Lonicera japonica*). The scrub thickets are primary hunting habitat for many mammal species. In spring and fall, they support migrating bird species. In winter, they support roosting raptors. Stands of trees, particularly deciduous trees like cottonwoods, have been dying from saltwater intrusion, and are reverting to "ghost forests." Sea level rise and more frequent flooding are anticipated to exacerbate this result (Sean Rile, 2020).

Figure 31. Dense stand of *Phragmites australis* as seen from the boardwalk adjacent to the main Belle Isle Reservation parking lot.

Upland

Upland areas of Belle Isle Marsh which support habitat include the main park (Figure 32), and the open space adjacent to the John Kilmartin Pathway. These areas contain important grassland meadow which support vegetation and wildlife important to the function of the ecosystem. Beyond Belle Isle Marsh, adjacent upland is predominantly developed by the City of Boston, City of Revere, and Town of Winthrop. Development represents a barrier for marsh migration with sea level rise.

Figure 32. Belle Isle Marsh Reservation main park, view from the Tower on February 8, 2022.

3.0 ISSUES AND VULNERABILITY

Belle Isle Marsh, the largest remaining salt marsh in Boston Harbor, has been recognized as a vulnerable coastal resource. Belle Isle Marsh was once much more expansive. Human impacts to the marsh have included berming, filling, dumping of waste, digging of ditches, and discharge of pollutants and nutrients by stormwater. In 2002, MA WRP (currently the MA Division of Ecological Restoration) and MA DEM (currently the MA Department of Environmental Protection) identified the following threats to the marsh, "loss of habitats, increase in invasive plant species and loss of native salt marsh plants, impaired water quality, flooding, increase in mosquitoes, increased risk of fire, and loss of recreational and educational opportunities, open space and scenic quality." Additionally, sediment input is assumed to be reduced due to watershed barriers and development. Furthermore, climate change threatens to accelerate many of these issues through sea level rise and increased coastal storm intensity. The North American Atlantic coast is projected to have one of the highest losses of wetlands globally due to sea level rise.

To grapple with such impacts and begin to think about restoration, how the above impacts disrupt the functioning of Belle Isle Marsh must be clear. A detailed description of key environmental stressors and the impact on marsh health and resilience is below. A depiction of environmental stressors is provided in Figure 33.

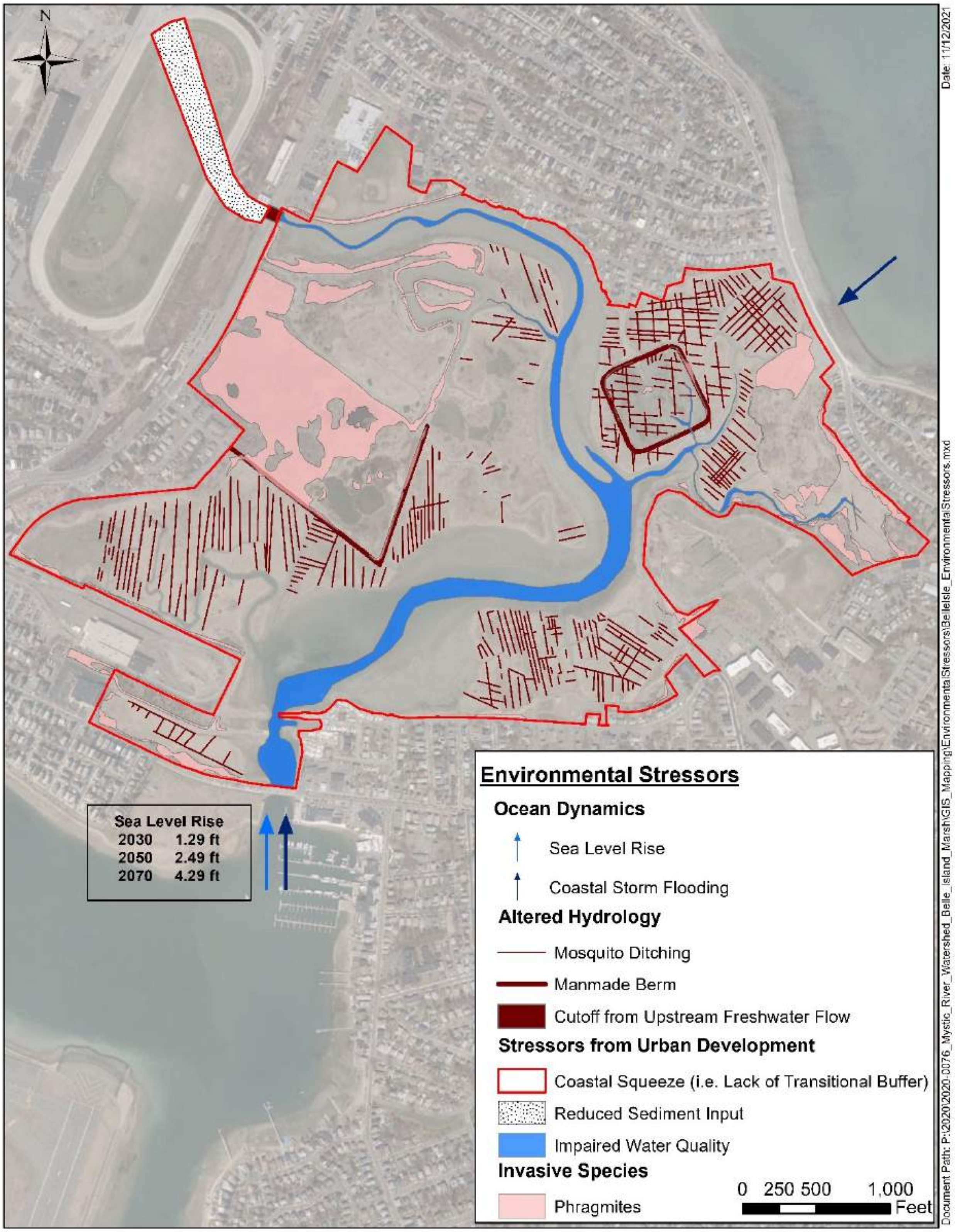


Figure 33. Environmental stressors impacting Belle Isle Marsh.

3.1 TIDAL HYDRODYNAMICS

Tidal restrictions exist in many locations throughout Belle Isle Marsh, as described in Section 2.2. Low tide attenuation was observed throughout tidal creeks, the low marsh platform, and the bermed areas of Belle Isle Marsh. In the both the Eastern and Western Marsh, while high tide propagates effectively throughout the system, low tides are perched within depressions such as Rosie's Pond (Figure 34), or berms such as the L-Berm and the Key. The L-Berm, in particular, experiences a very limited tidal range, as inefficient breaches in the berm severely restrict tidal flow, and overtopping of the berm only occurs during a spring high tide. Low tide attenuation negatively impacts marsh health in two primary ways:

1. It is indicative of poor drainage which can lead to: stagnation of water, reduced levels of dissolved oxygen, increased evaporation which increases water temperature and salinity, increased concentration of nutrients and pollutants, over-saturation of the marsh, and degraded habitat.
2. It limits habitat diversity by constraining the marsh to habitat which can only exist within a narrow set of tidal ranges and corresponding period of saltwater inundation. A non-attenuated tide range allows for the complete development of subtidal, mudflat, low marsh, high marsh, and transitional marsh habitat, while the low tide attenuated marsh tends to squeeze out mudflat.

Figure 34. Example EFDC model results depicting tidal perching in Rosie's Pond during a spring low tide.

Grid ditching for mosquito control conducted during the 1930s represents another stressor which impacts tidal hydrodynamics and ultimately marsh health. Ditches enhance tidal drainage from the low marsh platform, however the excessive drying of the marsh results in peat oxidation and subsidence of the marsh. Based on a review of aerial imagery, 11.4 miles of mosquito ditches were measured to remain within Belle Isle Marsh. Ditches may have been present to a greater extent, but have since filled in with natural sediment, vegetation, or fill material in recent years.

Other alterations to natural hydrodynamics and hydrology include the Sales Creek tide gate and transportation crossings of tidal creeks by roads or trails. These impacts have also had significant adverse effects on salt marsh health by restricting tidal flow and freshwater run-off, and by fragmenting formally contiguous marshes. In many cases, areas upstream of such hydrodynamic constrictions do not receive the necessary tidal saltwater flux to maintain salt marsh vegetation, and the lower salinity levels promote the establishment of *Phragmites*. Furthermore, limiting the connection between the marsh and inland watershed is anticipated to result in a reduction of sediment input into the marsh. Lower sediment supply results in lower marsh accretion rates. As sea level rise accelerates (see Section 3.2), marsh accretion cannot keep pace with projected water levels, and marsh habitat is vulnerable to drowning.

3.2 SEA LEVEL RISE

Sea level rise (SLR) threatens to inundate our shorelines and coastal low-lying areas, like wetlands, incrementally over time. Sea level is never static, changing over the course of minutes, to centuries, to millennia. Currently, the rate of global sea level rise is accelerating. Relative sea level rise refers to the rate of change experienced at specific locales, in this case being Boston Harbor, which varies from region to region.

The Commonwealth of Massachusetts has developed probabilistic relative SLR projections and made them available on the Massachusetts Climate Change Clearinghouse for use (MA EEA, 2022). SLR planning scenarios are derived from the Massachusetts-specific probabilistic projections downscaled from global climate models (DeConto and Kopp, 2017). These local projections incorporated the best available information on the impacts of a range of greenhouse gas emissions, ocean thermal expansion, and ice sheet melt, and provide a range of sea level rise scenarios based on these parameters. From among four scenarios (Intermediate, Intermediate-High, High, Extreme), the State has selected the High scenario for planning purposes in Massachusetts. Flood levels derived from the High scenario are conservative (there is a 99.5% confidence level that the “High” scenario will not be exceeded) and are considered appropriate for application where there is a low tolerance for risk. The High scenario projections are very unlikely to underpredict SLR across a spectrum of potential greenhouse gas emissions scenarios that do not meet the targets of the Paris Agreement (both rising or slowly declining scenarios) even when accounting for contributions from ice sheet melt. In other words, selecting the “High” scenario reduces the risk of under-preparing and under-designing for the future, while providing flexibility to move the timeline for adaptation actions further into the future if observed relative SLR follows lower trajectories. If sea level rises according to the Intermediate scenario, increments of sea level rise are projected to occur 20 to 30 years later.

The “High” SLR planning scenarios for Boston Harbor are summarized in Table 8 and Figure 35. Projections are anticipated to be no more than 1.3 feet above the 2008 baseline (updated 1999-2017 tidal epoch) by 2030, no more than 2.5 feet above the baseline by 2050, and no more than 4.3 feet above the baseline by 2070. Future projected water level datums under sea level rise were derived from the Massachusetts Coast – Flood Risk Model (MC-FRM, Bosma et al., 2021) at the mouth of Belle Isle Inlet and are summarized in Table 9.

Table 8. Relative sea level rise projections for Boston, MA – “High” scenario

Year	Sea Level Rise (ft)
2030	1.29
2050	2.49
2070	4.29
2100	7.69

Table 9. Future projected water level datums with sea level rise.

Datum	Present Day – Main Channel[1]	Present Day – Upper Channel[2]	Present Day – Boston Harbor[3]	2030 – 1.29 ft SLR[4]	2050 – 2.49 ft SLR[4]	2070 – 4.29 ft SLR[4]
0.5% WSE[5]	-	-	9.5	11.0	12.5	14.2
1% WSE[5]	-	-	9.3	10.6	12.2	14.1
2% WSE[5]	-	-	9.1	10.4	11.6	13.6
10% WSE[5]	-	-	8.2	9.6	10.8	12.8
MHHW	5.1	5.2	4.98	6.5	7.8	9.6
MHW	4.6	4.7	4.54	6.1	7.4	9.3
MTL	-0.3	0.0	0.17	1.4	2.6	4.4
NAVD88	0.0	0.0	0.0	0.0	0.0	0.0
MLW	-5.1	-4.7	-4.95	-3.2	-2.3	-0.6
MLLW	-5.4	-4.9	-5.3	-3.4	-2.5	-0.8
Tide Range	9.7	9.4	9.49	9.3	9.7	10.1

[1]Tidal datums represent observations from BI-1 (downstream of Saratoga St bridge) from Nov-9 to Dec-21, 2020.
[2]Tidal datums represent observations from BI-4 (downstream of Sales Creek tide gate) from Nov-9 to Dec-21, 2020.
[3]Tidal datums represent observations from Boston Harbor Tide Gauge (NOAA Station 8443970) centered on 2008.
[4]Future scenarios represent projected water levels at the mouth of Belle Isle Inlet. Values were derived from MC-FRM.
[5]Probabilistic WSE's were derived from the MC-FRM at the mouth of Belle Isle Inlet (Bosma et al., 2021).

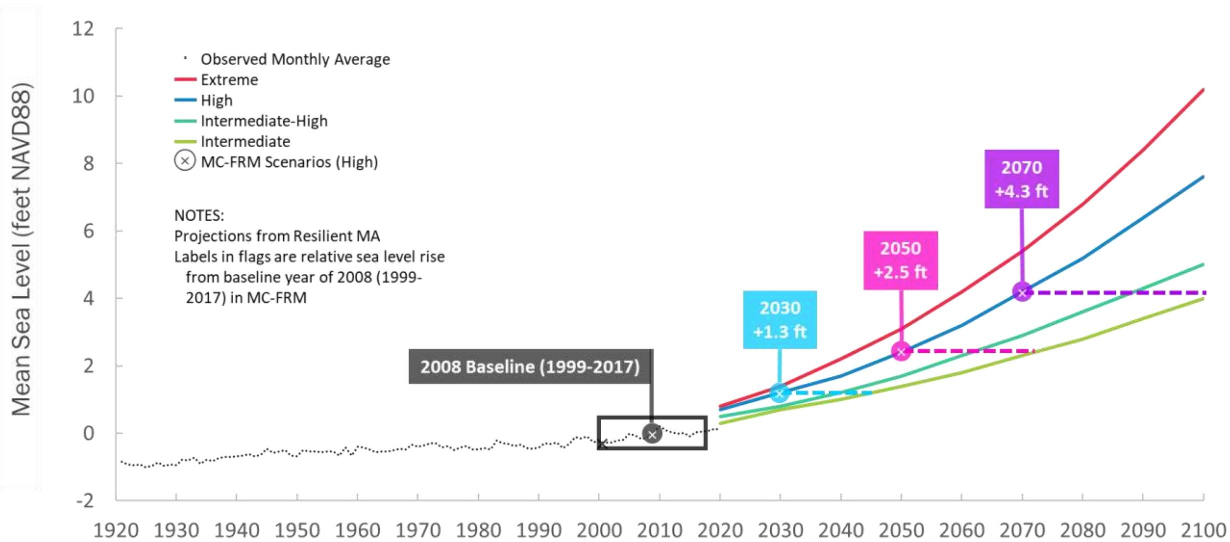


Figure 35. Observed relative mean sea level (1920-2020) and State projections (2020-2100) for Boston Harbor tide gauge (water levels presented in feet, NAVD88).

3.2.1 Spring Tide Flooding

Spring tidal flooding was modeled with EFDC (see Appendix C) and mapped under relative sea level rise scenarios. A spring high tide scenario is defined as the larger than average tide which occurs twice monthly, in response to a new and full moon. An example of spring tide (known as a king tide during which especially large tide ranges and water surface elevations occur) is shown in Figure 36, and can be viewed as a timelapse at https://www.youtube.com/watch?v=5FNmF7Djw4g. Spring tide flood extent is presented for 1.29 feet above present day for 2030 (Figure 37), 2.49 feet above present day for 2050 (Figure 38), and 4.29 feet above present day for 2070 (Figure 39). These sea level rise scenarios were simulated for a 5-day spring tidal cycle in all out-years. Spring high tide inundation results are summarized below:

2020 – Existing Conditions

- A spring high tide under present day sea levels inundates existing marsh platform habitat (low marsh, high marsh), and most areas currently inhabited by *Phragmites* and considered to be transitional habitat.
- The L-Berm, which cuts off most tidal penetration to the upland main park, is partially overtopped during a spring high tide.
- During neap conditions, water is perched in several areas of the marsh, including Rosie's Pond, the L-Berm, and the Key.

2030 – 1.29 ft SLR

- High marsh and transitional habitat are increasingly flooded during high tides.
- The L-Berm is anticipated to be more frequently and completely overtopped during high tide. However, the frequency remains low and is not anticipated to significantly affect established habitat types.

2050 – 2.49 ft SLR

- Spring tidal flooding is anticipated to further inundate the existing marsh and encroach on transitional and upland areas in Winthrop and Revere.
- Flood depths across the marsh platform increase by a couple of feet and marsh habitat will be inundated for a longer period of time each day.
- The Key and L-Berm overtopping increases in frequency with sea level rise, more frequently inundating the areas behind the berms and, because of poor drainage, causing over-saturation.

2070 – 4.29 ft SLR

- The L-Berm and Key berms are completely overtopped and areas habitat types are anticipated to convert to low marsh and/or mudflat.
- An island is created of the transitional/upland area of Belle Isle Marsh Reservation Park.

Two anthropogenically impacted areas, the L-Berm and the Key, are characterized by man-made berms which severely restrict tidal exchange. Water levels behind the L-Berm range approximately 1 ft within the existing salt panne (Figure 40). Water levels within the primary tidal channel of the Key range approximately 3.5 ft (Figure 41). Outside of these bermed areas, the main channel displays a full tide range.

Salinity results for existing conditions as well as sea level rise conditions are presented in Figure 42 through Figure 45. Salinity is presented in terms of Practical Salinity Units (PSU), for which a value of 0 PSU is equivalent to a freshwater (no salinity) condition, and a value of 35 PSU would be a near average ocean (saltwater) condition. Saltmarsh plants can live in freshwater, and depend on salinity to kill invasive species and freshwater wetland species. Salinities greater than 15-16 PSU create conditions which inhibit the recruitment of *Phragmites*. Salinity results are summarized below:

2020 – Existing Conditions

- Salinity in Belle Isle Marsh is highly variable, and ranges from 31.5 PSU at the inlet opening at the Boston Harbor boundary, to 3 PSU at the upstream tide gate.
- Freshwater is introduced into the system through groundwater flow, surface runoff, and a tide gate at Sales Creek connecting the saltmarsh to the Suffolk Downs region and upper Sales Creek.
- The tide gate releases freshwater once per tidal cycle, freshening the system on the ebb tide. The freshwater flows directly into the main channel and quickly spreads to adjacent low-lying areas, corresponding with a high density of *Phragmites* in such areas.
- Minimal tidal muting is observed in the upper main channel, and freshwater is typically mixed and flushed to Boston Harbor within one tidal cycle. Therefore, it is not expected that dredging of the main channel would improve conditions in the area of the tide gate.
- During precipitation events, the whole marsh experiences a freshwater flux that is the most evident on the marsh platforms. Peripheral areas of Belle Isle Marsh experience greater freshening, since flushing by tides is less effective. Capture of stormwater from development's runoff or outfalls would help limit *Phragmites* expansion in these areas.

2030 – 1.29 ft SLR

- The water within the marsh is expected to become more saline as more saltwater from Boston Harbor is introduced through the inlet. Increases in salinity are anticipated to help limit *Phragmites* expansion, and will support saltmarsh vegetation growth. Note that *Phragmites* can be managed by other manual and chemical methods, which often require repetition.
- The freshwater signal from the tide gate is still evident in 2030 and freshens the system during the ebb tide and low tide, when seawater volumes are at their lowest.

2050 – 2.49 ft SLR

- The salinity distribution is expected to continue becoming more saline as more water is introduced through the inlet that connects the system to Boston Harbor.
- The freshwater signal from the tide gate is still evident in 2050 and the system is relatively fresher during the ebb tide and low tide, when seawater volumes are at their lowest.

2070 – 4.29 ft SLR

- The salinity distribution is expected to continue becoming more saline as more water is introduced through the inlet that connects the system to Boston Harbor.
- By 2070, the berm to the Key is overtopped, and the flux of ocean water causes the average salinity to rise (Figure 45).
- The freshwater signal from the tide gate is still evident in 2070 and freshens the system the ebb tide and low tide, when seawater volumes are at their lowest. This signal is weaker and is quickly replaced by the high-salinity ocean water entering the system during the recurring incoming tide.

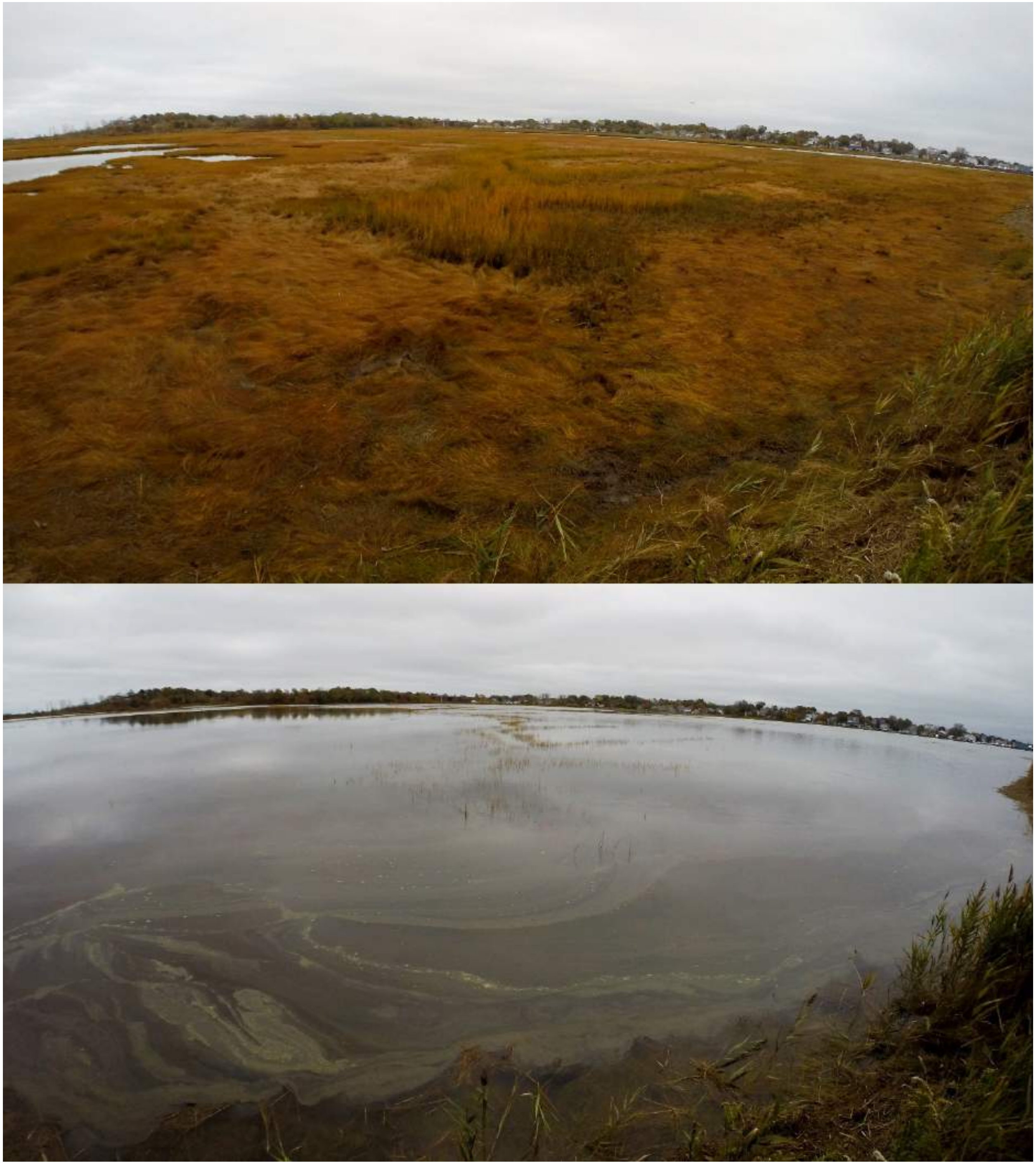


Figure 36. King Tide event at Belle Isle Marsh on Oct 29, 2019. Top – Low tide; Bottom – High Tide (Helmuth Lab at Northeastern University Marine Science Center, 2019).

Figure 37. Spring tide inundation in 2030 – 1.29 ft SLR.

Figure 38. Spring tide inundation in 2050 – 2.49 ft SLR.

Figure 39. Spring tide inundation in 2070 – 4.29 ft SLR.

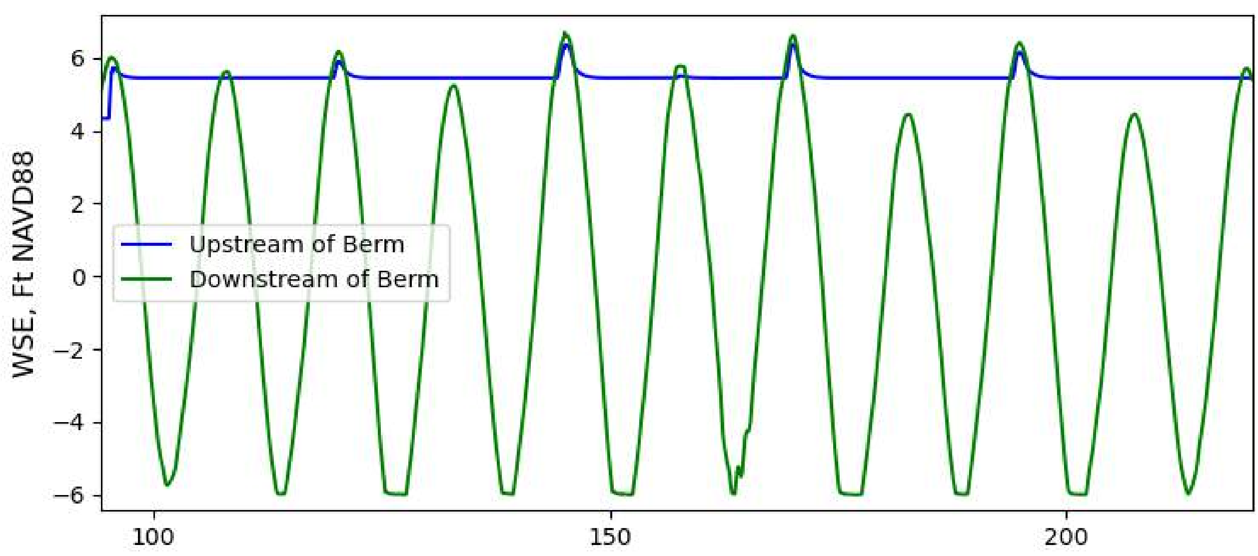


Figure 40. Water levels upstream of the L-Berm, and in the main channel during a 5-day snapshot of the existing conditions model.

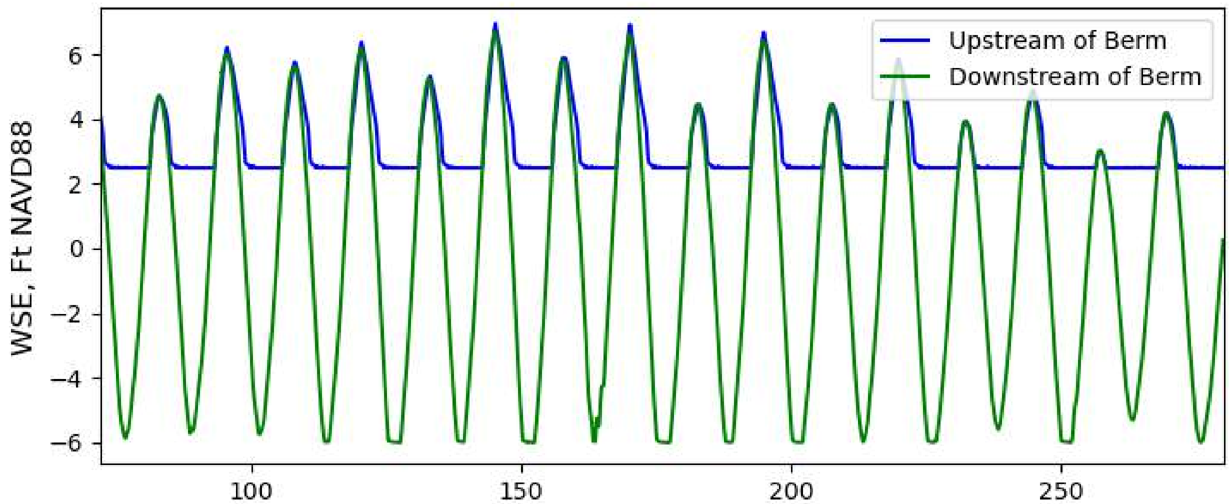


Figure 41. Water levels upstream of the Key berm, and in the main channel during a 5-day snapshot of the existing conditions model.

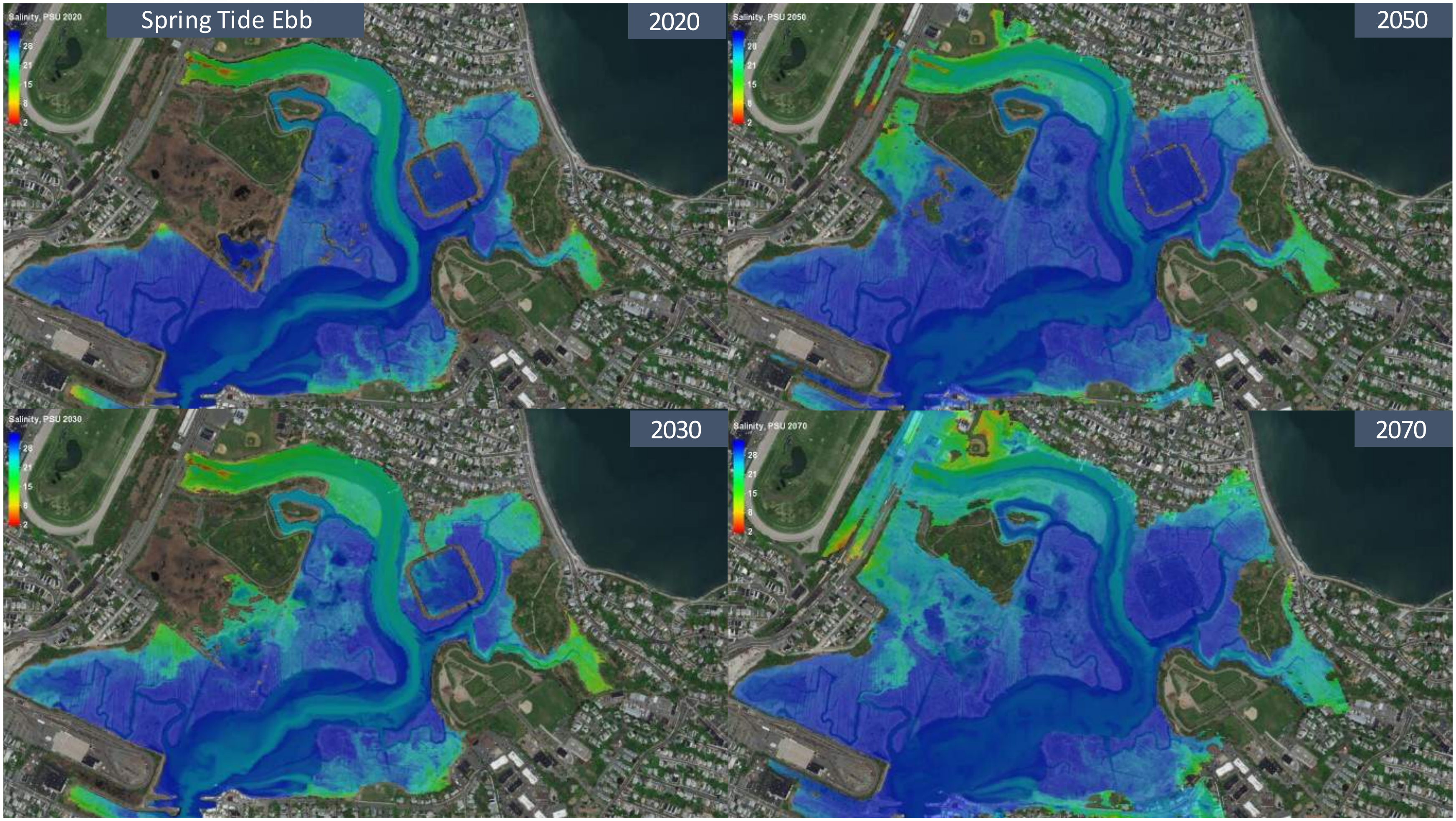


Figure 42. **Salinity distribution during a snapshot of a typical spring tide ebb (three hours after high tide), after a precipitation event, for 2020, 2030, 2050 and 2070.**

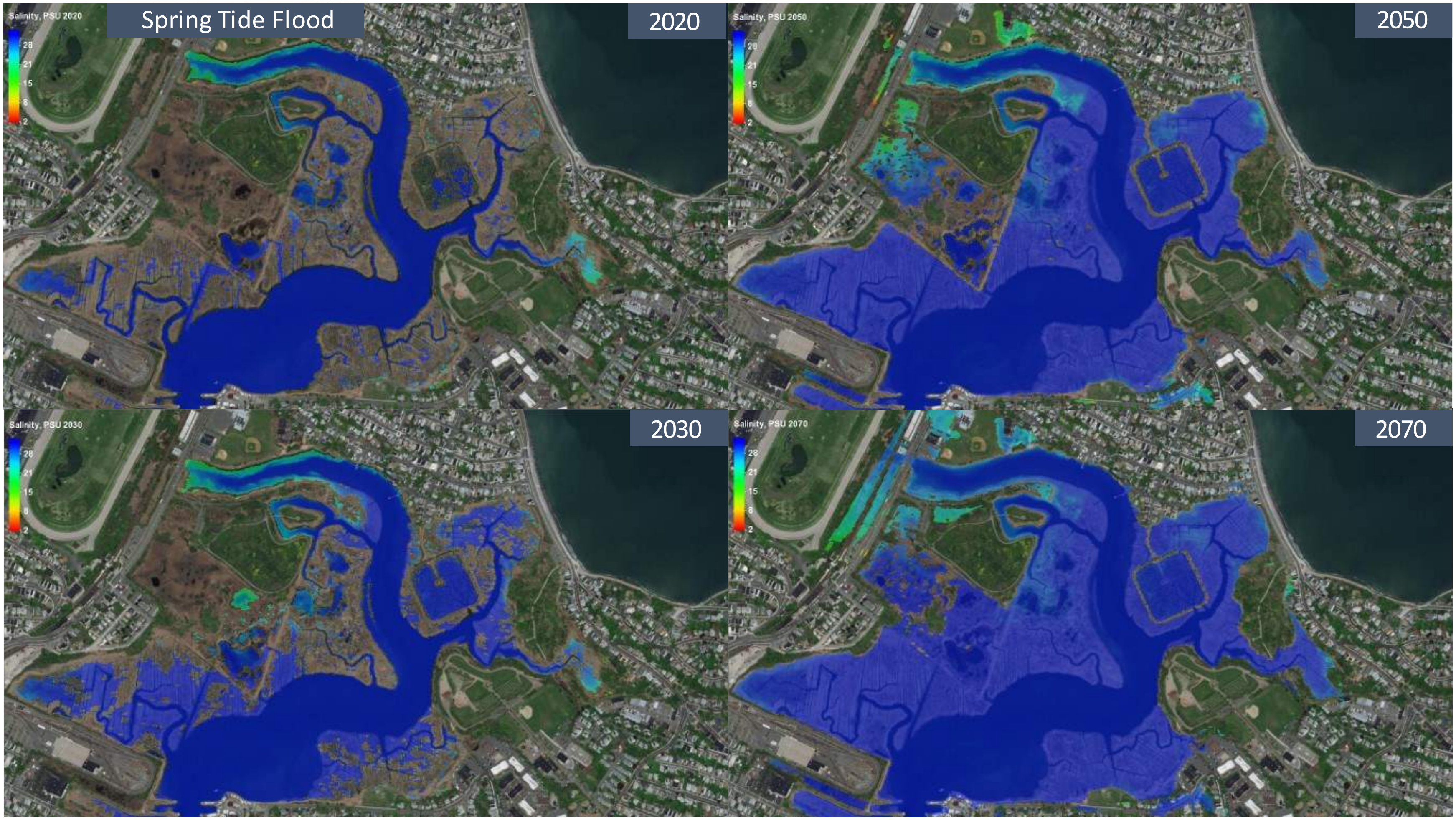


Figure 43. **Salinity distribution during a snapshot of the beginning of a typical mean tide (3 hours after low tide), during a dry-period, for 2020, 2030, 2050 and 2070.**

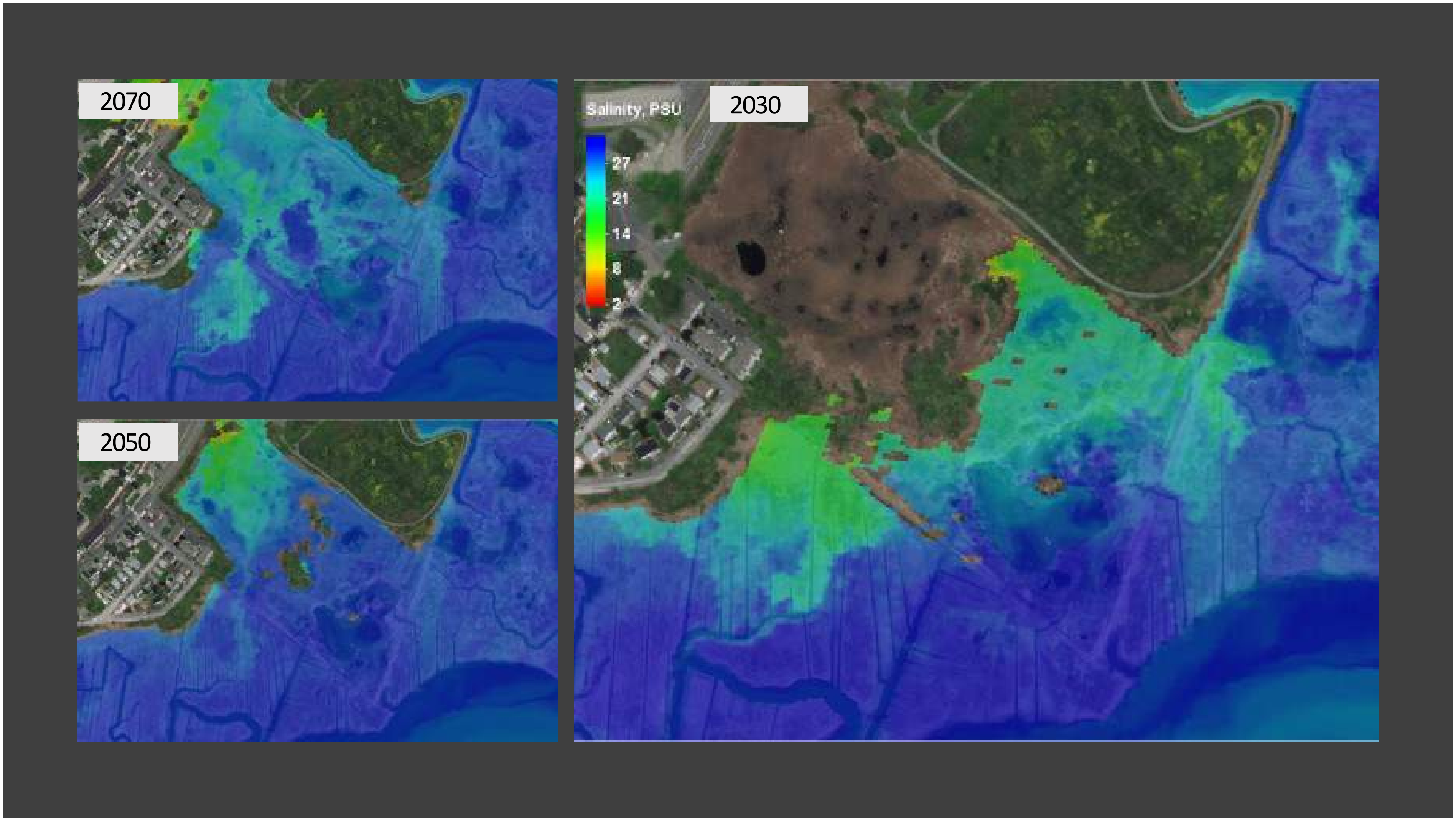


Figure 44. Salinity distribution during a snapshot of a neap tide ebb, zoomed in to the L-Berm for 2030, 2050 and 2070.

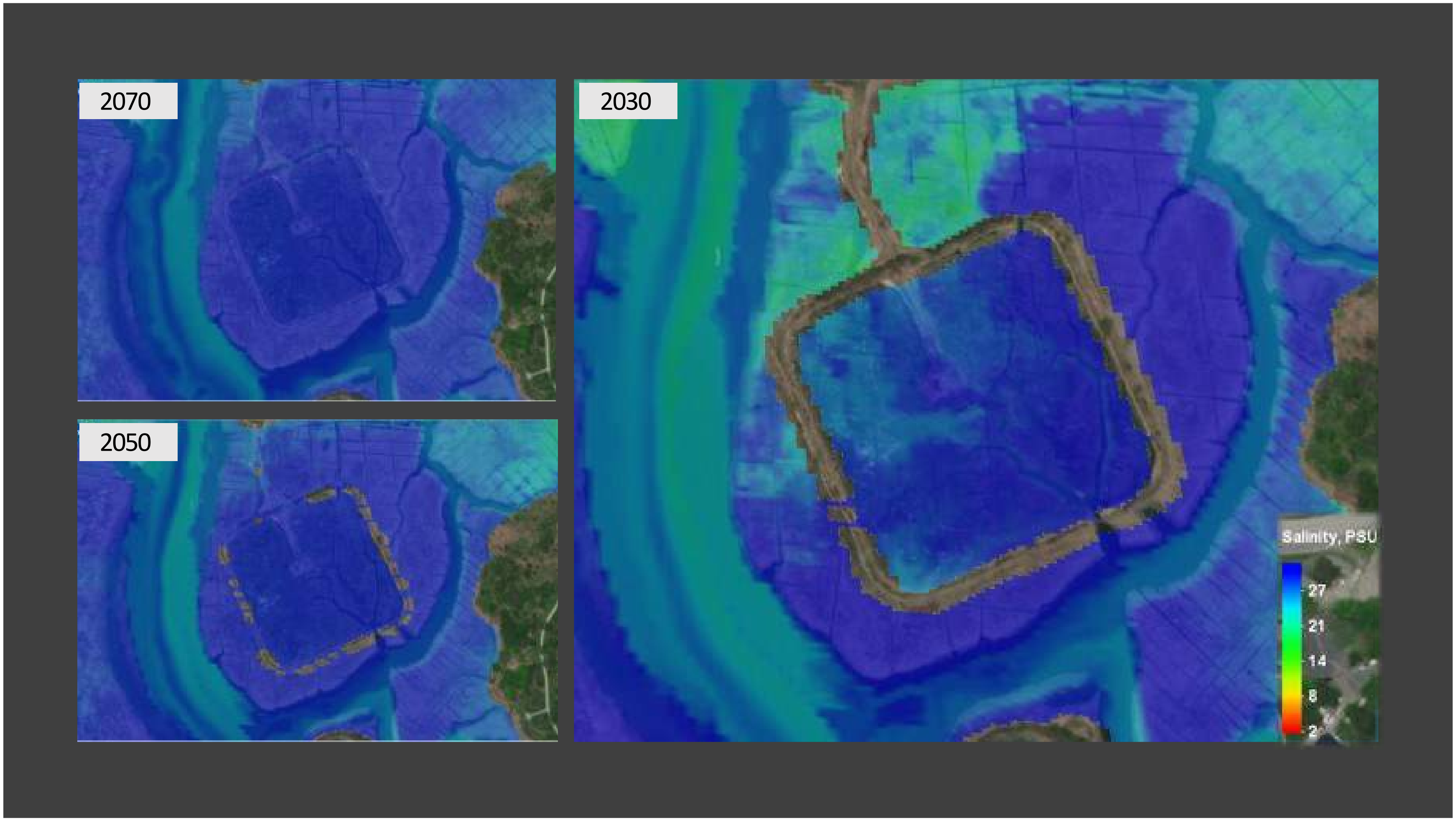


Figure 45. Salinity distribution during a snapshot of a neap tide ebb, zoomed in to the Key, for 2030, 2050 and 2070.

3.2.2 Storm Flooding

Storm flooding, being sporadic, plays a lesser role in the daily condition of Belle Isle Marsh. Marshes are resilient in the face of high-frequency (i.e., common, low intensity) storms, often withstanding or recovering from storm damage. However, storms play a major role in how adjacent communities perceive and interact with the marsh. This section presents probabilistic storm flooding projections for present and future sea level conditions.

Model Details

Storm flood projections are derived from the MC-FRM (Bosma et al., 2021). This hydrodynamic model simulates a full suite of processes that affect coastal water levels, including tides, waves, winds, storm surge, sea level rise, and wave set-up at a fine enough resolution to identify site-specific locations that may require adaptation. Water surface elevations were modeled using the ADvanced CIRCulation (ADCIRC) software to predict storm surge flooding coupled with the Unstructured Simulating Waves in the Nearshore (Un-SWAN) software, a third-generation spectral wave transformation model. This modeling effort was led by the Woods Hole Group in support of Massachusetts Department of Transportation (MassDOT) to assess potential flooding vulnerabilities to highways and other transportation infrastructure throughout the State of Massachusetts. The model quantitatively incorporates climate change influences on sea level rise, tides, waves, storm track, and storm intensity for 2030, 2050, and 2070 time-horizons, providing discrete risk estimates at various time horizons to assist with both near- and long-term planning. To do so, it evaluates a statistically robust sample of storms, including hurricanes, tropical storms and nor'easters, based on the region's existing and evolving climatology. Using this storm set, the model then calculates resulting water surface elevations to estimate the probability that various flood depths will be exceeded at each nodal point within the model boundary.

Storm Flooding Results

Annual probability of inundation results during present day, 2030, 2050, and 2070 are presented in Figure 46. Considering the study area is a marsh system, present day flood probability is high within the marsh system (100% annual chance) but then decreases significantly over a relatively short distance (on average approximately 300 ft) to 0.1% annual chance southeast and northeast of Belle Isle Marsh. Probability of inundation northwest of Belle Isle Marsh decreases over a longer distance extending inland of natural areas. By 2030, probability of inundation increases, but due to the relatively steep increase in elevation southeast and northeast of Belle Isle Marsh, probability of flooding decreases relatively abruptly. In contrast, flooding is anticipated to overtop the marsh boundary northwest of Belle Isle Marsh (i.e., Suffolk Downs/Sales Creek) and southwest of Belle Isle Marsh (i.e., Austin St/East Boston). By 2050, and then more significantly by 2070, areas once connected to the mainland may become "islands" isolated by water during storms, including the Main Park and the John Kilmartin Pathway. Short Beach and the Winthrop Parkway will be regularly overtopped, with overwash events impacting marsh health through sediment deposition.

Flood projection results across the region tell a story of existing coastal flood hazards becoming increasingly exacerbated by sea level rise and climate change. As sea level rises, events that today have a 1% annual chance of flooding will become increasingly frequent, and will become an annual event in areas of East Boston, Revere, and Winthrop under 2070 sea level rise projections. Depth of inundation during a 1% chance event during present day conditions is deepest within the marsh and bordering the ocean, decreasing away from these floodwater sources. Depth of inundation increases by each subsequent time horizon, which will impact developed areas most significantly, while natural areas will incur less damage.

Belle Isle Marsh will gradually become more frequently inundated, reducing the coastal flood resilience and ecological benefits of the resource.

As a result of storm flooding risk to developed areas adjacent to Belle Isle Marsh, municipalities and communities are planning ways to adapt to coastal hazards. Adaptation holds the potential to significantly impact the future of Belle Isle Marsh. Traditional engineering relies on hard infrastructure to provide protection, such as seawalls, bulkheads, and revetments, all of which draw a hard line between nature and development, diminishing the opportunity for the marsh to function naturally in response to sea level rise and storms. However, resilience planning across the region and State is motivated to incorporate nature-based solutions where feasible. Adaptation projects can be developed with multiple goals, including flood protection, habitat enhancement, and increased public access. Belle Isle Marsh currently serves an important role by attenuating floodwaters and providing protection from storm damage for inland development. In order to safeguard Belle Isle Marsh under long-term sea level rise projections, it is important that future development incorporate strategies which support marsh migration.

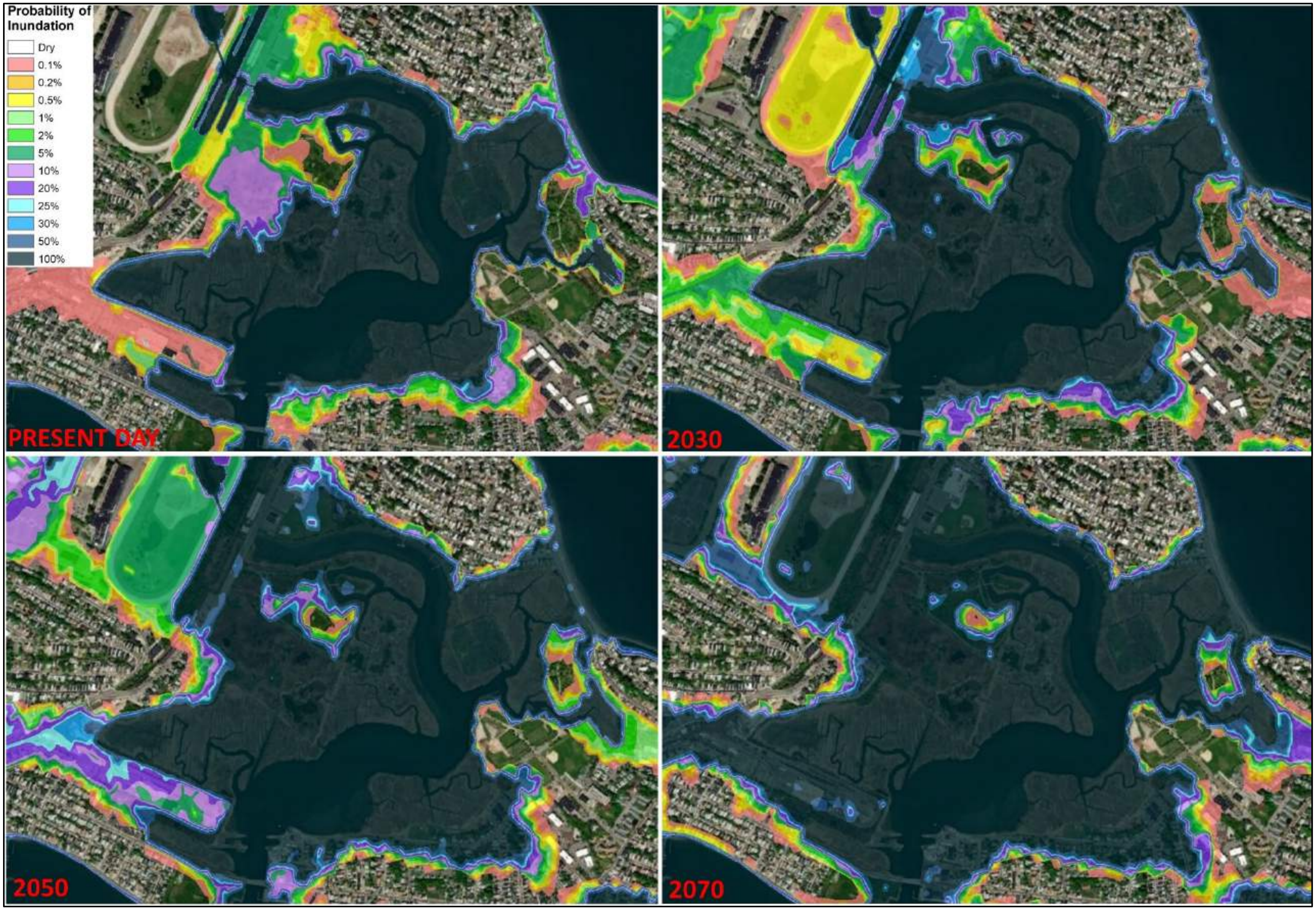


Figure 46. Annual probability of inundation at Belle Isle Marsh under Present Day, 2030, 2050, and 2070 sea levels (Bosma, et al. 2021).

3.2.3 Marsh Migration

Sea level rise threatens to increasingly inundate salt marshes, leading to the conversion of habitat types in place, and the migration of salt marsh habitat inland and upland as long as barriers are not present. The Sea Level Affecting Marshes Model (SLAMM) was used to evaluate projected future wetland habitat conditions of Belle Isle Marsh (see Appendix D). SLAMM was developed specifically to evaluate the potential impacts to coastal wetlands from sea level rise, and incorporates important parameters, such as elevation, wetland classifications, sea level rise, tide range, and accretion and erosion rates for various habitat types. To learn where the marsh wants to migrate, the assumption was made that the marsh could successfully migrate into nearby developed areas. However, unless efforts are made to retreat impervious surfaces (roads, buildings, etc.) out of migration pathways, marsh habitat is expected to be lost in these areas.

SLAMM utilizes unique names of wetland types as compared to wetland habitat types previously described. Furthermore, the SLAMM analysis boundary extends beyond the Belle Isle Marsh ACEC boundary and into adjacent uplands to account for potential marsh migration in these areas. Belle Isle Marsh wetland types, SLAMM classification, and estimated acreages are summarized in Table 10.

Table 10. Belle Isle Marsh wetland type, SLAMM classification, and acreage.

Field Designated Classification	SLAMM Wetland Classification	Area (acres)
Forest, Rocky/Structure, and All uncategorized areas within footprint	Upland	159
Phragmites or Shrubs	Transitional Salt Marsh	35
High Salt Marsh	Irregularly-Flooded Marsh	17
Low Salt Marsh	Regularly-Flooded Marsh	121
Beach or Mudflat	Tidal Flat	67
Open Water (Channel) or Open Water (Panne)	Estuarine Open Water	22
	Total*	**421**

**Note that the boundary of the SLAMM analysis extends beyond the boundary of the ACEC to allow for analysis of marsh migration into adjacent upland areas.*

Resulting habitat distribution maps under present day, 2030, 2050, 2070, and 2100 sea level rise scenarios are presented in Figure 47 through Figure 51. Changes in total habitat type acreages referenced throughout this section are detailed in Table 5. A summary of the existing conditions, and projected habitat changes within Belle Isle Marsh from present day through year 2100 is described below.

Year 2030 – 1.29 ft of Sea Level Rise (Figure 48, Table 11)

Changes predicted to occur in Belle Isle Marsh include a decrease in all habitats besides estuarine open water, which is projected to increase by 14 acres. Estuarine open water expands within the main channel as it increasingly occupies space currently defined as tidal flat. Additionally, open water habitat begins to penetrate further into tidal creeks. Tidal flats see the greatest loss to 1.29 ft of SLR of any habitat type (-10 acres). Low marsh habitat persists through year 2030 with no significant change. The bermed areas of Belle Isle Marsh, within the Key and upland of the L-Berm, do not see significant change. There is little change to high marsh, except for the migration of about 1 acre of high marsh into inland transitional areas. However, this migration would be impeded by impervious surfaces under current development conditions. Upland habitat is projected to decrease by 3 acres, indicating marsh habitat begins to migrate upland and inland with SLR.

Table 11. Projected habitat acreage changes – 2020 to 2030

Wetland Classification	Area (acres)		Change in Area (acres)
	2020	2030	2020 to 2030
Upland	159	156	-3
Transitional Marsh	35	33	-2
Irregularly Flooded Marsh	17	17	0
Regularly Flooded Marsh	121	122	1
Tidal Flat	67	57	-10
Estuarine Open Water	22	36	14

Year 2050 – 2.49 ft of Sea Level Rise (Figure 49, Table 12)

A continued increase in estuarine open water is projected, with a gain of 5 additional acres. Open water gains correspond to a loss of tidal flat (-3 acres). While subtidal habitat expands, mudflat is unable to migrate into low marsh habitat due to the steep scarp which exists between mudflat and the low marsh platform. As a result, subtidal habitat encroaches on low marsh habitat, and increases the opportunity for wave and tidal current action to impact and potentially erode the edge of marsh. There is a modeled gain of 19 acres of low marsh as it migrates into high marsh areas south of the MBTA railyard in East Boston. There is also a projected gain of 7 acres of transitional marsh (7 acres). Low marsh and transitional marsh gains correspond to a loss of high marsh (-7 acres) and a loss of upland area (-3 acres).

The two bermed areas do not change significantly, neither does the tidal creek and low marsh habitat abutting Winthrop. Expansion of estuarine open water will not be impeded by any current existing impervious areas. However, migration of approximately 1,300 square feet (sf) of tidal flat and 2,000 sf of regularly flooded marsh will be impeded by impervious surface.

Table 12. Projected habitat acreage changes – 2020 to 2050

Wetland Classification	Area (acres)		Change in Area (acres)
	2020	2050	2020 to 2050
Upland	159	135	-24
Transitional Marsh	35	40	5
Irregularly Flooded Marsh	17	10	-7
Regularly Flooded Marsh	121	141	20
Tidal Flat	67	54	-13
Estuarine Open Water	22	41	19

Year 2070 – 4.29 ft of Sea Level Rise (Figure 50, Table 13)

Wetland areas that increase include low marsh (28 acres) and estuarine open water (24 acres). These habitats expand into adjacent areas, where losses are projected in upland (-33 acres) transitional marsh (-1 acres), high marsh (-5 acres), and tidal flat (-13 acres). Near the inlet, open water habitat in the main channel overtops almost all tidal flat and abuts low marsh. As a result, wave action and tidal currents will further interact with low marsh habitat and potentially increase edge erosion. Low marsh is shown to persist through year 2070, maintaining most of its existing extent indicating that the marsh platform exists near the top of its viable elevation range. Low marsh habitat struggles to migrate inland in East Boston, likely due to the steep banks circumscribing the marsh by the MBTA railyard and Austin Street. Low marsh habitat migrates into low elevation residential neighborhoods of Winthrop and Revere. Additionally, transitional habitat migrates into Bennington St, Suffolk Downs, and Revere Public Schools. High marsh struggles to migrate into transitional habitat. By 2070, a much greater degree of wetland migration will be prevented by development. Transitional marsh and high marsh will be prevented from migrating and these wetland types will be lost to sea level rise without the ability to shift location. No significant change is projected in the bermed areas of the Key and L-berm in 2070.

Table 13. Projected habitat acreage changes – 2020 to 2070

Wetland Classification	Area (acres)		Change in Area (acres)
	2020	2070	2020 to 2070
Upland	159	102	-57
Transitional Marsh	35	39	4
Irregularly Flooded Marsh	17	5	-12
Regularly Flooded Marsh	121	169	48
Tidal Flat	67	41	-26
Estuarine Open Water	22	65	43

Year 2100 – 7.69 ft of Sea Level Rise (Figure 51, Table 14)

Following 7.69 ft of SLR by year 2100, wetland areas see the most extreme change of any timestep. Habitat acreage increases are seen in subtidal habitat (25 acres) and tidal flat (118 acres). Habitat acreage losses are projected in low marsh (-45 acres), high marsh (-4 acres), transitional marsh (-26 acres), and upland (-67 acres). The subtidal habitat is anticipated to continue its expansion within the main channel and tidal creeks. Tidal flats are anticipated to finally make the jump onto what today is the low marsh platform, and as a result this habitat reverses its downward trend and expands dramatically in area. Low marsh within the Key berm converts to tidal flat as well. The low marsh is pushed out of its existing footprint and migrates almost entirely into and throughout adjacent jurisdictions, what is today the L-berm area, and developed/impervious land of East Boston, Revere, and Winthrop. Belle Isle Marsh almost entirely converts to an open water and tidal flat wetland system with the L-berm are representing the only remaining viable marsh habitat within the Reservation. High marsh habitat is further squeezed out of functional space, as it struggles to migrate into transitional areas. Transitional habitat migrates further into the developed areas of East Boston, Revere, and Winthrop, and would also be expected to expand far beyond the study area boundary.

Multiple iterations of SLAMM analysis, paired with hydrodynamic modeling performed as a parallel task to SLAMM, was required to achieve reasonable projections of marsh migration behind the L-berm. Hydrodynamic model water level results were obtained behind the L-berm at the 2030, 2050, and 2070 planning horizons and manually input to represent tidal conditions at the L-berm. This allowed for the recognition that from the perspective of land elevation and tidal penetration, the L-berm can serve as future marsh habitat in long-term sea level rise scenarios. In this assessment, the tipping point for converting the L-berm to low marsh habitat occurs around 2080.

Table 14. Projected habitat acreage changes – 2020 to 2100

Wetland Classification	Area (acres)		Change in Area (acres)	% Change
	2020	2100	2020 to 2100	2020 to 2100
Upland	159	35	-124	-78%
Transitional Marsh	35	13	-22	-63%
Irregularly Flooded Marsh	17	1	-16	-94%

Wetland Classification	Area (acres)		Change in Area (acres)	% Change
	2020	2100	2020 to 2100	2020 to 2100
Regularly Flooded Marsh	121	124	3	2%
Tidal Flat	67	159	92	137%
Estuarine Open Water	22	90	68	309%

SLAMM Summary

Belle Isle Marsh habitat migration with sea level rise is characterized in two phases:

- **Present day to 2070:** Changes that occur from 2020 to 2070 include gains in estuarine open water (43 acres), low marsh (48 acres), and transitional marsh (4 acres). The most significant corresponding losses occur in tidal flat (-26 acres) and upland (-57 acres). High marsh losses are observed at a smaller scale (-12 acres) however, this represents over 70% of its current footprint. The increases in low marsh and transitional marsh are only able to become reality if development retreats and open space is provided for this migration.
- **2070 to 2100:** Changes that occur from 2070 to 2100 include gains in estuarine open water (25 acres) and tidal flat (118 acres). Significant corresponding losses occur in low marsh (-45 acres), high marsh (-4 acres), transitional marsh (-26) and upland (-67 acres). This represents a near complete conversion of the existing marsh habitat to open water and mudflat. Low, high, and transitional marsh habitat attempt to migrate inland and upland but will meet the barriers in existing development, except in the L-berm area where open space currently exists in the Reservation. Without action, the marsh is anticipated to be almost entirely lost to mudflat and open water.

Subtidal habitat is found to continuously expand, increasing by 309% in acreage by year 2100. The main channel specifically increases in width by up to hundreds of feet, potentially increasing marsh vulnerability as wave and tidal current forces may increase.

The year 2080 was found to represent a tipping point between the tidal flat and low marsh relationship. Low marsh was noted to persist through 2070. The Massachusetts Statewide SLAMM model (Woods Hole Group, 2016) projects low marsh to generally be converted to tidal flats under a 4.29 ft SLR scenario. However, at Belle Isle Marsh, low marsh habitat exists within the high end of its viable elevation range. With small amounts of marsh accretion (~2.8 mm/yr), the low marsh will be maintained through about year 2080 (5.29 ft SLR). This result is consistent with the understanding that marshes under meso- to macro-tidal ranges are more resilient to changes in sea level. This persistence of low marsh results in a loss of tidal flat, as tidal flats are squeezed between increasingly widening and deepening channels. Beyond 2080, the effects of sea level rise on low marsh reach a tipping point, where tidal inundation overtops the low marsh platform at an increased frequency and it converts nearly entirely to tidal flat, converting the marsh into a primarily subtidal/mudflat condition. It is anticipated that low marsh will want to migrate into upland developed areas, especially the areas of the MBTA Blue Line/Suffolk Downs, Revere Public Schools, residential areas of Revere, and residential areas of Winthrop, especially along Morton St.

High marsh habitat most notably struggles to migrate into transitional areas, and there is a projected 94% loss of high marsh acreages from present day through 2100. This result is critical to the saltmarsh sparrow as the high marsh is the only viable nesting habitat for saltmarsh sparrow. The population has declined 85% since 1995 and is predicted to become extinct by year 2050.

Transitional marsh is observed to over time migrate into East Boston especially in the MBTA railyard, the Town of Revere by Sales Creek tide gate, and Winthrop residential areas. Through the year 2070, the perimeter of the marsh in many reaches is too steep for habitat migration inland and upland with SLR. However, by 2100, low marsh and transitional habitats are projected to migrate out of the current marsh area and into low-lying areas of the surrounding communities. This is indicated by the estimated 78% loss in upland acreage between present day and 2100. If developed areas were not present, marsh habitat could potentially persist, migrating inland and upland in relation to sea level rise. However, under the current heavily developed conditions surrounding Belle Isle Marsh, marsh habitat is not likely to successfully migrate with sea level rise, and Belle Isle Marsh would no longer support extensive vegetated marsh habitat.

Table 15. Area (acres) of each wetland classification present within the Belle Isle Marsh study area for present day, 2030, 2050, 2070, and 2100 and change in area (acres) for select year to year comparisons.

Wetland Classification	Area (acres)					Change in Wetland Area (acres)					% Change
	2020	2030	2050	2070	2100	2020 to 2030	2030 to 2050	2050 to 2070	2070 to 2100	2020 to 2100	2020 to 2100
Upland	159	156	135	102	35	-3	-21	-33	-137	-124	-78%
Transitional Marsh	35	33	40	39	13	-2	7	-1	-26	-22	-63%
Irregularly Flooded Marsh	17	17	10	5	1	0	-7	-5	-4	-16	-94%
Regularly Flooded Marsh	121	122	141	169	124	1	19	28	28	3	2%
Tidal Flat	67	57	54	41	159	-10	-3	-13	118	92	137%
Estuarine Open Water	22	36	41	65	90	14	5	24	25	68	309%

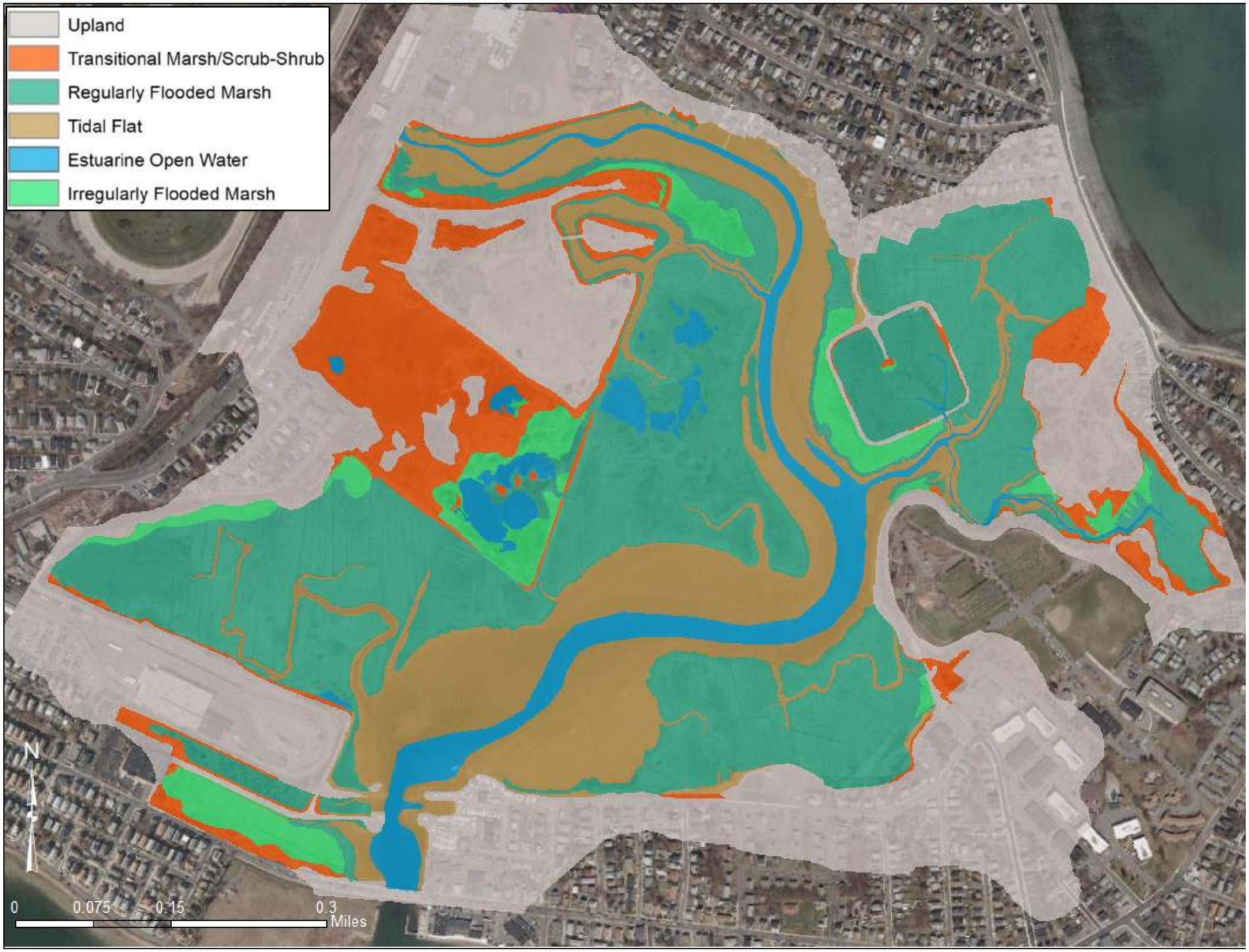


Figure 47. Present Day wetland conditions used in SLAMM modeling for Belle Isle Marsh and the surrounding area.

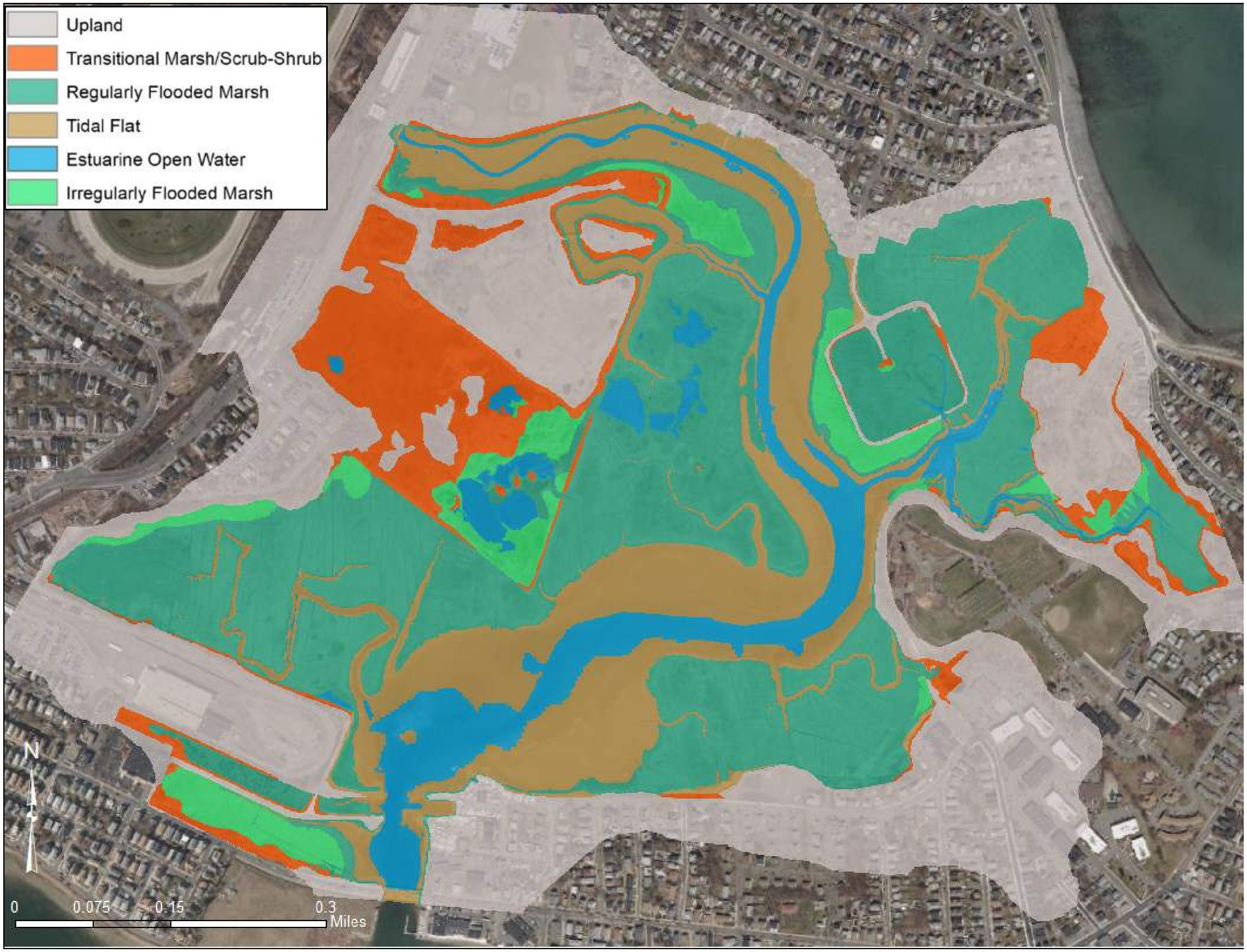


Figure 48. 2030 SLAMM modeling results for Belle Isle Marsh and the surrounding area.

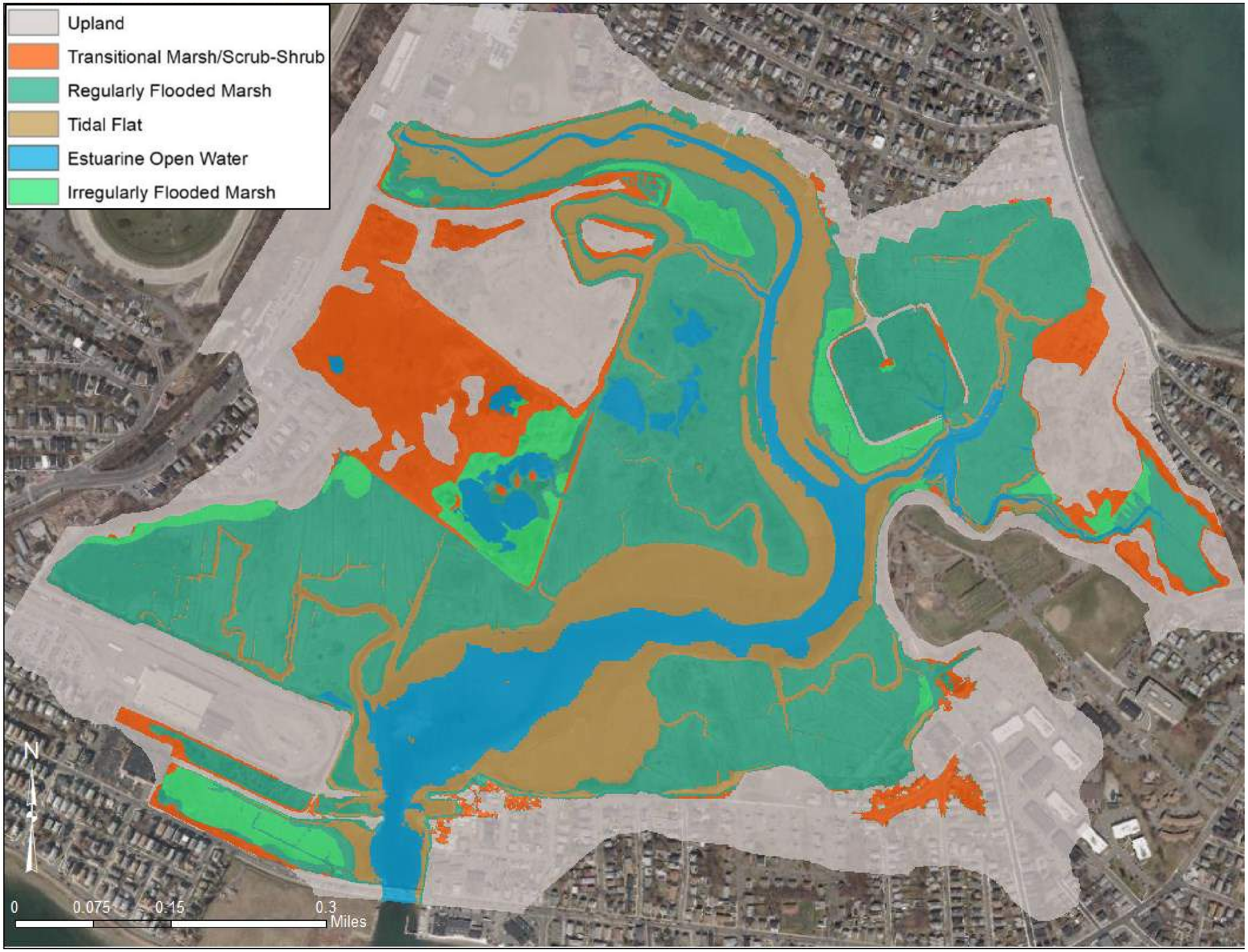


Figure 49. 2050 SLAMM modeling results for Belle Isle Marsh and the surrounding area.

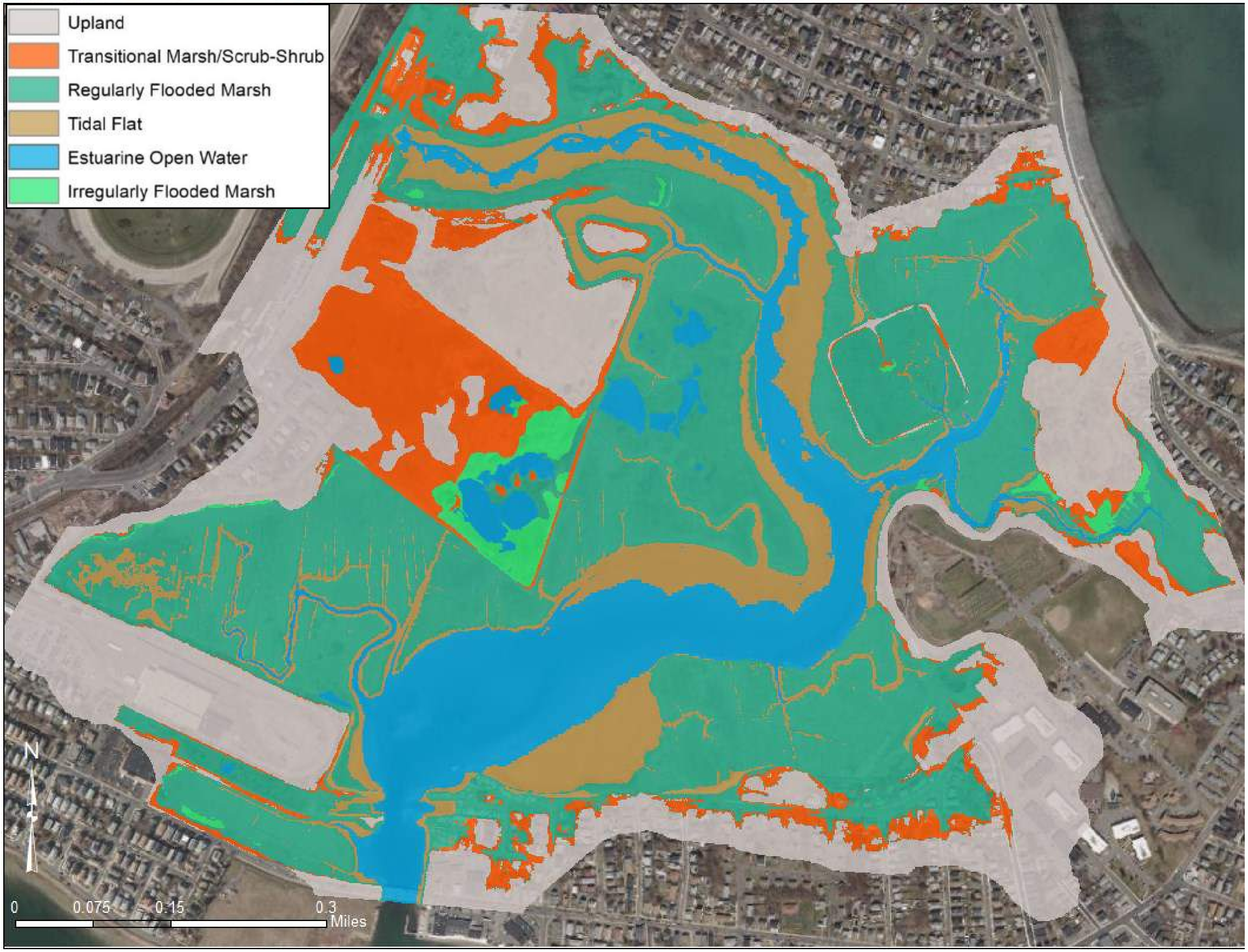


Figure 50. 2070 SLAMM modeling results for Belle Isle Marsh and the surrounding area.

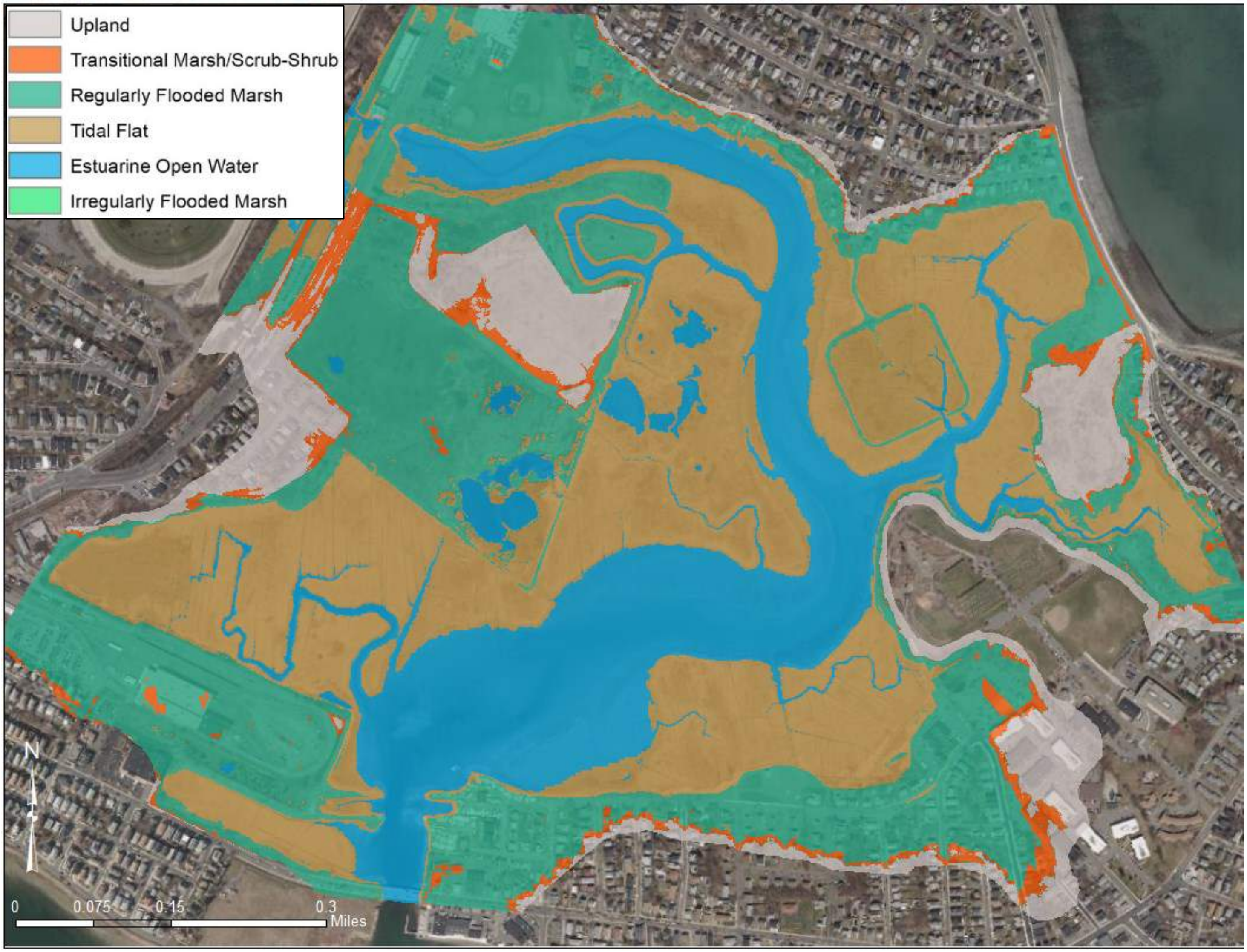


Figure 51. 2100 SLAMM modeling results for Belle Isle Marsh and the surrounding area.

3.3 IMPAIRED WATER QUALITY

Coastal ecosystem health is directly related to the quality of water. The salt marsh is an essential place for reproduction and growth of many fish and bird species. Poor water quality has been observed within Belle Isle Marsh, largely due to the level of development surrounding the marsh (Colarusso, 1998). Water clarity decreases during Bennington Street pump station operations. Dissolved oxygen levels have been suspected of causing fish kills. High levels of coliform bacteria have been observed within the marsh waterways. Trash debris has been observed in many areas, especially by Excel Academy. Oil slicks have been observed as well. Stormwater runoff to the marsh is a common occurrence, though not well studied, and is likely flushing pollutants and nutrients into the marsh system. Stormwater runoff containing pollutants and nutrients has been noted to flow to the marsh from surrounding development, degrading marsh plant root structure, and consequently destabilizing the marsh edge. Chemical contamination in sediment has been observed, such as at the Belle Isle Fish Co restoration project area. It is possible that additional sediment contamination exists within the marsh, especially given the history of dumping, fill, and development.

Marshes do provide a benefit to water quality, as vegetation and peat development take up and store pollutants and nutrients. However, poor water quality impacts both wildlife and vegetation. Salt marsh degradation is a typical outcome of poor water quality. Observed salt panne expansion may be related to poor water quality, in addition to excessive salinities and freeze/thaw processes. Additionally, significant marsh dieback has been observed in areas such as the marsh area between Sales Creek tide gate and the reservation's main parking lot, as well as the half-moon shaped eroded marsh/mudflat area adjacent to the boat yard and Morton St in Winthrop. DCR staff have noted that edge erosion is occurring along many of the larger tidal creek channels as well.

Furthermore, wildlife depend on high water quality to thrive. Belle Isle Marsh subtidal and mudflat habitat are identified by MassGIS as a Shellfish Suitability Area for soft-shelled clam. Clams provide a water quality benefit by improving clarity, and taking up nutrients.

3.4 INVASIVE SPECIES

Invasive species threaten to crowd out salt marsh vegetation. Extensive areas of former salt marsh are now dominated by invasive plant species, most notably the common reed, *Phragmites australis*. *Phragmites* has completely taken over some areas of the Reservation, particularly in the immediate vicinity of the main recreational area. The 2002 Salt Marsh Restoration Plan states that in Belle Isle Marsh, previous use of the marsh for dredged material disposal around 1930 created a large *Phragmites* dominated area. At disturbed sites, *Phragmites* frequently forms dense monotypic stands, which can outcompete native species, especially high and transitional marsh species. Monotypic stands of common reed typically contain several years' worth of dead plant material, both on the ground and standing, which can lead to an increased brush fire risk. *Phgramites*, however, is more effective at wave energy reduction. Eliminating *Phragmites* can be achieved by several methods, including increasing salt intrusion (*Phragmites* typically does not tolerate greater than 15-16 PSU), chemical treatment, and mechanical excavation. Restoration efforts typical require repetition to be effective.

3.5 BELLE ISLE MARSH VULNERABILITY

The Belle Isle Marsh complex contains a wide variety of habitat types and unique anthropogenic influences which have resulted in areas with distinct characteristics and function. As a result, marsh-wide generalizations do not bring clarity to developing restoration actions. The marsh was divided into eleven management areas for developing restoration alternatives which can address the specific concerns of each unique area. Belle Isle Marsh Management Areas are depicted in Figure 52, and the vulnerability results are organized by area in Table 16. Environmental vulnerability was determined through the culmination of literature reviews (Appendix A), data collection (Appendix B), EFDC hydrodynamic modeling (Appendix C), and SLAMM analysis (Appendix D).

Figure 52. General boundaries of management areas in Belle Isle Marsh.

Table 16. Present and future vulnerability of Belle Isle Marsh management areas.

No.	Management Areas	Vulnerability Description
1	Lower Main Channel	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Wave energy and tidal current velocities may increase and exacerbate marsh erosion Tidal current velocities pull sediment loose and cause calving and erosion of marsh edge. Increased velocities would exacerbate this issue. Saratoga Bridge is a source of minor tidal constriction
2	Upper Main Channel	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Transitional marsh wants to migrate into developed areas of East Boston and Revere • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure is predicted to increase in frequency and damage • Wave energy and tidal current velocities may increase and exacerbate marsh erosion Tidal current velocities pull sediment loose and cause calving and erosion of marsh edge. Increased velocities would exacerbate this issue. Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Sales Creek Tide Gate • Built in 1988 as part of the Sales Creek flood project. In 2005, DCR made repairs • Point source for widely collected freshwater discharge and coliform bacteria • Pump station pump events dramatically freshen the system and decrease water clarity • Upstream sediment impoundment reduces ability of marsh to capture sediment and increase in elevation with sea level rise
3	Excel Academy	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly

No.	Management Areas	Vulnerability Description
		• Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons • Transitional marsh wants to migrate into developed areas of East Boston • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze), especially along steep slopes around the perimeter (e.g., MBTA Orient Heights Maintenance Railyard) Runoff washes into the marsh from upland development. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation
4	West Marsh / Rosie's Pond	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons (saltmarsh sparrow nesting and foraging habitat) • Transitional marsh wants to migrate into developed areas of East Boston • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage High marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze), especially along steep slopes around the perimeter (e.g., MBTA Orient Heights Maintenance Railyard and Lawn Ave) Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues • The primary tidal creek follows mosquito ditches, as opposed to a natural path, resulting in inefficient outgoing tidal and stormwater conveyance A depression within the marsh known as Rosie's Pond has poor tidal and stormwater drainage, resulting in oversaturation of low marsh habitat and resulting degradation. Low tide is not fully observed in the area which increases residence time

No.	Management Areas	Vulnerability Description
		of nutrients and contaminants and limits habitat diversity. The sparse low marsh vegetation limits sediment capture and elevation of the marsh platform
5	Central Marsh	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues
6	L-Berm	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • High marsh habitat losses anticipated at all time horizons (saltmarsh sparrow nesting and foraging habitat) • Salinity is increasing around deciduous trees in the transitional zone/coastal thickets, causing die off and "ghost forests" Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) An artificial berm acts as a barrier to tidal exchange and tidal/stormwater drainage. Poor drainage leads to the expansion of salt pannes, and the degradation of low and high marsh habitat. Oversaturated areas which would be high marsh are converted to low marsh. Poor tidal exchange limits habitat diversity and increases residence time of nutrients and contaminants. Marsh migration is not feasible in most low-lying areas due to steep slopes around the perimeter, backed by development Runoff washes into the marsh from upland development. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Extensive phragmites in the Reservation Park area behind the L-Berm • Phragmites has overwhelmed multiple freshwater pools, which support endangered species and species of concern: Least Bittern, Rail, Sora

No.	Management Areas	Vulnerability Description
		• Buildup of dead plant matter increases brush fire risk • Phragmites does support rare and common nesting birds • Sea level rise is anticipated to increase salinity and convert phragmites to salt marsh by 2100 Invasives in coastal thickets (e.g., Japanese Honeysuckle) and woodlands (Multiflora Rose, Black Locust, Eastern Cottonwood, Tree of Heaven, Quaking Aspen and Norway Maple) do not maximize habitat value
7	Grassland Meadow / Main Park	Main Park is squeezed between development and the ocean (i.e. coastal squeeze) Invasives in coastal thickets (e.g., Japanese Honeysuckle) and woodlands (Multiflora Rose, Black Locust, Eastern Cottonwood, Tree of Heaven, Quaking Aspen and Norway Maple) do not maximize habitat value Future residential development threatens to increase pedestrian traffic with dogs, presenting a waste management and water quality concern
8	Morton St Marsh / Belle Isle Marine Ecology Park	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons • Transitional marsh wants to migrate into developed areas of Winthrop • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze), especially at Morton St/Banks St Runoff washes into the marsh from upland development. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues Ponding of high tide occurs adjacent to the Marine Ecology Park, oversaturating and degrading the marsh Accelerating marsh erosion has been observed adjacent to the boat yard and main channel

No.	Management Areas	Vulnerability Description
9	The Key	Sea level rise causes habitat conversion: • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons An artificial berm acts as a barrier to tidal exchange and tidal/stormwater drainage Poor drainage results in the oversaturation of low marsh habitat and subsequent degradation. The sparse low marsh vegetation limits sediment capture and elevation of the marsh platform Poor tidal exchange limits habitat diversity and increases residence time of nutrients and contaminants
10	East Marsh / Short Beach	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons • Transitional marsh wants to migrate into developed areas of Revere and Winthrop • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Runoff washes into the marsh from upland development. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues
11	Revere St Marsh / John Kilmartin Pathway	Sea level rise causes habitat conversion: • Subtidal habitat expansion • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons

No.	Management Areas	Vulnerability Description
		• Transitional marsh wants to migrate into developed areas of Winthrop • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Runoff washes into the marsh from upland development. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues. Improve stormwater and tide water conveyance.

4.0 RESTORATION APPROACH

Monitoring and restoration of Belle Isle Marsh is critical to tracking and reversing the negative impacts of environmental and anthropogenic stressors. In addition, salt marsh restoration addresses other concerns, including loss of recreational and educational opportunities, threat of brush fire, and lack of aesthetic and visual resource value (i.e., natural landscape). Restoration alternatives were developed with input from the steering committee, stakeholder, and community input. Core priority characteristics of Belle Isle Marsh were assembled, priorities informed establishment of restoration goals, and restoration goals informed development of appropriate restoration alternatives.

Through discussions with DCR, the current and future state of Belle Isle Marsh should be approached towards the following goals:

- Gain an understanding of the degraded areas of the marsh and obtain data to support conclusions regarding the probable causes and/or possible solutions to this degradation.
- Protect and restore salt marsh habitat.
- Prolong the existence of the reservation as Boston's largest salt marsh. Belle Isle Marsh is part of the only substantial green space in this Environmental Justice Community and is critically important to reducing heat island effect.

4.1 SUMMARY OF COLLABORATOR'S PRIORITIES FOR BELLE ISLE MARSH

Discussions with steering committee members have identified the following priority characteristics of Belle Isle Marsh which would be beneficial to marsh health and function if targeted in future research, management, and restoration efforts:

Existing resources and the natural condition of the marsh

The marsh has been negatively impacted from significant anthropogenic influence. Preserving and restoring the natural condition is critical to maintain the ecological and societal benefits provided by Belle Isle Marsh. Important issues to focus on include:

- The history of restricted/eliminated habitat and impaired water quality.
- Minimizing salt marsh erosion (collapse, calving) and degradation (ponding, pollution).
- Balancing wildlife and human uses.
- Anticipated added pressure of increased visitor usage from ongoing development. Off leash dogs are a particular concern for wildlife.
- Prevention of illegal dumping.
- Protection of existing salt marsh from encroaching development.
- Ensuring space for natural marsh migration.

Habitat diversity and connectivity, food web support, and biodiversity preservation

Marsh habitat supports critical flora and fauna biodiversity, it is a sanctuary among an urban setting:

- Subtidal habitat supports invertebrate and fish species critical to the food web, as well as commercial and recreational fishing.
- Mudflat habitat is critical for shorebird foraging:

  - Shorebirds (least terns and plovers, etc.) observed foraging on benthic invertebrates in late winter. They prefer mudflat of Belle Isle Marsh to the open coast because it is better sheltered from harsh weather conditions.
  - The shelter and food provided to shorebirds promotes an earlier nesting season, and supports reproductive success.
- Salt pannes provide the most protected foraging habitat for breeding and migratory shorebirds who feed on small fish and insects.
  - Salt pannes behind the L-Berm have previously supported horseshoe crab.
- Low marsh habitat is a sanctuary for birds at low tide, and fish at high tide. Vegetation takes up pollutants and nutrients, and sequesters them through peat development.
- High marsh habitat is critical for saltmarsh sparrow nesting – *Top Priority*
  - High marsh habitat is currently limited within the marsh, overshadowed by the much larger low marsh habitat.
  - High marsh habitat is the only viable habitat for saltmarsh sparrow breeding and nesting. Almost 100% of saltmarsh sparrow nesting occurs behind the L-Berm adjacent to salt pannes.
  - Sea level rise threatens saltmarsh sparrow. Almost 100% of saltmarsh sparrow nesting occurs behind the L-Berm adjacent to salt pannes. They are predicted to go extinct by 2050 without intervention.
- Transitional/upland habitat:
  - Forest has been found to support important bird species, but trees are dying from increased salinity, and elevation would need to be raised to prevent this further.
  - Fresh water pools support species of concern and endangered species, and are threatened by expanding stands of *Phragmites*.
  - Grassland meadow, especially the 12-acre area in the main park is considered an important and rare habitat. This is the only natural meadow for miles, and supports the important Meadow Vole and critical pollinator species.
  - Preserve and build upland wildlife corridors within an urban setting.

Water quality enhancement through sediment and nutrient cycling, chemical and metal retention, pathogen removal

- Marshes adjacent to outfalls, large impervious surfaces (i.e. parking lots, roofs), and other pollution sources provide water quality benefits through nutrient and pollutant uptake and filtration.
- Protect existing salt marsh from new and existing sources of pollution.

Storm surge and wave attenuation

- Marsh vegetation provides a buffer between the ocean and development. It can serve to attenuate storm waves.
- Shorelines composed of natural habitat act as a regenerative buffer against storm waves, providing erosion control and protection of infrastructure/development.
- Encroachment of saltwater threatens to corrode infrastructure.
- Flood projections threaten to cutoff evacuation routes.

- Sea level rise threatens to exacerbate all issues regarding coastal storm flooding.

Stormwater conveyance and discharge

- Provide flood storage capacity and improve drainage.
- Restore natural sediment inputs to the marsh system.

Carbon storage for climate change mitigation

- Peat marshes provide carbon sequestration which helps mitigate climate change.
- *Phragmites* stands increase the risk of brush fires, while peat building low and high marsh vegetation lessen risk.

Socio-economic services to humans such as aesthetics, natural heritage, recreation/ecotourism, education, physical and psychological health

- Preserve and improve aesthetic quality. Belle Isle Marsh is one of a few green spaces available to residents of East Boston.
- Increase recreational opportunities. In order to appreciate and understand salt marshes, people must be able to see them and directly access them. Note that Belle Isle Marsh became a popular visitor serving space as a relief to the stresses of city and pandemic.
- Continue and create ongoing science and monitoring programs.

4.2 Restoration Goals

The cross-section of Belle Isle Marsh vulnerabilities (see Section 3.5) and the valued characteristics of the marsh (see Section 4.1) led to the identification of restoration goals. Restoration goals are used to develop restoration alternatives, and plan catalytic alternatives, near-term alternatives, long-term alternatives, and monitoring recommendations.

Protect existing resources

Preserving existing peat marshes is the primary way to maintain sequestered carbon and mitigate climate change. Marsh creation is less significant to carbon sequestration because it depends on a sediment substrate, not peat:

- Do not disturb sensitive species such as high marsh and saltmarsh sparrow.
- Do not disturb the habitat value provided to breeding and migratory shorebirds in salt pannes.
- Prioritize and design least destructive/minimally invasive restoration approaches.

Increase marsh resilience in the face of sea level rise

- Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown):
    - Increase elevation of existing habitat areas (mudflat/low marsh/high marsh).
    - Create high/transitional marsh habitat for marsh migration.
    - Target no net loss of habitat area.
- Create open space designated for marsh migration in upland areas.
- Minimize the expansion of salt pannes with sea level rise. Expanded salt pannes could increase die off. This is accomplished through improved flushing of salt pannes.
- Protect grassland meadow from sea level rise.

Increase habitat value for sensitive species

- Expand high marsh area for saltmarsh sparrow.
- Reduce *Phragmites* to restore freshwater pools and replace with high/transitional marsh native vegetation.
- Restore habitat diversity to enhance connections and migration corridors among isolated habitats to improve fish and wildlife habitat. This is accomplished through improving tidal range and elevations throughout the marsh to support co-existence of subtidal (low elevation) through transitional marsh (high elevation) habitats.
- Enhance tidal drainage to eliminate perched tides and ponding, which subsequently oversaturate and degrade marsh habitat. Target areas with poor drainage and degraded marsh habitat, such as Rosie's Pond, L-Berm, and the Key.

Improve water quality

- Restoration alternatives that are hydrologically connected to point or non-point discharges will benefit water quality by treating polluted run-off.
- Look to expand habitat for and populations of filter feeders, such as oysters, clams, and mussels.
- Increase tidal prism and reduce residence time, especially in tidally constricted areas such as Rosie's Pond, L-Berm, and the Key.

Restore natural marsh condition

- Reverse negative impacts of historic berms by enhancing tidal penetration returning historically filled areas to marsh habitat.
- Reverse negative impacts of historic ditching to restore salt panne/tidal creek network through ditch remediation and runneling.
- Remove invasive species and increase native species biodiversity (see *Phragmites* discussion under "Increase habitat value…").
- Restore natural sedimentation patterns by enhancing sediment transport through barriers such as Sales Creek tide gate.

Address marsh erosion

- Minimize edge erosion along main channel and tidal creeks.
- Reverse historic erosion through marsh restoration.
- Priority areas include Winthrop (between the boat yard and the Marine Ecology Park) and the upper main channel (by the Sales Creek tide gate).

Maximize social benefit of Belle Isle Marsh, while minimizing human impact to resources

- Increase low impact public access. This may include access points (pedestrians and boaters), boardwalk trails, formal programming, educational/interpretive and wayfinding signage, and trash bins and doggie bags for pet waste.
- Protect open space through salt marsh restoration.
- Provide mosquito control, which otherwise discourages visitors.

- Use alternatives to educate the community regarding wetlands and wetland restoration. Involve local volunteers.

4.3 RESTORATION ALTERNATIVES

To achieve restoration goals, a "toolbox" of restoration strategies was developed (Table 17). These strategies were then considered within each of the Marsh Management Areas (Figure 2) to identify catalytic alternatives (alternatives which can be implemented now for immediate benefit, Figure 53), near-term alternatives (alternatives to adapt to 2030-2050 conditions), long-term alternatives (alternatives to adapt to 2050-2100 conditions), and supporting monitoring tasks (Table 18). Note that the state of the marsh, its function, uses, and the surrounding development are subject to change and future restoration projects must account for such changes.

Table 17. Belle Isle Marsh Restoration Toolbox.

Restoration Toolbox	Description
No Action	No action may be preferable in areas supporting sensitive species which may be at risk of displacement due to restoration efforts. No action may be preferable in areas with an inherent expectation that issues will naturally resolve as sea level rises. For instance, existing *Phragmites* abutting the main channel by Sales Creek is projected to convert to marsh area.
Enhanced Tidal Penetration, and Tidal/ Stormwater Drainage	Lack of tidal and stormwater flushing can create areas of stagnant fresh or saltwater, which degrade marsh habitat, support mosquito breeding, and limit biodiversity (including mosquito-controlling killifish). Alternatives that promote stormwater drainage from salt marshes by removing impediments to flow, or the strategic creation of ditches, may contribute to mosquito control. Restoration alternatives that increase flow to tidally restricted salt marshes and promote drainage of tides and stormwater are recognized to improve water quality, habitat quality, and habitat diversity. Enhancing tidal and stormwater flows typically is achieved through removing points of constriction, breaching barriers, excavating/dredging more direct channels, and increasing channel area through excavating/dredging. Such areas in Belle Isle Marsh include Saratoga Street bridge, Sales Creek tide gate, man-made berms (L-Berm and the Key), and certain tidal creeks/mosquito ditches (approaching Rosie's Pond, approaching Short Beach, and approaching Arglye St/Bayou St, Winthrop). Excavated or dredged material may be beneficially re-used for marsh creation. Dredging may also improve navigational use of channels, a goal of Winthrop and Revere planning documents.
Open Marsh Water Management (OMWM)	Tidal creek systems consisting of complex, dendritic drainage patterns, containing creeks of several orders and high sinuosity, generally provide higher habitat quality. A wide range of creek widths, depths, flow rates, water temperatures, salinity levels, and other physical elements, comprise a corresponding range of microhabitats, each suited to particular species or guilds. This condition is directly opposite to the existing condition of most Massachusetts salt marshes, including Belle Isle Marsh, which have been subjected to grid ditching for mosquito control. Ditch remediation and runneling creates an appropriate habitat for the natural enemies of the mosquitoes; and reduce flooding in areas that are not wet on an ordinary basis which reduces the environment that would support mosquitoes but not their predators. Plugging grid ditches, re-establishing salt pannes and improving small meandering tidal creeks enhances killifish and bird foraging habitat.

Restoration Toolbox	Description
	Marsh areas that are not ditched and drain over a broad surface maintain more contact between water, vegetation, and soil. This may prevent further subsidence, reduce the rate of marsh loss, enhance nutrient and pollutant uptake, and possibly even gradually elevate the marsh bed through sediment deposition. This provides co-benefits through storm surge attenuation.
Salt Marsh Restoration	Salt marsh restoration involves the dredging or grading (cutting/filling) of landforms and planting of vegetation to create and/or restore salt marsh habitats. Healthy salt marsh habitat reduces storm surge and wave energy, reduces run-off velocities, promotes sediment deposition and uptake of nutrients and pollutants, and supports biodiversity. Alternatives may enhance existing habitat such as Rosie's Pond, the L-Berm, and the Key. Alternatives may expand habitat seaward into mudflat/open water areas such as in eroded areas of Winthrop or the upper main channel. Alternatives may expand habitat landward by removal of fill material, such as the L-Berm. Priority habitat types can be expanded, such as high marsh which supports saltmarsh sparrow nesting and low marsh migration with sea level rise.
Marsh Migration Pathways	Expansion of high marsh, transitional marsh, and open space uplands creates a natural buffer between natural and developed areas, and creates space for marsh migration. Management practices should focus on the following key areas: • Areas where marsh elevation is not accreting, • Areas where marsh migration is predicted to occur but would be impeded by existing or future development, • Areas where steep slopes prevent the gradual migration of marsh habitat inland and upland, • Areas where tidal flows are attenuated or nearly fully restricted by topography, which consequently limit the accretion, migration, and expansion of habitat. Marsh migration pathways are enhanced through retreat of low-lying developed areas, creation of gentle slopes (~12:1 H:V) so that vegetation can migrate, and enhanced tidal exchange to far reaches of a marsh system.
Shoreline Stabilization (i.e., Erosion Control)	Salt marsh sills can be installed to dampen wave energy, protect the marsh edge, and encouraging sediment accretion. Living breakwaters using materials which support oyster recruitment and oyster restoration can improve water quality through filtration. With sea level rise, areas with increased open water fetch and increased wave energy/current velocities may become priorities for shoreline stabilization.
Thin Layer Deposition (TLD)	TLD refers to the incremental raising of marsh habitat elevation to adapt to sea level rise and/or marsh subsidence. TLD is typically constructed in low or high marsh areas, and typically raises marsh elevations between 4-10 inches. There was a "natural experiment" in the North Shore's Great Marsh in the late-2010's when extreme tides stranded large chunks of mud-laden ice on the marsh platform. Once ice melted, mudflat-sourced sediment now covered the marsh

<table>
<tr><th>Restoration Toolbox</th><th>Description</th></tr>
<tr><td></td><td>platform. Scientists from New Hampshire monitored the subsequent recovery and observed that vegetation recovered naturally in areas with 4 inches or less of material deposition.</td></tr>
<tr><td>Invasive Species Management & Native Species Planting</td><td>Removal of non-native species, primarily Phragmites:
• Mow Phragmites and remove biomass
• Allow tidal penetration for saltwater to kill rhizomes (not very effective, need next steps)
• Chemical treatment (glyphosate)
• If prefer to avoid chemicals, excavate the rhizomes out.
Revegetate habitat with salt tolerant native species that will increase biodiversity (see Section 2.7).</td></tr>
<tr><td>Water Level Control Structure</td><td>This would consist of a series of combination slide/flap gates that would be used to allow for full control of the tides. The structure would be used to attenuate the tide to a certain level, being engaged somewhere along a spectrum of open to closed. The structure would be an operational element that could be controlled as necessary and allow for storm protection (short-to-mid-term) and marsh resiliency in the face of sea level rise (long-term). There would be full control of the volume of water entering and exiting the system. An example was constructed in the Herring River Restoration Project, Wellfleet, MA.
While intended primarily to prevent the marsh from drowning under sea level rise, the control structure would provide coastal flood risk benefits. However, the structure would not alone would not solve the overall coastal flood risk problem long-term, which also would require adaptation in other modeled entry points of flood water.</td></tr>
<tr><td>Monitoring Program</td><td>Restoration efforts should be accompanied by a Monitoring and Adaptive Management plan addressing topics such as:
• Long-term environmental conditions (e.g., water levels, water quality, habitat distribution, wildlife populations)
• Success or failure to meet restoration goals
• Triggers for re-assessment (e.g., marsh erosion, lack of vegetation establishment, change in species, etc.)
• Adaptive management strategies to alter or abandon a restoration approach which is not successful
Install long-term tide gauge to observe king tide, storm surge, and sea level change within the marsh. This can help inform design criteria for restoration and development.
Areas identified for “No Action” should be monitored to ensure expected changes with sea level rise proceed successfully.</td></tr>
</table>

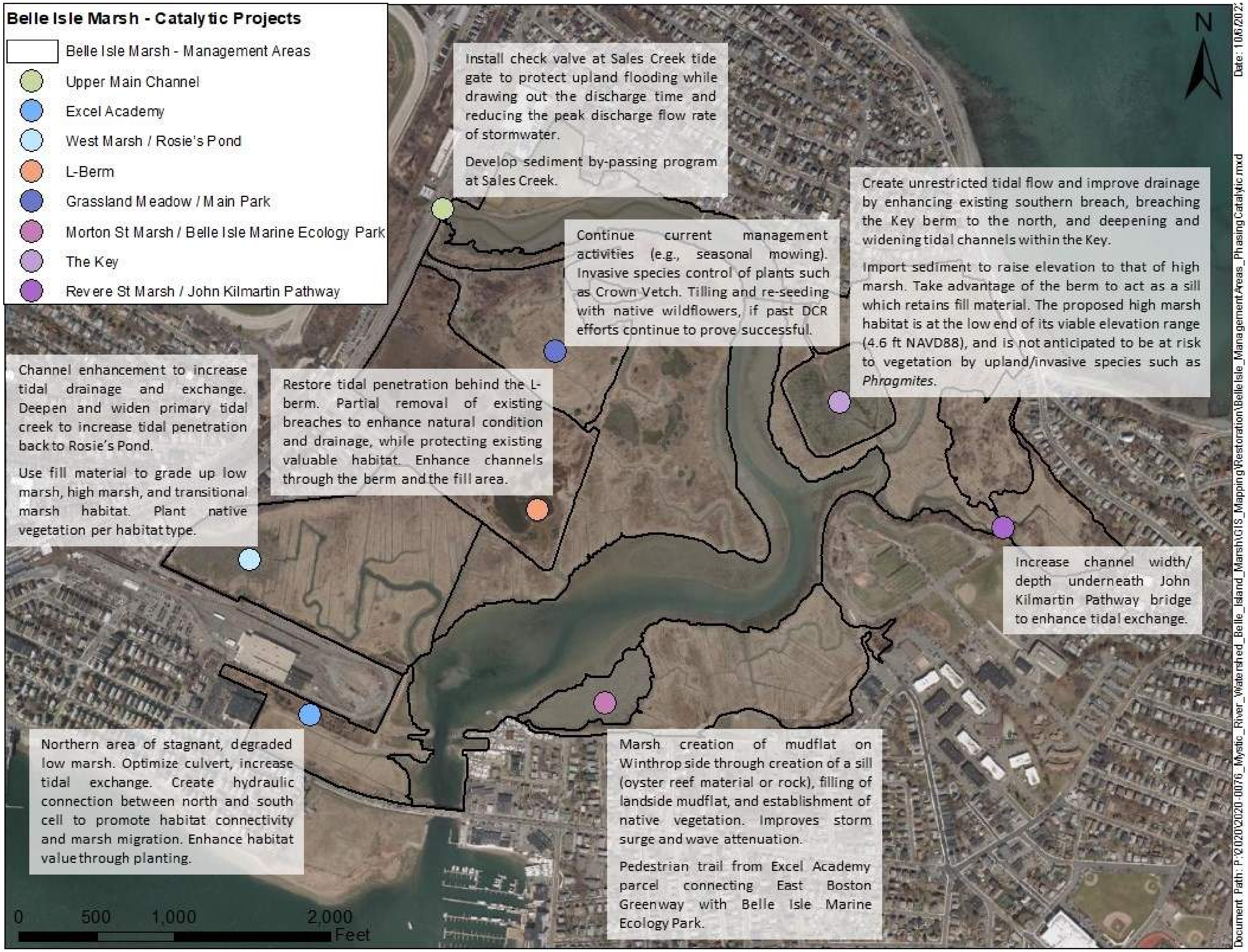


Figure 53. Catalytic alternatives which could be implemented at Belle Isle Marsh with immediate benefit.

Table 18. Restoration Alternatives and Implementation Phases.

No.	Management Areas	Desired Goal	Catalytic Alternatives (Present Day Implementation)	Short Term Approach (2030 – 2050 Implementation)	Long Term Approach (2050 – 2100 Implementation)	Monitoring
1	Lower Main Channel	Maintain maximum tidal prism and tidal range to support water quality and habitat distribution/diversity	No catalytic alternatives proposed.	Dredging of the main channel could provide sediment for marsh creation in mudflat, and thin layer deposition in adjacent marsh platform.	At Saratoga St Bridge, install water level control structure. The structure would control tidal and storm surge water levels within the marsh, preserving marsh habitat under SLR and partially protecting communities from flooding by way of Belle Isle Marsh. The structure would have the capability of non-linear exchange capacity due to the use of slide/flap gates. The system can be set to limit water coming in, but still be allowed to discharge stormwater during lower tides. Design would maintain marine habitat connection for subtidal species, with only short-lived disruption during a major storm event.	Long-term (25 years or permanent) tide gauge to monitor local dynamics and long-term changes to tidal level, storm surge, and sea level rise.
2	Upper Main Channel	Restore natural sedimentation patterns and saltwater penetration up Sales Creek	Install check valve at Sales Creek tide gate to protect upland flooding while drawing out the discharge time and reducing the peak discharge flow rate of stormwater. Develop sediment by-passing program at Sales Creek.	Develop tide gate management plan to leave tide gate open during all but storm surge conditions, allowing low-lying areas adjacent to the Blue Line to convert to salt marsh, and promoting the migration of saltmarsh habitat inland.	Consider if Revere Public School fields would accept any degree of managed retreat for salt marsh migration. If not, along perimeter of marsh and development, construct living shoreline/ horizontal levee with gently sloping face to provide elevation protection from storms and provide habitat migration pathways.	Need for further understanding of tide gate management, flow rates, water quality, and changes with development. Monitoring of tide gate opening schedule, measurements of flow rate, and long-term salinity and tide gauge would enhance understanding.
3	Excel Academy	Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown) • Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration Restore degraded marsh habitat adjacent to MBTA maintenance yard	Northern area of stagnant, degraded low marsh. Optimize culvert, increase tidal exchange. Create hydraulic connection between north and south cell to promote habitat connectivity and marsh migration. Enhance habitat value through planting.	Plug some, but not all mosquito ditches. Selectively enhance tidal exchange through runneling, with a focus on areas of stagnation/marsh degradation. Pedestrian trail from Excel Academy connecting East Boston Greenway with Belle Isle Marine Ecology Park. Mitigate marsh erosion with stabilization approaches such as installing oyster reefs.	Thin layer deposition across low marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates. Along perimeter of marsh and development, construct living shoreline/horizontal levee with gently sloping face to provide elevation protection from storms and provide habitat migration pathways.	Vegetation and water level monitoring. City of Boston is planning a berm and/or floodwall along the perimeter of this area, coordinate adaptation efforts.
4	West Marsh / Rosie's Pond	Revitalize degraded wetland. Address consequences of mosquito ditching. Enhance tidal and stormwater drainage to minimize ponding (Figure 34). Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown)	Channel enhancement to increase tidal drainage and exchange. Deepen and widen primary tidal creek to increase tidal penetration back to Rosie's Pond. Use fill material to grade up low marsh, high marsh, and transitional marsh habitat. Plant native vegetation per habitat type.	Plug some, but not all mosquito ditches. Selectively enhance tidal exchange through runneling, with a focus on areas of stagnation/marsh degradation	Thin layer deposition across low marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates.	Vegetation and water level monitoring.

No.	Management Areas	Desired Goal	Catalytic Alternatives (Present Day Implementation)	Short Term Approach (2030 – 2050 Implementation)	Long Term Approach (2050 – 2100 Implementation)	Monitoring
		• Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration				
5	Central Marsh	Minimize the expansion of salt pannes with sea level rise. Address consequences of mosquito ditching. Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown) • Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration	No catalytic alternatives proposed.	Plug some, but not all mosquito ditches. Selectively enhance tidal exchange through runneling, with a focus on areas of stagnation/marsh degradation.	Thin layer deposition across low marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates.	Vegetation and water level monitoring.
6	L-Berm	Do not disturb saltmarsh sparrow nesting (i.e. high marsh) and foraging habitat or overwintering owl habitat. Enhance tidal exchange and tidal/stormwater drainage. Revitalize degraded wetland. Expand high marsh area for saltmarsh sparrow. Minimize the expansion of salt pannes with sea level rise. Remove invasive species and increase native species biodiversity. Reduce *Phragmites* and restore freshwater pools and create high/transitional marsh.	Restore tidal penetration behind the berm. Partial removal of existing breaches to enhance natural condition and drainage, while protecting existing valuable habitat. Enhance channels through the berm and the fill area. *Complete removal of the berm and grading the marsh surface to the level of pre-existing salt marsh was considered, but is anticipated to result in impacts to existing saltmarsh sparrow habitat, and precludes the opportunity to manage future tidal levels under SLR through a water level control system installed at breach locations.*	Under sea level rise, salt panne and high marsh can be preserved through tidal control measures installed at berm breach areas, for example a rudimentary control system like weir boards. Removal of non-native species, primarily *Phragmites* to promote and expand low/high/transitional marsh. • Mow phragmites, remove biomass • Allow tidal penetration for saltwater to kill rhizomes (not very effective, need next steps) • Chemical treatment (glyphosate) • If prefer to avoid chemicals, excavate the rhizomes out.	Under sea level rise, import material and grade high marsh and transitional habitat. The berm can be used to act as a sill which retains fill material.	Vegetation and water level monitoring. City of Boston is planning a berm and/or floodwall along the perimeter of this area, coordinate adaptation efforts.
7	Grassland Meadow / Main Park	Do not disturb valuable grassland meadow habitat. Minimize human impact to resources. Remove invasive species and increase native species biodiversity.	Continue current management activities (e.g., seasonal mowing) Invasive species control of plants such as Crown Vetch Tilling and re-seeding with native wildflowers, if past DCR efforts continue to prove successful.	Reconfigure trails to control traffic flow into use areas and away from sensitive areas. Add boardwalks and rails along the trail to prevent human trampling of fragile habitat. Signage and educational materials/ programs to inform public of the ecological value of Belle Isle Marsh, climate change vulnerability, and the science and engineering of restoration alternatives for long-term preservation of the marsh.	Protect grassland meadow habitat from saltwater intrusion and sea level rise through creation of nature-based solution. Design elevated feature with gently sloping face to provide protection from coastal storm overtopping and provide habitat migration pathways.	Continue ongoing vegetation and wildlife monitoring.

No.	Management Areas	Desired Goal	Catalytic Alternatives (Present Day Implementation)	Short Term Approach (2030 – 2050 Implementation)	Long Term Approach (2050 – 2100 Implementation)	Monitoring
8	Morton St Marsh / Belle Isle Marine Ecology Park	Expand marsh area and enhance storm protection value Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown) • Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration	Marsh creation of mudflat on Winthrop side through creation of a sill (oyster reef material or rock), filling of landside mudflat, and establishment of native vegetation. Improves storm surge and wave attenuation. Pedestrian trail from Excel Academy connecting East Boston Greenway with Belle Isle Marine Ecology Park.	Plug some, but not all mosquito ditches. Selectively enhance tidal exchange through runneling, with a focus on areas of stagnation/marsh degradation.	Thin layer deposition across low marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates. Managed retreat of existing boatyard for natural marsh migration.	Vegetation and water level monitoring.
9	The Key	Revitalize degraded wetland. Enhance tidal exchange and tidal/stormwater drainage. Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown) • Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration	Create unrestricted tidal flow and improve drainage by enhancing existing southern breach, breaching the Key berm to the north, and deepening and widening tidal channels within the Key. Raise marsh elevation to that of high marsh. Take advantage of the berm to act as a sill which retains fill material.	Adaptive management of catalytic restoration alternative to ensure high marsh habitat establishes and entices saltmarsh sparrow nesting.	Thin layer deposition across marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates.	Vegetation and water level monitoring. Monitoring could improve understanding of sedimentation and re-vegetation processes regarding the natural changes which have occured since storms breached the Key in 2018.
10	East Marsh / Short Beach	Address consequences of mosquito ditching. Enhance tidal exchange and tidal/stormwater drainage. Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown) • Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration	No catalytic alternatives proposed.	Channel enhancement to increase tidal exchange: • Tidal creek – deepen and widen primary tidal creek to increase tidal penetration back to Rosie's Pond • Mosquito ditches – Plug some, but not all ditches. Selectively enhance tidal exchange through runneling, with a focus on areas of stagnation/marsh degradation	Thin layer deposition across low marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates. Along perimeter of marsh and Winthrop Parkway, construct living shoreline/ horizontal levee with gently sloping face to provide elevation protection from storm waves overtopping Short Beach and provide habitat migration pathways. If overwashing of Short Beach increases in frequency and severity, natural sand deposits could be planted to create coastal dune habitat.	Vegetation and water level monitoring.
11	Revere St Marsh / John Kilmartin Pathway	Address consequences of mosquito ditching. Enhance tidal exchange and tidal/stormwater drainage. Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown) • Increase elevation of existing habitat areas (mudflat/low marsh/high marsh) • Create high/transitional marsh habitat for marsh migration	Increase channel width/depth underneath John Kilmartin Pathway bridge to enhance tidal exchange.	Plug some, but not all mosquito ditches. Selectively enhance tidal exchange through runneling, with a focus on areas of stagnation/marsh degradation.	Thin layer deposition across low marsh platform to incrementally raise marsh elevation in parallel with observed sea level rise rates.	Vegetation and water level monitoring.

5.0 RESTORATION CONCEPT DEVELOPMENT AND MODELING

While Table 18 details restoration alternatives from small to large scale, a hydrodynamic modeling assessment was employed to evaluate three large-scale restoration approaches. The EFDC hydrodynamic model (see Appendix C) was developed and calibrated to assess existing conditions (see Sections 2.3, 3.1, and 3.2.1). A representation of hydrodynamic circulation in the marsh was validated with observations, and was successfully validated with observations. EFDC was then utilized to design and model restoration alternatives at three sites. This modeling assessment is not comprehensive, and is tailored to the parameters of the EFDC model. For example, ditch remediation and runneling could not be modeled due to limitations of model resolution (i.e., ditch remediation involves topographic changes on the scale of inches, while the model resolution is 3-4 meters). Therefore, the restoration assessment does not explore modeling of low impact, small-scale restoration concepts. It was decided that the most value that this assessment could bring would be to model large-scale restoration, and determine the potential benefits. Once proven to be effective, these approaches can then begin the process of optimization, and can be scaled back, if necessary, through more detailed analysis in future design phases. Recommended alternatives were input into the model as a change in the topography, for instance, the creation of a new channel, breaching of a berm, or grading of habitat. The model was rerun under these conditions and new water level, velocity, and salinity results were observed to determine if conditions are substantially improved.

It is important to note, the Assessment does not directly address the current operation of the Bennington Street Pump Station nor changes that will result from development of Suffolk Downs. Details of model setup, inputs, and calibration can be found in Appendix C.

5.1 RESTORATION SITES AND CONCEPT DEVELOPMENT

Restoration locations were determined through a series of discussions with the Steering committee, including DCR, MyRWA, FBIM, and TNC. Through discussions of vulnerability and priorities, three Marsh Management Areas were selected for the focus of this study: Rosie's Pond, L-Berm, and the Key (Figure 54). Conceptual restoration approaches were developed for each of these three catalytic alternatives, as detailed below. The three sites and restoration concepts are not necessarily the top three actions to be taken within the marsh, and instead represent large-scale actions which are intended to derive the greatest benefit to degraded parts of the marsh, both in the short and long-term. Other reaches of the marsh also would benefit from restoration, both small and large-scale, but were beyond the scope of this work to model.

Figure 54. Belle Isle Marsh priority restoration areas: Rosie's Pond, L-Berm, and the Key.

5.1.1 Rosie's Pond

Rosie's Pond currently exists as a "depression" in the saltmarsh at an average elevation of 1.6 ft NAVD88. Vegetation within Rosie's Pond is mostly degraded low marsh with large areas of standing water. The goal of the Rosie's Pond restoration is to dredge a connecting channel between a flooded mosquito ditch network and the center of the pond, branching out in order to deliver tidal water to the area, and drain standing tidal and stormwater. Dredge depths are proposed to -3.2 ft NAVD88. Additionally, healthy low marsh surrounding the pond sits at an elevation of 4.4-4.7 ft NAVD88. Due to the depression in Rosie's Pond being 2.8-3.1 ft lower than the preferred elevation of low marsh and a lack of natural sediment input to the marsh system, filling of the marsh is proposed to allow low marsh habitat to thrive. The restoration design raises the surface of the saltmarsh to the upper elevation of healthy ambient (present-day) low marsh, 4.6 ft NAVD88. This elevation slopes up to an area of fringe high-marsh proposed at an elevation of 5.2 ft NAVD88, which ultimately ties into transitional-upland habitat at 7.2 ft NAVD88. Restoration aims to dredge roughly 20,000 cubic yards (cy) of material for deepening of the primary tidal creek in West Marsh, enhancement of the existing channels, and creation of secondary channels within Rosie's Pond. Raising of the low marsh platform and high/transitional marsh will require roughly 13,000 cy of fill material to raise Rosie's Pond and expand high marsh habitat. These volumes were estimated using changes in topobathy between the existing modeling DEM and the restoration DEM, presented in Figure 55.

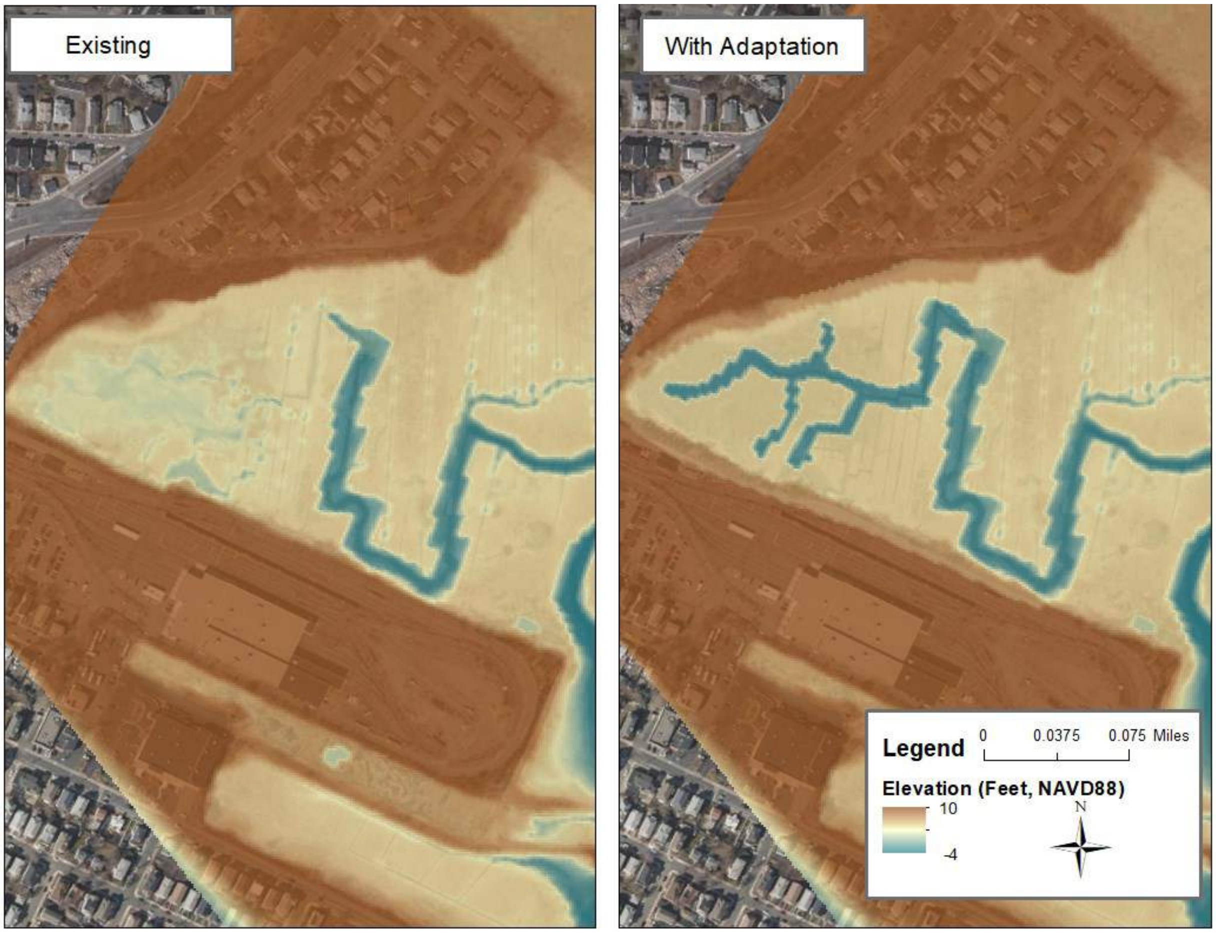


Figure 55. **The left panel presents the existing conditions, while the right panel presents the restoration scenario for the Rosie's Pond sub-region of Belle Isle Marsh. Higher regions are presented in orange, brown and yellow, whereas low regions are presented in shades of blue. All elevations are in feet, NAVD88.**

5.1.2 L-Berm

The L-Berm is one of the most anthropogenically impacted areas of Belle Isle Marsh. The L-Berm surrounds a region of hydraulic disconnection, and is a tidal barrier for a series of salt pannes and high marsh habitat. Observations and modeling show that the L-Berm acts to trap water, resulting in standing water and expanding salt pannes and low marsh behind the structure. The restoration design for the L-Berm enhances the three main existing breaches in the berm, dredging a channel to -3.2 ft NAVD88 which is the elevation of the mudflat at the edge of the Belle Isle Marsh main channel. Proposed channel enhancement continues behind the L-Berm to areas of poor drainage. The L-Berm dredge areas are proposed to follow existing tidal creeks or mosquito ditches and enhance existing breaches in the man-made berm. Leveraging existing breach areas and low elevation areas is anticipated to benefit this alternative because it reduces dredge volume and supports the revitalization of habitat types which are struggling to establish in these impacted areas. Multiple model iterations of increasing dredge depths found that dredging to the elevation of mudflat is necessary to introduce the full tidal range behind the L-Berm. Furthermore, the enhanced breaches can be adapted under future SLR conditions with weir boards to effectively control water levels behind the L-Berm, allowing salt marsh habitat to persist (Figure 56).

The goal of restoration is to drain the standing water behind the L-Berm, increase the tide range, and halt the expansion of the salt pannes while allowing critical high marsh habitat for saltmarsh sparrow nesting to continue to thrive. Improved drainage is also anticipated to expand high marsh area, because present day elevations which could support high marsh are instead supporting low marsh vegetation which tolerates the oversaturation. This restoration activity will require the excavation/dredging of roughly 52,000 cy of material, mostly surface material in submerged mosquito ditches (existing channels) and at the berm. These volumes were estimated using changes in topobathy between the existing modeling DEM and the designed restoration DEM, presented in Figure 57.

Complete removal of the L-Berm was considered, but was thought to be a heavy-handed approach when the model shows enhancing existing breaches and connecting channels is enough to improve tidal exchange behind the L-Berm. Salt marsh re-establishment within the footprint of the berm is an anticipated result of the proposed restoration. Higher elevation areas currently occupied by *Phragmites*, shrubs, and forest would convert to salt marsh under future SLR conditions, facilitated by the improved tidal exchange of the restoration alternative.

Figure 56. Example of weir boards on the face of a large culvert used for water control in Orleans, MA.

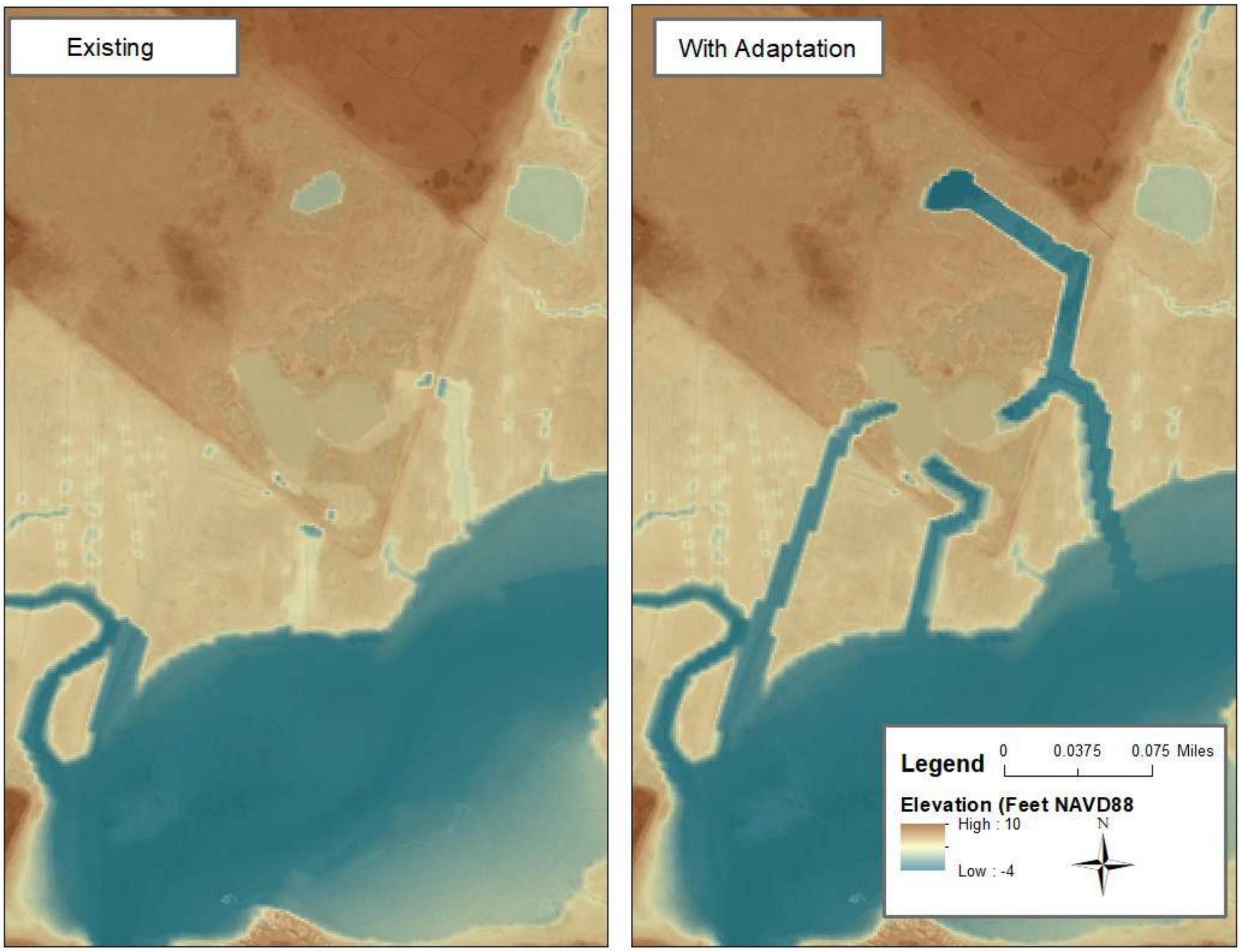


Figure 57. The left panel presents the existing conditions, while the right panel presents the restoration scenario for the L-Berm sub-region of Belle Isle Marsh. Higher regions are presented in orange, brown and yellow, whereas low regions are presented in shades of blue. All elevations are in feet, NAVD88.

5.1.3 The Key

The Key is a small section of Belle Isle Marsh that is experiencing low marsh die off due to a lack of proper drainage via the natural breaches occurring in an anthropogenic berm. Recent breaching by 2018 storms has returned some tidal exchange, improving marsh conditions, but full restoration is still lacking. The goal behind the Key restoration is to increase the tide-range within the Key, eliminating the restriction and creating a transparent tidal signal through the Key breaches. The Key dredge areas are proposed to follow existing tidal creeks or mosquito ditches and enhance existing breaches in the man-made berm. Leveraging existing breach areas and low elevation areas is anticipated to benefit this alternative because it reduces dredge volume and supports the revitalization of habitat types which are struggling to establish in these impacted areas. Furthermore, the enhanced breaches can be adapted under future SLR conditions with weir boards to effectively control water levels behind the Key berm, allowing salt marsh habitat to persist. The breaches in the Key are being proposed to be dredged to a depth of -3.2 ft NAVD88, equivalent to the typical mudflat elevation, which through iterative model runs has proven to provide the greatest amount of tidal signal transparency through the breach. Proposed dredge depths are to accommodate mudflat habitat characteristic of tidal creeks. Future design phases should optimize dredge depths to ensure restoration success while minimizing dredge volumes.

Additionally, the restoration design proposes to raise the surface of the marsh in the Key to an elevation of 4.7 ft NAVD88, which is the elevation of ambient high marsh in the areas surrounding the Key. This will convert the Key into a high marsh “sanctuary” protected by the Key berm and isolated from the main park, which aims to attract saltmarsh sparrow and provide protected habitat which is resilient to SLR. This restoration activity will require the removal of roughly 12,000 cy of material, mostly surface material in submerged mosquito ditches (existing channels) and at the berm, and will require roughly 11,000 cy of fill material to raise the surface of the marsh. These volumes were estimated using changes in topobathy between the existing modeling DEM and the designed restoration DEM, presented in Figure 58.

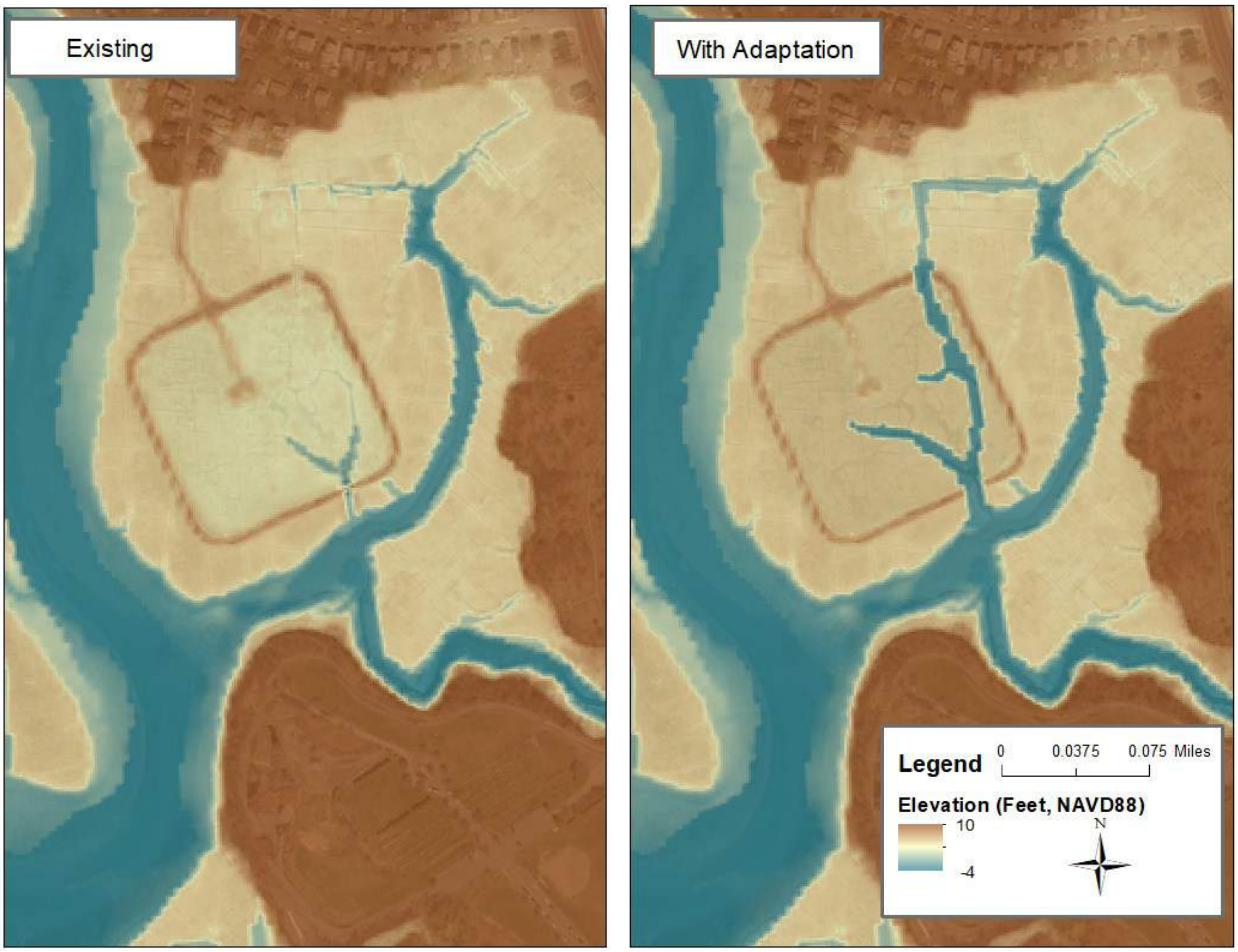


Figure 58. The left panel presents the existing conditions, while the right panel presents the adaptation scenario for the Key sub-region of Belle Isle Marsh. Higher regions are presented in orange, brown and yellow, whereas low regions are presented in shades of blue. All elevations are in feet, NAVD88.

5.2 Restoration Modeling

Restoration modeling was accomplished by applying each of the design elevations to the existing EFDC grid and completing simulations under a present-day spring tide cycle to note changes in circulation, flushing and minimum/maximum water surface elevations. The grid was divided into three sub-sections

(Rosie's Pond, the L-Berm, and the Key) of the marsh for simulation and post-processing analysis. Hydrodynamic modeling results for the proposed restoration were analyzed for conditions representing immediate post-construction, assuming a no sea level rise scenario. The following sections describe the results of each of the modeling simulations.

5.2.1 Rosie's Pond

Rosie's Pond exists as a shallow depression in the marsh where water collects, and therefore contains degraded saltmarsh vegetation. Marsh migration modeling indicates that this section of Belle Isle Marsh is vulnerable to transitioning to mudflat by the year 2070 due to large pockets of low-lying marsh and standing water that exist today (Woods Hole Group, 2022). The Rosie's Pond restoration features a raised marsh and a dredged channel through the center of the newly elevated marsh habitat.

Observed low tide water level in the depression is ~4 ft NAVD88, while the marsh elevation sits at 1.6 ft NAVD88, indicating that over 2 ft of stagnant water is common in Rosie's Pond. The limited tide range of existing conditions shows tidal attenuation (i.e., dampening or muting) of the lowest tides. The high tide is able to fully propagate across Rosie's Pond, however, during the outgoing (ebb) tide, drainage of the low marsh plain through tidal creeks is not efficient enough to completely drain the marsh platform. Before drainage from the upper marsh can be completed, the next incoming (flood) tide arrives and begins the cycle over. Restoration design model results indicate that the tidal range in the area of proposed new channels can be increased from 2.5 ft today, to approximately 9 ft under restoration conditions (Figure 59). Restoration results show a near full tidal prism as compared to Boston Harbor; the limited tidal range difference (<0.5 ft) represents limited tidal muting. The proposed alternative significantly reduces tidal muting and improves circulation in the Rosie's Pond area compared to existing conditions. Furthermore, the full suite of marsh habitats (subtidal, mudflat, low marsh, high marsh, and transitional marsh) require varying inundation frequencies and elevations to establish. Therefore, creating a greater range of tidal elevations by filling, grading, and dredging creates greater habitat diversity.

Water surface elevation results were extracted at a point on the proposed low marsh area which today exists as a shallow depression with standing water, typical of Rosie's Pond (Figure 60). Existing water surface elevations compared to the saltmarsh elevations exhibit standing water of up to approximately 2.5 ft at low tide during the spring tidal cycle. Under proposed conditions, water surface elevations compared to the saltmarsh elevation indicate no standing water during low tides in the spring cycle. This indicates that sufficient drainage can be restored, reversing the negative impacts of standing water, and supporting the expansion of low marsh habitat.

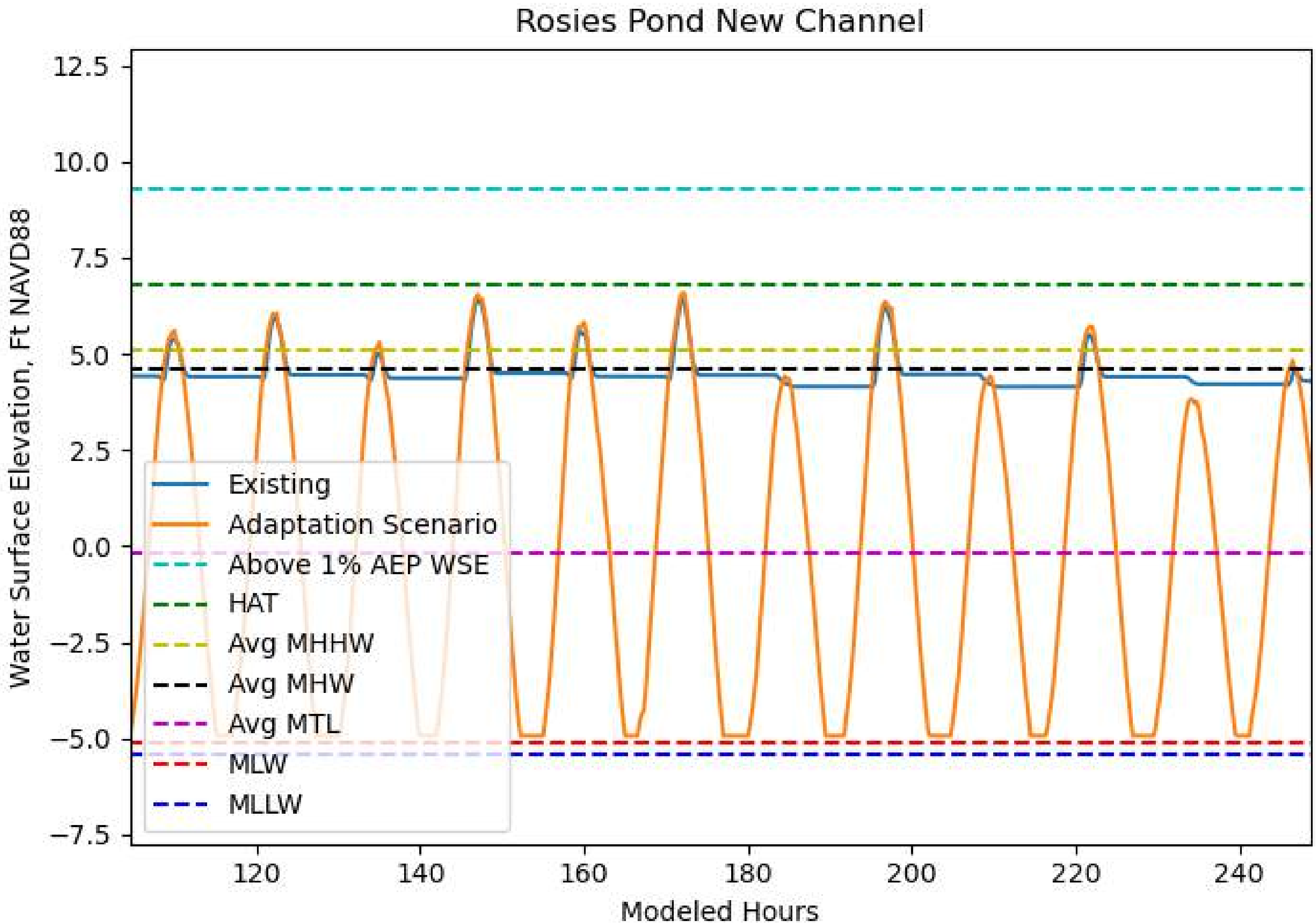


Figure 59. **Water surface elevation at today's Rosie's Pond (Existing), and the proposed new channel (Adaptation Scenario). Tidal datums are included as horizontal lines for reference. Results demonstrate that the tidal range is improved from <2.5 ft to up to approximately 9.5 ft under the same conditions.**

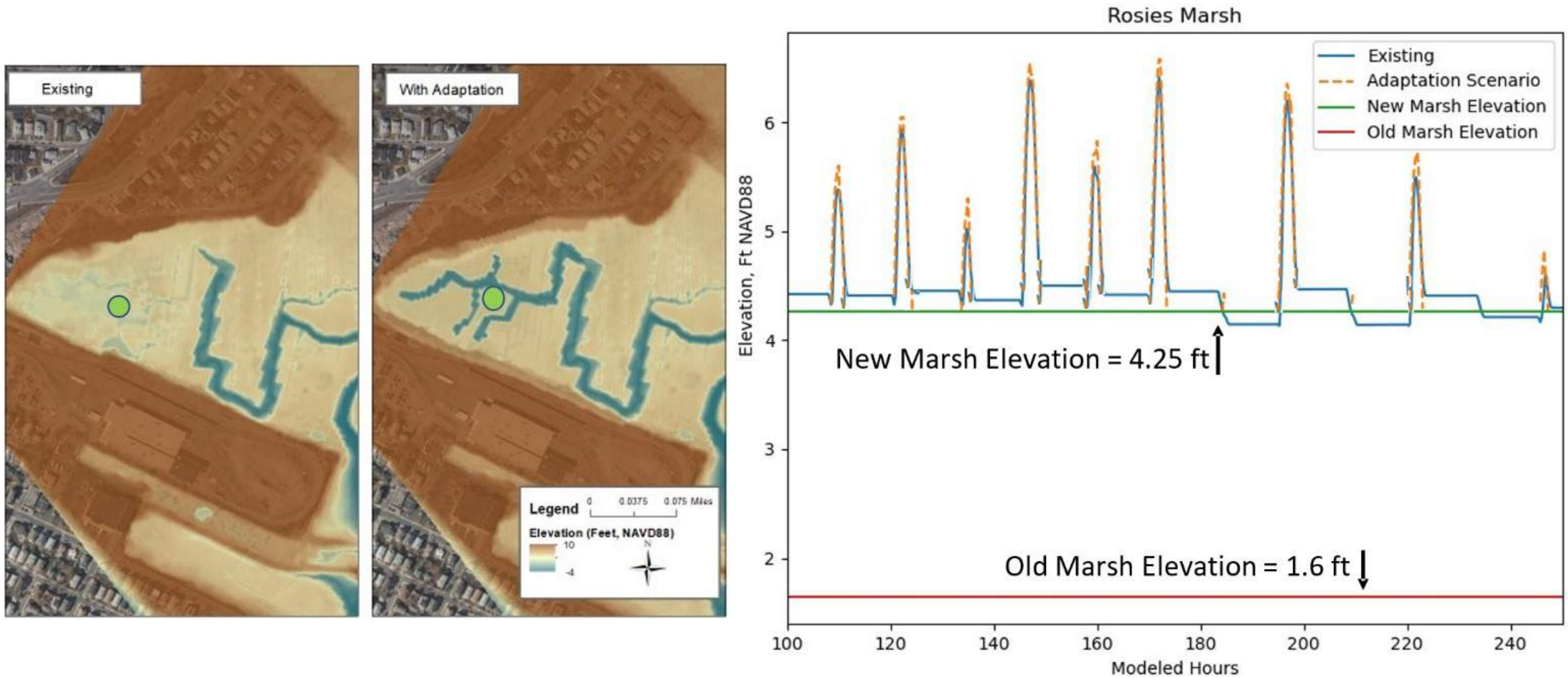


Figure 60. The left panel presents the existing and adaptation scenario for the Rosie's Pond sub-region of Belle Isle Marsh. The right panel presents critical elevations in the marsh, including the New Marsh elevation (green), Old Marsh elevation (red) and the water surface elevation time-series for the existing and adaptation scenarios.

5.2.2 L-Berm

The L-Berm supports high marsh habitat for nesting saltmarsh sparrow which is inundated only by the spring tide. Low marsh habitat behind the L-Berm sits at a higher elevation than the low marsh platforms characteristic of the rest of Belle Isle Marsh; this is a result of poor drainage and oversaturation. Furthermore, the salt pannes behind the L-Berm provide critical habitat for foraging birds and small fish. However, these regions are experiencing expansion due to increased inundation by sea level rise and the inability to properly drain due to the restricting presence of the L-Berm, and are encroaching on high marsh nesting habitat. The only tides that reach the salt pannes are the highest of the spring tides. Salt panne expansion may result from one or two causes: 1 – in the winter, salt pannes have resident water which freezes and expands and expands the salt panned; increasing the tidal prism will help minimize freezing, and 2 – in the summer, salt pannes which do not flush develop higher concentrations of sulfide and salinity due to evaporation, and the resulting water quality kills saltmarsh vegetation; flushing salt pannes can limit this process.

Water Levels

In the marsh, the restoration goal of improving tidal drainage and stormwater conveyance aims to reduce the presence of stagnant water, with the intent to allow low marsh to naturally evolve into high marsh. In the location of the proposed new channel to the northeast, present day tidal range is limited to 2.5 ft, with the low end limited by the elevation of existing marsh. The tidal range of the proposed channel is approximately 9.5 ft (Figure 61). The L-Berm is overtopped in sections during spring high tides, and existing breaches cannot efficiently drain the overtopped water during the outgoing (ebb) tide before the next incoming (flood) tide arrives repeats the cycle. Restoration modeling results show a nearly full tidal prism as compared to Boston Harbor; the limited difference (<0.5 ft) in tidal range represents minimal muting of the low tides. Since the full suite of marsh habitats (subtidal, mudflat, low marsh, high marsh, and transitional marsh) require varying inundation frequencies and elevations to establish, creating a greater range of tidal elevations by grading/dredging creates an opportunity for greater habitat diversity.

In the salt pannes, the water surface elevation is determined by the L-Berm breaches which keep the water surface at roughly 5.6 ft NAVD88, with slow drainage between high tides. A restoration goal was not to fully drain the salt pannes, which provide important foraging habitat and marine breeding grounds, but allow for sufficient drainage to minimize the expansion of the salt pannes. The new channel elevations that control water to and from the L-Berm allow the salt pannes to drain, but do not allow them to drain completely, due to the elevations surrounding the salt pannes that supports the ponding that exists today. Existing conditions maintain approximately 1.5 ft of standing water level in the salt panne during a spring low tide, while proposed restoration conditions reduce standing water depths to at or below <0.5 ft during a spring low tide (Figure 62). The restoration design involves opening the channels to allow for future phase adaptations. A future phase adaptation could be to control these channel breaches in the L-Berm with a control structure, such as a weir, to regulate the water levels under future storm and SLR scenarios.

Residence Time

A healthy level and frequency of tidal exchange is needed behind the L-Berm in order to enhance drainage and water quality. Regular surface water replacement due to tidal flushing is important in maintaining healthy salinity, sulfide, dissolved oxygen, and runoff pollutant concentrations. No water quality data of the salt pannes was available for this study, however observed salt panned expansion is an indicator of potential poor water quality and need for improved flushing. It is important to note that salt marshes do provide an ecological function of taking up nutrients and pollutants, and flushing a salt panne may be seen as losing this benefit. However, minimizing salt panne expansion and enhancing habitat quality will support vegetation growth and peat development, which improve the ability for marshes to capture pollutants.

The performance of a sub-estuary, such as the hydraulically disconnected L-Berm region, at replacing its water (i.e., flushing) can be determined by tracking a numerical tracer, either a numerical dye (diffusive contaminant) or Lagrangian particle (a parcel of water with non-diffusive properties) and analyzing the results. For this study, a particle/chemical tracer, referred to as a numerical dye, was modeled and tracked using EFDC. The initial numerical dye tracer location is presented in the left panel of Figure 63. The concentration of the dye was set at an initial condition of 100 mg/l and was allowed to diffuse over time during a spring tidal cycle, which represents the time-period with the highest rates of flushing for the system. The results indicate that in the existing condition, the L-Berm region is restricted in its ability to replace water tidally, due to the lack of drainage provided by the breaches in the L-Berm. In the existing condition, the L-Berm reaches a "fully flushed" state (37% of initial concentration) at 48 hours after the initial numerical dye injection (Figure 63, right panel, blue line). Therefore, if a pollutant were spilled into the L-Berm's salt pannes, it would take two days during a spring tidal cycle for this system to be fully flushed. Keeping in mind that currently only the highest of the spring tides reach the L-Berm's salt pannes, the concentration decay rate during a neap cycle would be far slower. In comparison, the L-Berm flushing time under restoration conditions is roughly 10 hours, or 1/5th of the existing condition (Figure 63, right panel, green dotted line).

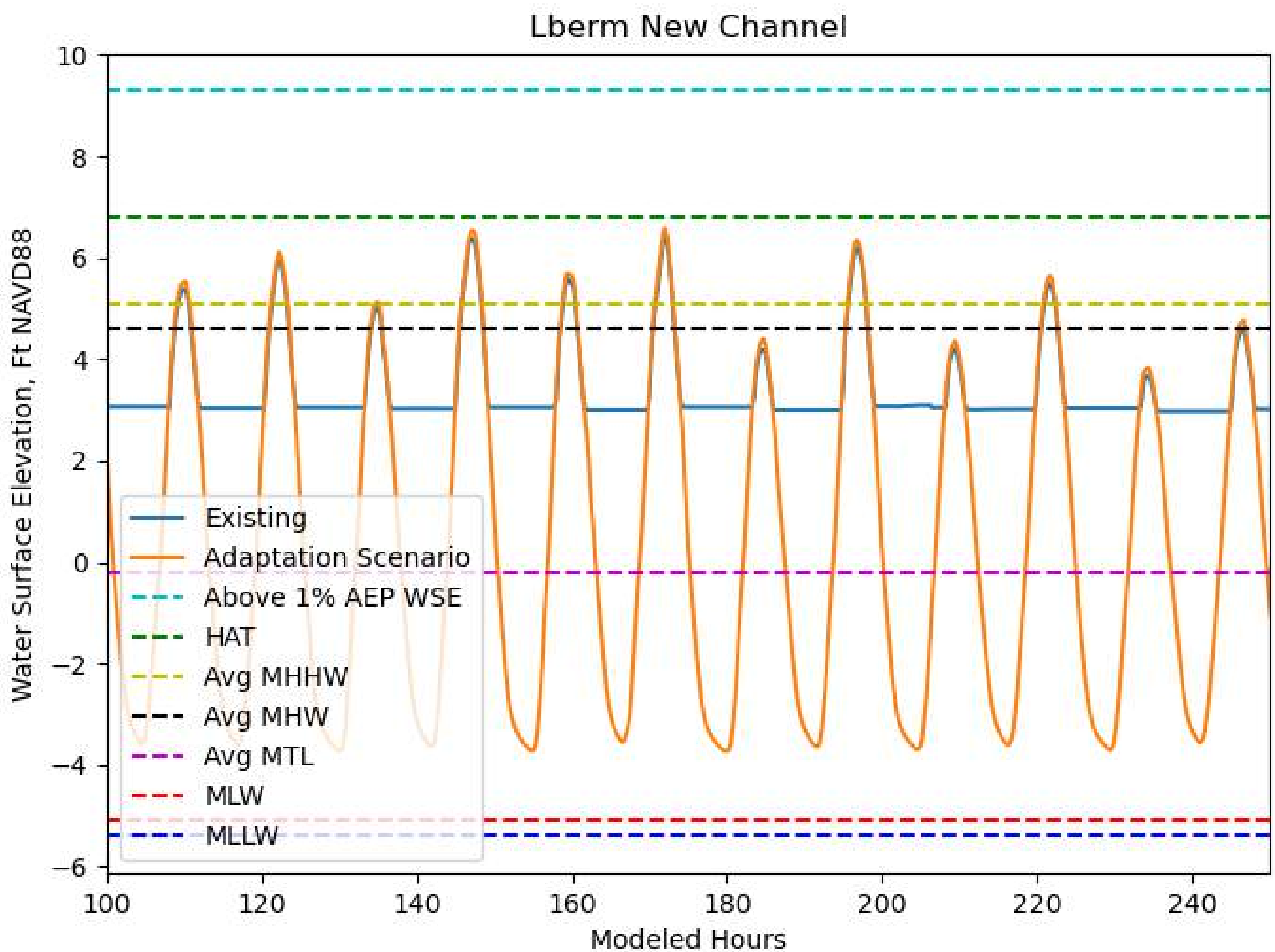


Figure 61. Water surface elevation behind today's L-Berm (Existing), and the proposed new channel (Adaptation Scenario). Tidal datums are included as horizontal lines for reference. Results demonstrate that the tidal range is improved from 2.5 ft to up to approximately 9.5 ft under the same conditions.

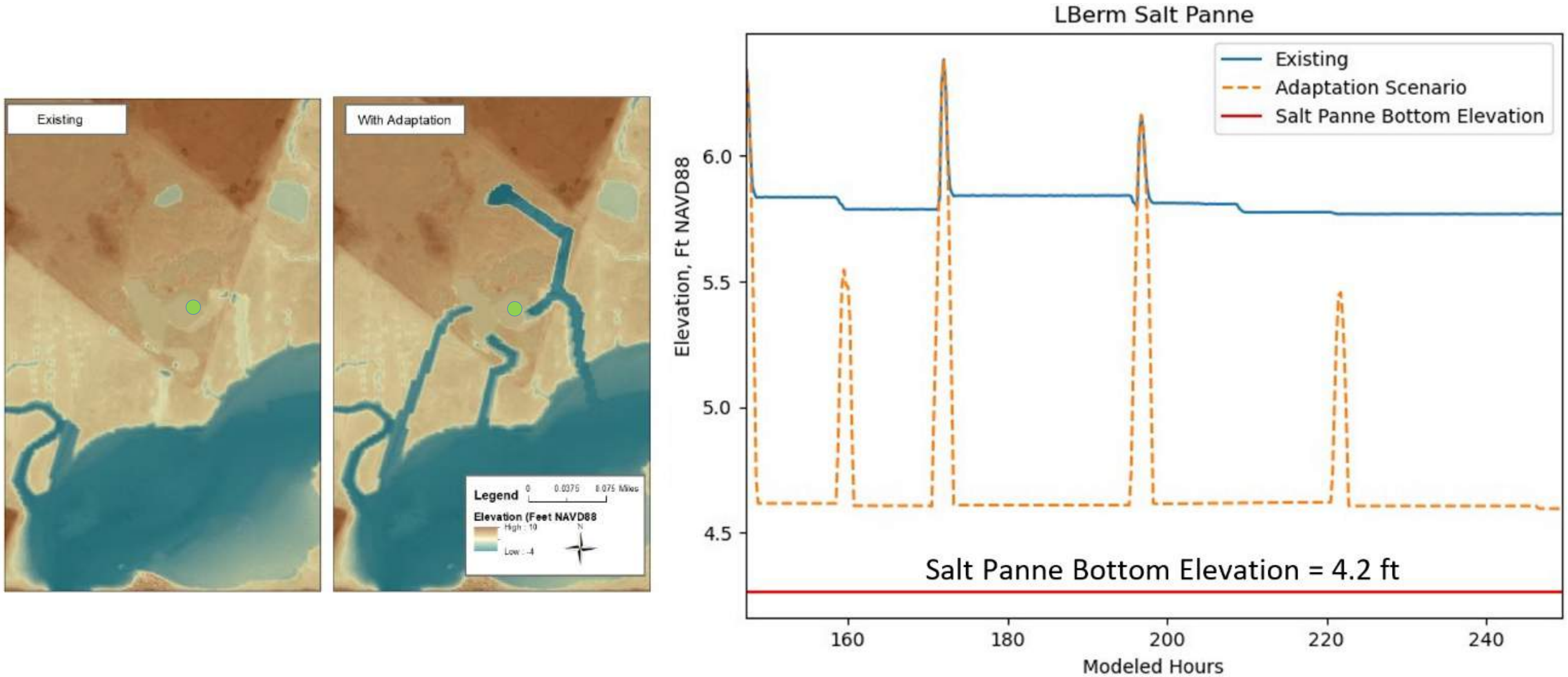


Figure 62. **The left panel presents the existing and adaptation scenario for the Rosie's Pond sub-region of Belle Isle Marsh. The right panel presents critical elevations in the marsh, including the New Marsh elevation (green), Old Marsh elevation (red) and the water surface elevation time-series for the existing and adaptation scenarios.**

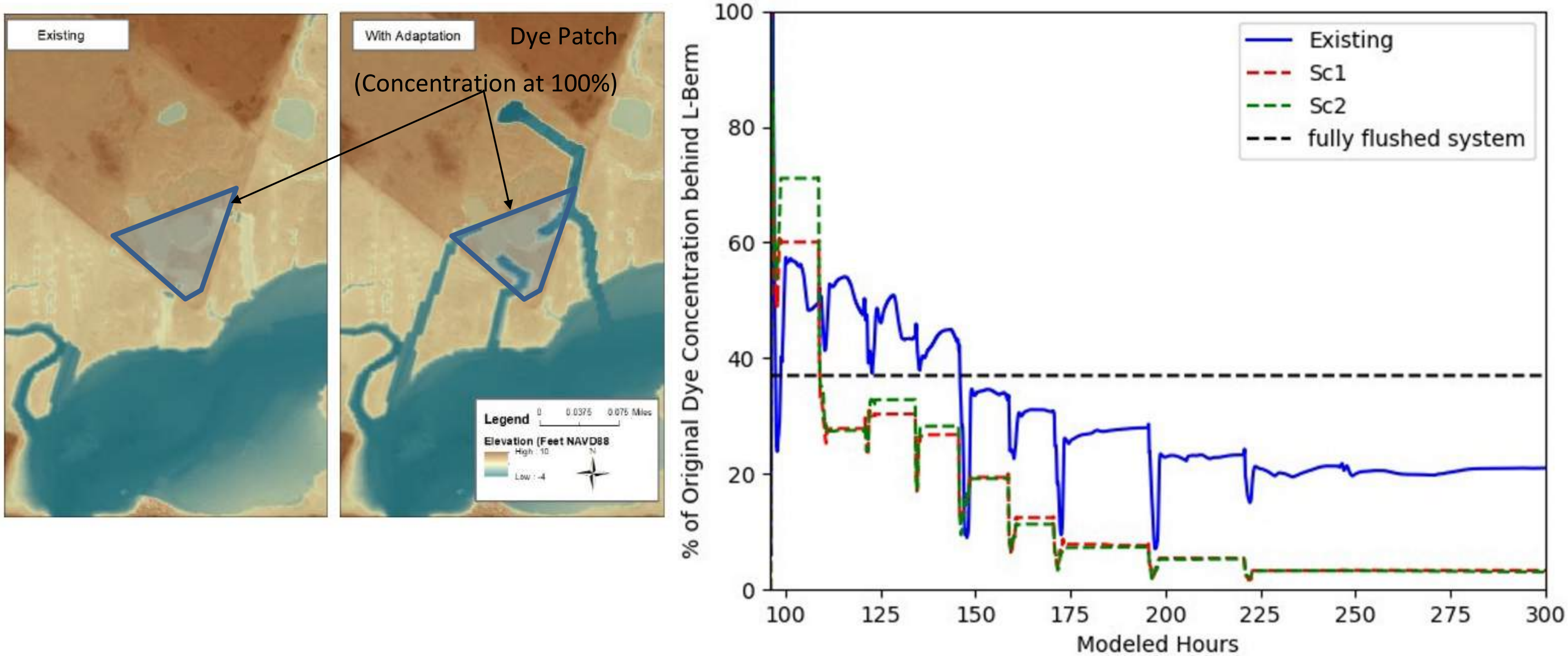


Figure 63. **Evolution of a numerical dye patch modeled in EFDC. The left panel represents the location of the dye patch (considered a contaminant) in the numerical model, while the right panel represents the decay over time for the Existing condition (blue) and the adaptation scenarios (red, green dotted lines). The black dotted line represents the concentration of dye left in the system after it reaches a "fully flushed" state (37% of initial concentration). Note that the red dotted line is also presented as "Scenario 1," which represented an initial restoration design with shallower channels. The shallower channels did not produce ideal results for water levels, and therefore "Scenario 2" was developed to achieve hydraulic goals.**

5.2.3 The Key

The Key currently exists as a bermed region of the marsh, with the berm acting as a tidal restriction. Two existing breaches in the Key's berm have allowed tides to infiltrate the low marsh with restricted, slow drainage. Water surface level results for the Key shows a concave slope in the water surface elevation signal, indicating slow drainage as compared to the main channel (Figure 64). The water level within the Key channels only falls to above 2.5 ft NAVD88 during the modeled spring low tide, while the tidal creek within the Key nears 1.5 ft NAVD88. The goal of the Key restoration design is two-fold. The first goal with restoration activity is to improve the tidal drainage and exchange between the Key and the main channel in order to promote the health of the marsh, and the second goal is to raise the surface of the Key to an elevation of healthy high marsh habitat.

To achieve hydraulic goals, care was taken to ensure that the entrance channel that connects the inside of the Key through the breach was deep enough to allow for an unrestricted low tide exchange with quicker drainage, as compared to today's low tide attenuation and slow drainage. Restoration design promotes a large exchange of tides, demonstrated by the increased tide range and accelerated drainage compared to the existing conditions (Figure 65). This indicates that sufficient drainage can be restored, reversing the negative impacts of standing water, and supporting the health of marsh habitat. Furthermore, Figure 66 presents the water surface elevations for the Key channel both inside of the Key and just to the outside of the entrance under restoration conditions. The water surface elevations are very similar, indicating that dredging the entrance channel to the Key in the restoration at a depth of -3.2 feet NAVD88 is sufficient to create unrestricted tides.

Restoration proposes to raise the Key by approximately 2 ft, close to the MHHW line, to support high marsh habitat (Figure 67). By creating high marsh habitat and increasing tidal range, the full suite of marsh habitats (subtidal, mudflat, low marsh, high marsh, and transitional marsh) is established. Additionally, the proposed alternative significantly reduces tidal muting and improves circulation in the Key area compared to existing conditions.

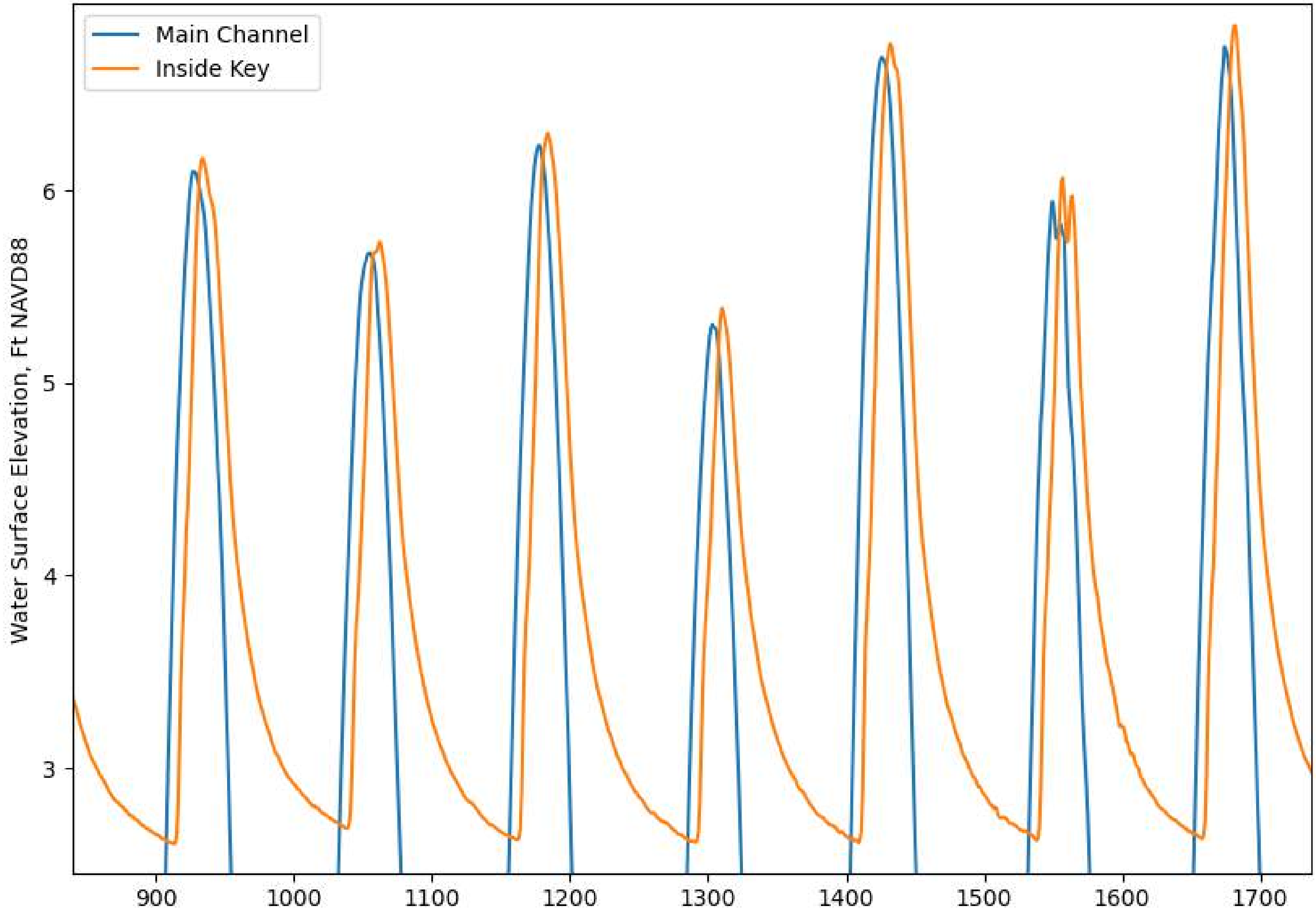


Figure 64. **Water surface elevation data for the existing condition, in the main channel outside of the Key (BI1) and the data taken inside the Key (BI2). The x-axis is model time in 24 hour time (i.e., 900 = 9AM, 1000 = 10AM, etc.).**

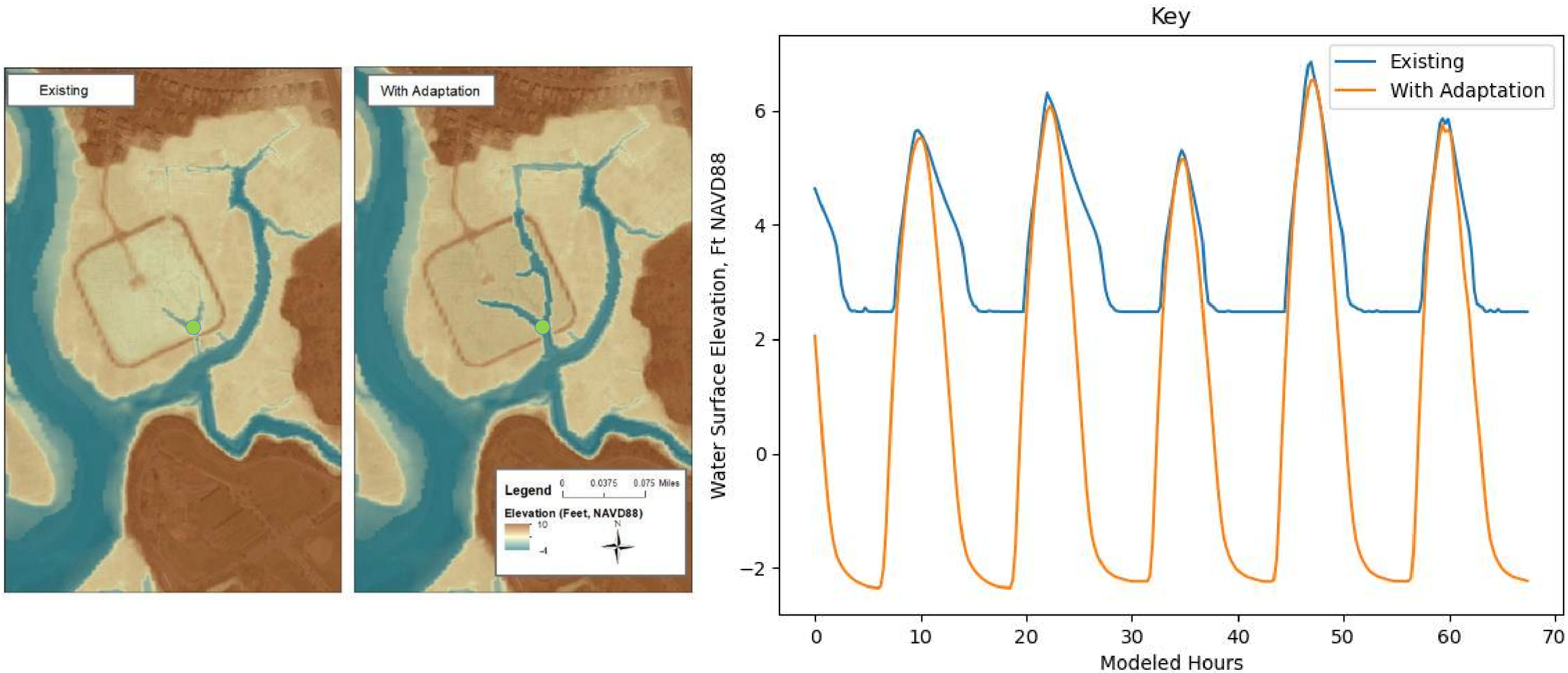


Figure 65. The left panel presents the existing and adaptation scenario for the Key sub-region of Belle Isle Marsh. The right panel presents water surface elevation data within the Key for existing and proposed conditions.

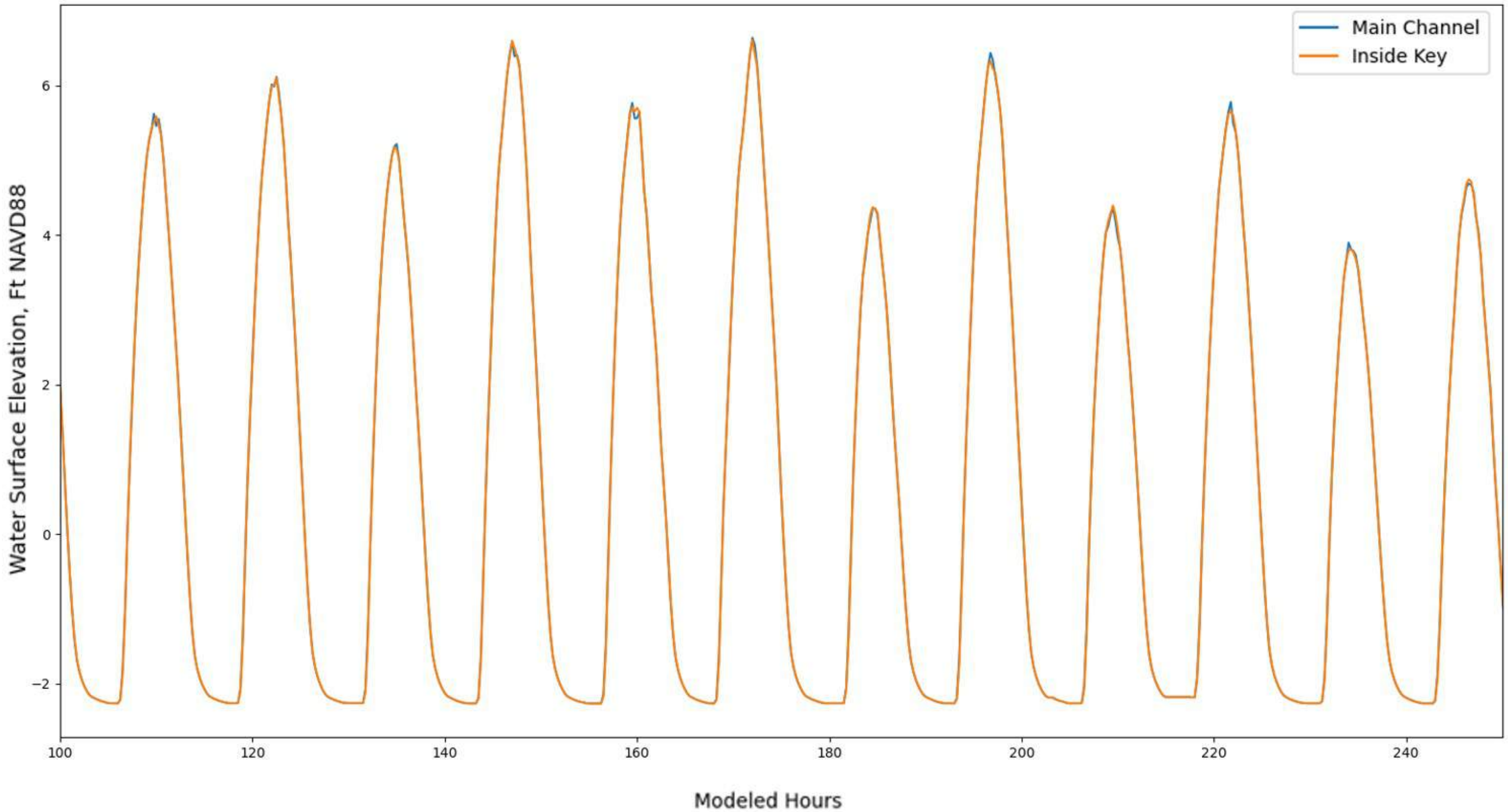


Figure 66. Water surface level results for restoration design of the Key at two locations: one outside of the Key (in the main channel) and one inside the Key (at the location of observation point BI2).

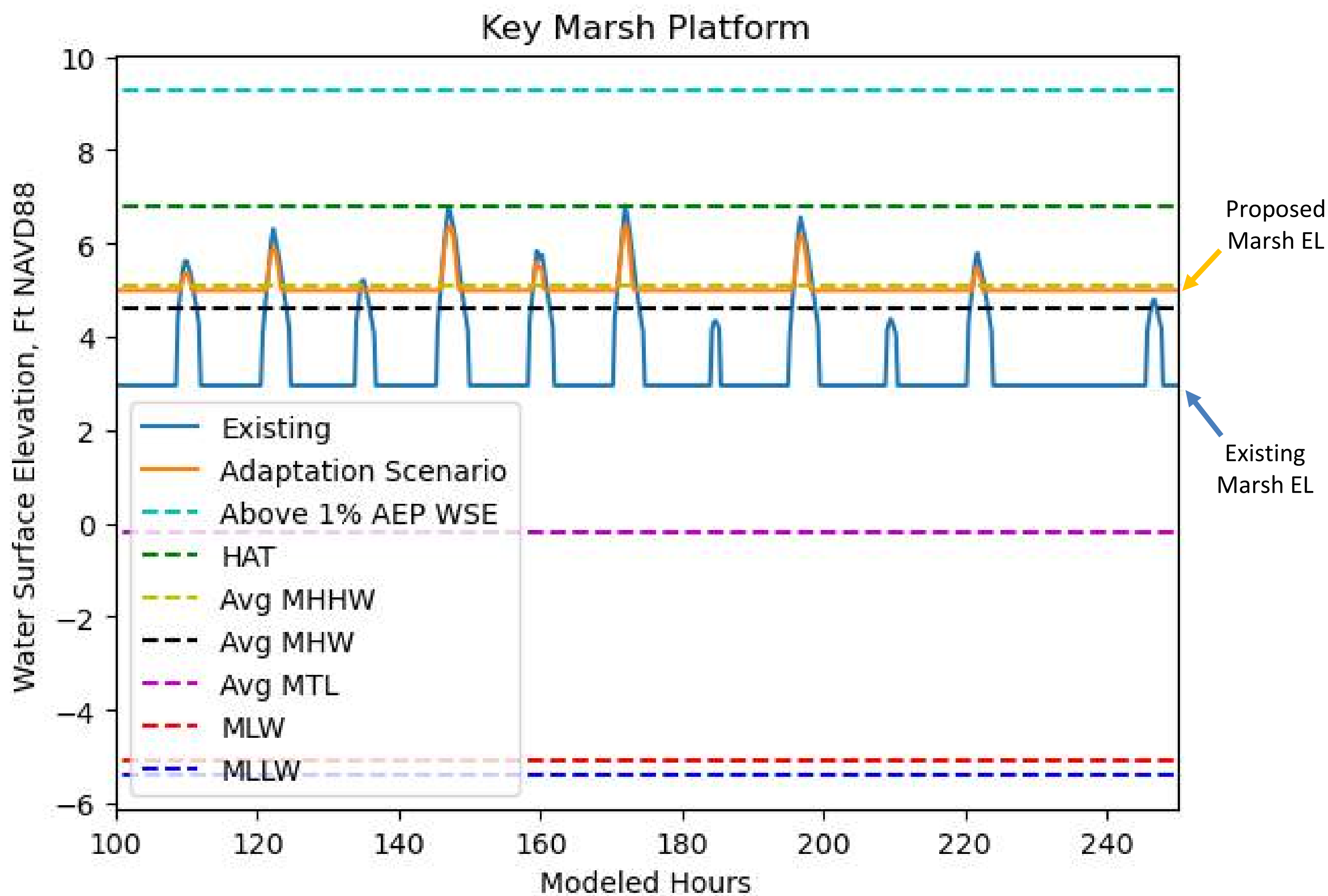


Figure 67. **Water surface elevation behind the Key (Existing), and in the proposed new marsh (Adaptation Scenario). Tidal datums are included as horizontal lines for reference. Results demonstrate that the new marsh surface is just below the MHHW level in the Key, providing evidence that high marsh vegetation may be able to sustain at the new elevation.**

5.2.4 Vegetation Fate Based on Percent (%) Inundation

Tidal inundation frequency analyses were performed with hydraulic modeling results. Inundation frequency is presented here as the percentage of tidal cycles within a spring/neap cycle that the tidal water level reaches a certain elevation. It is an important factor for habitat design and distribution because saltmarsh vegetation becomes established at particular inundation frequencies. The percentage of high tides in a full spring/neap tidal cycle that wet areas throughout the marsh under existing and restoration scenario modeling simulations is presented in Figure 68 and Figure 69, respectively. Areas with the lightest greens/yellows represent areas that are only inundated by seawater during spring tidal cycles and storms. Areas with the darkest blues and greens are inundated by tides on more of a regular basis, with the darkest blue representing tidal inundation by 100% of the tides (subtidal). The percentage of tides that reach a given area can be helpful in determining the types of vegetation that could survive in given regions of the marsh. Habitat distribution of existing and restoration conditions based solely on elevation and its relation to water levels is depicted in Figure 70. It is important to note that the L-Berm is currently characterized as high marsh in terms of elevation, but supports a wide extent of low marsh vegetation. This, along with model results, is an indication of poor tidal drainage and oversaturation of the L-Berm area. This poor drainage increases the wetting period of high marsh, and converts vegetation types to that of low marsh.

In the existing conditions, Rosie's Pond and the Key are inundated by 80-99% of tides. This limits the ability for low marsh vegetation to survive in these regions. These areas would mostly likely convert to mudflat with greater inundation, as was confirmed in the sea level rise assessment (Appendix D). The proposed restoration in these same regions reduces daily inundation occurrences to approximately 25% (for the Key) and 55% (for Rosie's Pond) of high tides, which is a target for the survival of healthy high marsh (Key) and healthy low marsh (Rosie's Pond). Results for the L-Berm do not show significant change beyond the proposed channels. This indicates that existing low and high marsh areas will remain. Restoration intends not to impact existing saltmarsh sparrow habitat. However, the improved drainage of the low marsh and salt panne areas is intended to improve stagnation and water quality concerns, and aims to slow salt panne expansion and support high marsh expansion. It is anticipated that low marsh habitat which borders on high marsh will convert to high marsh and consequently increase viable saltmarsh sparrow nesting habitat as a result of the improved drainage conditions. In general, this alternative proposes creating a greater range of tides and elevations at all three sites by grading and dredging to improve tidal exchange and stormwater flows, and provide greater habitat health and diversity.

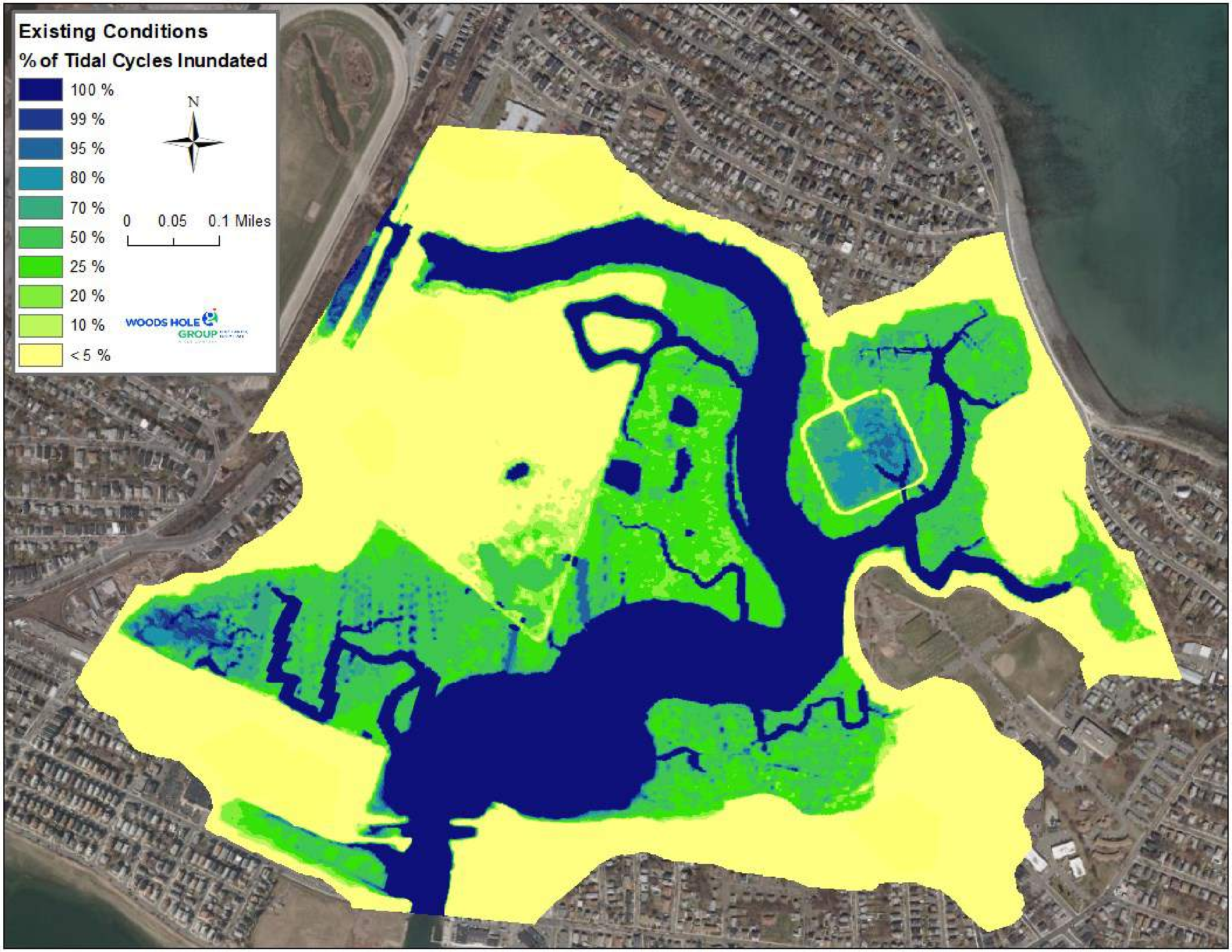


Figure 68. The percentage of high tides that reach specific locations of the Marsh under existing conditions. Higher percentages of high tides are presented in blues and greens, whereas lower percentages of high tides are presented in light greens and yellows.

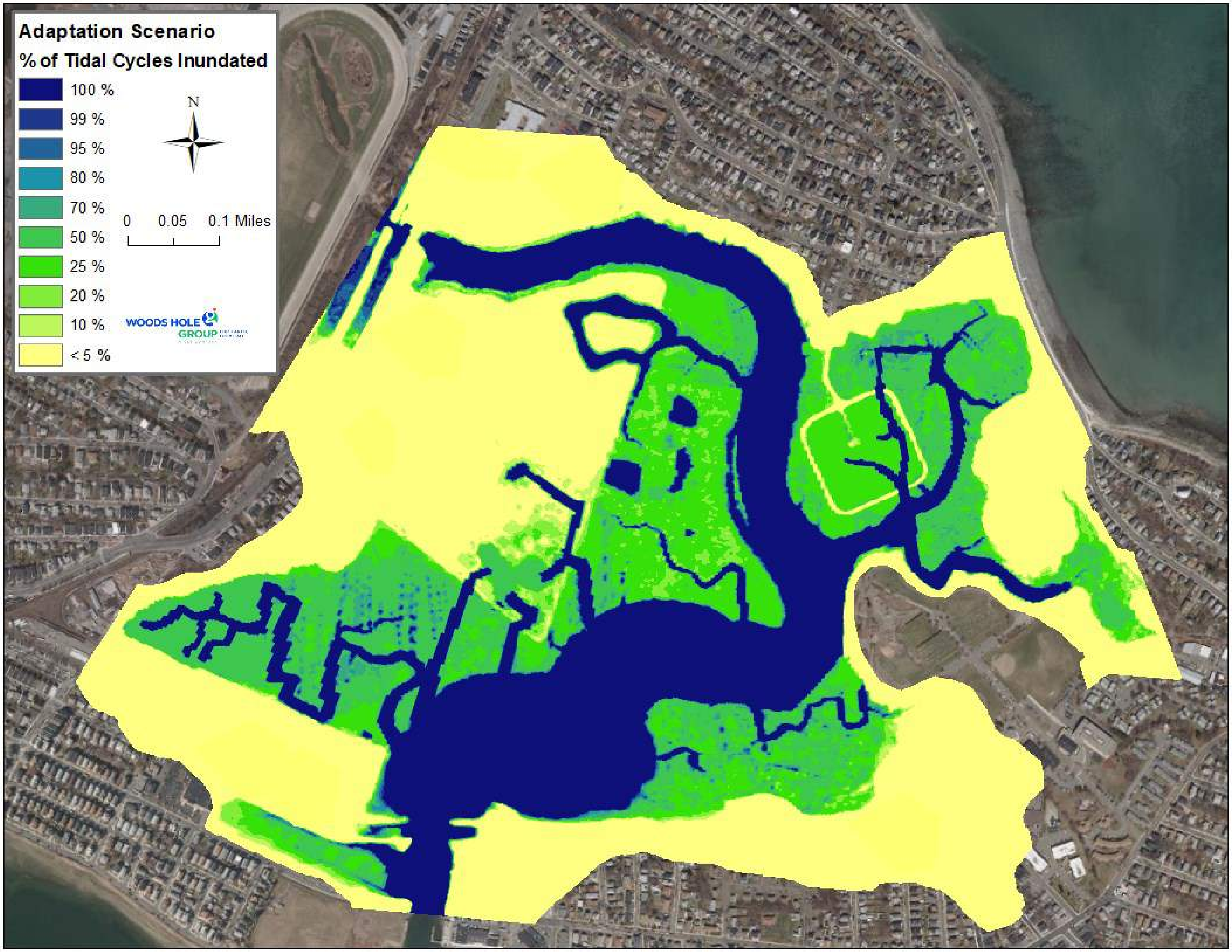


Figure 69. The percentage of high tides that reach specific locations of the Marsh for the adaptation scenario. Higher percentages of high tides are presented in blues and greens, whereas lower percentages of high tides are presented in light greens and yellows

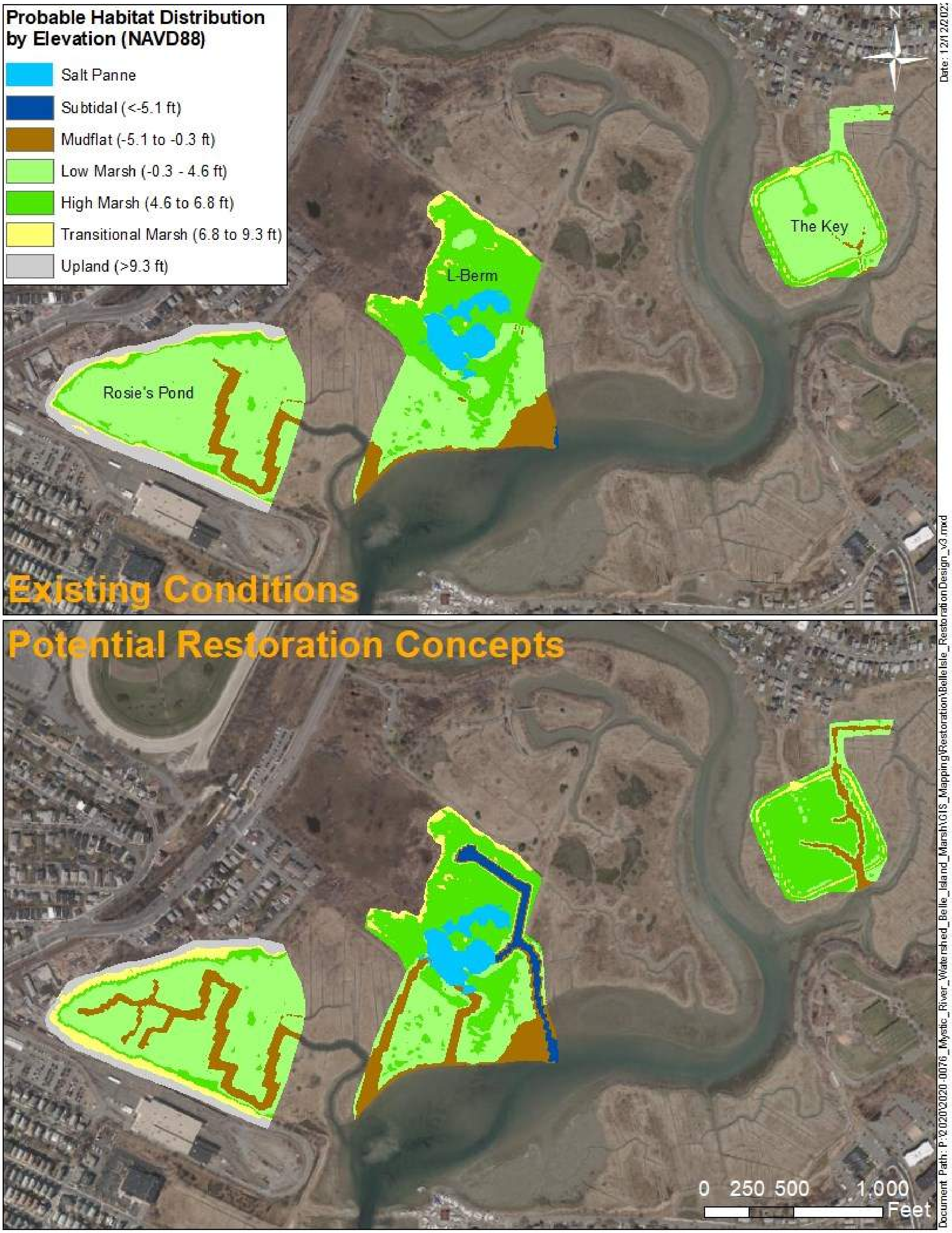


Figure 70. **Habitat distribution based on elevations of existing & restored conditions. Note that in actuality, the L-Berm is occupied by significant low marsh area due to poor drainage.**

6.0 PHASING STRATEGY

Belle Isle Marsh is an extensive and complex marsh system. Distinct areas contain different tidal regimes, and support a range of habitat types and wildlife in varying states of ecological health. Furthermore, present day human impacts, and future climate change impacts are affecting areas of the marsh in unique ways. Certain areas of the marsh can benefit from restoration today, while other areas of the marsh may benefit from ongoing monitoring to recognize triggers for future restoration.

As presented in Section 4.3, restoration alternatives for eleven marsh management areas can be implemented at different timescales. Catalytic alternatives could be implemented right away to address immediate issues, serve as a demonstration (pilot) project that is needed now, and/or serve as a keystone feature of a layered approach which can be implemented in phases.

To help strategize the phasing of restoration alternatives in Belle Isle Marsh, an approach to present day, near-term, and long-term restoration and monitoring is considered in Table 19. This table is intended as a brief outline, and the details of each restoration approach can be found in the restoration toolbox (Table 17), as well as a site by site breakdown of restoration across various time horizons (Table 18). The time horizon for implementation was developed with consideration of sea level rise, future habitat migration, and other ongoing impacts of marsh health.

Table 19. Restoration Phasing Strategy Considerations

Timeframe	Restoration Phase	Detail
Present Day	Targeted monitoring	● Water Levels ● Water Quality ● Habitat Changes and Vegetation Health ● Marsh Accretion/Erosion ● Adaptive Monitoring and Management of Improvements
	Small-scale catalytic alternatives	● OMWM (i.e., ditch remediation and runneling) ● Erosion control ● Invasive species management and native species planting
	Large-scale catalytic alternatives	● Rosie's Pond Restoration piloting the benefits of dredging tidal creeks ● L-Berm Restoration piloting breaching berms and observing subsequent natural habitat adjustments ● The Key Restoration piloting creation of high marsh sanctuary for saltmarsh sparrow
Near-Term (2030-2050)	Targeted monitoring	● Water Levels ● Water Quality ● Habitat Changes and Vegetation Health ● Marsh Accretion/Erosion ● Adaptive Monitoring and Management of Improvements
	Expand on catalytic/ pilot alternatives	● Based upon monitoring of low impact restoration approaches, such as OMWM, expand the reach of such projects and implement lessons-learned ● Identify and replicate the benefits of large-scale catalytic alternatives: dredging, breaching berms, raising marsh elevations
	Experimental Thin Layer Deposition	● Pilot alternatives targeting areas of subsidence, lack of accretion, and or ponding

Timeframe	Restoration Phase	Detail
	Prepare for habitat migration	● Morton St/Banks St, Winthrop will likely be first to flood ● Focus on existing open space areas (e.g., Sales Creek) ● Identify region-wide habitat connectivity opportunities
	Erosion control at marsh edge	● Pilot living breakwater, oyster restoration, or marsh sill alternative ● Test the value of coir logs, layered coir blankets wrapped around soil, and other natural material approaches
	Stormwater management	● Manage stormwater and water quality, as more frequent storm flooding flushes nutrients and pollutants into the marsh system
Long-Term (2050-2100)	Targeted monitoring	● Water Levels ● Water Quality ● Habitat Changes and Vegetation Health ● Marsh Accretion/Erosion ● Adaptive Monitoring and Management of Improvements
	Transformational restoration	● Based upon monitoring of marsh and catalytic/pilot alternatives, implement large-scale marsh restoration to ensure proper tidal exchange, habitat elevations, vegetation and wildlife biodiversity, and vulnerable communities are maintained throughout the reservation
	Large-scale thin layer deposition	● Based upon observed sea level rise, as well as success and lessons learned of pilot TLD alternatives, implement on a large-scale to maintain marsh elevation with respect to tides
	Water level control	● Install water level control features (weir boards, tide gates) to control tidal levels within feasible areas of the marsh (e.g., L-Berm or Key), or potentially marsh-wide (Saratoga Street). Water level control can maintain appropriate marsh inundation despite moderate levels of sea level rise
	Re-envision the reservation	● Begin planning measures designed to allow BIM to adapt to future sea level rise conditions with prior results as a guideline ● Prioritize habitats and ecological services provided by the marsh to determine what must be protected from sea level rise
	Re-envision the boundary between the marsh and development	● Facilitate marsh migration, where feasible ● Manage the marsh edge to maximize habitat value as long as possible ● Manage stormwater and water quality, as more frequent storm flooding flushes nutrients and pollutants into the marsh system

7.0 PERMITTING CONSIDERATIONS

Permitting of restoration alternatives within Belle Isle Marsh is anticipated to be intensive. Depending upon the size of the proposed work, permitting may take between 1-3 years. Many aspects of the proposed restoration alternatives have been historically difficult to permit, including thin layer deposition, and habitat conversion. Additionally, due to the designation of the reservation as an ACEC, special regulations apply according to the Code of Massachusetts Regulations (CMR). Belle Isle Marsh is within a designated Outstanding Resource Waters area, entailing further special regulations. Despite this, ecological restoration projects, even those involving dredging and resource area conversion, may be permitted, if justifiable and legal. Environmental permitting of a restoration alternative which involves dredging and filling (as proposed for Rosie's Pond, the L-Berm, and the Key) includes the preparation and filing of all local, state and federal applications as described below.

Massachusetts Environmental Policy Act (MEPA) Review – It is anticipated that the proposed alternatives will trigger one or more thresholds for the filing of an Environmental Notification Form (ENF) with MEPA (i.e., 301 CMR 11.03(3)(b)1.f; 301 CMR 11.03(3)(b)5)). Massachusetts Historical Commission (MHC) will receive the ENF, allowing an opportunity to identify archaeological requirements. It is anticipated that a mandatory Environmental Impact Report (EIR) will be required in the MEPA Certificate on the ENF. The ENF/EIR will contain detailed information describing and analyzing the alternatives and will assess the potential environmental impacts and mitigation measures, incorporating relevant portions of technical memoranda prepared. Public notice must be placed in a local newspaper, and abutters notified.

Conservation Commission Notice of Intent (NOI) – The applicant must submit a NOI application with the local Conservation Commission of the jurisdiction in which the work resides. The Conservation Commission will notify the Natural Heritage & Endangered Species Program (NHESP), Division of Marine Fisheries (DMF), and Department of Environmental Protection (DEP) to provide comment. The application requires submittal of engineering plans. Public hearings follow the application, with acceptance leading to acquisition of an Order of Conditions.

Department of Environmental Protection (DEP) Combined Chapter 91 and Water Quality Applications – A combined DEP Chapter 91 and Water Quality Certification application will be required for preparation and submittal to DEP. Supporting this permit, a Sampling and Analysis Plan must additionally be prepared to sample and test dredge and fill material. USACE and DEP will provide a determination on the suitability of material handling and placement. Public notices must be published in the local newspaper, and waterfront abutters must be notified.

Massachusetts Coastal Zone Management Federal Consistency (CZM) – The applicant must prepare and file a request for federal consistency with MA CZM. A Federal Consistency Statement must be prepared to address consistency of the proposed alternative with the Coastal Program Policies of CZM.

US Army Corps of Engineers (USACE) Review – The applicant must file an Individual Permit application with the USACE New England Division for the proposed alternative. Because the property includes intertidal and sub-tidal areas, and historical naval battlefields (e.g. Revolutionary War Period Battle of Chelsea Creek), consultation and coordination will be required with the Massachusetts Historical Commission (as required under the National Historic Preservation Act [36 CFR 800] and 950 CMR 70-71), and Board of Underwater Archaeological Resources (BUAR, as required under 301 CMR 12). Furthermore, consultation and coordination with Tribal Historic Preservation Officers is required at this stage. Requirements for pre-construction investigative studies, and/or identification of procedural requirements during construction will be identified in this stage.

Local Special Permit – A special permit application may be necessary according to local regulations.

8.0 REFERENCES

Bosma et al. 2021. *Assessing the vulnerability of MassDOT's coastal transportation systems to future sea level rise and coastal storms, and developing conceptual adaptation strategies.*

Boston Planning & Development Agency (BPDA) and Boston Redevelopment Authority. 2020. *Master Plan for Planned Development Area No. 124 – Suffolk Downs Redevelopment, East Boston*. October, 28, 2020.

Colarusso. 1988. *Belle Isle Marsh Reservation Water Quality Monitoring Program*. Submitted by Philip Colarusso, August 15, 1988.

DeConto and Kopp, 2017. *Massachusetts Sea Level Assessment and Projections.* Technical Memorandum.

EOEA. 1998. *Designation of Portions of the Cities of Boston, Lynn, and Revere, and the Towns of Saugus and Winthrop as the Rumney Marshes Area of Critical Environmental Concern with Supporting Findings*. Signed by James S. Hoyte, Secretary of Environmental Affairs, Massachusetts Executive Office of Environmental Affairs, August 22, 1988.

Helmuth Lab at Northeastern University Marine Science Center. 2019. *King Tide event at Belle Isle Marsh, MA: Oct 29, 2019*. https://www.youtube.com/watch?v=5FNmF7Djw4g.

Massachusetts Division of Fisheries & Wildlife. 2020. *Saltmarsh Sparrow – Ammospiza caudacuta*. Natural Heritage & Endangered Species Program. https://www.mass.gov/doc/saltmarsh-sparrow/download.

Massachusetts Office of Energy and Environmental Affairs. 2022. *Resilient MA – Climate Change Clearinghouse for the Commonwealth.* https://resilientma.mass.gov/home.html.

MassDOT & FHWA. 2015. *Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery.*

MA WRP and MA DEM. 2002. *Rumney Marshes Area of Critical Environmental Concern Salt Marsh Restoration Plan*. Prepared by Massachusetts Restoration Program and Massachusetts Department of Environmental Management on behalf of the Rumney Marshes ACEC Salt Marsh Restoration Task Group. May 2002.

Riley, Sean. 2020. *Belle Isle Marsh Reservation Area of Critical Environmental Concern & Important Bird Area Management Assessment*. January 2020.

Stevens, Rachel, Jamie Carter, and Chris Peter. 2022. *An Ecological Approach to Designing Salt Marshes. Tidal Wetland Vegetation Elevation and Ecotone Boundaries in Great Bay, New Hampshire*. Great Bay National Estuarine Research Reserve. Technical Report. March 2022.

Woods Hole Group. 2016. *Modeling the Effects of Sea-Level Rise on Coastal Wetlands*. Prepared for the Massachusetts Office of Coastal Zone Management.

Appendix A: Task 1: Review Existing Conditions – Summary Memo

WOODS HOLE GROUP FOR EARTH, FROM SPACE
A CLS COMPANY

MEMORANDUM

DATE January 18, 2021 **JOB NO.** 2020-0076

TO Catherine Pedemonti
Mystic River Watershed Association
20 Academy Street, Suite 306
Arlington, MA 02476-6401

FROM Elise Leduc
Woods Hole Group
eleduc@woodsholegroup.com

Task 1: Review Existing Conditions – Summary Memo - FINAL

This document summarizes information gathered from a site visit and initial conversations with project partners, past restoration activities, and site studies and existing information related to the Belle Isle Marsh site. The intent of this task was to develop a better understanding of work conducted to date and ensure availability of data essential for fully understanding the physical processes and natural resources within the system (updating our field data collection plan in Task 2 as needed). Existing data and studies were reviewed to ascertain what data are already available and where gaps exist.

Document reviewed as part of this task include:

- Rumney Marshes ACEC Designation (1998)
- Rumney Marshes ACEC – Salt Marsh Restoration Plan (May 2002)
- Belle Isle Marsh Reservation ACEC & IBA Management Assessment (Jan 2020)
- Belle Isle Marsh Water Quality Monitoring Program (1988)
- Belle Isle Marsh Restoration – Environmental and Engineering Evaluations (August 1991)
- Belle Isle Marsh Reservation – Preliminary Research and Master Plan Phase – Feasibility Study (1978)
- Sales Creek Information from Beals & Thomas

Significant findings from each of these documents is summarized below.

A. Define the project study area

The Belle Isle Marsh portion of the Rumney Marshes Area of Critical Environmental Concern (ACEC) consists of 422 acres and spans three Towns: Boston, Revere and Winthrop. The ACEC boundaries are displayed with a blue dashed line in Figure 1. Ownership within this area includes state-, municipal- and privately-owned parcels.

While the management scope of the final Resource Management Plan will consider the entire ACEC, for the purposes of the field-based data collection (Task 2) and hydrodynamic modeling (Task 3), our focus will be on the large state- and municipally-owned salt marsh parcels, shown in green and labeled with current ownership information in Figure 1. This excludes any private residential parcels along the perimeter of the marsh, as well as the upper portions of Sales Creek. The field study boundaries were further refined to exclude extreme upland areas of those of those parcels (e.g., the cemetery in Winthrop, the Beachmont Veterans Memorial School in Revere). The final boundary determined for the field study component of the project is displayed by a yellow line in Figure 1.

Figure 1. **Belle Isle Marsh study area boundaries for the development of a Resource Management Plan.**

B. Site Visit – September 23, 2020

A Professional Wetland Scientist (PWS) from Woods Hole Group attended a site walk with representative from Mystic River Watershed Association (MyRWA), the Massachusetts Department of Conservation and Recreation (DCR), the Nature Conservancy (TNC), and Friends of Belle Isle Marsh.

The visit involved a tour around the entire Belle Isle Marsh Area, stopping at various access points. The following is a summary of site conditions at each access point:

1. **Belle Isle Reservation Park** (from main parking lot):
    - There is a pipe under the parking lot access relatively close to the road, which allows the fresh water wetland to the south to drain into the tidal river to the north. DCR unclogs the north end of this pipe approximately 2x/year.

- Area seen from southwestern boardwalk closest to main parking lot, there is an approximately 30-acre area of mostly Phragmites, interspersed with upland patches of forest. One forested path, just west of the brackish pool, is comprised largely of birches.
- There is a small brackish open water pool in the salt marsh by a small southern walkway (by self-guided tour post #3).
- The central grassland meadow consists of approximately 12.5 upland acres. This area contained some purple loosestrife in southwest corner, but DCR staff mentioned that controlling the invasive crown vetch has been a bigger problem. The state has implemented targeted mowing to control it. Japanese knotweed is also actively removed; due to regular removal, Japanese knotweed is not currently a significant problem at the site. This upland area is a historic landfill. It was capped and landscaped. A drainpipe exits near the northeast corner.
- The long southeastern boardwalk crosses a mixed vegetation salt marsh area and an earthen berm. The earthen berm was described as originally having been built in the 1930s, and it has since breached in a number of areas. DCR staff mentioned that the state is currently discussing how to manage the resulting impounded area; consideration has been given to whether to further breach the berm to allow for better hydrologic connectivity.
- The salt marsh adjacent to the tidal creek extending south along the eastern portion of the property has experienced significant dieback and erosion and the creek has significantly widened over the last 4 or 5 years. DCR staff noted that this edge erosion is happening along many of the larger tidal channels as well.
- DCR staff noted that current management of the salt marsh largely consists of annual salt marsh sparrow monitoring. No major active salt marsh restoration has occurred recently or is planned.

2. **Key Parcel**:
    - This area was the site of a planned multi-agency restoration project to breach the berm and restore the salt marsh within the interior but the project was ultimately dropped
    - A breach in the northeast corner of the berm was the only place water could enter into the bermed area for a long time, but the southern part of the berm breached during a storm in 2018.
    - Prior to the breach, the inner area had been largely unvegetated (only a small bit of salt marsh had existing in the northeast section where tidal water was able to come in and out). Since the 2018 breach, the interior area has almost entirely re-vegetated over the last 2 years. The western half still has some significant pooling though.
    - A kestrel box has been installed on a pole along path out to the berm.
    - Footings from old WWII radio towers are still visible inside the bermed area
    - It was noted that the homes near the trailhead, as well as those near the Beachmont Yacht Club, flooded during the 2018 storm.

3. **John Joseph Kilmartin Pathway / Short Beach**
    - This area includes one of the largest wooded parcels in the town of Winthrop, with one of the highest tree canopies. Although it's not vegetated with an ideal tree species assemblage (the property includes a lot of non-natives) it is still an incredibly important wildlife habitat.

- A number of the large aspens near the parking area are starting to die. It's unclear whether this is due to old age, salt water intrusion, or other factors.
- DCR recently restored a ~1 acre meadow on eastern side of the walking path.
- Due to a history of dumping, much of this site is underlain by chunks of concrete, asphalt and other debris. Some of this material is exposed at the overlook location.
- A number of swallow nest boxes are installed out on the salt marsh near the overlook.
- The parking area off Winthrop Ave is owned and maintained by DCR.
- Flooding from Short Beach is a problem. During events with significant storm surge or heavy waves flooding can either go around southern end of concrete seawall or splash over the main portion of the road itself. Storm drains in the road drain back to the ocean, but if sheet flow is heavy enough it continues west across the road, between the houses, and into the upper portions of the marsh.
- At southern end of this parcel there is a boardwalk bridge over tidal creek to the cemetery in Winthrop. At this point, property ownership changes from DCR to Town of Winthrop.

4. **Belle Isle Marsh Marine Ecology Park**
    - This area is owned and managed by the Town of Winthrop. There is now a large parking area at the corner of Morton and Winthrop Streets that provides access to an extensive boardwalk system that connects between the Morton Street Pavilion and the cemetery.
    - The boardwalk was only recently built (after the 2018 storms) and cost approximately ~$1.8-2 million.

5. **Morton Street Pavilion**:
    - This parcel consists of a large wooden pavilion constructed on a ~1.5 acre parcel that is owned by DCR but was leased to the Town of Winthrop for 5 years. The property will revert back to DCR ownership/maintenance next year.
    - All of Morton Street was flooded during the 2018 storms.
    - The area of salt marsh just west of this parcel has degraded significantly to mudflat. Only scattered hummocks of vegetated salt marsh remain.
    - There is some ponding at the upland edge of salt marsh immediately west of the upland parcel even at low tide.

6. **Excel Academy / CVS**:
    - There is a trailhead at back of Excel Academy. The trail is owned/maintained by DCR.
    - This parcel is adjacent to an MBTA railroad maintenance yard.
    - There is a concrete structure at end of trail (and another across the river). These structures mark where the MWRA sewer line runs under the river (on its way to Deer Island).
    - Just upstream of concrete structures there is a series of old wooden bridge piles.
    - Boston Natural Areas Network had previously conducted some restoration activities just north of main trail (along MBTA fence line). They added rip rap to create a path/viewpoint, included interpretive signs, and planted some salt marsh plants. However, much of this was destroyed in the 2018 storms.

7. **Lawn Ave Parcel**:
   - This parcel includes a path out to an elevated overlook platform.
   - The salt marsh surrounding this area has some of the highest salt marsh plant diversity of the entire Belle Isle Marsh system: *Spartina alterniflora, S. patens, Distichlis spicata*, seaside goldenrod, and high tide bush (DCR staff noted that this is the only high tide bush on the site).
   - The thickets in the upland areas are frequently used as long-eared owl roosts in the winter.
   - DCR staff noted that because this is one of the least trafficked portions of the reservation by humans there are lots of wildlife.
   - DCR runs a bird banding station here (mist nets for song birds and baited traps for raptures).
   - From the overlook, large pannes can be seen in the southeastern corner of bermed-in area.
   - High salt marsh area between pannes and the *Phragmites* is where all the salt marsh sparrow nests are built.
   - In 2016, there was a significant horseshoe crab breeding population using the pannes for egg laying.

8. **Sales Creek**:
   - This portion of the water way is not tidal.
   - Occasionally (approximately once in the last decade), there is a significant release of fresh water when heavy rains flood that back area.
   - The water control structure at Bennington Street is owned and managed by DCR.

Some additional general site history was also discussed during the site visit:

- The Reservation was built between 1975 and 1983. The park was designed by Jim Falk.
- The surrounding neighborhoods in Winthrop and Revere contribute stormwater runoff to the marsh. Both have EPA permits.
- At 1141 Bennington St., several parcels of privately owned land and Austin Avenue border the salt marsh. Austin Avenue provides access to the MBTA maintenance yard by an easement; DCR also has an easement to utilize a section of Austin Avenue. In March 2019, a fire destroyed the structures at 1141 Bennington Street. A proposal for housing on this location has been prepared but, as of the date of this memo, has not yet been submitted to the City of Boston. The salt marsh-Austin Avenue interface is characterized by broken fencing, overgrown vegetation, street runoff, and rock and gravel intrusion from occasional work along Austin Avenue. Ongoing illegal dumping occurs into the salt marsh at this location.
- There is currently a significant amount of future development planned for this area. A large HYM development of apartments in Boston and Revere is set to be constructed over the next 10-20 years. The area in Revere is fully permitted and construction has already started. The Boston area is in the last stages of permitting. Together, these apartments will house an additional 60,000 – 70,000 people immediately adjacent to Belle Isle Marsh. The potential impact to the site could be enormous. There are also concerns about the lifetime of those apartments given sea level rise. HYM has only vouched for the site through 2070 with regards to sea level rise and climate change.

The following sections summarize the main findings of previous studies and reports that were reviewed as part of this task.

C. Rumney Marshes ACEC Designation (1998)

The Area of Critical Environmental Concern (ACEC) designation pointed to this area's significance for flood control, prevention of storm damage, protection of land containing shellfish and fisheries, prevention of pollution, protection of wildlife habitat and protection of public water supplies as a reason for listing it as an ACEC. The larger Rumney Marshes ACEC includes both the Saugus and Pines River Estuary and Belle Isle Marsh. The designation further cited the relatively undisturbed nature of these resource areas within an otherwise heavily developed area as clear indication of their value. The landward boundary was defined by the 100-year flood elevation, except where specified otherwise. The Belle Isle Marsh portion of the system includes Belle Isle Creek, the marshes of this system and tributary streams, including Sales Creek.

Criteria for ACEC designation included:

1. Threats to public health through inappropriate use – Salt marshes play an important role in the prevention of flood damage by providing vital flood storage capacity. The loss of this flood storage capacity would have significant implications with regard to public health, safety and welfare.
2. Productivity – These areas contain some of the most productive and extensive salt marsh systems in the greater Boston area, containing salt marsh, tidal flats, and shallow subtidal channels. These areas were described by the U.S. Fish and Wildlife Service as "one of the most biologically significant estuaries in Massachusetts north of Boston."
3. Uniqueness of the area – This relatively undisturbed estuary and marsh complex is quite unique given its close proximity to a major metropolitan center.
4. Imminence of threat to resources – Given the existing developmental pressure along the fringes of these areas, the chronic and cumulative impacts can ultimately have significant adverse impacts on the natural system.

D. Rumney Marshes ACEC – Salt Marsh Restoration Plan (May 2002)

The salt marsh restoration plan was developed to "identify how salt marsh restoration might help address some of the effects of cumulative salt marsh loss - such as, a decline in water quality, loss of flood storage, and decreased habitat for wildlife, fish, and shellfish throughout the ecosystem." In addition to addressing potential restoration actions, this document also included significant background information on the site's history and ACEC designation, existing wildlife, and threats to the site. Information on these topics from this report are summarized below.

<u>ACEC Designation</u>:

The Rumney Marshes Area of Critical Environmental Concern (ACEC) was characterized by the U.S. Fish and Wildlife Service as one of the most biologically significant estuaries in Massachusetts north of Boston. The entire ACEC is 2,634 acres in size and is located in the municipalities of Boston, Revere, Winthrop, Lynn and Saugus. The ACEC is comprised of two marsh systems, Rumney Marsh and Belle Isle Marsh. These two areas are now disconnected but were formally portions of a much larger salt marsh complex. The purpose of the ACEC Program is to identify, designate and preserve critical environmental resource areas, and facilitate and support long-term stewardship.

<u>History</u>:

Rumney Marsh and Belle Isle Marsh, now separated by channelized buried creeks and filled land, were once interconnected by the Chelsea River, Mill Creek, and Sales Creek. In total, the two marsh systems drain an area of approximately 65 square miles. The majority of the uplands and filled wetlands within this region are now heavily developed urban land, which contribute large volumes of polluted run-off and other non-point source pollution to the Belle Isle Marsh watershed. The role of salt marshes in such a landscape is critical for attenuation of peak run-off velocities, water quality improvement, flood storage, and maintenance of fish and wildlife habitat.

Belle Isle Marsh Description:
Belle Isle Marsh is the smaller of the two Rumney Marshes ACEC components and is located approximately 1.5 miles south of Rumney Marsh proper and just north of Logan Airport. The ACEC at Belle Isle Marsh is 359 acres and is located in Boston, Revere and Winthrop. The primary surface water feature in Belle Isle Marsh is Belle Isle Inlet, which travels through the center of the Belle Isle Marsh from Bennington Street to the Saratoga Street Bridge (approximately two miles). The two major tributaries of Belle Isle Inlet are Sales Creek to the west and Short Beach Creek to the east. Sales Creek flows into Belle Isle Inlet from the west side of Bennington Street. Sales Creek formerly connected with the Chelsea River, but the upper portions of this system are is now partially buried and channelized. Remnants of Sales Creek are present within the Suffolk Downs Racetrack and within small portions of remaining creek just north of the track stables. Due to the importance of the hydrologic connections among these remaining sections of Sales Creek to the marsh, the remaining sections of Sales Creek were also included in the ACEC boundary. Wetland types mapped in 1998 in Belle Isle Marsh included 174 acres of salt marsh, 55 acres of tidal flats, 27 acres of other vegetated wetlands, and 6 acres of open water (a total of 262 acres of wetland).

Birds/Wildlife:
Among the mammal species indigenous to the area are raccoon, muskrat, meadow vole, skunk, red fox, and harbor seal[1]. Muskrat and meadow vole reside in the marsh proper with visitors of raccoon, red fox, and opossum. Reptiles and amphibians are limited in the marshes because of the small amount of available habitat and are found mostly on the fringes of the ACEC in the uplands or in freshwater areas.

Fish/Shellfish/Invertebrates:
Like all estuarine systems, Belle Isle Marsh is critical resource areas for both resident and transient fish species. Year-round resident fish species in the salt pannes and creeks of Belle Isle Marsh include mummichogs (*Fundulus heteroclitus*), killifish (*Fundulus spp.*), three-spined sticklebacks (*Gasterosteus aculeatus*), and four-spined sticklebacks (*Apeltes quadracus*). These species play a crucial role in the salt marsh food web. As prey species for larger fish and birds and consumers of detritus, vegetation, and smaller fish, they represent an important link in the maintenance of trophic structure relationships. Soft-shell clam (*Mya arenaria*) and blue mussel (*Mytilus edulis*) are the most common shellfish found within Rumney Marsh and Belle Isle Marsh.

Threats/Impacts:
Both Rumney Marshes and Belle Isle Marsh were once much more extensive. Human impacts to the marshes have included filling, dumping and digging of ditches. Surveys by the Army Corps have determined that approximately 11.5 acres of salt marsh were filled within the ACEC between 1978 and 1989, despite the existence of rigid wetland regulations.

This 2002 Restoration Plan listed the following as threats to the Rumney Marshes ACEC, including Belle Isle Marsh: loss of habitats, increase in invasive plant species and loss of native salt marsh plants, impaired water quality, flooding, increase in mosquitoes, increased risk of fire, and loss of recreational and educational opportunities, open space and scenic quality.

[1] This species list was taken from a 2002 report but underrepresents the suite of mammals presently (2021) utilizing the Reservation; the Belle Isle Marsh Reservation Park Supervisor notes that mink, long-tailed weasel and eastern coyote are also present at the site. Red fox, however, have been extirpated from the park for about a decade.

Grid ditching for mosquito control conducted during the 1930s, attempted to drain water from virtually the entire marsh surface, eliminating salt pannes and small tidal creeks, essential habitat areas for killifish and wading birds. Mosquitoes continued to breed on the moist marsh surface, but killifish were no longer present to consume mosquito larvae, one of their preferred food sources. As a result, mosquito populations increased. Open Marsh Water Management (OMWM) is an innovative technique for mosquito control, which involves the systematic plugging of grid ditches and the re-establishment of salt pannes and small meandering tidal creeks in order to bring killifish back onto the marsh surface. Implementation of OMWM has been extremely effective in both controlling mosquitoes and restoring lost ecological functions to salt marshes. The Northeast Massachusetts Mosquito Control and Wetlands Management District has implemented a number of OMWM projects in Rumney Marsh and Belle Isle Marsh to specifically address continuing mosquito problems.

Other alterations to natural hydrology (e.g., tide gates and crossings of tidal creeks by roads) have also had significant adverse effects on salt marsh wildlife by restricting tidal flow and freshwater run-off and fragmenting formally contiguous marshes.

Extensive areas of former salt marsh are now dominated by invasive plant species, most notably the common reed, *Phragmites australis*. At disturbed sites, common reed frequently forms dense monotypic stands, which can outcompete native species. In addition to its habitat impact, monotypic stands of common reed typically contain several years' worth of dead plant material, both on the ground and standing, which can lead to an increased brush fire risk. The 2002 Salt Marsh Restoration Plan states that in Belle Isle Marsh, previous use of the marsh for dredged material disposal around 1930 created a large *Phragmites* dominated area which can potentially be restored with proper excavation.

<u>Restoration Projects (Implemented and Planned)</u>:
In 1998, the Rumney Marsh Salt Marsh Restoration Task Group compiled a list of potential restoration projects totaling approximately 273 acres of potentially restorable salt marsh. Additionally, between 1993 and 2002, 142 acres of this total salt marsh acreage have been restored within the ACEC at 14 sites. Additional areas of potentially restorable salt marsh have also been identified. The 2002 acreage of potentially restorable salt marsh was estimated to be approximately 131 acres at 16 sites. Highlights from some of the proposed and complete restoration projects are listed below:

> *<u>Proposed Restoration project</u>*: The "Belle Isle Fish Co." project proposed to restored approximately 1.5 acres of salt marsh located off Saratoga Street in Boston behind Osco drug store just west of the Saratoga Street Bridge.
>
> > Site/Project Description: "The Belle Isle Fish Company site (BIFCO) is owned and managed by the City of Boston as publicly accessible conservation land. The site is bounded by Belle Isle Inlet to the east, the MBTA Orient Heights Maintenance Yard on the west, and the MDC's Belle Isle Reservation to the north and south. In the early 1990s, the site was investigated as a potential mitigation area for Central Artery/Tunnel wetland impacts. During the course of this investigation, substantial soil contamination was discovered on-site. Because of this, the site was dropped from consideration for CA/T mitigation. In accordance with the Massachusetts Contingency Plan (MCP), the City of Boston was left with the responsibility of cleaning up the site. Boston's Environment Department and Parks Department have been working jointly since 1998 to develop a site remediation and salt marsh restoration plan for BIFCO. As of February 2002, the city had submitted a Phase III Release Action Plan to DEP and began preparation of construction specifications. The overall project plan involves the removal of approximately 7,000 cubic yards of fill, capping of contaminated hot spots, and restoration of salt marsh in the excavated area and creation of coastal bank and grassland habitat on the capped area. The site will be managed as a

natural area for passive recreation and eventually will be incorporated as a key component of the East Boston Greenway, connecting Saratoga Street to the MDC Reservation. Though not a large salt marsh restoration, the project will provide significant benefits to Belle Isle Inlet by reconnecting large areas of fragmented marsh and helping to improve surface water run-off from the adjacent industrial area. Depending on the availability of funding, construction of the project is scheduled for the winter of 2002-2003."

Completed Restoration project: "Radio Tower Dike/OMWM Area" project located east of Belle Isle Inlet, near Short Beach Creek restored 5 acres of salt marsh. This diked salt marsh was the site of a 5-acre OMWM project completed by the Northeast Massachusetts Mosquito Control and Wetlands Management District in 1993.

Proposed Restoration project: "Sales Creek/Bennington Street" project proposed to restore 6 acres of wetland at the Intersection of Sales Creek and Bennington St.

Site/Project Description: "A standard flapper type tide gate prevents tidal flow from going upstream into Sales Creek, although some leakage may occur at Bennington Street and at a culvert under Route 1A which drains to Chelsea Creek. It may be possible to modify the standard flapper type tide gate at Bennington Street, to include a Self-Regulating Tide Gate to introduce controlled tidal flow to Sales Creek to help control *Phragmites* and improve its ecology, habitat values, and flushing characteristics."

E. Belle Isle Marsh Reservation ACEC & IBA Management Assessment (Jan 2020)

This assessment provides a history of the ownership and use of the Belle Isle Marsh area, as well as a description of the different segments of the site. The Belle Isle Marsh Reservation is a fragmented reservation, requiring a vehicle to get to and access the various satellite areas of the park. This 2020 assessment provides a detailed description of each of the reservation areas and habitats types, as well as documentation of the various fauna that utilize the site. The assessment ends with a summary of some of the historic, ongoing and potential future threats to the marsh (e.g., significant housing developments nearby, off-leash dogs, sea level rise and climate change, etc.). Although the details from this 2020 document are not reproduce here, the information in this document will be drawn from heavily in the development of the Belle Isle Marsh Resource Management Plan.

F. Belle Isle Marsh Water Quality Monitoring Program (1988)

This document was developed as part of developing a water quality monitoring program for Belle Isle Marsh. The goals of the program included:

1. Detect present day water quality problems and any changes in water quality in the future, and
2. Be simple enough to be carried out by non-scientific personnel after training.

Although funding was tight, the program was initiated through a partnership with Mass Audubon and MWRA and was partially funded by a CEIP fund grant. Details of the monitoring program and results from the initial year of implementation are documented below.

Need for Water Quality Monitoring:

Salt marshes used to dominate the coastline from Rowley to Cape Cod, but many of these areas have been developed or turned into dumpsites. Belle Isle Marsh has remained open space, but open space does not guarantee productive space. Coastal ecosystem health is directly related to the quality of water. The salt marsh is an essential place for reproduction and growth of many fish and bird species.

Water Quality Parameters:

The initial year of water quality monitoring included sampling for the following parameters:

1. Salinity – measures the concentration of salt in the water and provides information about how far freshwater extends into the estuary.
2. Dissolved Oxygen – measures the concentration of oxygen in the water. Aquatic organisms require oxygen for respiration. Low dissolved oxygen concentrations reduce benthic species diversity and can have other adverse impacts. Massachusetts state regulations require a minimum of 6mg/L of dissolved oxygen.
3. Turbidity – measures water clarity. High turbidity can limit photosynthesis and can clog the gills of fish and filter feeding organisms.
4. Temperature – Dissolved oxygen concentrations are related to temperature, so it's important to measure both. Elevated temperatures can lead to low dissolved oxygen concentrations and potentially fish kills.
5. Coliform Bacteria – Coliform bacteria are organisms that are indigenous to the digestive tracts of warm-blooded animals. They are used as an indicator of sewage.
6. Biochemical Oxygen Demand – Bacteria degrade organic matter by using up oxygen from the water column. This measurement provides a relative idea of how much organic matter is present in a sample.

In addition, pH was also considered, but equipment was unavailable to measure this.

Sample Sites:

The initial year of sampling included 8 different sampling sites:

A. Sales Creek (Trailer Park)
B. Sales Creek (Cerretani's)
C. Sales Creek (Pumping Station)
D. Bennington Street Bridge
E. Island Bridge
F. MDC Property
G. Saratoga Street Bridge
H. Rosie's Pond

The locations of these sites are shown in Figure 2.

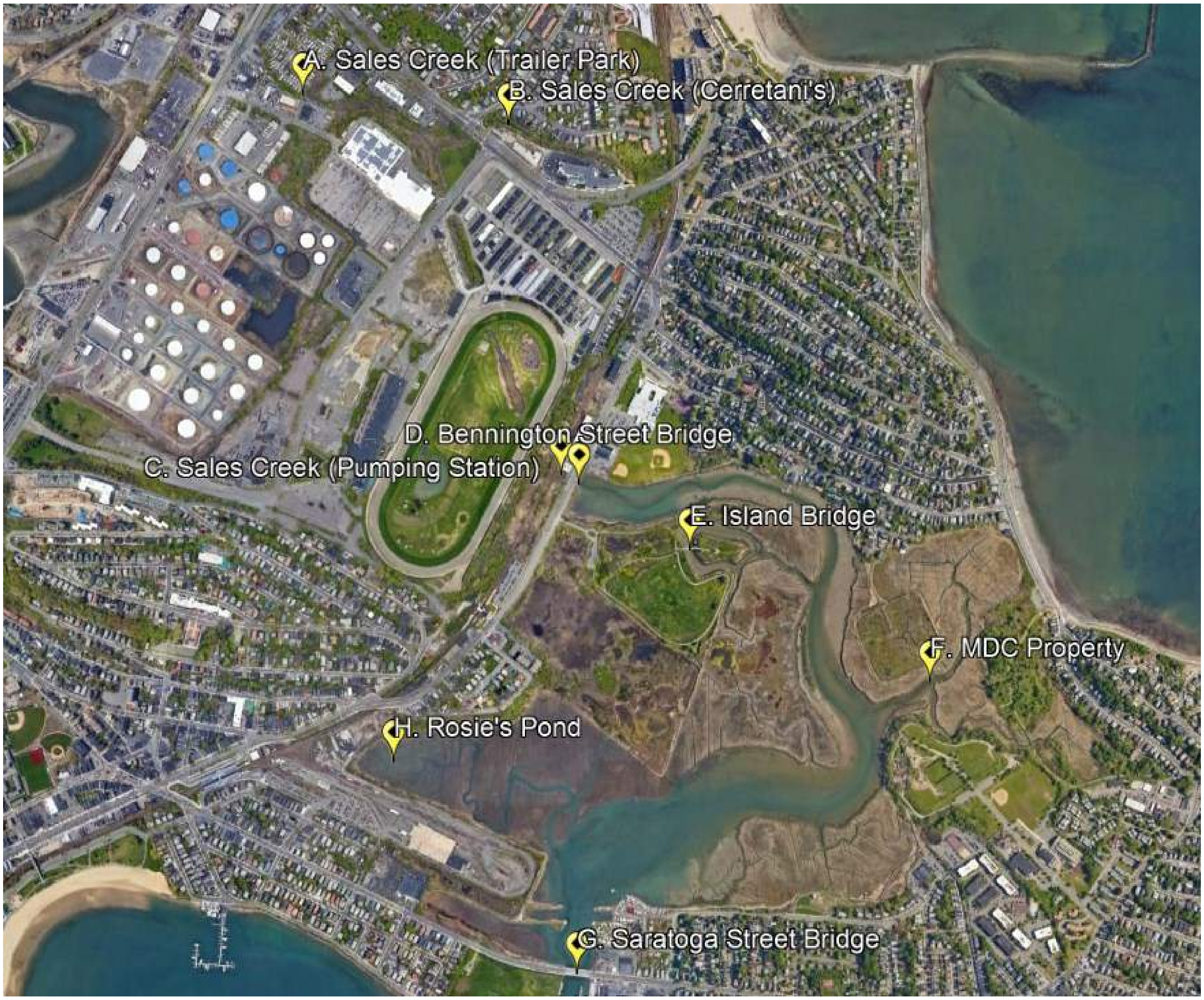


Figure 2. **Map of 1988 water quality sampling stations.**

Monitoring Methods:
All samples were collected within an hour of high tide (in many cases, this is the only time water is available for sampling). The Bennington Street Bridge and the Island Bridge were sampled three times a week. All other sites were sampled once a week. Sampling spanned 11 weeks in 1988.

Results:
The 1988 report concluded that, at the time, there were many water quality problems in Belle Isle Marsh. Quantitative results from the 1988 water quality monitoring are provided in Tables 1 through 4. Additional summaries about the data for each water quality parameter are provided below:

1. Salinity: At high tide, the entire marsh is seawater with salinities consistently between 29 and 31 ppt. However, at low tide, in dry weather conditions, the salinity in many areas of the marsh are greatly reduced. The input of fresh water from Sales Creek is felt deep within the marsh. During wet weather, salinity values are much lower throughout the marsh. This is especially true when the pumping station is

in operation; at these times, a large portion of the marsh becomes freshwater (e.g., salinity at the Island bridge was reduced to 4 ppt).

2. Water clarity: In general, water clarity decreases as water comes in from the harbor and disperses around the marsh. After operation of the pumping station, water clarity was reduced to zero and remained in this condition at most sites in the marsh for several days after.
3. Dissolved oxygen: DO concentrations varied greatly throughout the site, with concentrations decreasing as you move upstream. The lowest DO concentrations were near the pumping station. After wet weather, dissolved oxygen concentrations decreased throughout the marsh. Low dissolved oxygen concentrations are probably responsible for the fish kills experienced within Belle Isle Marsh.
    a. Fish Kills: During the summer of 1988, there were three incidences of extensive fish kills. The first occurred in the isolated pools of water out in the lower marsh during a hot, dry period of weather. These isolated pockets of water heat up and the degradation of organic matter in the pools results in dangerously low oxygen levels. An occurrence like this is natural during hot dry summer conditions. The other two fish kills were higher causes for concern. Both resulted after the operation of the pumping station and significant discharge into the marsh, which had a high organic matter content.
    b. In general, dissolved oxygen decrease after wet weather due to the influx of organic matter (including large amounts of dog waste in the park).
4. Coliform Bacteria: High levels of coliform were found at the Bennington Street sample site at all times, but were higher after wet weather, so much so that they were too high to count, even with a dilution factor of 100. Sales Creek was determined to be the major source of coliform, with the storm drain that empties into this area also contributing varying amounts. Based on further analysis, it was determined that the majority of the problem already exists in Sales Creek before it enters Suffolk Downs (i.e., the source of the high coliform from upstream of Suffolk Downs). Most other sample sites throughout Belle Isle Marsh had coliform levels that fell within the normal range. It appears that Boston Harbor did not significantly contribute to the coliform counts within Belle Isle Marsh.
5. Other Water Quality Issues:
    a. The storm drain that empties into the Bennington Street site has a continuous oil slick associated with it, cause by street runoff. Oil also emanates from the creosote piling on the Island Bridge. Oil and gas also originate from boat use in the estuary.
    b. Aquatic species diversity in the marsh is extremely low. There are several species that should be abundant in the salt marsh, but do not exist there. Fiddler crabs, for instance, are not present in the marsh[2].

Recommendations:

1. Continue water quality monitoring in the long-term
2. Additional environmental chemistry testing for sediments contaminants
3. Compilation of a complete flora and fauna map for the reservation

[2] This is no longer the case. The Belle Isle Marsh Reservation Park Supervisor notes that presently (2021) there are a number of fiddler crab colonies across the Belle Isle Reservation.

Table 1. Summary of 1988 Water Quality Testing Results.

Site	Turbidity (m)	Salinity (ppt)	D.O. (mg/l)	Temperature (C)
Saratoga	2.96	29.73	9.3	13.5
	(2 – 4)	(28 – 31.5)	(7.1 – 11.1)	(9 – 18)
MDC Property	0.52	27.42	5.53	22.17
	(0.5 – 1)	(26 – 30)	(5.1 – 6.9)	(19 – 22)
Island	0.77	27.22	5.32	20.97
	(0 – 1.5)	(4 – 31)	(3.5 – 7.1)	(17 – 24)
Bennington	0.44	26.56	3.72	22.34
	(0 – 1)	(0 – 31)	(2.3 – 5.7)	(16.5 – 28)
Osco	--	10	4.16	29.5
		(1 – 20)	(1.9 – 7.1)	(24 – 37)
Rosies	--	27.8	5.98	25.6
		(20 – 32)	(4.0 – 9.8)	(21 – 28)

Unshaded cells represent the mean value; shaded cells represent the range.

Table 2. Mean total and fecal coliform counts from 1988 testing.

Site	Total Coliform Count (cells/100ml; mean)	Total Coliform Count (cells/100ml; range)	Fecal Coliform Count
Bennington Street	53,314	(3,400 – TNTC)	TNTC
Storm Drain	5,886	(1,700 - 13,000)	1,100
Island Bridge	20,800	(1,300 – 110,000)	7,000
MDC Property	7,287	(0 – 40,000)	--
Sales Creek	62,267	(2,600 – TNTC)	TNTC
Rosie's Pond	5,590	(20 – 18,000)	--
Saratoga Street	2,575	(160 – 10,000)	0
Carratani's	75,000	(n=1)	--
Trailer Park	13,000	(n=1)	700
Bennington Street (immediately after pumping station was put into operation)	TNTC		

TNTC = Too numerous to count, minimum value would be 200,0000

Table 3. Water quality conditions at Bennington Street before and after operation of pumping station from 1988 sampling.

	Turbidity (m)	D.O. (mg/l)	Salinity (ppt)	Coliform (cells/100ml)
Before	0.25	2.8	27	25,000
After	0	2.3	0	TNTC

Table 4. Biochemical oxygen demand taken from Sales Creek and Belle Isle Marsh from the 1988 sampling.

Site	Reading (mg/l)
Sales Creek 1 (Cerretani's)	8.3
Sales Creek 2 (Trailer Park)	9.1
Pumping Station	8.5
Bennington Street Storm Drain	4.6
Storm Drain 2*	6.0

*This site empties into the inlet approximately 500 feet down from the Sales Creek input; it is runoff from several baseball fields and a playground.

G. Belle Isle Marsh Restoration – Environmental and Engineering Evaluations (August 1991)

This document proposed a restoration plan to increase the amount of salt marsh and vegetation diversity within the bermed area of Belle Isle Marsh and to reduce the amount of *Phragmites*. An area of approximately 25 acres has been altered through the construction of a bermed dredged material disposal site, which is believed to have occurred in the 1930s. This berm eliminated tidal flooding to the area behind it, but a series of subsequent breaches have resulted in reclamation of approximately 10 acres of salt marsh and salt marsh mixed with low *Phragmites*.

As part of the settlement of the federal lawsuit against the Commonwealth of Massachusetts over the pollution of Boston Harbor, funds were placed in the Massachusetts Bays Environmental Trust. The agreement specified that $100,000 should be used for the Belle Isle Marsh cleanup, restoration, or study of the sublethal effects of contaminants on the marsh flora and fauna. A working group convened in 1989 to determine how to best utilize these funds to benefit Belle Isle Marsh. The recommendation of this working group was to focus on restoring the area behind the berm.

<u>Vegetation Mapping</u>: Vegetation across Belle Isle Marsh was mapped and described in 9 main sections. The majority of Belle Isle Marsh was high marsh, which extends roughly from mean high water (MHW) to the level of the highest spring tides. On the high marsh, salt meadow grass (*Spartina patens*) is dominant and spike grass (*Distichilis spicata*) is second most dominant. Large areas of high marsh are also dominated by short salt marsh cordgrass (*Spartina alterniflora*). Low marsh areas were dominated by tall salt marsh cordgrass. The largest area of *Phragmites* is located behind the berm adjacent to Belle Isle Park. Baseline vegetation surveys were conducted by Mass Audubon (North Shore) to describe the existing plant community and set up a series of permanent transects so that changes in plant community could be documented over time. Data was collected on species composition, relative frequency, relative cover, and relative importance for each species.

<u>Benthic Surveys</u>: Baseline surveys of benthic fauna were also conducted by Mass Audubon. Benthic samples were taken from ten station in Belle Isle Marsh in August 1990. Samples taken from the main channels and the ditches found oligochaetes and the polychaete, *Streblospio benedictii*, to be the dominant taxa, accounting for 89-93% of all individuals found in those locations. The dominance of these two taxa is characteristic of the intertidal fauna in Boston Harbor. Samples from the salt pannes found a reduced number of organisms.

<u>Fish Surveys</u>: Fish data were collected using steel minnow traps and seines. Data indicated that the most abundant fish in the mosquito ditches were mummichogs (*Fundulus heteroclitus*). Other fish observed included three- and four-spined sticklebacks, striped killifish, and juvenile eels. Winter flounder are also commonly caught by recreational fishermen in the inlet.

General Tide Information: The maximum predicted astronomical high water at the NOAA gauge in Boston Harbor was 12 feet mean low water (MLW), the mean spring high water level was 10.3 feet MLW, and the mean high water level was 9.5 feet MLW. Actual tides within Belle Isle Marsh were not measured but were most likely less than these maximums due to the restriction at Saratoga Street. Behind the berm near existing openings, based on the presence of salt marsh vegetation, evidence of tidal flooding is present up to elevation 11.8 MLW.

Proposed Restoration Alternatives (for area behind berm): This report suggestioned 3 alternatives for restoring tidal flooding to the bermed area:

1. Partial or complete removal of the berm;
2. Construction of channels through the berm and on the surface of the bermed area; and
3. Complete removal of the berm and grading the marsh surface to the level of pre-existing salt marsh.

All options would improve hydraulic conveyance and tidal circulation, but Option 2 was selected as the preferred alternative due to the effectiveness and cost constraints of the other two options.

Historical and Archaeological Resources: This document included an assessment from Thomas Mahlstedt, who was Chief Archaeologist for the Metropolitan District Commission at the time, regarding potential historical resources within the proposed restoration area. The assessment assumed that fall harvesting of salt marsh hay continued at Belle Isle Marsh throughout the 18th and 19th centuries. The only possible, although highly unlikely, historic period archaeological remains would be evidence of the hay harvesting activities. Remains of the wooden post structures, known as staddles, which held the marsh hay until the marsh and estuary frozen enough to cart the hay to the local markets, may exist in the marshland or may have been buried by the landfill. Even if buried, they are likely to have been crushed by the weight of the overburden, so they would not retain a high degree of integrity.

Mahlstedt's assessment also described how Belle Isle Park is not a natural landform. A refuse dump was created in the vicinity in the 1920s when Breed's Isle, as it was still called by some, was selected to relieve Boston's growing waste problem. At that time, the wetlands were systematically filled. Based on cores, it appears that much of what was placed in this area is likely to be disposed earthen fill, perhaps from nearby dredging, rather than refuse.

Suffolk Downs Racetrack was built in 1935 on the landfill. The MBTA blue line trolley and Bennington Street were also built on the landfill. East of the road the Suffolk Downs Drive-in Theatre was built on the fill in the 1950s. After it was closed in 1971, the former theater property was abused and used as a general dumping ground. The Friends of Belle Isle Marsh lobbied to have this area preserved as open space, and ultimately the land was purchased by MDC in the 1980s. In 1986, extensive landscaping was conducted on the former drive-in site. Deep trenches were excavated from the fill to create the island-like configuration that is present today. The spoil from this dredging was placed over the drive-in site and contoured and graded to create a rolling hill meadow aesthetic. The spoil was then capped with a membrane of impervious PVC plastic, over which loam was spread, graded and planted. Benches, winding walkways, a small parking area, signs and an observation tower completed the development of the park.

Although Mahlstedt could not confirm the presence or absence of archaeological (prehistoric) resources, he noted that the survival of prehistorical archaeological remains has been found in similar nearby settings, and are therefore possible at this site.

H. Belle Isle Marsh Reservation – Preliminary Research and Master Plan Phase – Feasibility Study (1978)

This document summarized the results of an initial investigation into the feasibility of constructing the "Master Park Concept". The report concluded that the overall concept was feasible. The initial Master Plan Concept included the following:

1. Passive recreation
2. Altering the flat landscape of the old Suffolk Downs Drive-In Theater facility to create more natural, rolling terrain
3. Formation of an island connected by bridges
4. Reduce the existing concrete driveway and add stone dust walking trails
5. A fishing pier near Belle Isle Inlet
6. A small park structure for public toilets and park management staff
7. A lookout tower
8. Parking for approximately 50 cars
9. A general inventory of existing plant species, and a determination of which undesirable species should be removed; replanting with desired species where necessary
10. Park furnishing and other appurtenances.

Plan L2, included with the study, has a full depiction of the initial Master Plan Concept; while Plan L10 presents the revised Master Plan Concept that could be constructed with a more reasonable budget (and appears to largely match what is in place today). The revised plan included only a single bridge to the created island, and a reduced network of roads and paths. In addition, the proposed fishing pier and toilet facility were removed from the plan.

At the time, existing conditions included significant debris around the site, which had been used as an unsanctioned dumping ground since the closure of the drive-in, and areas of burned marsh. The old theater area and parking lot were located on filled materials. This area was surrounded by relatively undisturbed tidal marsh. Even in the 1970s, there was an area of significant *Phragmites* to the north, between the parking area and Bennington Street, which had been cut off from tidal flushing. The vegetation survey conducted during the feasibility assessment found no endangered or rare plants or animals on the site.

A subsurface soil evaluation was also conducted. The findings showed that there was a layer of anthropogenically placed fill, underlain by a stratum of naturally occurring soft organic soils, which is further underlain by a deep deposit of sand and clay. Given this subsurface material, the report provided the following recommendations:

- All permanent structures requiring good vertical alignment (e.g., bridges, piers, observation towers, etc.) should be pile supported;
- The deep tidal channels should have slopes no steeper than 4H:1V; and
- Future settlement should be considered in areas where sites grades are to be raised.

The report also included an analysis of the Belle Isle Inlet at Saratoga Street. Serious shoaling conditions in this tidal waterway were experienced in the past. The report mentions that dredging had been considered in the past (but not performed) and noted that the clam beds in this area would suffer from a major dredging operation.

I. Sales Creek Information from Beals & Thomas

Although DCR does not own or manage land around Sales Creek, because this waterbody flows directly into Belle Isle Marsh and is part of the ACEC, the project team reached out to the property owners of that site to see if they (or their consultants) would be willing to share existing conditions information regarding the wetlands and topography of the Sales Creek System. A wetland scientist from Beals & Thomas provided the following information:

1. Wetland delineations for the Sales Creek system
2. Invasive species inventories and maps for the Sales Creek system
3. Site photos showing the existing conditions of Sales Creek
4. Topographic data for the Sales Creek area

Reference Information on Above Sources:

Rumney Marshes ACEC Designation (1998):

EOEA. 1998. *Designation of Portions of the Cities of Boston, Lynn, and Revere, and the Towns of Saugus and Winthrop as the Rumney Marshes Area of Critical Environmental Concern with Supporting Findings*. Signed by James S. Hoyte, Secretary of Environmental Affairs, Massachusetts Executive Office of Environmental Affairs, August 22, 1988.

Rumney Marshes ACEC – Salt Marsh Restoration Plan (May 2002)

MWRP and MDEM. 2002. *Rumney Marshes Area of Critical Environmental Concern Salt Marsh Restoration Plan*. Prepared by Massachusetts Restoration Program and Massachusetts Department of Environmental Management on behalf of the Rumney Marshes ACEC Salt Marsh Restoration Task Group. May 2002.

Belle Isle Marsh Reservation ACEC & IBA Management Assessment (Jan 2020)

Riley, S. 2020. *Belle Isle Marsh Reservation Area of Critical Environmental Concern & Important Bird Area Management Assessment*. January 2020.

Belle Isle Marsh Water Quality Monitoring Program (1988)

Colarusso. 1998. *Belle Isle Marsh Reservation Water Quality Monitoring Program*. Submitted by Philip Colarusso, August 15, 1988.

Belle Isle Marsh Restoration – Environmental and Engineering Evaluations (August 1991)

USACE. 1991. *Belle Isle Marsh Restoration Environmental and Engineering Evaluations*. Prepared for Commonwealth of Massachusetts Executive Office of Environmental Affairs by New England Division U.S. Army Corps of Engineers funded by Massachusetts Environmental Trust. August 1991.

Belle Isle Marsh Reservation – Preliminary Research and Master Plan Phase – Feasibility Study (1978)

Moriece and Gary, Inc. Landscape Architects. 1978. Belle Isle Marsh Reservation – Preliminary Research and Master Plan Phase – Feasibility Study. Prepared for Commonwealth of Massachusetts Metropolitan District Commission. May 26, 1978.

Appendix B: Task 2: Data Collection – Summary Memo

MEMORANDUM

DATE April 7, 2021 **JOB NO.** 2020-0076

TO Catherine Pedemonti
Mystic River Watershed Association
20 Academy Street, Suite 306
Arlington, MA 02476-6401

FROM Elise Leduc
Woods Hole Group
eleduc@woodsholegroup.com

Task 2: Data Collection – Summary Memo

During the fall of 2020 Woods Hole group conducted several tasks to fill the gaps in data associated with the Belle Isle Marsh. The tasks outline below serve as an environmental inventory of the existing conditions, the local resources and the coastal dynamics.

A. Wetland Cover Type Map

Due to the size of the site and the extensive wetland resource areas present, an initial cover type map was created through aerial photo interpretation and a review of the most recent MassDEP wetland layer. A Professional Wetland Scientist (PWS) from Woods Hole Group compared the most recent MassDEP wetland layer (Figure 1) with recent aerial photography from 2019. Where significant changes were evident between the MassDEP mapping and the wetland resource areas evident on the more recent aerial imagery, the wetland shapefile was updated to reflect the most recent information. For example, the outer edge of the salt marsh was refined in many cases to capture more site-specific details and to account for erosion of the marsh platform that has occurred. Wetland and habitat categories were also refined to provide more detailed information about the vegetative communities present within the Belle Isle Marsh site. For example, “Salt Marsh” was broken into multiple categories, such as “High Salt Marsh”, “Low Salt Marsh”, “Brackish Marsh”, and “Phragmites”, and “Open Water” was categorized as being part of a channel or a panne. The refined wetland map produced from this desktop refinement is presented in Figure 2.

A PWS and a Coastal Scientist from Woods Hole Group then conducted a field visit on October 12, 2020 to ground truth the remotely generated wetland cover type map using an RTK GPS. Woods Hole Group also noted dominant plant species present in each area, as well as any other distinct conditions present within particular sections of the site. The resulting mapping data will be important not only to accurately describe the various habitat types across the site but will be important input parameters to the hydrodynamic modeling (Task 3) and future wetland modeling (Task 4). Based on the data collected during the October 12th field assessment, the wetland cover type map was further refined and a final wetland cover type map was developed (Figure 3). Example photos of key features and vegetation communities are provided in Appendix A.

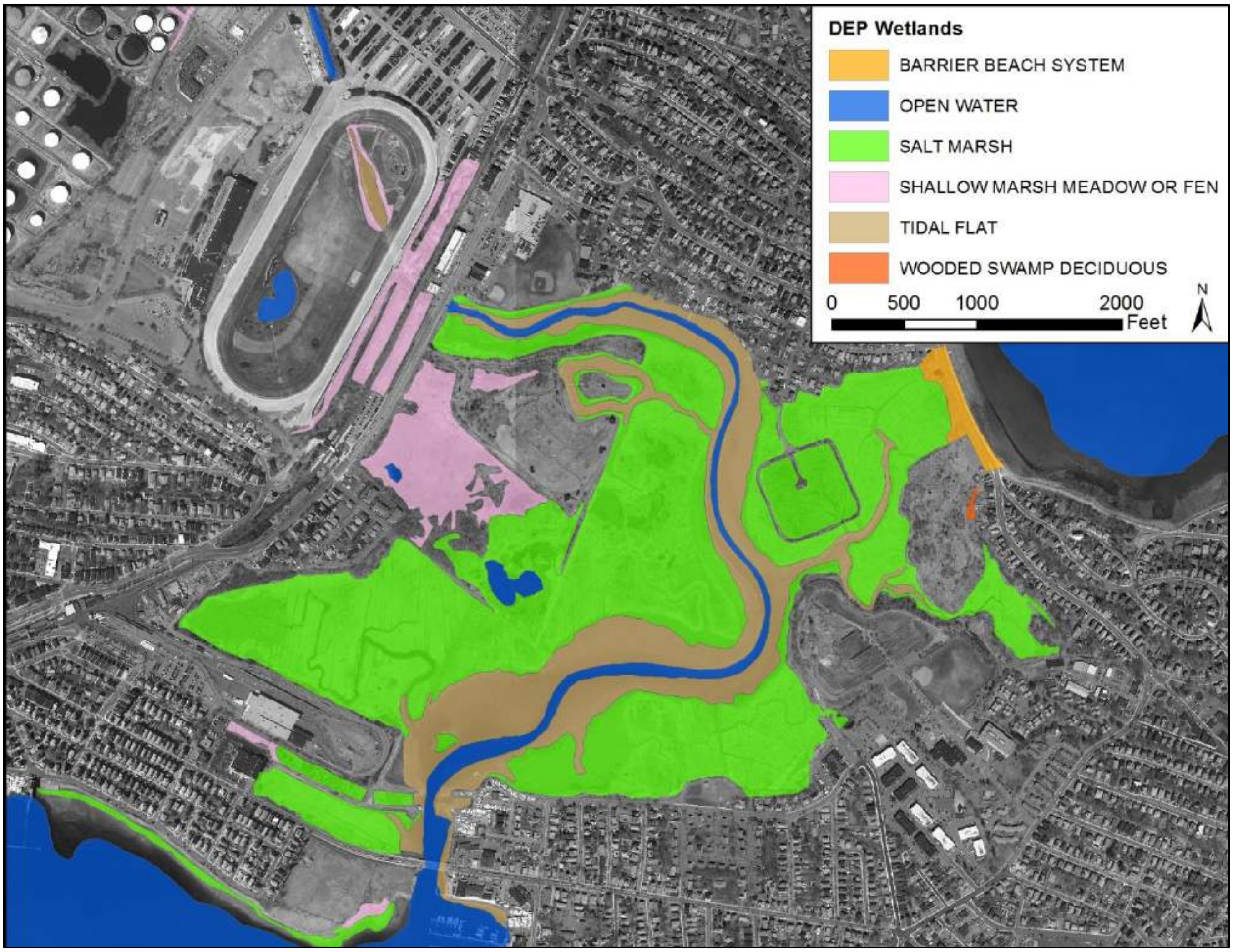


Figure 1. Wetland Cover Type Map based on the MassDEP 2005 wetland mapping.

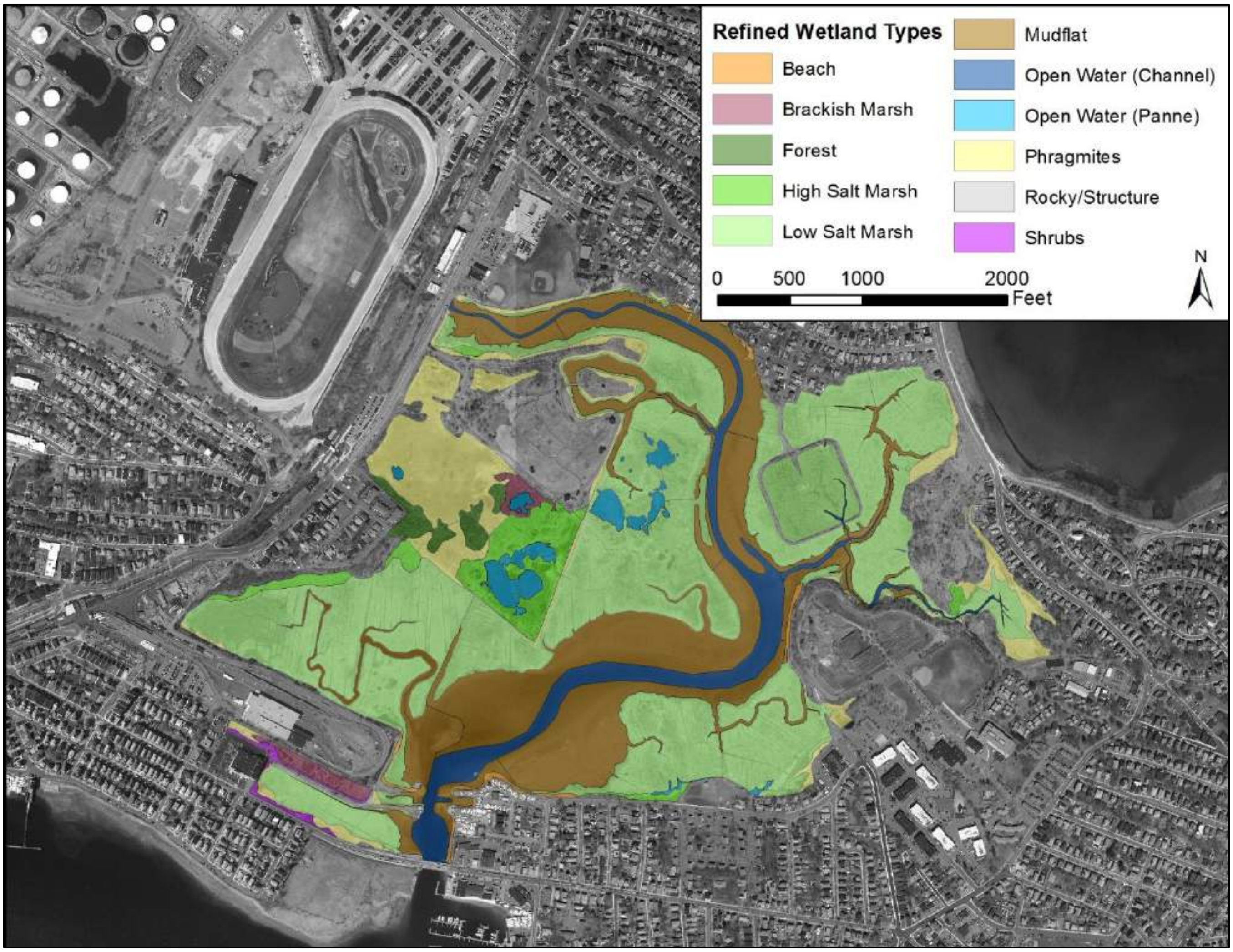


Figure 2. **Refined wetland cover type map based on aerial photo interpretation.**

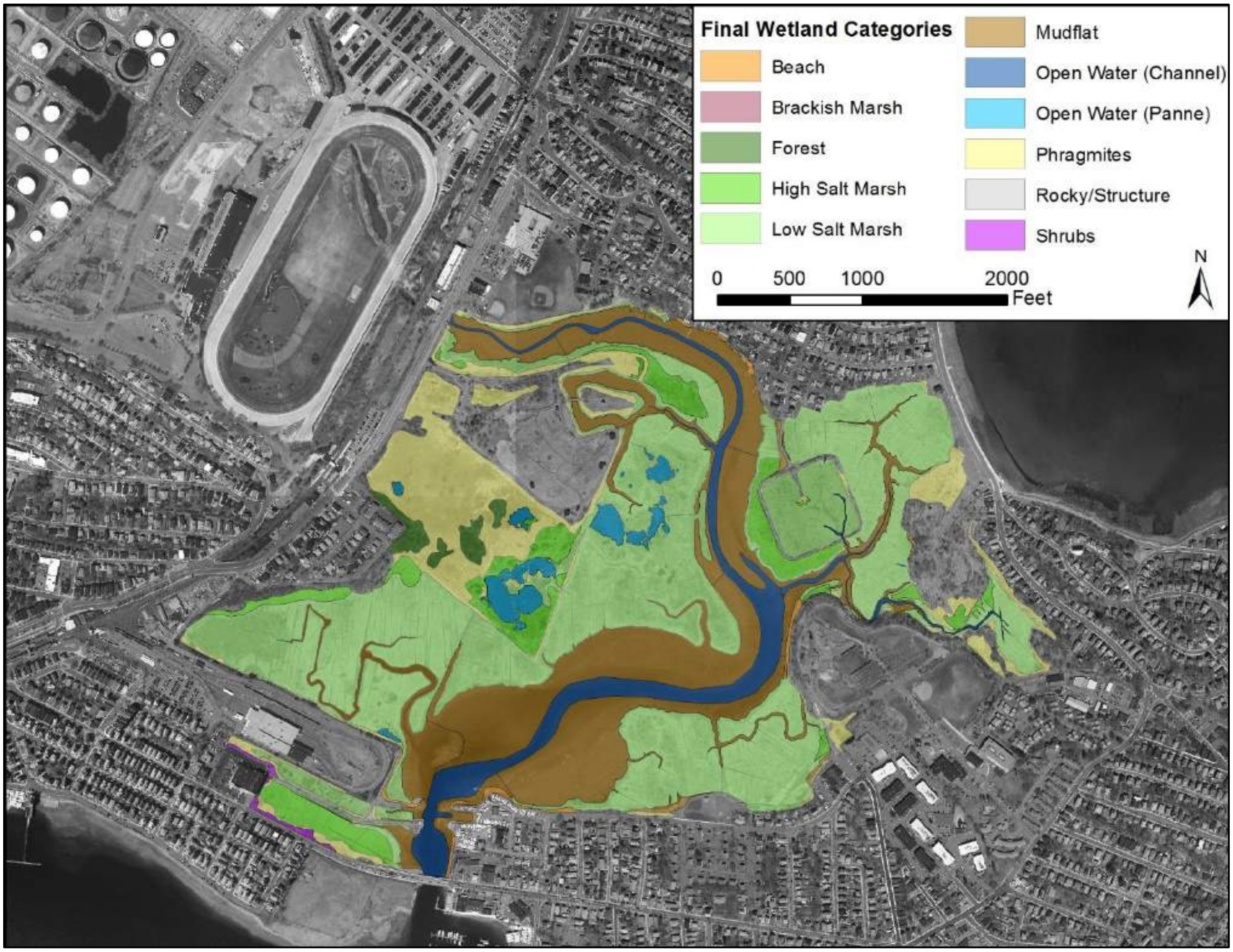


Figure 3. Final wetland cover type map based on field-based ground truthing.

Due to site access issues, Woods Hole Group was not able to evaluate the Sales Creek portion of the Belle Isle Marsh ACEC firsthand. Beals & Thomas, the consultants for HYM, were able to provide some site-specific information regarding the wetlands and habitat types in that portion of the site. Beals & Thomas delineated the Sales Creek wetlands in November 2019. A subset of the HYM wetlands delineation plan is shown in Figure 4. The wetlands in this section of the site consist largely of freshwater open water areas and narrow bordering vegetated wetlands (BVWs) (Figure 5). The BVWs are vegetated predominantly with invasive species, including common reed (*Phragmites australis*), tree of heaven (*Ailanthus altissima*), oriental bittersweet (*Celastrus orbiculatus*), and multiflora rose (*Rosa multiflora*).

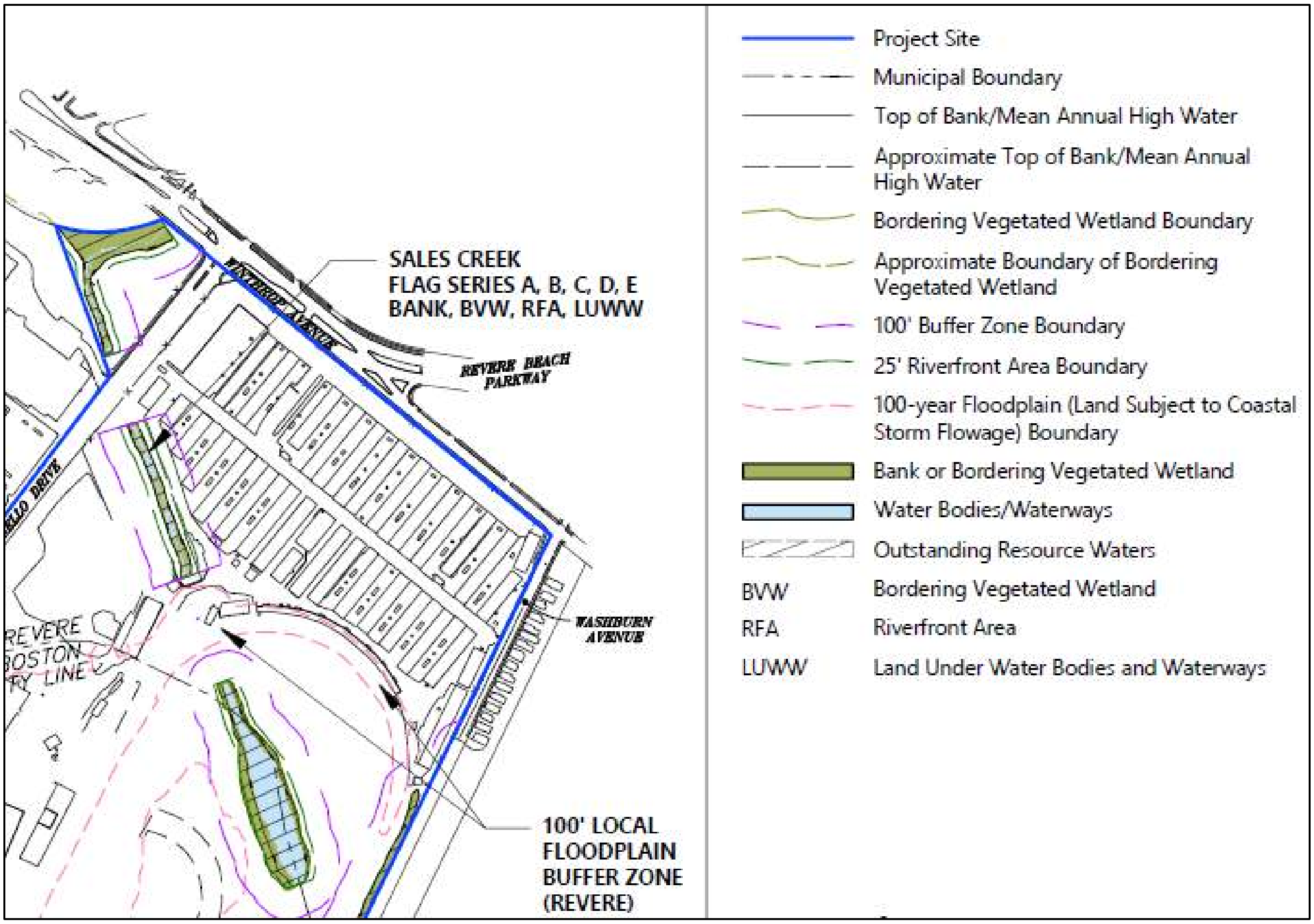


Figure 4. **Wetlands delineated in the Sales Creek area (figure extracted from Beals & Thomas plan for the Suffolk Downs Redevelopment).**

Looking south along Sales Creek and associated BVW within infield.

Looking south along Sales Creek.

Figure 5. **Example photographs of the bordering vegetated wetlands (BVWs) and open water areas within the Sales Creek wetlands (photos from Beals & Thomas).**

B. Topographic and Bathymetric Data Collection

On November 25, 2020, two Woods Hole Group Coastal Scientists conducted a targeted topographic survey using an RTK GPS. The goals of this task were twofold: 1) to collect detailed elevation information for key site features (e.g., the marsh surface, berms, bottom elevations of the tidal channels and culvert invert elevations), and 2) validate the LiDAR data for the site. A total of 916 discrete elevation points were collected throughout the site (Figure 6). These data will be important not only to accurately describe the physical characteristics of the site but also to refine the LiDAR data for use as an important input parameter to the hydrodynamic modeling (Task 3) and future wetland modeling (Task 4).

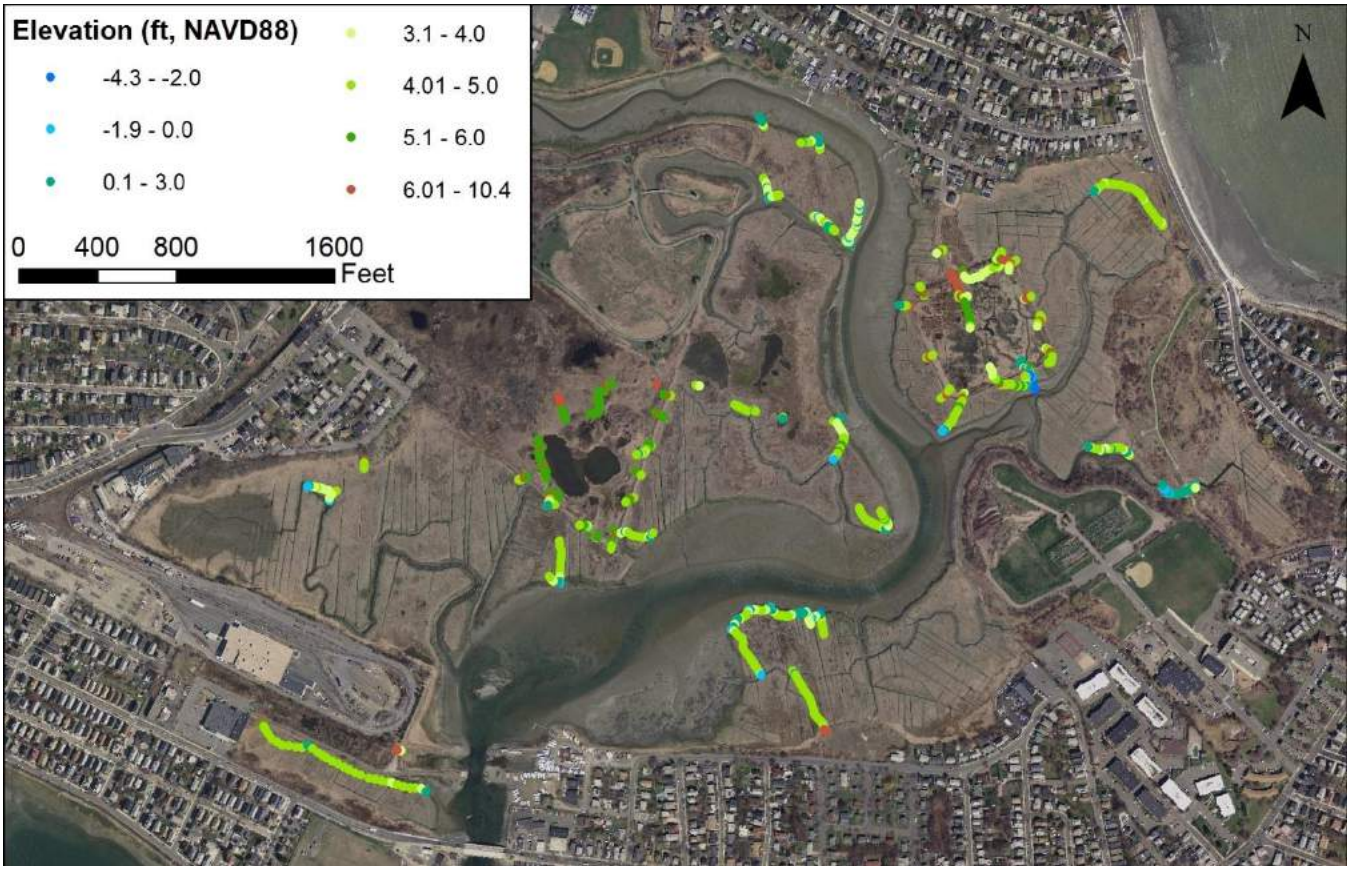


Figure 6. Topographic survey points and elevations.

On March 11, 2021, two Woods Hole Group Coastal Scientists conducted a bathymetric survey using an echo sounder paired with a survey grade Real Time Kinematic (RTK) GPS interfaced through Hypack software. The goal of this task was to collect detailed elevation information within the tidal channels. A total of 25,413 soundings were taken. Elevations ranged from 1.48 to -23.26 ft NAVD88. Elevations in the southern portion of the thalweg are deeper, ranging from -10 to -15 feet NAVD88 north of Saratoga Street, with the deepest soundings around the marina at the southern end of the survey area. The northern portion of the thalweg is shallower, ranging from approximately -8 to -2 feet NAVD88. Due to the shallow depths and the narrow tidal creeks, the boat-based survey was unable to capture the elevation details within the smaller tidal channels. To obtain an accurate understanding of these locations, on March 31, 2021 two Woods Hole Group Coastal Scientists collected elevation information along targeted channel cross sections using a survey grade Real Time Kinematic (RTK) GPS. Cross section data will be used to fill any data gaps relative to tidal creeks. These data will important not only to accurately describe the physical characteristics of the site but will also be important input parameters to the hydrodynamic modeling

(Task 3) by combining them with the topographic information collected from the site (see Figure 6 above) to develop a complete picture of the topo-bathy elevations of the Belle Island Marsh system.

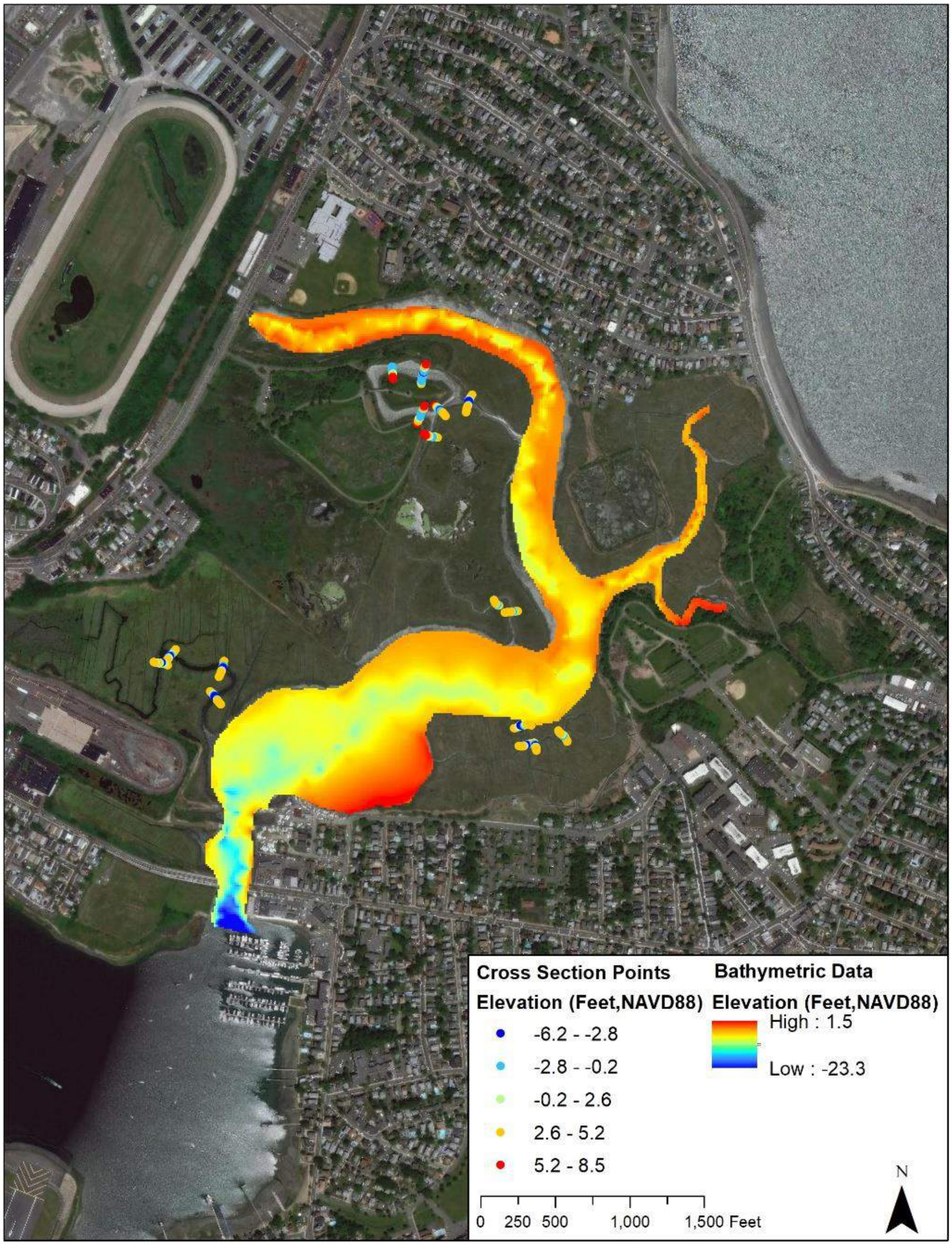


Figure 7. Bathymetric Survey data in feet relative to NAVD88.

C. Salinity and Water Level Data Collection

On November 9, 2020 two Woods Hole Group Coastal Scientists deployed 7 tide gauges (Figure 8) to collect detailed site-specific tidal information necessary to accurately model the hydraulics and hydrology of the Belle Isle Marsh system. All stations were deployed in areas with an unobstructed channel connection to station BI1, except for stations BI2 and BI5. Station BI5 was deployed in a marsh panne behind a bermed-off area, and BI2 was installed upstream of the broken berm in the Key Parcel. Additionally, it was noted during both deployment and recovery that the channel downstream of station BI3 was clogged with emergent vegetation.

In-Situ AquaTroll 200s, measuring temperature, salinity and absolute pressure, were installed at stations BI1, BI2, BI3, BI4, and BI5. Onset HOBO sensors, measuring temperature and absolute pressure (but not salinity), were installed at stations BI6 and BI7. The tide gauges were mounted on pipe anchors (Figure 9) that were fixed into the sediment, with the exception of BI5, which was installed on a bottom mount. All instruments were surveyed in using an RTK GPS, providing centimeter-level vertical accuracy. The tide gauges were recovered on December 21, 2020, for a total of 42 days deployed. Upon recovery it was discovered that stations BI1, BI6, and BI7 went dry during some low tides during the deployment. As a result, the lowest low tides were not recorded, particularly during spring low tides. This was not unexpected at BI6 and BI7 due to their locations. Station BI1 was deployed and recovered in the deepest accessible area using a drysuit, but due to the significant tidal range in this area, and the difference between neap and spring low tides, this location still experienced lower water levels than could be measured by the deployed tide gauge. The sensor at station BI2 malfunctioned part-way through the deployment, ending the recording on November 18th, 2020. Meteorological data, including atmospheric pressure and precipitation, was obtained from Logan International Airport.

Figure 8. **Tide gauge locations for seven deployed tide gauges in Belle Isle Marsh.**

Figure 9. An aqua troll A200 mounted on a pipe anchor prior to deployment.

Table 1 shows the tidal datums for all seven water level monitoring stations. Tidal range was greatest at station BI1 and decreased moving into the system. High tide propagated largely unrestricted through all of the system as can be seen in the datums and Figure 10, with MHHW relatively equal at all stations. The decrease in tidal range in the upstream portions of the Belle Isle system is likely due to higher streambed elevations. Station BI5 (inside the marsh panne behind a bermed-in area) experienced no tidal influence except on the highest spring tides, when the high tide elevation was great enough to over-top the marsh platform and flood the panne. Stations BI2 and BI5 both experienced slightly higher MHHW than the rest of the system, potentially from higher bed elevations or effects of wind. Precipitation did not appear to have an impact on water surface elevations at any of the stations.

Table 1. Tidal datums at all water level monitoring stations (NAVD88, feet).

	BI1	BI2*	BI3	BI4	BI5	BI6	BI7
MHHW	5.1	5.7	5.1	5.2	5.6	5.2	5.2
MHW	4.6	5.2	4.6	4.7	5.6	4.6	4.6
MTL	-0.3	3.9	3.3	0.0	5.6	1.7	0.9
MLW	-5.1	2.6	2.1	-4.7	5.5	-1.2	-2.8
MLLW	-5.4	2.6	2.1	-4.9	5.5	-1.2	-2.8
Tide Range	9.7	2.6	2.5	9.4	0.1	5.8	7.4

*BI2 did not record a full tidal cycle, datums are approximate.

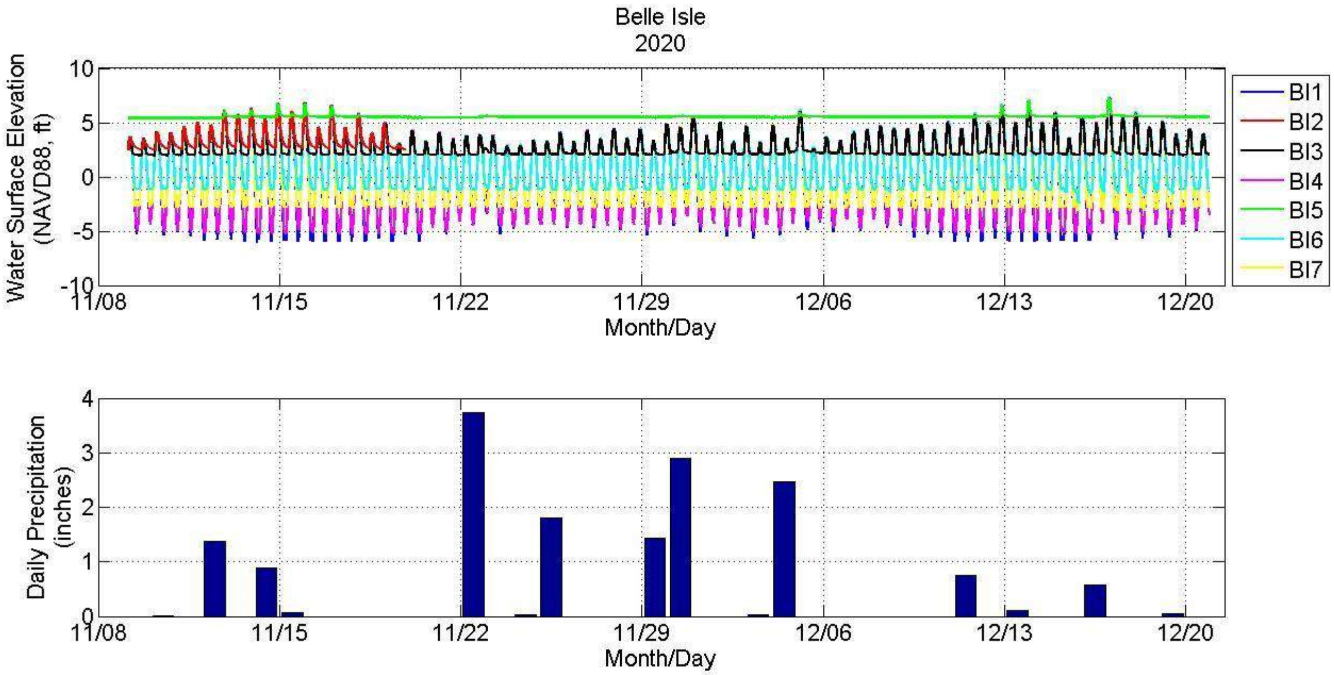


Figure 10. **Time-series of water surface elevations (NAVD88, ft) at all 7 tide gauge stations (top) and the daily precipitation (inches) recorded at Logan International Airport (bottom).**

For a closer look, the stations can be divided up into three sections, the Main Channel (stations BI1 and BI4), the Eastern Marsh (BI1, BI2, BI3, and BI7), and Western Marsh (BI1, BI5, and BI6). In the Main Channel, we can see that the tide propagates fully through the system, with only a slightly elevated low tide at BI4 due to higher stream-bed elevations than at BI1 (Figure 11). In the Eastern Marsh, low tides are perched moving upstream, while high tie propagates throughout the system (Figure 12). In the Western Marsh, low tides are also perched as you movie upstream, with BI5 experiencing only the highest of spring tides (Figure 13).

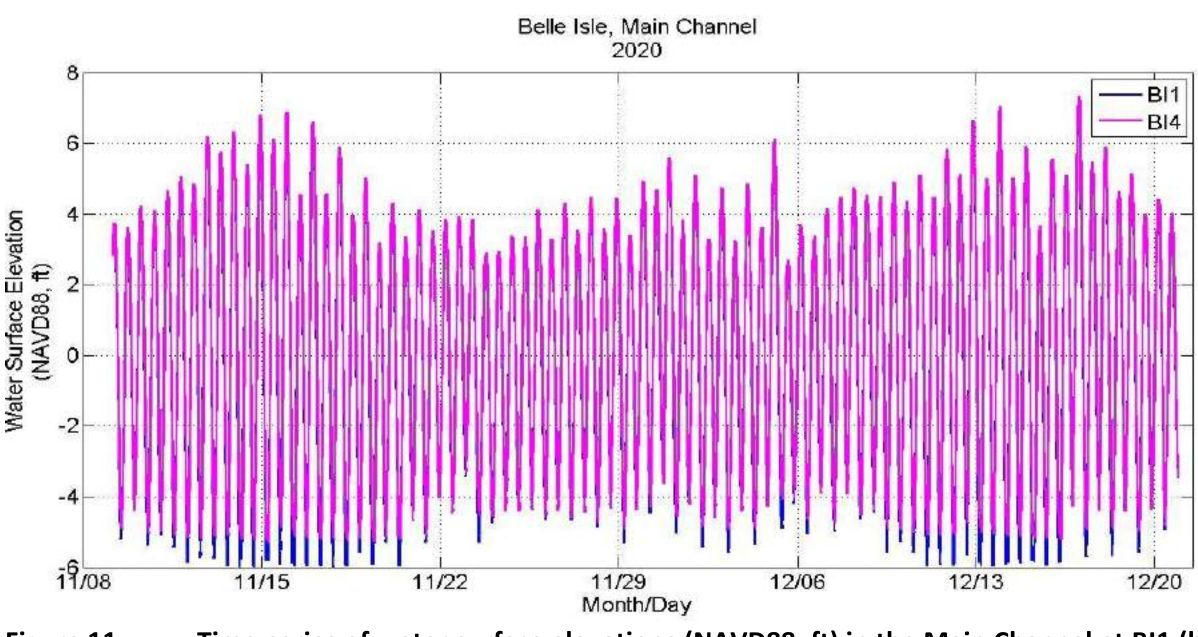


Figure 11. **Time-series of water surface elevations (NAVD88, ft) in the Main Channel at BI1 (blue) and BI4 (purple).**

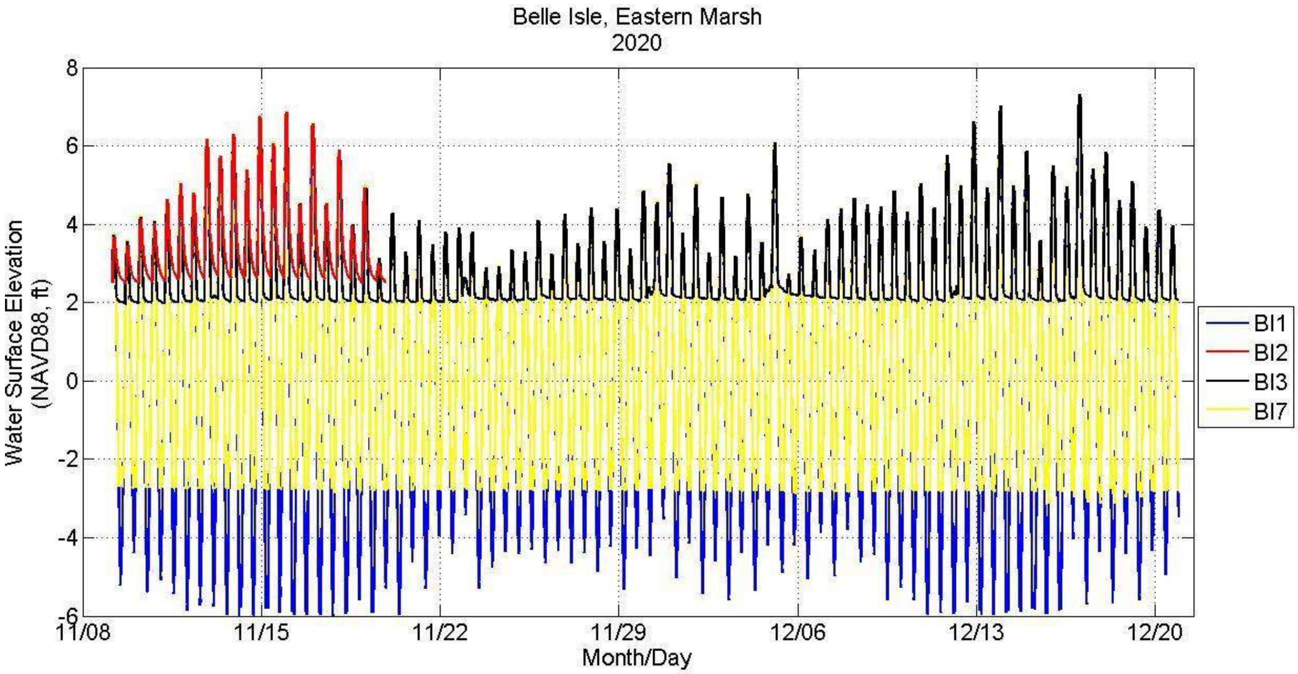


Figure 12. **Time-series of water surface elevations (NAVD88, ft) in the Eastern Marsh at BI1 (blue), BI2 (red), BI3 (black), and BI7 (yellow).**

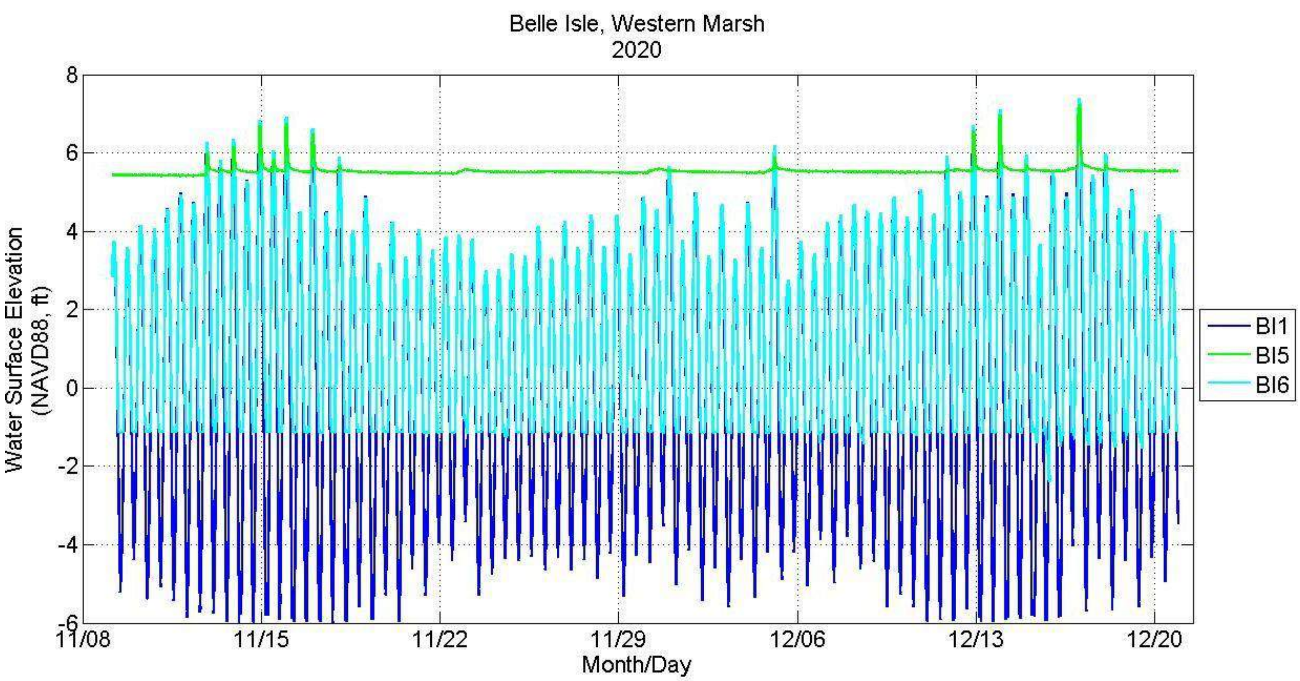


Figure 13. **Time-series of water surface elevations (NAVD88, ft) in the Western Marsh at BI1 (blue), BI5 (green), and BI6 (cyan).**

Salinity data were collected at station BI1, BI2, BI3, BI4, and BI5 (Figure 14). Salinities in the system were generally high (mean >22 PSU) at all stations but were highly variable (Table 2). The salinity at station BI4 in particular ranged from over 30 PSU during high tides to <1PSU during some low tides. Maximum salinities at all stations were over 30 PSU, even at BI5, indicating that salt water is propagated throughout the marsh. From Figure 13, it is also obvious that precipitation has a strong impact on salinity at stations BI2, BI3, and BI5, with large decreases in salinity occurring with rain events (>2 inches per day). Precipitation does not appear to have an impact on salinity at stations BI1 and BI4; the salinity at these locations is driven predominantly by tidal forcing. Salinity at station BI5 shows that the marsh panne is flooded with high salinity water with spring high tides, and then decreases with precipitation and neap tides before being flooded again during spring high tides.

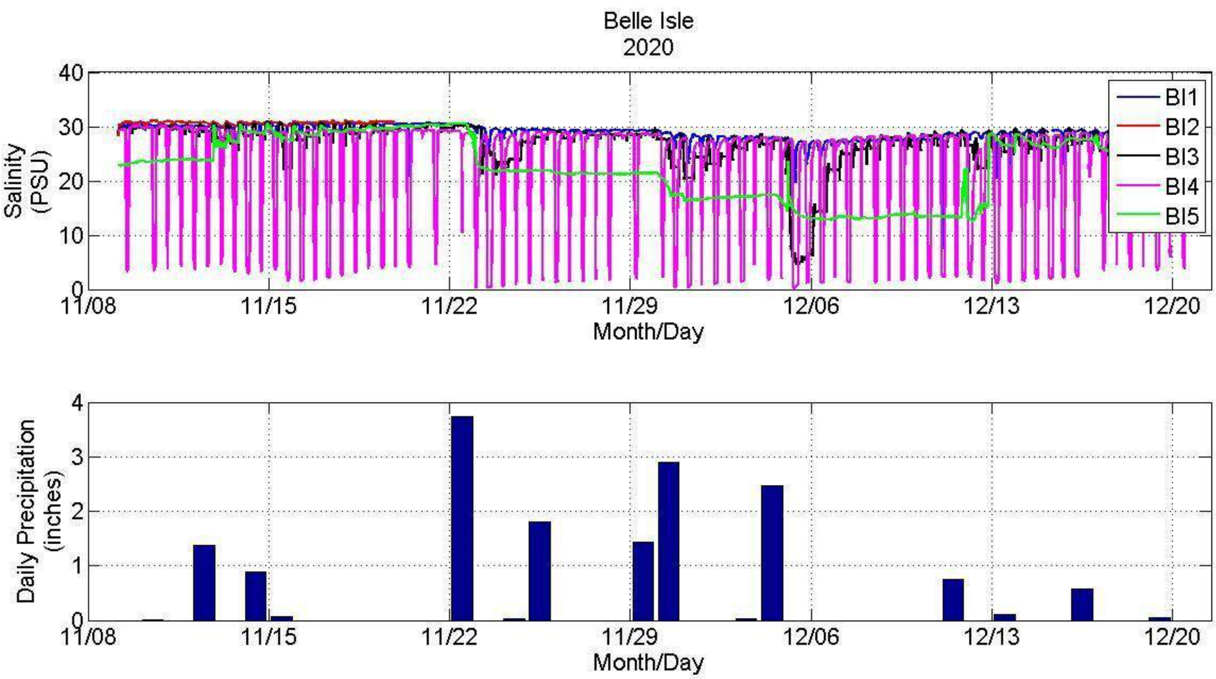


Figure 14. Time-series of salinity (PSU) at five of the tide gauge stations (top) and the daily precipitation (inches) recorded at Logan International Airport (bottom).

Table 2. Salinity statistics (PSU) at BI1, BI2, BI3, BI4, and BI5.

	BI1	BI2*	BI3	BI4	BI5
Max	30.7	31.3	30.8	30.1	30.6
Min	7.5	28.4	4.7	0.3	12.4
Mean	29.0	30.7	27.0	22.6	22.7

*BI2 did not record a full tidal cycle, statistics are approximate.

D. Sediment Sampling

On October 28, 2020 two Woods Hole Group Coastal Scientists collected 7 sediment samples (Figure 15) to characterize the existing conditions within the tidal channels. Data collected will also provide additional input data for modeling efforts (Task 3). Laboratory testing for grain size was conducted by GeoTesting Express. The results are summarized in Table 3, and the resulting grain size curves for all 7 samples are included in Appendix B. Sediment grab samples were taken using a Petit Ponar and Eckman sampler. Sample instrumentation was cleaned between each sample to prevent cross contamination. Sediment sample locations with higher tidal flow (i.e., SED-1 and SED-2) showed a larger grain size assemblage. This coarser sediment also resulted in multiple sample attempts to collect an adequate sample volume at SED-1 and SED-2 locations, making it difficult for the instrumentation to penetrate. In addition, these locations had a layer of shell fragments and clay on the sediment surface which further hindered sampling. The remaining stations contained softer sediments with finer grain sizes that were easily sampled. Stations SED-3, SED-4, SED-7 were collected in easily sampled, loose, and deep muck. While stations SED-5 and SED-6 were also easily sampled but contained a higher concentration of tight organic matter.

Figure 15. Sediment sampling locations.

Table 3. Summary of Sediment Sample Grain Size Analysis

Sample ID	Cobble	Gravel	Sand	Silt/Clay	D50
SED-1	0%	16%	51.7%	32.3%	0.1242mm
SED-2	0%	2.9%	63.2%	33.9%	0.1810mm
SED-3	0%	0.1%	2.7%	97.2%	0.0125mm
SED-4	0%	0.7%	1.1%	98.2%	0.0044mm
SED-5	0%	0%	5.6%	94.4%	0.0057mm
SED-6	0%	0%	11.2%	88.8%	0.0082mm
SED-7	0%	1.7%	17.9%	80.4%	0.0063mm

E. Historical and Archaeological Resources

Based on consultation with the Boston City Archaeologist, Joe Bagley, there are currently no recorded historical or archaeological sites within the Belle Isle Marsh site. However, very few targeted surveys have been conducted to date. One survey was conducted for the boardwalks on the site, which generally have minimal impacts. The abstract for that report, Belle Isle Marsh Reservation Proposed Boardwalk impact to Historic Resources, prepared in 1996 by Thomas F. Mahlstedt (archaeology report #25-1547 on file at the MHC) states:

> "After a review of a similar assessment for a salt marsh restoration project by the Army Corps of Engineers, it was determined that the construction of the proposed boardwalk and observation deck would not impact any significant historic or archaeological resources. An unidentified wooden pen-like enclosure is located to the south of an earthen berm, approximately 75 m from the boardwalk, so it should not be damaged or otherwise affected by the project. The project area itself was a low-lying tidal marsh, with historic development occurring first on the hill to the west (present day Orient Heights) and later on Beachmont and Youngs Hill, to the north. It was recommended that the project be allowed to proceed without further archaeological study."

However, this was a very short report (12 pages) and focused only on the southwestern side of the marsh, closer to Leverette and Lawn Avenues. The entire marsh has yet to be surveyed. Even so, according to the Boston City Archaeologist, the marsh is "sensitive for archaeological resources", meaning that it is likely that there are unrecorded historic and Native archaeological sites present there because of the ecological conditions of the site, which would have been attractive for millennia. Given ongoing sea level rise, this area would have been dry habitable land no less than 3,000 years ago, and evidence of Native habitation, including shell middens, have been found in similar areas throughout the state. For example, a Native site was found in Charlestown during the big dig. This site providing evidence of a 3,000-5,000 year old Native habitation near the shoreline of what had been a similar salt marsh area but was subsequently was drowned by rising seas and found intact under a later peat deposit along the shore. Bagley agrees that this site displays characteristics similar to other areas where Native cultural remains have been found, however in a recent low tide site walk (November 2020), Bagley did not observe any evidence of shell middens eroding from the shore or exposed areas where the soil had been disturbed near tree plantings or where animals had been digging.

Bagley also observed brick rubble in some areas. With no evidence of historic buildings on any maps, this corroborates the reports that the park has been subject to dumping of soil and debris. If this is the case, there may be older deposits, including Native cultural remains, that have been covered by later fills that are both preserving and preventing visibility to the native deposits. Bagley concluded that within the Belle Isle Marsh Reservation park property itself, the most likely site for Native resources is on the main, larger land mass, with a possibility for similar resources on the smaller one with the lookout tower.

The Belle Isle Marsh Restoration – Environmental Engineering Evaluations report from August 1991 also had some information about potential archaeological and historical resources at this site. This document also included an assessment from Thomas Mahlstedt, who was the Chief Archaeologist for the Metropolitan District Commission. The assessment assumed that fall harvesting of salt marsh hay continued at Belle Isle Marsh throughout the 18th and 19th centuries. The only possible, although highly unlikely, historic period archaeological remains would be evidence of the hay harvesting activities. Remains of the wooden post structures, known as staddles, which held the marsh hay until the marsh and estuary frozen enough to cart the hay to the local markets, may exist in the marshland or may have been buried by the landfill. Even if buried, they are likely to have been crushed by the weight of the overburden, so they would not retain a high degree of integrity. Bagley agrees with Mahlstedt's interpretation that any hay-related activities would have a weak footprint. And even if some did survive, there are so many similar activity areas along the shoreline, that he did not think they would represent a particularly significant or rare archaeological feature.

Mahlstedt's assessment also described how Belle Isle Park is not a natural landform. A refuse dump was created in the vicinity in the 1920s when Breed's Isle, as it was still called by some, was selected to relieve Boston's growing waste problem. At that time, the wetlands were systematically filled. Based on cores, it appears that much of what was placed in this area is likely to be disposed earthen fill, perhaps from nearby dredging, rather than refuse.

Finally, Joe Bagley suggested the possibility of conducting a series of shovel test pits with his team to see if there is a Native site at the Park. This would require coordination between the City of Boston and DCR but would make a great spotlight for public engagement on the intersection of open space planning, sea level rise, Native history, archaeology, and conservation. In the absence of additional surveys, Bagley recommends that any adaptations planned for the park to increase its coastal resiliency, especially those in dry land areas, be reviewed by DCR's archaeologist, Ellen Berkland, and Native tribal representatives. Ideally, there would be a phase one shovel test pit grid deployed on the property to establish the presence/absence of sensitive sites to determine which specific areas of the park should be targeted for a more focused archaeological review, rather than treating the entire park equally. These impacts can be mitigated by archaeological survey in areas of proposed ground disturbance to test if there are surviving archaeological deposits, likely Native, prior to the work beginning. Then additional surveys can happen to document and recover the site before the work continues, or plans can be modified to avoid disturbances.

In addition to potential historical and archaeological resources within the salt marsh itself, there are also two registered historic locations within the Belle Isle Marsh ACEC:

1. Revere Beach Parkway
2. Winthrop Parkway

Revere Beach Parkway is a 5.3-mile historic parkway listed in the National Register of Historic Places (MACRIS inventory number: REV.H) in the suburbs north of Boston, which was initial built between 1896 and 1904. Construction began in 1897, with a bridge across the railroad tracks of what is now the MBTA Blue Line. Today, this is comprised of the curve of Route 145 / Ocean Avenue just east of Sales Creek. Although this bridge was later lengthened to cross State Road, the original 1899 northern bridge abutment still exists. The Olmsted Brothers consulted on the parkway design.

Winthrop Parkway is a 0.75-mile historic parkway listed in the National Register of Historic Places (MACRIS inventory number: REV.E) just east of Belle Isle Marsh and separates the marsh from the Atlantic Ocean. The parkway was constructed between 1909 and 1919 and is now part of Route 145 between Elliot Circle and the Revere-Winthrop line.

F. Existing Uses

The Belle Isle Marsh Reservation is a fragmented reservation, requiring a vehicle to get to the various satellite areas of the park from a management or visitor perspective. The access points to the reservation are located in various points in Revere, Winthrop and East Boston. The access and use of each section are described below and shown in Figure 16:

1. **Main Park**: This section of the Reservation is located in East Boston and is accessed via Bennington Street. The total upland acreage is roughly 30 acres. This area contains a 40-car parking lot and the reservation’s main kiosk. Additional features at this site include a 20-foot tall observation tower, a large wooden bridge to tower, a 12-acre capped wildflower meadow, park benches, roughly 1 mile of stone dust pedestrian trails, and two wooden boardwalks overlooking the marsh. With the large parking area and accessible trails, this is one of the most heavily used areas by pedestrians, joggers, dogwalkers and birdwatchers. As of 2019-2020, a comprehensive interpretive plan is underway, which will add new signage around the reservation with a focus on native habitat and wildlife.

2. **Lawn Avenue Area**: This section is located off Bennington Street via Leverett Avenue and Lawn Avenue. At Lawn Avenue DCR maintains a small mowed grass area (approximately 150 x 350 feet) with apple trees and a lookout bench. At the edge of this grass area is the entrance to a 1,200-foot trail that winds through a dense scrub thicket, over bog bridges and out to a small observation platform that overlooks a large section of salt pannes and salt marsh. There is roughly 4 acres of upland scrub thicket in this section. Further south on Palermo Street is another small parcel which was the site of a major dumping litigation still being enforced by the Commonwealth against D&M auto doctor. When the property sells, over 100 tons of concrete / asphalt material will need to be removed as part of the settlement. Once the debris is removed, habitat restoration can begin. The Lawn Avenue area is also the site of annual salt marsh sparrow nest monitoring (spring/summer) and bird banding (fall) activities coordinated by DCR.
3. **Saratoga Street / CVS / Excel Academy Area**: This section, located in East Boston, has long been cared for by DCR, but it is actually owned by the Boston Parks Department. From the parking lot behind CVS and Excel Academy on Saratoga Street, there is a stone dust road along an MWRA easement. This site provides access to two "points" in Belle Isle Inlet that attract fisherman to this location.
4. **Morton Street Parcel / Belle Isle Marine Ecology Park**: In 2018, with the help of a large grant from the state, the town of Winthrop in partnership with DCR excavated existing contaminated material from the site, and developed a waterfront park with a lookout deck and almost a ¼ mile of boardwalk through the salt marsh. Street parking is available along Morton Street or at the parking lot at the corner of Morton Street and Winthrop Street. Additional educational signage is planned for this area.
5. **Short Beach / Kilmartin Pathway**: Acquired by MDC in 1993, this 23-acre site was heavily contaminated with historic fill, consisting predominantly of asphalt, granite and other stone material. In 2012, the site was somewhat restored with some of the fill removed and the installation of a stone dust pedestrian path and some park benches. The main access point is the 20-car Short Beach parking lot off Winthrop Avenue across from Short Beach. At the southern end of this parcel is a footbridge that connects the property to the Winthrop Cemetery, and ultimately to the new Belle Isle Marine Ecology Park. This area can also be accessed on foot from a pathway at the end of Bayou Street; no parking is available at this location.
6. **The Key Parcel**: Accessed by Summer Street in Beachmont (Revere), this 7-acre bermed site was once the home of WWII submarine radio towers. The berm is a stone berm, which currently has two breaches (one to the north and one to the south). An access gate at the end of Summer Street leads to a long grass path which provides pedestrian access to the "key": the square shaped outer berm.

In addition to the above referenced sections of the Belle Isle Marsh Reservation, the rest of the acreage at Belle Isle Marsh is either saltmarsh or transitional wetland areas.

Figure 16. Main sections of the Belle Isle Marsh.

In addition to passive recreation, educational outreach and on-site programing have been a primary goal of DCR at the Belle Isle Marsh Reservation. DCR currently runs approximately 40 free public programs a year inside the reservation with the target of enhancing public awareness of local ecology and wildlife stewardship. To accomplish this, DCR partners with a number of sister organizations, including the Friends of Belle Isle Marsh, MassAudubon, the Trustees of Reservations, Essex County Greenbelt, Northeast Wetland Restoration, Saugus River Watershed Council, Harborkeepers, MassWildlife, EPA, Brookline Bird Club, Mystic River Watershed Association and the New England Aquarium. With these various partners, DCR has been able to increase public outreach for the reservation by offering joint programming, volunteer field work opportunities, or restoration partnerships.

G. Site History

Below is a general timeline of key events, changes and projects that have occurred within the Belle Isle Marsh Site:

Pre-Development: Rumney Marsh and Belle Isle Marsh, now separated by channelized buried creeks and filled land, were once interconnected by the Chelsea River, Mill Creek, and Sales Creek. Based on archaeological information about this area, the site likely had a long history of Native use.

1600s-1800s: Livestock and Agricultural Use: Starting as an Island in the mid-1600s, the site changed ownership and names numerous times. It was called Hogg Island, then Breeds Island, and finally, Belle Isle in the late 1800s. During this time, the site use was predominately for livestock and agriculture like most saltmarshes at the time.
1800s/1900s: Wetlands Filled: The majority of the uplands and filled wetlands within this region are now heavily developed urban land, which contribute large volumes of polluted run-off and other non-point source pollution to the Belle Isle Marsh watershed.
1920s: Refuse Dump Created: A refuse dump was created in the vicinity in the 1920s when Breed's Isle, as it was still called by some, was selected to relieve Boston's growing waste problem. At that time, the wetlands were systematically filled.
1935: Creation of Suffolk Downs Racetrack: Suffolk Downs Racetrack was built in 1935 on the landfill. The MBTA blue line trolley and Bennington Street were also built on the landfill.

1930s: Mosquito Control: Grid ditching for mosquito control conducted during the 1930s attempted to drain water from virtually the entire marsh surface, eliminating salt pannes and small tidal creeks, essential habitat areas for killifish and wading birds. Mosquitoes continued to breed on the moist marsh surface, but killifish were no longer present to consume mosquito larvae, one of their preferred food sources. As a result, mosquito populations increased.
1930s: Creation of Earthen Berm: A 7,000-foot long earthen berm south of the main park area was originally built in the 1930s, cutting off approximately 52 acres of salt marsh from regular tidal inundation, although it has since breached in a number of areas.
1941: Berm and Radio Towers Constructed at Key Parcel: A rock berm was constructed enclosing approximately 7 acres of salt marsh to protect five World War II radio towers at what is now known as the Key Parcel. The berm obstructed tidal flow to this area of the salt marsh. Footings from these structures still remain.
1951: Suffolk Downs Drive-in Theater is Built: East of Bennington Street the Suffolk Downs Drive-in Theatre was built on formerly filled area.

1971: Suffolk Downs Drive-in Theater Closes: After the Suffolk Downs Drive-in Theater closed in 1971, the former theater property was abused and used as a general dumping ground.

1975: MDC Acquires Property: The Metropolitan District Commission (MDC) acquires the main Belle Isle Marsh Reservation site (formerly the Suffolk Downs Drive-in Theater).

1980-1986: Construction of Belle Isle Marsh Reservation: The Bell Isle Marsh Reservation Park was designed by Jim Falk and constructed. The park in its current form, with extensive landscaping, walking paths, lookout tower, and new channels was completed in 1986. Deep trenches were excavated from the fill to create the island-like configuration that is present today. The spoil from this dredging was placed over the drive-in site and contoured and graded to create a rolling hill meadow aesthetic.
1986: Belle Isle Marsh Reservation Opens: Belle Isle Marsh Reservation was officially opened in September of 1986, by the Metropolitan District Commission (MDC). The MDC later became the Department of Conservation & Recreation (DCR), which still owns and manages the reservation today.
1978-1989: Continued Salt Marsh Impacts: Surveys by the Army Corps have determined that approximately 11.5 acres of salt marsh were filled within the ACEC between 1978 and 1989, despite the existence of rigid wetland regulations.
1985: Formation of the Friends of Belle Isle Marsh: The Friends of Belle Isle Marsh (FBIM) was formed in 1985 by a group of birdwatchers who joined with other local groups to oppose the siting of an oil tanker off-loading facility at that location. The Friends group (FBIM) have continued to be instrumental in protecting the reservation.

1988: Trial Water Quality Monitoring Program: One summer's worth of regular water quality monitoring was initiated through a partnership with Mass Audubon and MWRA and was partially funded by a CEIP fund grant. The 1988 report concluded that, at the time, there were many water quality problems in Belle Isle Marsh. For example, operations at the pump station at Sales Creek at the time included major discharge events that significantly affected water quality and caused fish kills. The study concluded with the recommendation that water quality monitoring continue into the future.

1998: Belle Isle Marsh Designated an ACEC: The larger Rumney Marshes Area of Critical Environmental Concern (ACEC) includes both the Saugus and Pines River Estuary and Belle Isle Marsh. The Belle Isle Marsh portion of the system includes Belle Isle Creek, the marshes of this system and tributary streams, including Sales Creek.

1990s to 2002: Open Marsh Water Management: OMWM is an innovative technique for mosquito control, which involves the systematic plugging of grid ditches and the re-establishment of salt pannes and small meandering tidal creeks in order to bring killifish back onto the marsh surface. The Northeast Massachusetts Mosquito Control and Wetlands Management District implemented a number of OMWM projects in Belle Isle Marsh to address continuing mosquito problems. For example, the diked salt marsh at the Key Parcel was the site of a 5-acre OMWM project completed by the Northeast Massachusetts Mosquito Control and Wetlands Management District in 1993.

1990s to 2020: Additional Land Acquisition and Protection: The original MDC land acquisition for the reservation was around 152 acres (roughly 30 acres of upland and the rest salt marsh). Since the site's designation as an ACEC, DCR has worked diligently to protect and acquire abutting parcels from the various municipalities and private landowners, both from purchasing land and pursuing land deeded to the Commonwealth for conservation purposes. As of December 2019, DCR owns 233 acres of the 300+ acres of Belle Isle Marsh, while the remaining land is owned by the town of Winthrop and the city of Revere.

Present Day:

- The surrounding neighborhoods in Winthrop and Revere currently contribute stormwater runoff to the marsh. Both have EPA permits
- The Morton Street Pavilion property was temporarily leased to the Town of Winthrop by DCR. It was a five-year lease but will revert back to DCR in 2021.
- A large system of boardwalks was constructed at Belle Isle Marsh Marine Ecology Park in Winthrop in 2018.
- A large HYM development of apartments in Boston and Revere is set to be constructed over the next 10-20 years (i.e., the old Suffolk Downs site). The area in Revere is fully permitted and construction has already started. The Boston area is in the last stages of permitting. Together, these apartments will house an additional 60,000 – 70,000 people immediately adjacent to Belle Isle Marsh. The potential impact to the site could be enormous. There are also concerns about the lifetime of those apartments given sea level rise. HYM has only vouched for the site through 2070 with regards to sea level rise and climate change.
- The New England Casket Company, located south of Lawn Ave, has since burned down, but historically had lots of dumping activity in and around the marsh. This site is currently planned to be redeveloped as condos, further increasing the population in the immediate vicinity of the site.

Appendix A:
Wetland Cover Type Mapping Photos

Figure A-1. Dense stand of Phragmites australis as seen from the boardwalk adjacent to the main Belle Isle Reservation parking lot.

Figure A-2. Mixed species high salt marsh community (e.g., *Distichlis spicata*, *Spartina patens*, etc.) intermixed with open water pannes, and patches of *Phragmites australis* behind the berm immediately south of the main Belle Isle Reservation.

Figure A-3. Tidal creek edges dominated by low salt marsh (i.e., *Spartina alterniflora*).

Figure A-4. Transition from low salt marsh (e.g., *Spartina alterniflora*; left) to high salt marsh (e.g., *Spartina patens*; center) to *Phragmites australis* across from the view tower island.

Figure A-5. **Eroding segments of low salt marsh, vegetated with *Spartina alterniflora*, just downstream of Bennington Street.**

Figure A-6. **Little to no salt marsh is present across the river from the main Belle Isle Reservation (at the end of Crystal Avenue in Revere).**

Figure A-7. Significant wrack deposits along the entrance patch to the Key property have resulted in bare, unvegetated areas of the salt marsh due to smothering.

Figure A-8. The area inside the berm at the Key property still has large areas of open water, but has started to revegetate with *Spartina alterniflora* and *Salicornia sp*.

Figure A-9. **An area of high salt marsh (e.g., *Distichlis spicata* and *Spartina patens*) as viewed from the overlook along the Kilmartin Pathway.**

Figure A-10. **Look upstream along the tidal creek from the boardwalk between the Kilmartin Pathway and the Winthrop Cemetery, the marsh is dominated by *S. alterniflora* and *Phragmites australis*.**

Figure A-11. **The salt marsh along the western part of Morton Street is eroding into small hummocks and patches of *Spartina alterniflora*.**

Figure A-12. **A large section of high salt marsh (*S. patens* and *D. spicata*) adjacent to Excel Academy.**

Figure A-13. **The tidally restricted wetland between the DCR maintained pathway and the railroad maintenance yard (near Excel Academy) is a patchwork of open water and *S. alterniflora*.**

Figure A-14. **Marsh boardwalk from Lawn Avenue to the wildlife observation deck, bordered by dense *Phragmites australis* on both sides.**

Appendix B:
Sediment Grain Size Analysis Results

GeoTesting EXPRESS

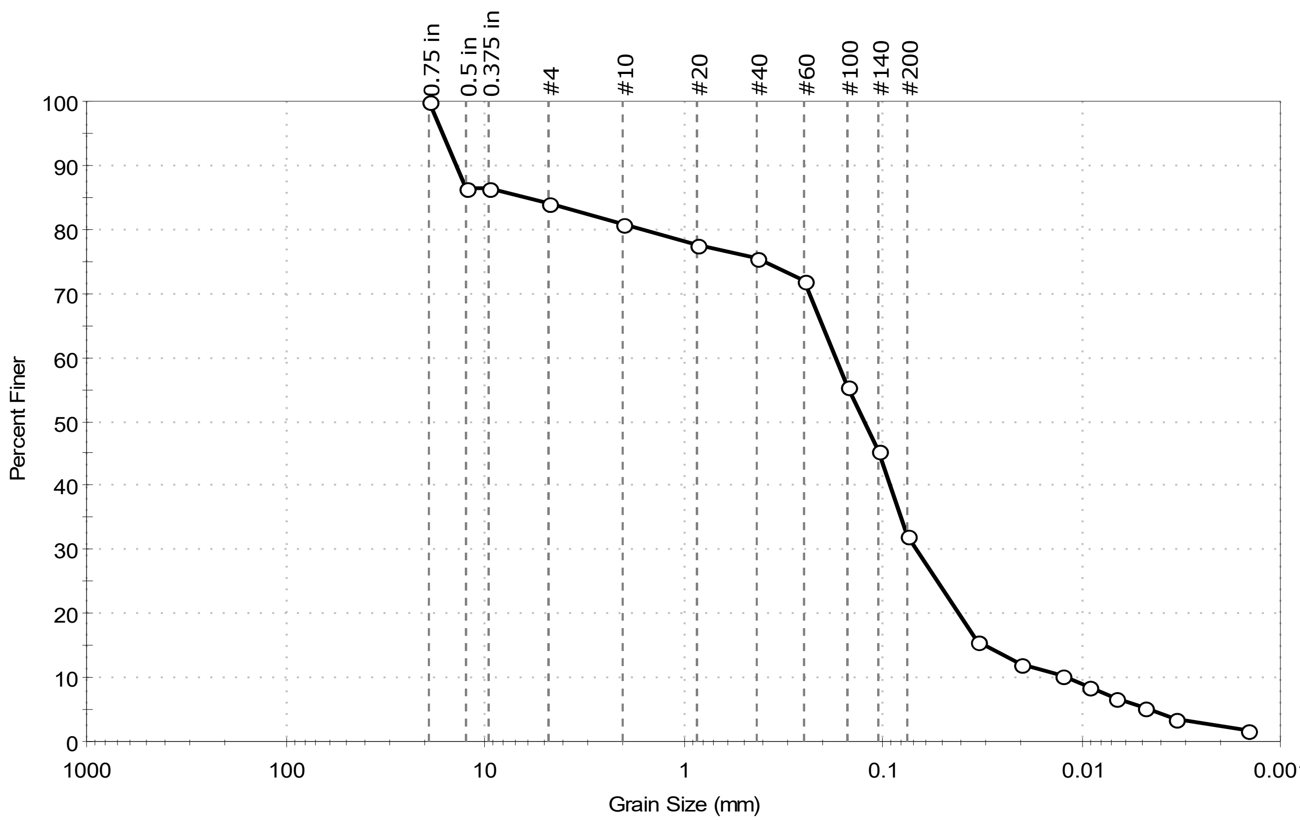
Client: Woods Hole Group			
Project: Mystic Watershed Belle Isle			
Location:		Project No:	GTX-312651
Boring ID: ---	Sample Type: bag	Tested By:	ckg
Sample ID: SED-1	Test Date: 12/09/20	Checked By:	jsc
Depth : GRAB	Test Id: 589101		

Test Comment: ---

Visual Description: Moist, dark olive gray clayey sand with gravel

Sample Comment: Sample contains shells

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	16.0	51.7	32.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	86		
0.375 in	9.50	86		
#4	4.75	84		
#10	2.00	81		
#20	0.85	78		
#40	0.42	75		
#60	0.25	72		
#100	0.15	56		
#140	0.11	45		
#200	0.075	32		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0332	16		
---	0.0204	12		
---	0.0126	10		
---	0.0093	9		
---	0.0067	7		
---	0.0048	5		
---	0.0034	3		
---	0.0015	2		

Coefficients

D_{85} =6.4168 mm D_{30} =0.0671 mm

D_{60} =0.1722 mm D_{15} =0.0308 mm

D_{50} =0.1242 mm D_{10} =0.0118 mm

C_u =14.593 C_c =2.216

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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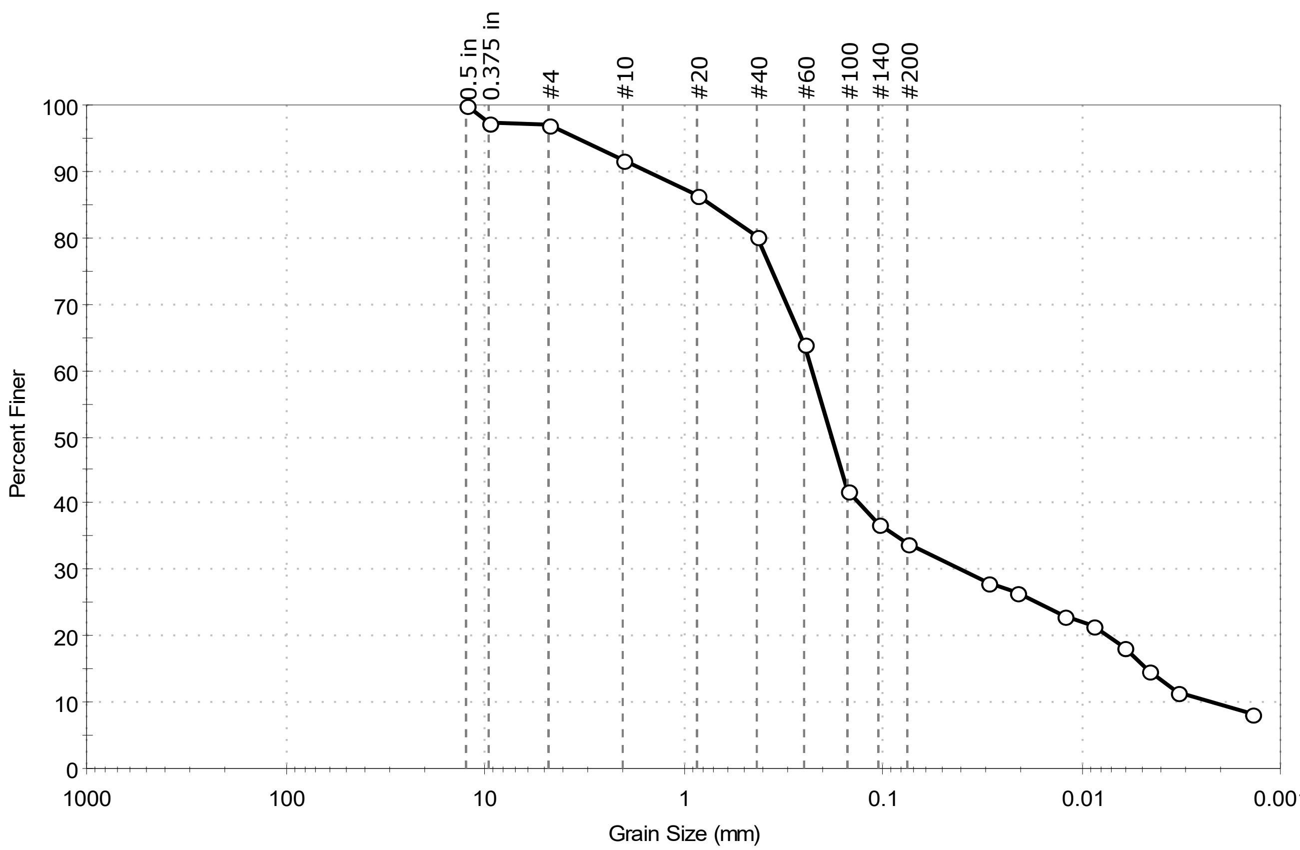
Client:	Woods Hole Group
Project:	Mystic Watershed Belle Isle
Location:	
Project No:	GTX-312651
Boring ID:	---
Sample ID:	SED-2
Depth :	GRAB
Sample Type:	bag
Test Date:	12/10/20
Test Id:	589102
Tested By:	ckg
Checked By:	jsc
Test Comment:	---
Visual Description:	Moist, dark olive gray silty sand
Sample Comment:	Sample contains shells

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	2.9	63.2	33.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	97		
#4	4.75	97		
#10	2.00	92		
#20	0.85	86		
#40	0.42	80		
#60	0.25	64		
#100	0.15	42		
#140	0.11	37		
#200	0.075	34		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0294	28		
---	0.0214	26		
---	0.0121	23		
---	0.0087	21		
---	0.0062	18		
---	0.0046	15		
---	0.0033	12		
---	0.0014	8		

Coefficients

D_{85} =0.7292 mm
D_{30} =0.0399 mm
D_{60} =0.2275 mm
D_{15} =0.0046 mm
D_{50} =0.1810 mm
D_{10} =0.0022 mm
C_u =103.409
C_c =3.181

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

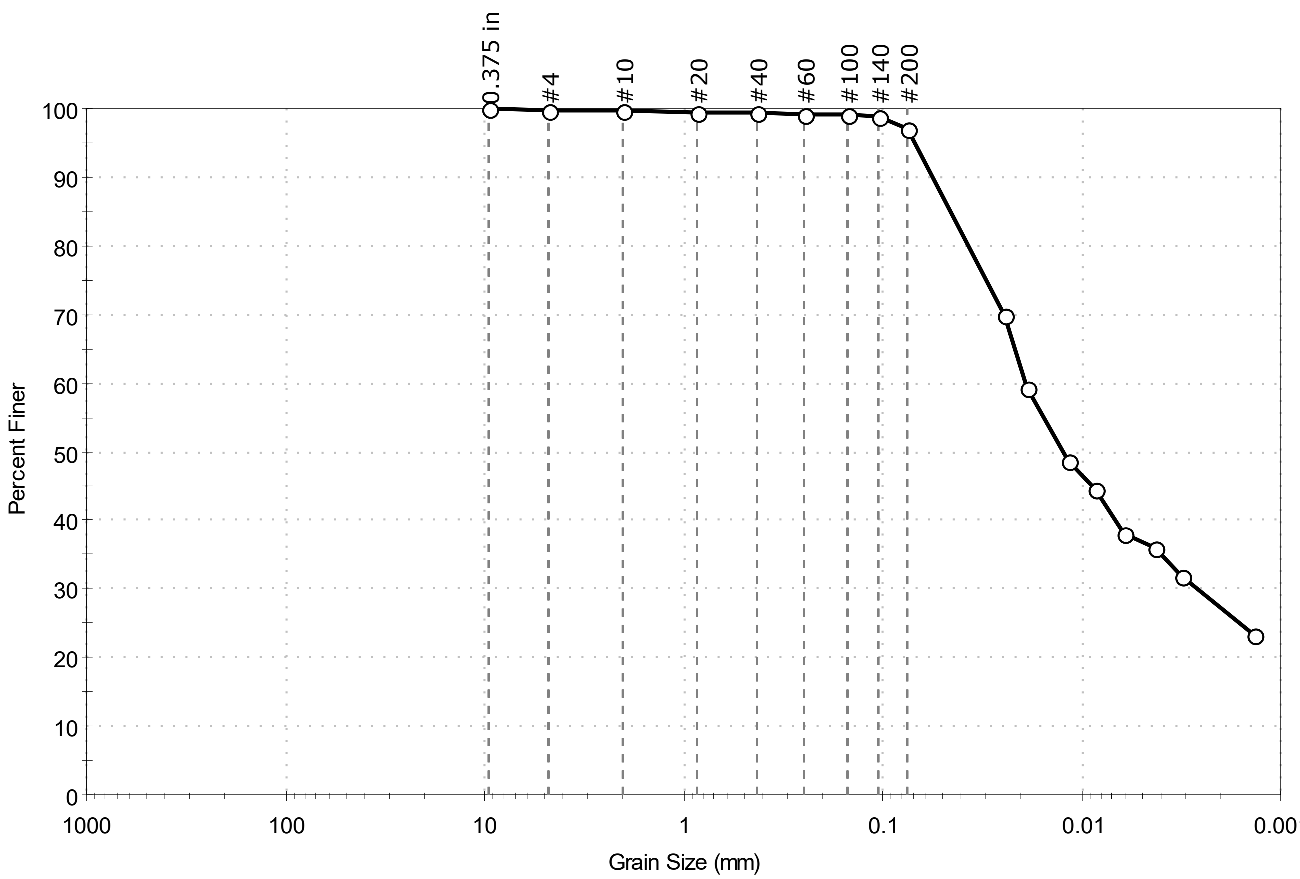
Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

GeoTesting EXPRESS

Client: Woods Hole Group			
Project: Mystic Watershed Belle Isle			
Location:		Project No:	GTX-312651
Boring ID: ---	Sample Type: bag	Tested By:	ckg
Sample ID: SED-3	Test Date: 12/10/20	Checked By:	jsc
Depth : GRAB	Test Id: 589103		
Test Comment: ---			
Visual Description: Moist, dark olive gray clay			
Sample Comment: ---			

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.1	2.7	97.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	99		
#100	0.15	99		
#140	0.11	99		
#200	0.075	97		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0242	70		
---	0.0190	59		
---	0.0118	49		
---	0.0085	44		
---	0.0062	38		
---	0.0043	36		
---	0.0032	32		
---	0.0014	23		

Coefficients

D_{85} =0.0453 mm | D_{30} =0.0027 mm

D_{60} =0.0194 mm | D_{15} =N/A

D_{50} =0.0125 mm | D_{10} =N/A

C_u =N/A | C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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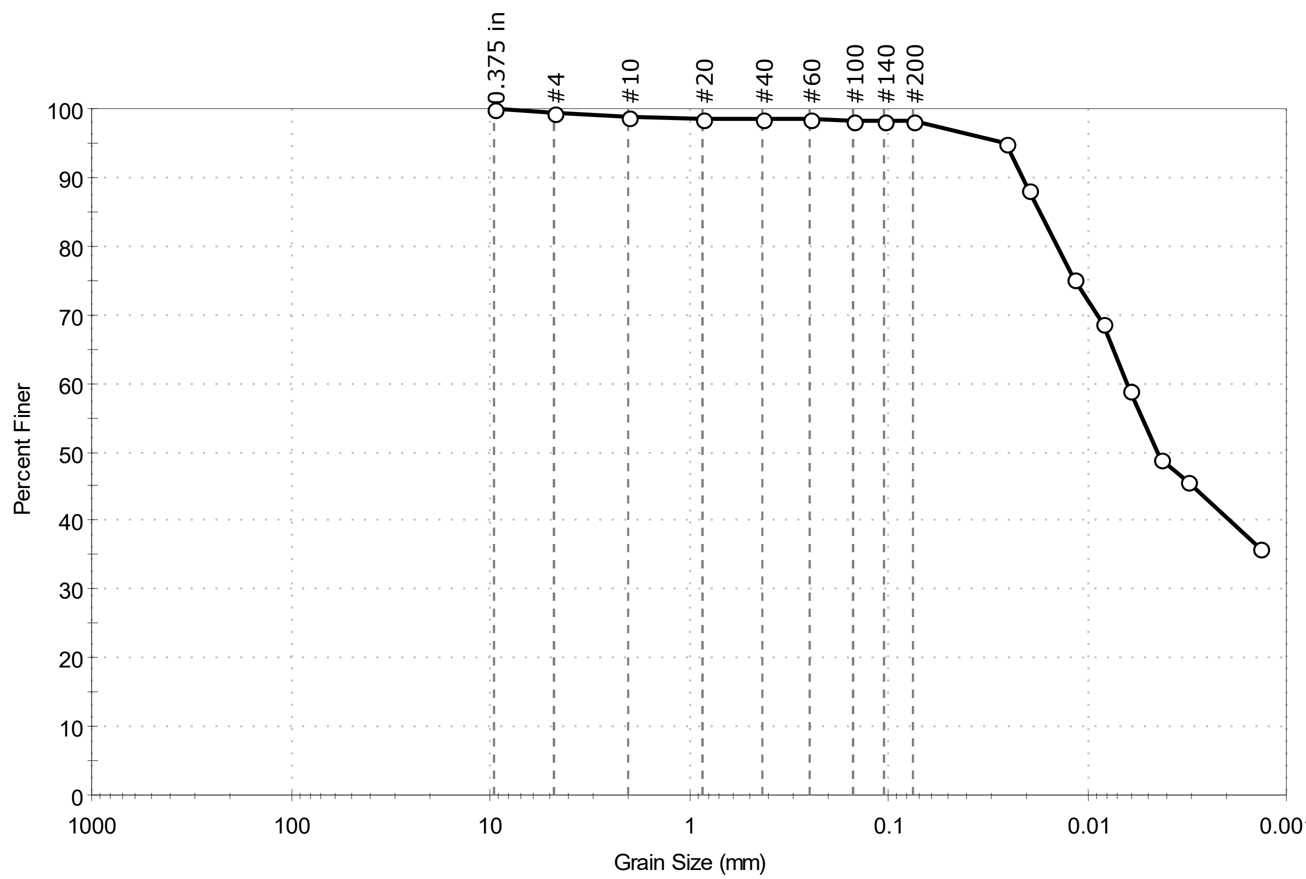
GeoTesting EXPRESS

Client:	Woods Hole Group				
Project:	Mystic Watershed Belle Isle				
Location:				Project No:	GTX-312651
Boring ID:	---	Sample Type:	bag	Tested By:	ckg
Sample ID:	SED-4	Test Date:	12/14/20	Checked By:	emm
Depth :	GRAB	Test Id:	606139		
Test Comment:	---				
Visual Description:	Moist, very dark gray clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.7	1.1	98.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	99		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	98		
#140	0.11	98		
#200	0.075	98		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0257	95		
---	0.0197	88		
---	0.0117	75		
---	0.0084	69		
---	0.0061	59		
---	0.0043	49		
---	0.0031	46		
---	0.0014	36		

Coefficients

D_{85} =0.0172 mm D_{30} =N/A

D_{60} =0.0063 mm D_{15} =N/A

D_{50} =0.0044 mm D_{10} =N/A

C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

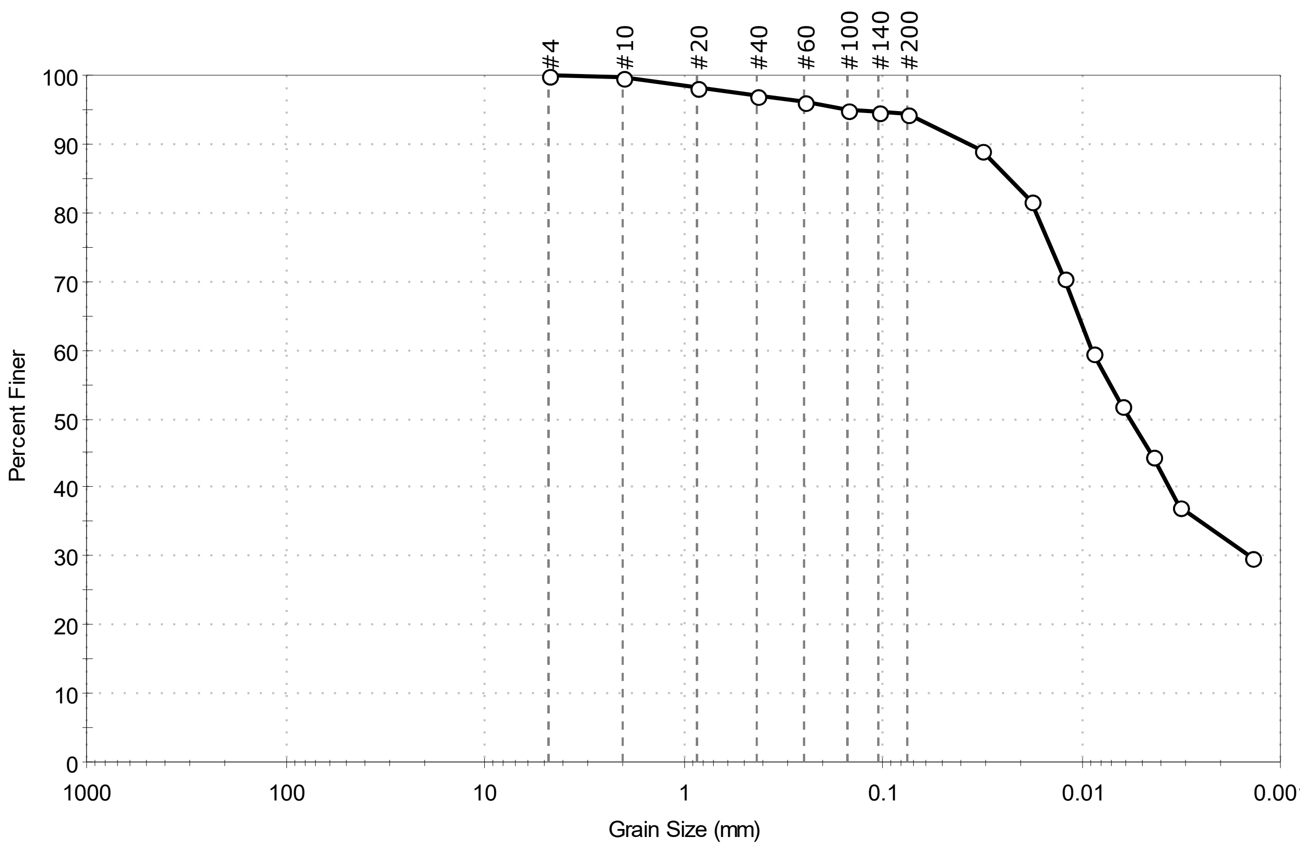
Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	Woods Hole Group		
Project:	Mystic Watershed Belle Isle		
Location:		Project No:	GTX-312651
Boring ID: ---	Sample Type: bag	Tested By:	ckg
Sample ID: SED-5	Test Date: 12/09/20	Checked By:	jsc
Depth : GRAB	Test Id: 589105		

Test Comment: ---
Visual Description: Moist, dark gray clay
Sample Comment: Sample contains organics

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	5.6	94.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	97		
#60	0.25	96		
#100	0.15	95		
#140	0.11	95		
#200	0.075	94		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0319	89		
---	0.0182	82		
---	0.0122	71		
---	0.0088	59		
---	0.0063	52		
---	0.0044	45		
---	0.0032	37		
---	0.0014	30		

Coefficients

D_{85} =0.0232 mm
D_{30} =0.0014 mm
D_{60} =0.0089 mm
D_{15} =N/A
D_{50} =0.0057 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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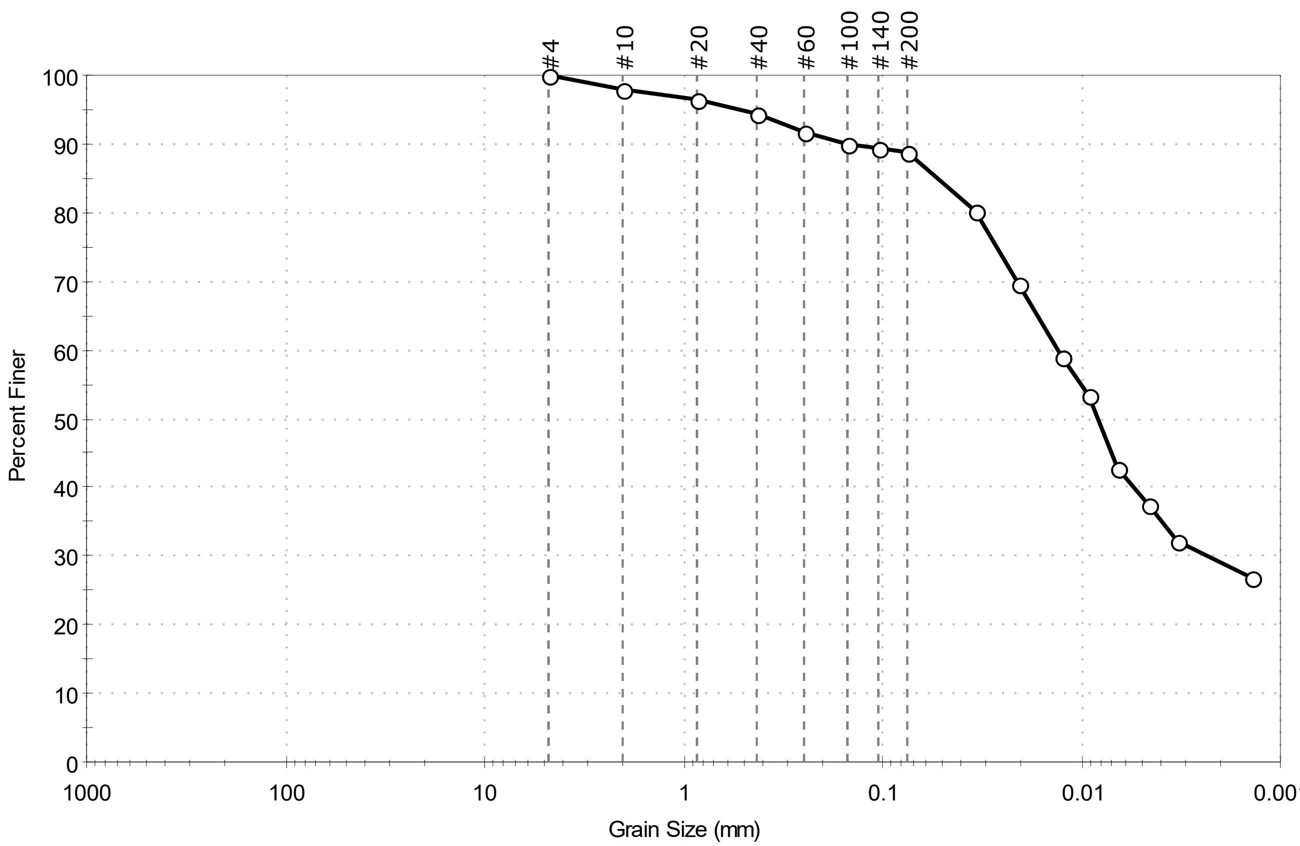
Client: Woods Hole Group
Project: Mystic Watershed Belle Isle
Location:
Project No: GTX-312651

Boring ID: ---	Sample Type: bag	Tested By: ckg	
Sample ID: SED-6	Test Date: 12/09/20	Checked By: jsc	
Depth : GRAB	Test Id: 589106		

Test Comment: ---
Visual Description: Moist, dark olive gray clay
Sample Comment: Sample contains organics

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	11.2	88.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	98		
#20	0.85	97		
#40	0.42	94		
#60	0.25	92		
#100	0.15	90		
#140	0.11	90		
#200	0.075	89		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0340	80		
---	0.0206	70		
---	0.0125	59		
---	0.0092	54		
---	0.0065	43		
---	0.0046	37		
---	0.0033	32		
---	0.0014	27		

Coefficients

D_{85} =0.0526 mm　D_{30} =0.0024 mm
D_{60} =0.0132 mm　D_{15} =N/A
D_{50} =0.0082 mm　D_{10} =N/A
C_u =N/A　C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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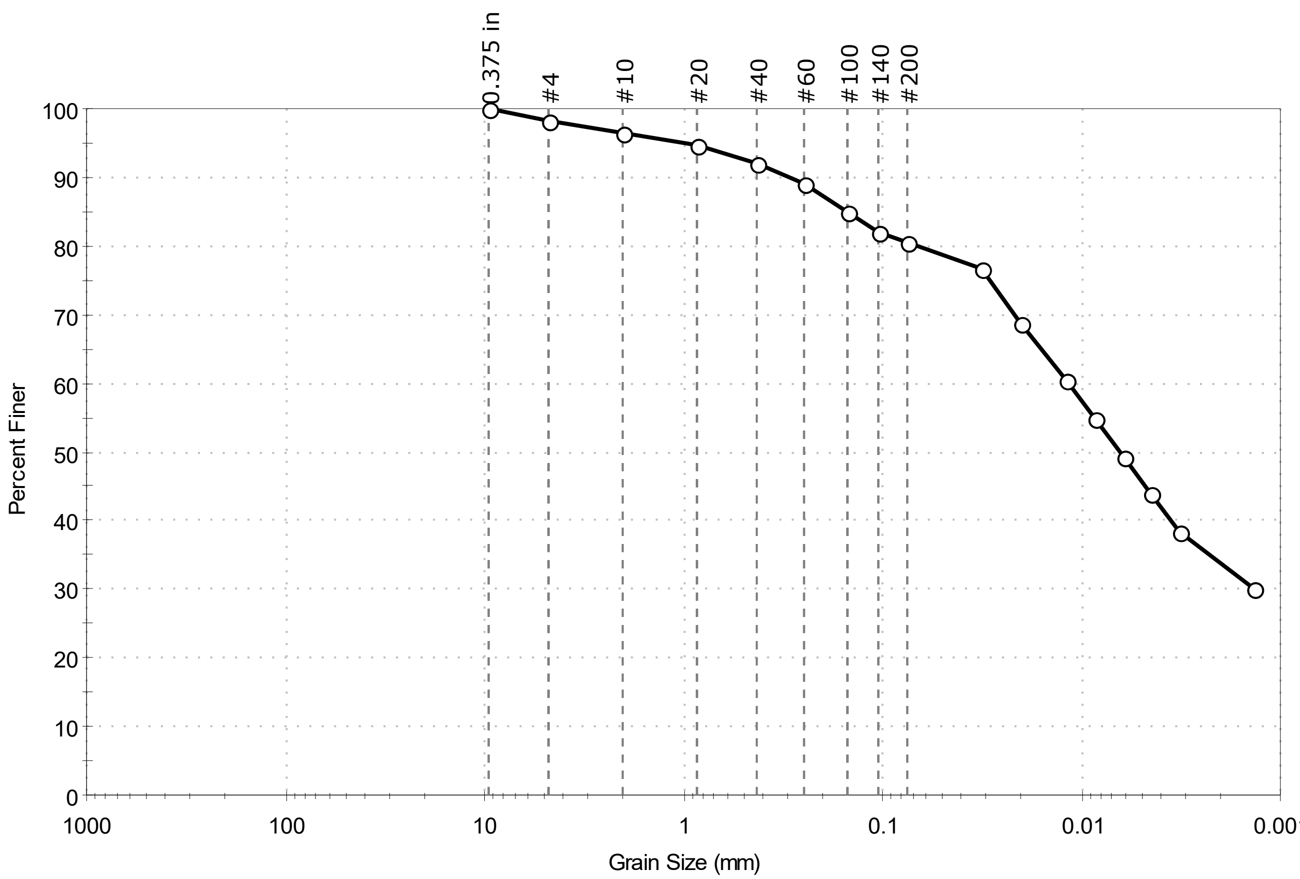
GeoTesting EXPRESS

Client:	Woods Hole Group				
Project:	Mystic Watershed Belle Isle				
Location:				Project No:	GTX-312651
Boring ID:	---	Sample Type:	bag	Tested By:	ckg
Sample ID:	SED-7	Test Date:	12/09/20	Checked By:	jsc
Depth :	GRAB	Test Id:	589107		

Test Comment: ---
Visual Description: Moist, dark olive gray clay with sand
Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	1.7	17.9	80.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	96		
#20	0.85	95		
#40	0.42	92		
#60	0.25	89		
#100	0.15	85		
#140	0.11	82		
#200	0.075	80		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0320	77		
---	0.0204	69		
---	0.0119	60		
---	0.0085	55		
---	0.0061	49		
---	0.0045	44		
---	0.0032	38		
---	0.0014	30		

Coefficients

D_{85} =0.1523 mm D_{30} =N/A
D_{60} =0.0116 mm D_{15} =N/A
D_{50} =0.0063 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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Appendix C: Task 3: Belle Isle Marsh Hydrodynamic Assessment – Summary Memo

MEMORANDUM

DATE September 23, 2022 **JOB NO.** 2020-0076

TO Catherine Pedemonti
Mystic River Watershed Association
20 Academy Street, Suite 306
Arlington, MA 02476

Sarah White
MA Department of Conservation and Recreation
Office of Climate Resilience
251 Causeway Street
Boston, MA 02114

FROM Grace Medley & Conor Ofsthun
Coastal Scientist, Woods Hole Group, Inc.

Task 3: Belle Isle Marsh Hydrodynamic Assessment – Summary Memo

1. Introduction

Woods Hole Group (WHG) was tasked with providing a hydrodynamic assessment for Belle Isle Marsh and adjacent properties in Boston, Revere, and Winthrop, MA for the MA Department of Conservation and Recreation (DCR) and Mystic River Watershed Association. In assessing the current and future state of Belle Isle Marsh, DCR holds the following goals:

- Protect and restore salt marsh habitat.
- Gain an understanding of the degraded areas of the marsh and obtain data to support conclusions regarding the probable causes and/or possible solutions to this degradation.
- Prolong the existence of the reservation as Boston's largest salt marsh. Belle Isle Marsh is part of the only substantial green space in this Environmental Justice Community and is critically important to reducing heat island effect.

The goals of this assessment were to simulate the existing hydrodynamics of Belle Isle Marsh and to develop and apply a tool to assess the performance of conceptual restoration alternatives in relation to saltmarsh health and resilience goals established through a collaborative stakeholder process. The following technical memorandum describes the development and application of the hydrodynamic model and analysis of its results. The purpose of this modeling effort was to provide guidance for the development of restoration and adaptation alternatives for Belle Isle Marsh. The model was used to predict water surface elevations under present and future sea level conditions, salinity levels, and changes to the saltmarsh hydraulics under existing and alternative conditions. This memorandum provides details on the development, calibration, and validation of the Belle Isle Marsh Hydrodynamic Model. It then provides a series of simulation results and a summary of findings that characterize the hydrodynamics of Belle Isle Marsh in its existing state. To address saltmarsh health and resilience issues

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identified in the existing conditions simulations, a series of restoration and adaptation goals and alternatives to advance them in specific areas of interest were developed with input from stakeholders and modeled. Finally, these results were analyzed to assess the saltmarsh health and resiliency benefits of the alternative scenarios compared to the baseline existing conditions.

This hydrodynamic model assessment was prepared as one of a series of tasks intended to assess Belle Isle Marsh existing conditions and vulnerability, and analyze restoration opportunities. A review of existing conditions (Woods Hole Group, 2021a), a field data collection effort (Woods Hole Group, 2021b), marsh migration modeling with sea level rise (Woods Hole Group, 2022), and this hydrodynamic assessment will be assembled and summarized in a final report.

2. Combined Topobathymetric DEM

As a first step to the hydrodynamic modeling assessment, care was taken to ensure that the elevations in the underlying Digital Elevation Model (DEM) were as close as possible to existing conditions at the site. All adjustments were made to LiDAR DEM in ArcGIS to create a single topobathymetric dataset, which was applied to both the SLAMM and hydrodynamic modeling efforts. Due to the methods of data collection, a raw DEM often falls short when capturing bathymetry below the water surface, elevations of marsh platforms in areas of dense vegetation, and narrow channel thalweg profiles. In these cases, it is important to both ground-truth and correct the DEM with elevation data collected in-situ. In December 2020 and March 2021, Woods Hole Group collected Real Time Kinematic (RTK) survey data points at various locations around the marsh in order to characterize the site. These points were used as part of the modeling effort to ground truth and adjust the 2018 USGS CONED topobathymetric LiDAR set sourced from NOAA Digital Coast. The LiDAR DEM was adjusted in the following ways: bathymetry from the survey was added, marsh platforms, channel thalwegs and linear features (berms) were adjusted to better align with the survey data. The combined topobathymetric DEM used in the hydrodynamic model is presented in Figure 1. Bathymetric data was unavailable for the salt pools and pannes, therefore reasonable estimates to represent these regions based on water surface elevation data from the instrumentation deployment were applied to the DEM.

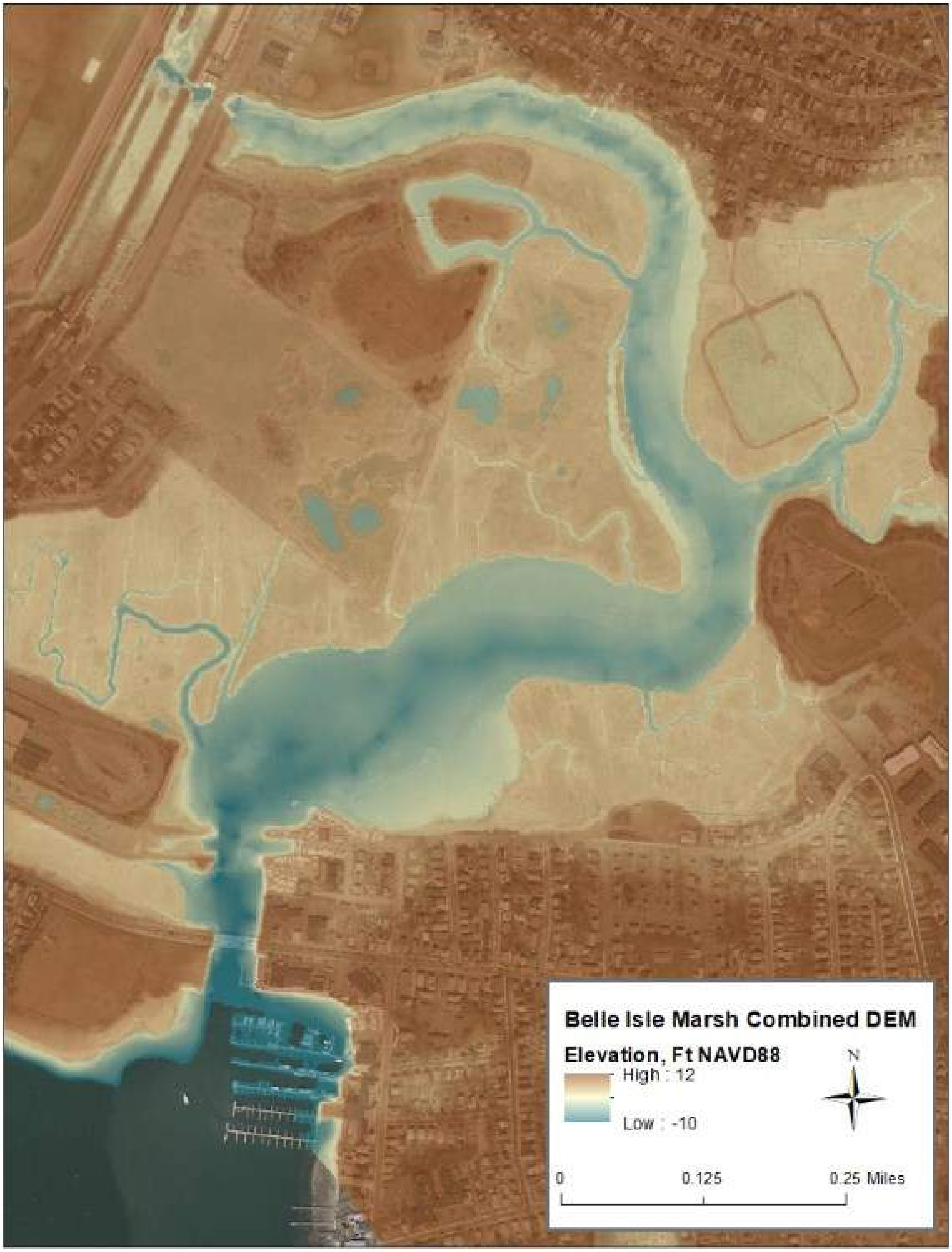


Figure 1. Combined Topobathymetric DEM used for hydrodynamic modeling, overlain on 2018 Orthoimagery for Massachusetts. All elevations are reported in ft, NAVD88.

3. Model Development

After a careful consideration of many hydrodynamic and hydraulic numerical models that specifically simulate the hydrodynamics in saltmarshes, the Environmental Fluid Dynamics Code (EFDC) (Hamrick, 1996) was chosen as an appropriate numerical tool to describe the conditions at Belle Isle Marsh. EFDC was chosen due to the code's ability to simulate 2-dimensional, time-dependent flow, water surface elevations, and concentrations of scalars (temperature and salinity), as well as the addition of hydrodynamic control structures (culverts, weirs, etc.) when necessary. The following describes the hydrodynamic model setup, including boundary conditions, input conditions and validation.

3.1 EFDC

EFDC is a 2-dimensional, depth-integrated hydrodynamic model that solves the equations of motion for a moving, variable density fluid on a curvilinear orthogonal or a cartesian coordinate modeling grid. EFDC is widely used to predict water surface elevation, water quality indicators, flow velocities, discharge, sediment transport, and circulation patterns in large and small-scale estuaries, and is an EPA-approved hydrodynamic modeling tool for estuarine hydrodynamic modeling. Additionally, EFDC allows for wetting and drying of computational cells, making it well suited for simulating diurnal and semi-diurnal flooding of marsh platforms, draining of saltmarsh channels, as well as adequately capturing storm inundation. EFDC has been used in a variety of environmental studies ranging from pollutant transport, sediment transport and fate, and simulating the hydrodynamics of complex wetland systems. In the state of Massachusetts, EFDC has been used by WHG to model the hydrodynamics and salt fluxes in the Herring River in Wellfleet MA and Great Marsh in Newbury, MA.

3.2 Grid Generation

EFDC functions on a curvilinear orthogonal computational grid with bathymetry applied at each cell center. The Belle Isle Marsh grid is a curvilinear orthogonal structured grid with 108,712 computational cells. The grid was produced in SMS 12.2 and converted to the input format necessary for EFDC. Topography and bathymetry were then interpolated to the grid as an elevation in meters NAVD88, which were sourced from the combined topobathymetric DEM created for this project (Section 2 of this memorandum). The grid resolution is variable, ranging from 3-6 meters. For areas where interpolation caused certain grid points to be mis-represented, for example in narrow channels, the grid was hand-edited to ensure that the proper elevations were captured by the correct grid cells.

The benefit of a curvilinear structured grid is the ability to focus resolution to the areas of interest. The highest grid resolution occurs in the channels of the marsh and reaches 3-4 meters (Figure 2 and Figure 3). The lowest resolution occurs over far field, high elevation areas furthest from the main marsh channels, and at the open ocean boundary. The grid boundary follows the 5-meter elevation contour, which was determined based on the high-water marks occurring during large storms for the marsh. The full grid used for the Belle Isle Marsh hydrodynamic assessment is presented in Figure 2.

Since the model simulates wetting and drying of cells, there is no need to distinguish between "land" and "ocean" cells. However, cells can be masked, or removed from the computational domain through a masking sub-routine. This essentially will determine whether computational cells will allow water to flow through them. There are currently no masked cells in the model as it has been developed, but may be considered when designing and implementing alternative designs.

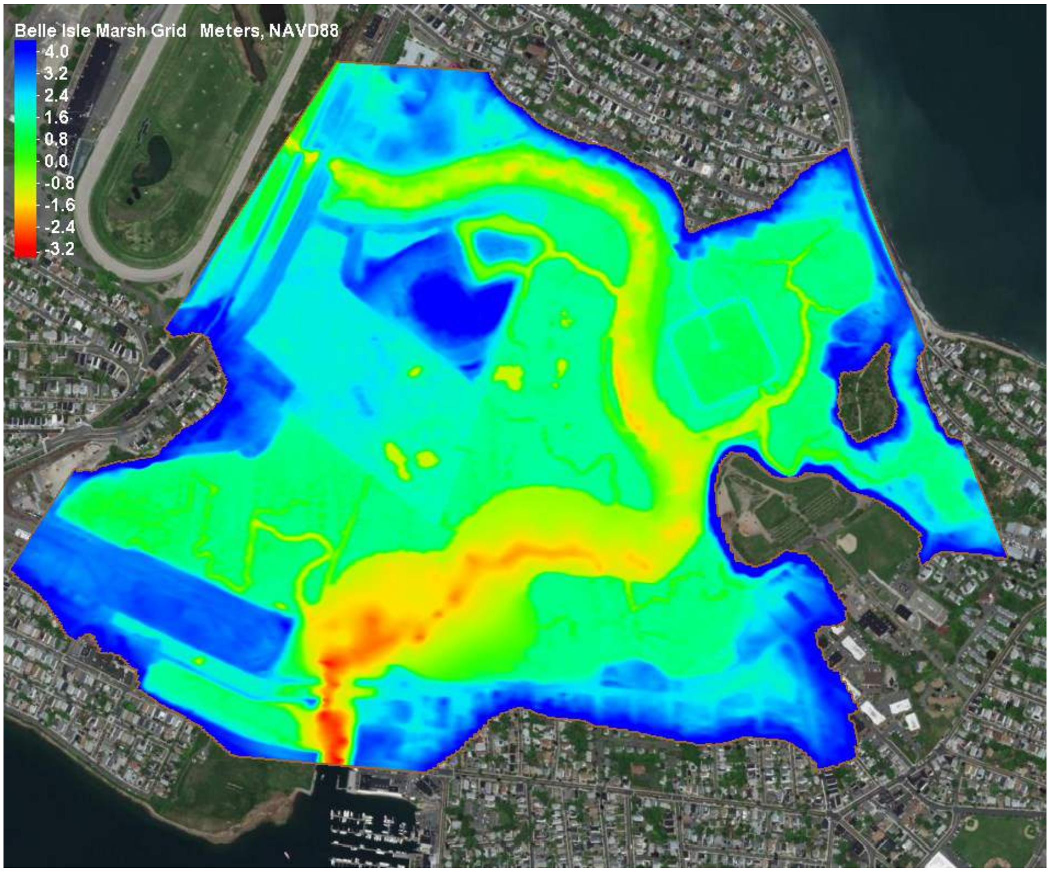


Figure 2. Full extent of the Belle Isle Marsh Hydrodynamic model, with grid elevations for bathymetry and topography represented in meters, NAVD88. Red and yellow represent low-elevation (deep) areas, whereas green and blue shades represent higher elevations.

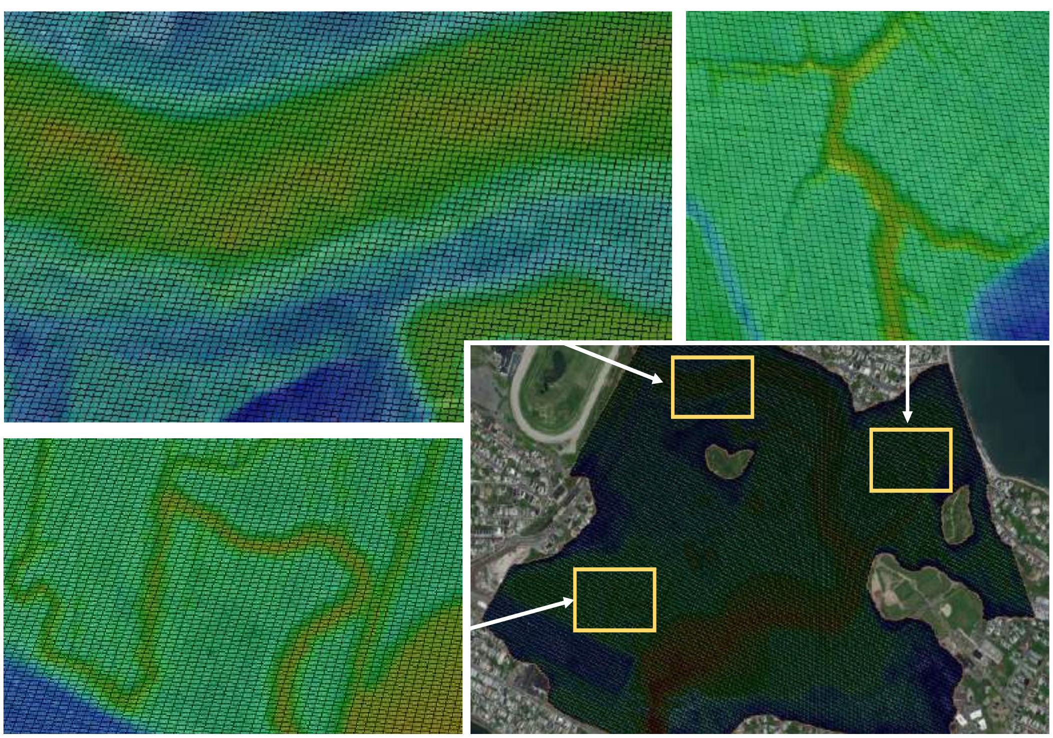


Figure 3. Full extent of the Belle Isle Marsh Hydrodynamic model, with zoomed frames to highlight model resolution in specific areas of the marsh. Highlighted areas are outlined in yellow, with each arrow corresponding to each zoomed area.

3.3 Boundary Conditions

The primary driver of the Belle Isle Marsh EFDC model is a water surface elevation time-series forced at the southern open (ocean) boundary, which connects Belle Isle Marsh to Boston Harbor. A 30-day window from November 9 to December 9, 2020 was chosen for a validation period using these conditions to capture a full spring and neap tidal cycle. The open ocean boundary conditions chosen for the model is the time-series observational data from a tide gauge placed just by Main St bridge at the entrance to the estuary. For this reason, the "open ocean" boundary is situated just to the south of the location of Main St bridge. This tide gauge is named BIM1, and was part of a 7 tide gauge observational effort which observed water levels and salinity throughout the marsh (Figure 4; Woods Hole Group, 2021b). Of these 7 sites, 5 were additionally outfitted to measure salinity: BIM1, BIM2, BIM3, BIM4, and BIM5. Direct data on discharge from Sales Creek was not available, and therefore the observed minimum salinity was used as a proxy for discharge flow. EFDC was calibrated based on how much freshwater was needed to match the results at the validation point. Precipitation data from Logan Airport was added as "rain on grid" at a salinity of 0 PSU, which "freshens" the surface of the marsh when it rains. Groundwater flow and outfall flows were not incorporated into the model.

Figure 4. Tide gauge locations for seven deployed tide gauges in Belle Isle Marsh.

3.3.1 Temperature and Salinity Boundary Conditions

Fresh water is sourced from one main location in the Belle Isle Marsh system. This is the Bennington Street pump station and tide gate at the apex of the marsh and Sales Creek, in close proximity to the station BIM4. The pattern of freshwater fluxes at BIM4 indicates the presence of a tide-gate that opens and empties water from Sales Creek through the Suffolk Downs region once per tidal cycle. The tide gate was not surveyed as part of the scope of this project, and therefore the freshwater fluxes as a result of the tide gate must be parameterized and calibrated based on the salinity observed at BIM4. Because the model does not simulate groundwater or over-land runoff flows, and very little is known about submerged drainage pipes in the area, freshwater was parameterized from the tide gate as a freshwater flow boundary of 1m^3/s at a value of 3 PSU at the apex of the marsh system. For the ocean (southern) boundary, a constant surface and bottom water salinity (30.25) were chosen based on the salinity observations at BIM1. This value is roughly the average of the incoming tidal salinity at BIM1 and was considered reasonable for the boundary of the marsh system where it meets Boston Harbor. Stratification was not included in this modeling effort due to the fact that:

1. The observations were collected during the late Fall/Winter months, when thermal and salinity stratification tend to be at a minimum, and
2. The model is running in two dimensions and parameterizes density-driven flows. It is not part of the current modeling scope to model temperature, and therefore a constant temperature of 15 degrees C was applied to both the freshwater and ocean boundaries.

3.3.2 Atmospheric Conditions

In addition to the surface water parameters that force the model, precipitation was specified over the surface of the entire Belle Isle Marsh model domain. These precipitation events were collected from the meteorological station at Logan International Airport, and cover a period of 30 days beginning in November 2020 and ending in December 2020 (Figure 5). Wind speed and direction, and radiational fluxes were not applied as surface forcing for this modeling effort.

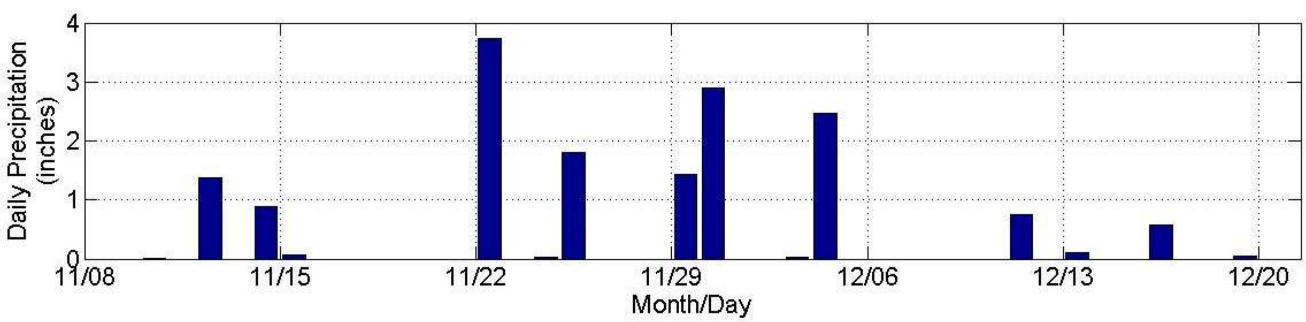


Figure 5. Time-series of daily precipitation (inches) recorded at Logan International Airport (bottom) over the period of tidal observation from November 9 to December 21, 2020.

3.3.3 Roughness Height

A saltmarsh is characterized by a variation of smooth channels, low vegetation, high vegetation and open water. All of these features contribute drag to the water column as the water moves over them. High vegetation will attenuate tides to a greater degree than low vegetation. Since vegetation isn't directly input into EFDC, it is instead parameterized by the application of a variable Roughness height. Roughness height is a one-dimensional frictional coefficient that describes the vertical distance at which a feature can exert drag on the water column. Higher roughness lengths are attributed to thicker, taller vegetation, whereas smaller roughness heights are attributed to sandy or muddy stream beds, or open ocean. For this modeling study, a roughness height of 0.001 m was applied to open ocean, 0.002 m was applied to channel beds, 0.05 m was applied to low marsh, and a value of 0.1 m was applied to high marsh, phragmites, and scrub-shrub areas. A 0.1 m roughness height is approximately equal to a Manning's Roughness Coefficient of ~0.26, which is representative of a pasture with short to high grasses on a floodplain.

3.3.4 Water Surface Elevation Boundary Conditions

Water surface elevations were forced at the southern, open boundary at 6-minute intervals. For existing conditions, the boundary was forced with the water surface elevations from the observational data collected at BIM1. The time-series of boundary condition forcing for existing conditions and all validation simulations is presented in the following section.

4. Calibration and Validation

In order to use a model to simulate adaptations and future sea level rise (SLR) conditions the model must be calibrated to and validated against observational data. The model was calibrated for water surface elevations and salinity for a 30-day period in November to December of 2020. Before calibration, a modeled ramp-up was conducted that drained the channels of Belle Isle Marsh from a constant depth of 1 cm. During this ramp-up, the water surface elevation at the boundary was held constant while the marsh drained. This drainage ramp-up ensured model stability during a cold start (i.e., initial conditions) and allowed the time-series of water surface elevations to be applied while remaining stable and computationally efficient. For salinity, this model ramp-up ensured that the salinity field in the model had reached equilibrium before validating it against observational data. The result of this 3-day model ramp-up was applied as the initial condition for the validation run as well as all storm and sea-level-rise simulations. This ramp-up period is not included in comparisons to observational data.

Three statistical parameters were evaluated to assess the model performance and uncertainty: mean error (ME) (Equation 1), or bias, root mean square error (RMSE) (Equation 2), and relative mean absolute error (RMAE) (Equation 3). ME gives an indication as to whether the model is underpredicting or overpredicting water levels. RMSE and RMAE give an indication of the magnitude of the error, in feet and in a percentage of the tidal range, respectively. A smaller RMAE indicates the model is capable of simulating the system reasonably well.

$$ME = \frac{\sum(P_{simulated} - P_{measured})}{n} \qquad \textbf{Eq (1)}$$

$$RMSE = \sqrt{\frac{\sum(P_{measured} - P_{simulated})^2}{n}} \qquad \textbf{Eq (2)}$$

$$RMAE = \frac{\sum|(P_{measured} - P_{simulated})|}{\sum|P_{measured}|} \qquad \textbf{Eq (3)}$$

4.1 Existing Conditions, Water Surface Elevations

Water levels and tidal datums from two observational sites (Woods Hole Group, 2021b) in the main channel representing the Belle Isle Inlet and Sales Creek tide gate are compared against the Boston Harbor tide gauge which has been operating since 1921 (Table 1). Table 2 presents the model validation statistics for each of the 7 validation points within the marsh. Existing conditions were run in EFDC for a period of 15 days, to ensure a full spring and a few tidal cycles of a neap cycle, were captured. Figure 6 presents time-series zoom of 8 days for the east marsh stations (BIM2, BIM3, and BIM7) and the west marsh stations (BIM1, BIM4, BIM5, and BIM6). For this validation period, the ME, RMAE and RMSE were calculated to determine model skill for water surface elevations.

Table 1. Present day tidal datums at Belle Isle Marsh and Boston Harbor (ft NAVD88).

Tidal Datums		Belle Isle Inlet[1]	Sales Creek Tide Gate[2]	Boston Harbor[3]
Annual Probabilistic Water Surface Elevation (WSE)[4]	0.5% WSE	-	-	9.5
	1% WSE	-	-	9.3
	2% WSE	-	-	9.1
	10% WSE	-	-	8.2
Highest Astronomical Tide	HAT	-	-	6.82

Mean Higher High Water	MHHW	5.1	5.2	4.98
Mean High Water	MHW	4.6	4.7	4.54
Mean Tide Level	MTL	-0.3	0.0	0.17
North American Vertical Datum 1988	NAVD88	0.0	0.0	0.0
Mean Low Water	MLW	-5.1	-4.7	-4.95
Mean Lower Low Water	MLLW	-5.4	-4.9	-5.3
Tide Range from MLW to MHW	Tide Range	9.7	9.4	9.49

[1]*Tidal datums represent observations from BI-1 (downstream of Saratoga St bridge) from Nov-9 to Dec-21, 2020.*
[2]*Tidal datums represent observations from BI-4 (downstream of Sales Creek tide gate) from Nov-9 to Dec-21, 2020.*
[3]*Tidal datums represent observations from Boston Harbor Tide Gauge (NOAA Station 8443970) centered on 2008.*
[4]*Probabilistic WSE's were derived from the MC-FRM (Bosma et al., 2021).*

Table 2. Model validation statistics of water surface elevation at 7 tide gauge stations.

Station	ME (ft)	RMSE (ft)	RMAE (%)
BIM1	0.04	0.09	0.7
BIM2	0.19	0.4	8.8
BIM3	0.09	0.21	5.4
BIM4	0.79	0.30	2.5
BIM5	0.10	0.11	19.9
BIM6	0.28	0.53	7.6
BIM7	-0.04	0.47	5.2

Visually, the model captures both the phase and amplitude of the time-series observation at each station quite well. Minor exceptions do exist at BIM2, BIM5 and BIM7. At BIM2, the structure of the Key entrance is such that a modeled weir structure cannot quite capture the effects of the rocky breach that exists there. Observations show slow drainage during ebb tides, while the model shows quicker drainage, but still captures the low water level at ~2.5 ft NAVD88. The Key observations suggest improving drainage would be the primary goal, especially in the near term, for marsh restoration. BIM5 is an enclosed region behind a berm (L-Berm), and experiences inundation at the highest of spring tides. Drainage is also observed to be slow, impeded by the inefficient breaches and suggesting that improved drainage would be a primary goal of restoration. Conversely, slow drainage is modeled, but not observed at BIM7. BIM7 is located up in the northeastern portion of the marsh, in a small channel. This leads us to believe that the model resolution may be insufficient to capture the bathymetry of this narrow channel, and as a result artificially perches the water levels by an average of 0.04 feet.

Statistically, the modeled water levels compare well with the measured water levels; most of the stations maintain a RMAE below 10%, with the exception of BIM5. This is well below what is considered acceptable (30%) for estuarine modeling by the EPA (Ambrose et. al, 1990), and therefore provides high confidence in the model's representation of hydrodynamics in the marsh. The BIM5 station is located in one of the salt pannes behind the L-Berm, and therefore the tide range is very small. Since RMAE factors in the tide range and reports the error as a percentage of the tide range, seeing a higher value of relative error makes sense. A mean error, and a RMSE of ~0.1 feet is considered acceptable for modeling alternatives at this station. The model tends to slightly underpredict the data almost everywhere with the exception of station BIM7. Overall, the model is well calibrated for the amplitude and phase of the tidal signal and can therefore be used for evaluating alternatives.

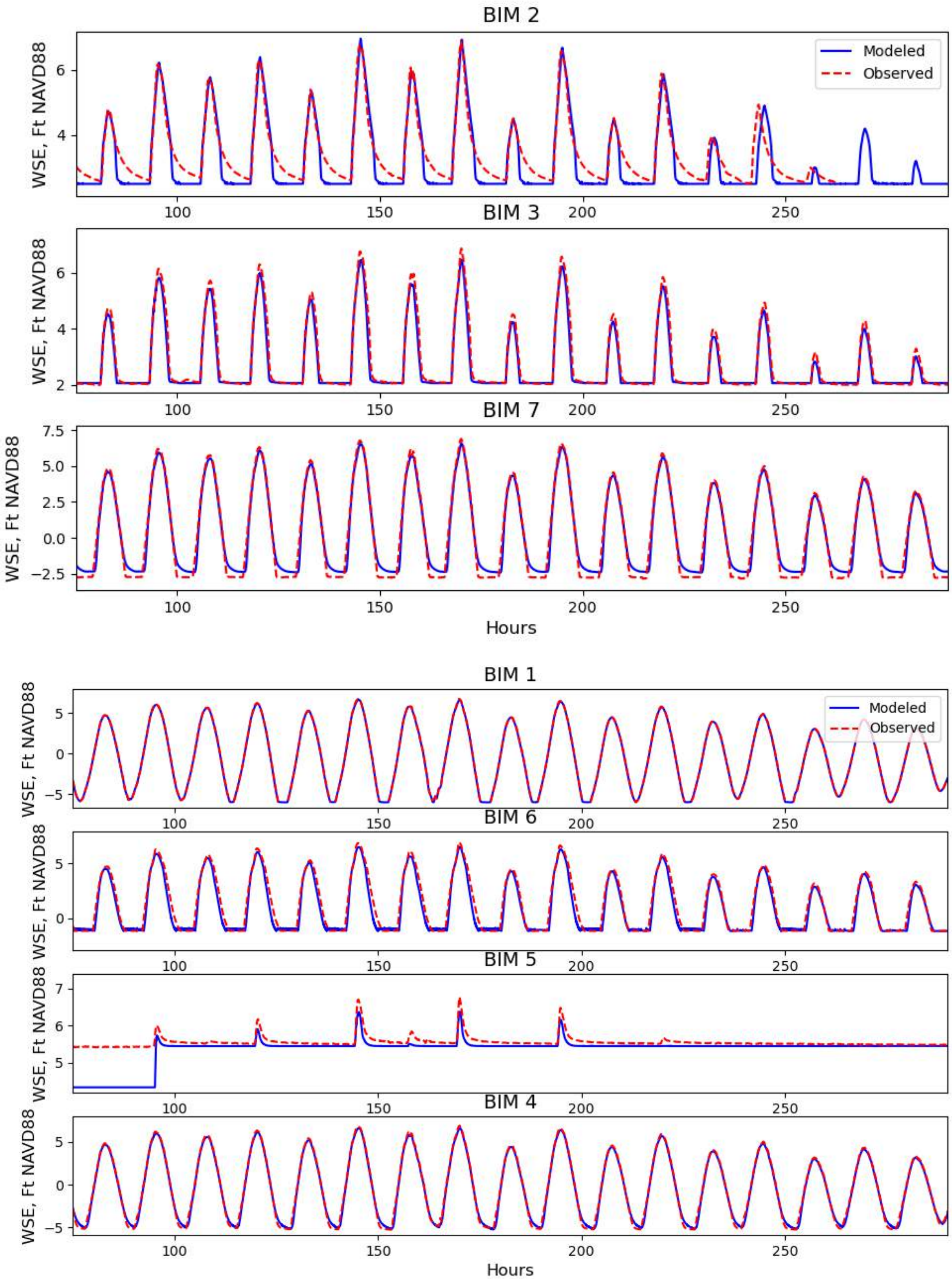


Figure 6. Modeled and observed water surface elevation (WSE) at 7 tide gauge stations throughout Belle Isle Marsh.

4.1.1 Water Levels, Elevation, and Marsh Habitat

Wetland habitat distribution within Belle Isle Marsh was mapped through a combination of reviewing the National Wetlands Inventory, reviewing aerial surveys, and ground-truthing performed by a WHG Professional Wetland Scientist (Woods Hole Group, 2021b). Habitats within Belle Isle Marsh include primarily open water (channels and salt pannes), mudflat, low marsh, high marsh, transitional marsh (primarily *Phragmites*), some beach/rocky shoreline, and upland areas such as the main park (Figure 7).

Wetland habitat distribution is primarily dependent upon the tidal wetting period of marsh habitat. Areas which are submerged the majority of the day typically do not support salt marsh vegetation (i.e., subtidal or mudflat), whereas areas wetted less frequently may support salt tolerant vegetation such as *Spartina alterniflora* (typical of low marsh) or *Spartina patens* (typical of high marsh), and more. Above the high tide line, less salt tolerant species can begin to establish, and these transitional areas within Belle Isle Marsh are often occupied by *Phragmites* and other transitional marsh species (Figure 8).

Due to the relationship between wetting period, tidal datum, and elevation, habitat types can be described by an elevation range for growth, assuming a full tidal range is present. Habitat elevation ranges and their corresponding tidal datum in Belle Isle Marsh are presented in Table 3. While habitat elevation ranges may cover a large vertical extent, optimal elevations exist where plant types can thrive. Within Belle Isle Marsh, low marsh vegetation is typically found to thrive around 4.4 ft NAVD88, while high marsh vegetation is typically found to thrive around 4.8 ft NAVD88.

Table 3. Belle Isle Marsh habitat elevation ranges and corresponding water level.

Habitat	Approximate Elevation Range (ft, NAVD88)	Corresponding Water Level Datum
Upland	> 9.3	Above 1% WSE
Transitional Marsh	6.8 to 9.3	HAT to 1% WSE
High Marsh	4.6 to 6.8 (mean BIM EL is 4.8)	MHW to HAT
Low Marsh	-0.3 to 4.6 (mean BIM EL is 4.4)	MTL to MHW
Mudflat	-5.1 to -0.3	MLW to MTL
Subtidal	< -5.1	Below MLW

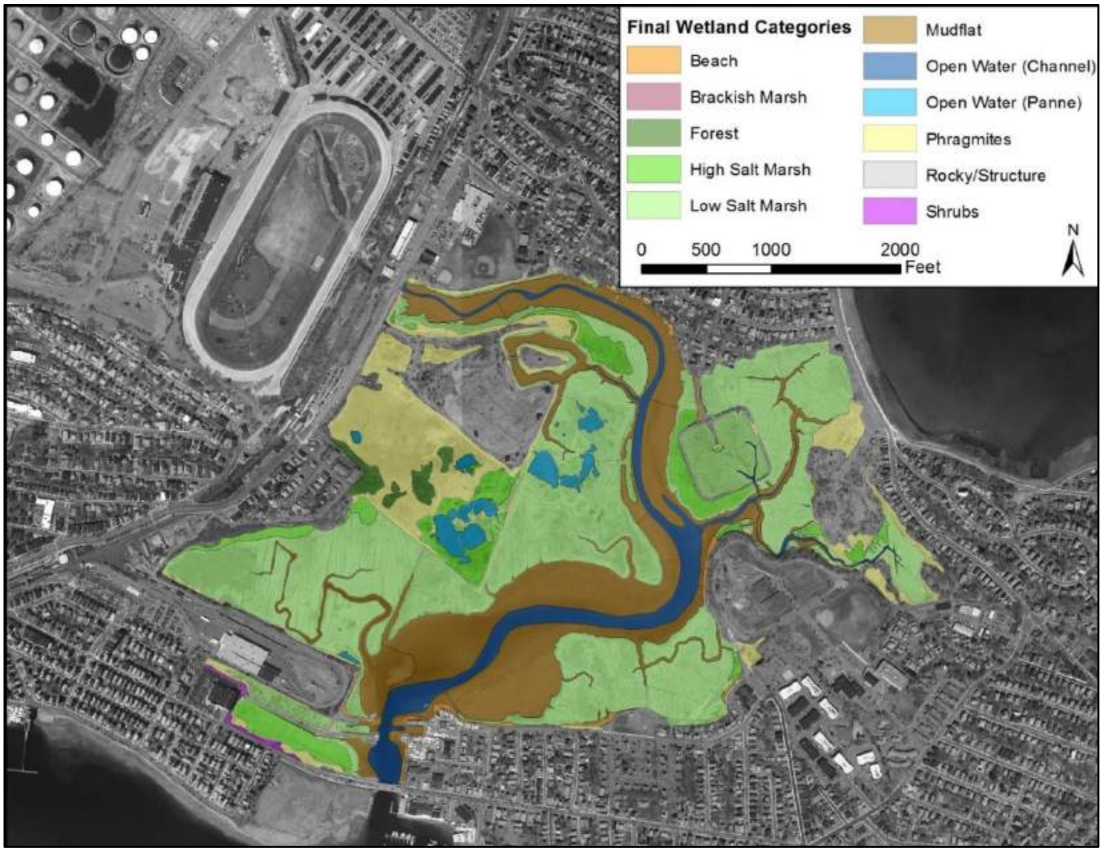


Figure 7. Final wetland cover type map based the National Wetlands Inventory and field-based ground truthing (Woods Hole Group, 2012b).

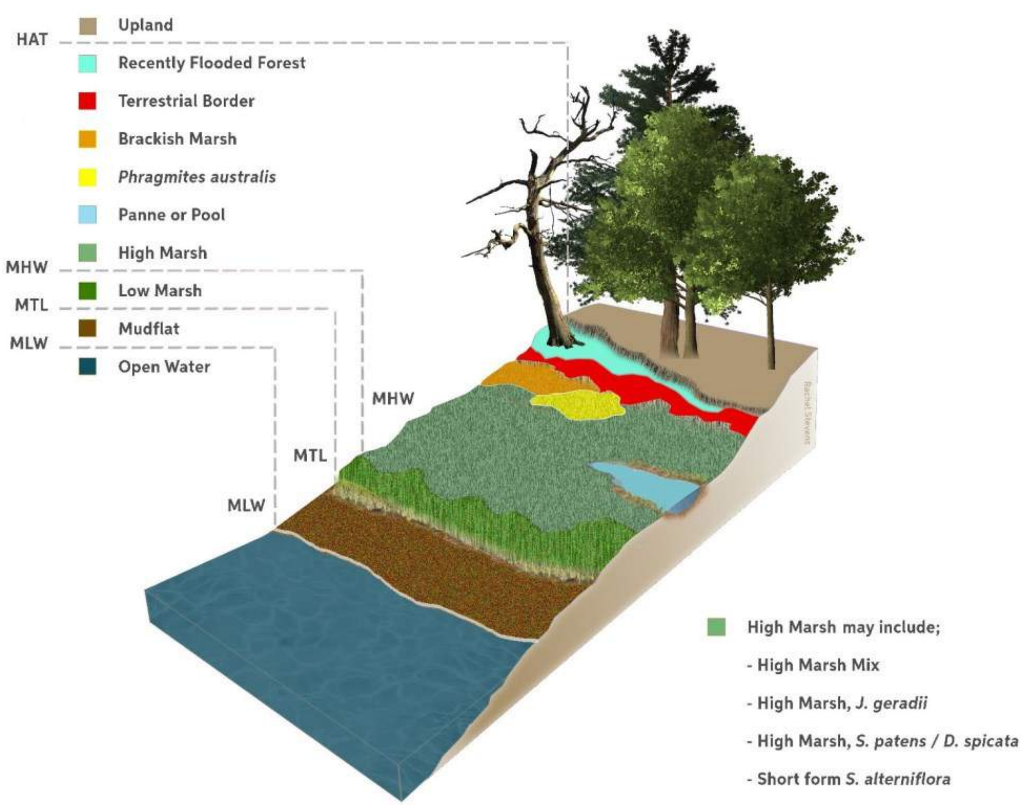


Figure 8. Saltmarsh habitat distribution by tidal datum (Stevens et al., 2022).

4.2 Existing Conditions, Depth-Averaged Salinity

Existing conditions were run in EFDC for a period of 15 days, to ensure a full spring and neap tidal cycle was captured. For the salinity validation period, the ME, and RMSE were calculated to determine model skill for salinity (Figure 9). Table 4 presents the model validation statistics for each of the 5 salinity validation points within the marsh (BIM6 and BIM7 did not collect observational data for salinity).

Table 4. Model validation statistics of depth-averaged salinity at 5 salinity monitoring stations

Station	ME (PSU)	RMSE (PSU)
BIM1	-0.66	1.23
BIM2	-0.4	0.48
BIM3	-3.33	3.67
BIM4	-5.0	8.39
BIM5	4.44	4.76

In reviewing the time-series and statistical results, two conclusions were made:

1. The model captures the tidal variability in the salinity, and provides a reasonable standpoint at which to capture trends in future salinity, and
2. The model under-represents the salinity in the marsh, especially at BIM3 in the eastern secondary channels of the marsh. The under-representation of salinity is as high as 5 PSU, but this is not a constant error, and typically the error is less than 1 PSU throughout the simulation period. There are a few reasons why the salinity in a depth-integrated salinity model like EFDC is difficult to match to observational data. The first reason is site-specific, and has to do with the fact that in an urban saltmarsh such as Belle Isle Marsh, there is a fair amount of surface stormwater runoff, which can drive salinity variability. Additionally, there may be freshwater intrusions from groundwater that the model does not resolve.

All considered, the model sufficiently captures changes in salinity within different reaches of the marsh and throughout varying tidal cycles that it can be confidently utilized to represent existing conditions and saltmarsh restoration measures.

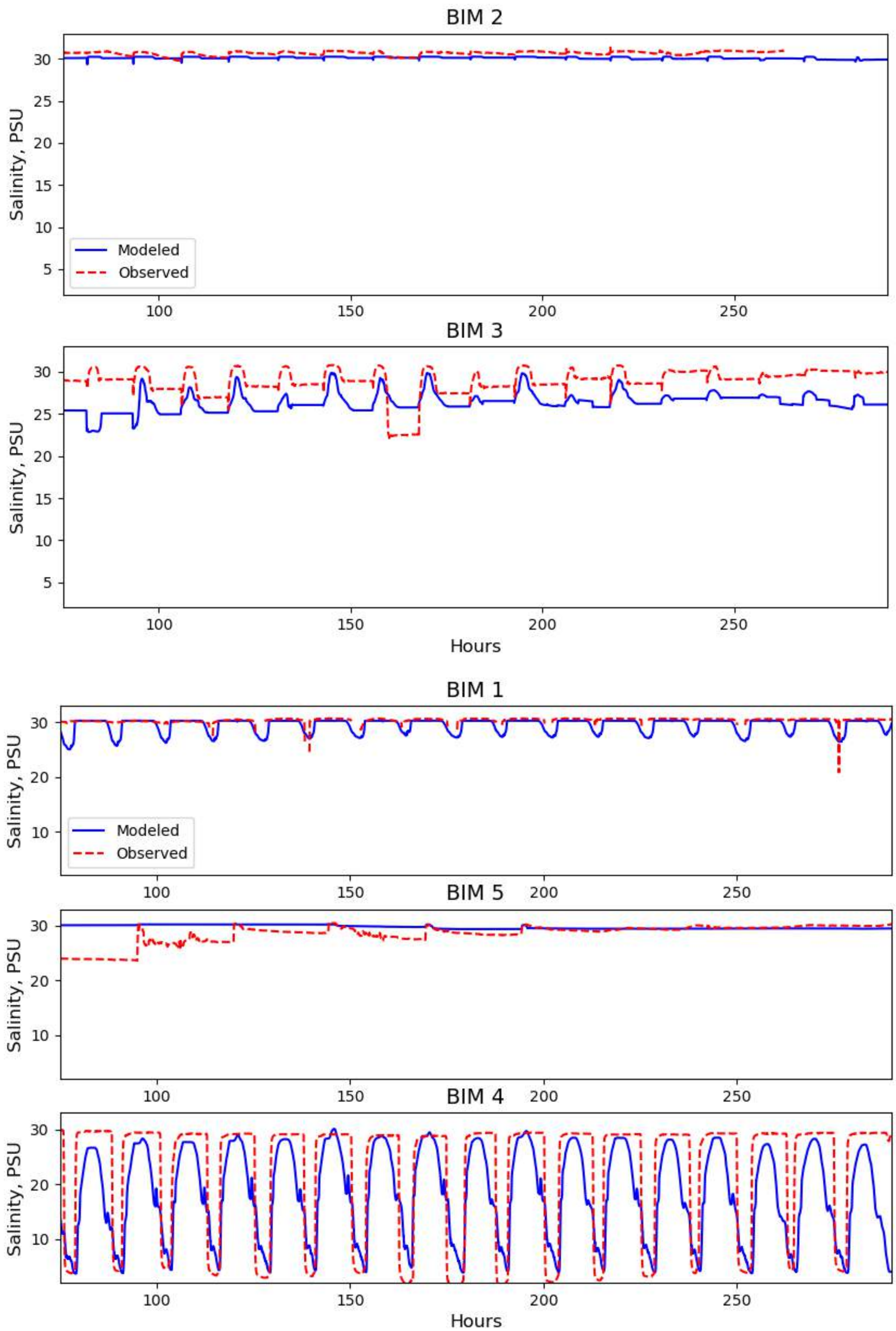


Figure 9. Modeled and observed salinity at 5 salinity monitoring stations throughout Belle Isle Marsh.

5. Existing Conditions and Sea Level Rise Model Results

EFDC model outputs include tidal water levels, inundation depth, tidal velocities, and salinity distribution. The following section summarizes the tidal water level and salinity distribution results under existing marsh conditions and water levels, as well as future sea level rise scenarios. Tidal velocity results are summarized for spring tide conditions, while neap tide conditions are provided in Appendix A.

5.1 Water Level

Sea level rise cases that were chosen to simulate are the 2030, 2050 and 2070 cases used by the Massachusetts Coast - Flood Risk Model (MC-FRM) (Bosma et al., 2021). The values used for relative sea level rise are 1.29 feet above present day for 2030 (Figure 11), 2.49 feet above present day for 2050 (Figure 12), and 4.29 feet above present day for 2070 (Figure 13). These values were selected by the Commonwealth of Massachusetts for use in MC-FRM during the model's development and are based on the High relative sea level rise projections for Boston (DeConto and Kopp, 2017). If sea level rises according to the Intermediate scenario, these increments of sea level rise are projected to occur 20 to 30 years later than the dates referenced above. These sea level rise scenarios were simulated for a 5-day spring tidal cycle in all out-years. Water level results are presented in terms of a spring high tide scenario, defined as the larger than average tide which occurs twice monthly, in response to a new and full moon. Spring high tide inundation results are summarized below:

- 2020 – Existing Conditions
    - A spring high tide under present day sea levels inundates existing marsh platform habitat (low marsh, high marsh), and most areas currently inhabited by phragmites and considered to be transitional habitat.
    - The L-Berm which cuts off most tidal penetration to the upland Belle Isle Marsh Reservation Park is overtopped during a spring high tide.
    - During neap conditions, water is perched in several areas of the marsh, including Rosie's Pond, the L-Berm, and the Key.
- 2030 – 1.29 ft SLR
    - High marsh and transitional habitat are increasingly flooded during high tides.
    - The L-Berm is anticipated to be more frequently overtopped during high tide. However, the frequency remains low and is not anticipated to significantly effect established habitat types.
- 2050 – 2.49 ft SLR
    - Spring tidal flooding is anticipated to further inundate the existing marsh and encroach on transitional and upland areas in Winthrop and Revere.
    - Flood depths across the marsh platform increase by a couple of feet and marsh habitat will be inundated for a longer period of time each day.
    - The Key and L-Berm overtopping increases in frequency with sea level rise, more frequently inundating the areas behind the berms and, because of poor drainage, causing over-saturation.
- 2070 – 4.29 ft SLR
    - The L-Berm and Key berms are completely overtopped and areas habitat types are anticipated to convert to low marsh and/or mudflat.
    - An island is created of the transitional/upland area of Belle Isle Marsh Reservation Park.

Two anthropogenically impacted areas, the L-Berm and the Key, are characterized by man-made berms which severely restrict tidal exchange. Water levels behind the L-Berm range approximately 1ft within the existing salt panne (Figure 14). Water levels within the primary tidal channel of the Key range approximately 3.5 ft (Figure 15). Outside of these bermed areas, the main channel displays a full tide range.

Figure 10. Spring tide inundation in existing conditions – No SLR.

Figure 11. Spring tide inundation in 2030 – 1.29 ft SLR.

Figure 12. Spring tide inundation in 2050 – 2.49 ft SLR.

Figure 13. Spring tide inundation in 2070 – 4.29 ft SLR.

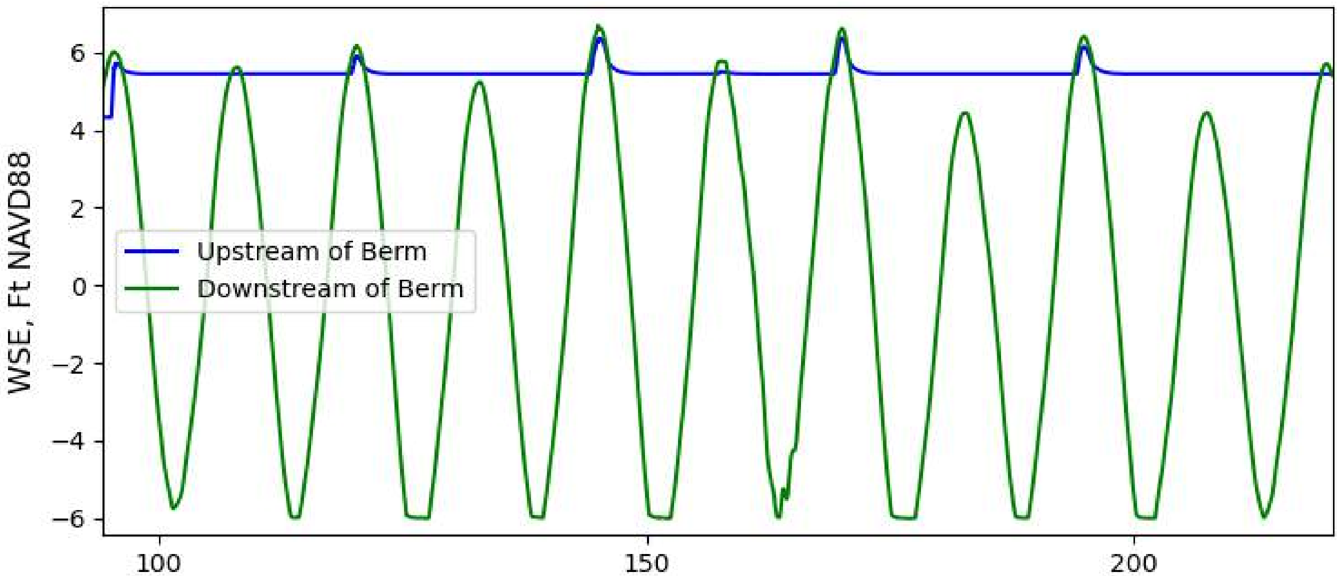


Figure 14. Water levels upstream of the L-Berm, and in the main channel during a 5-day snapshot of the existing conditions model.

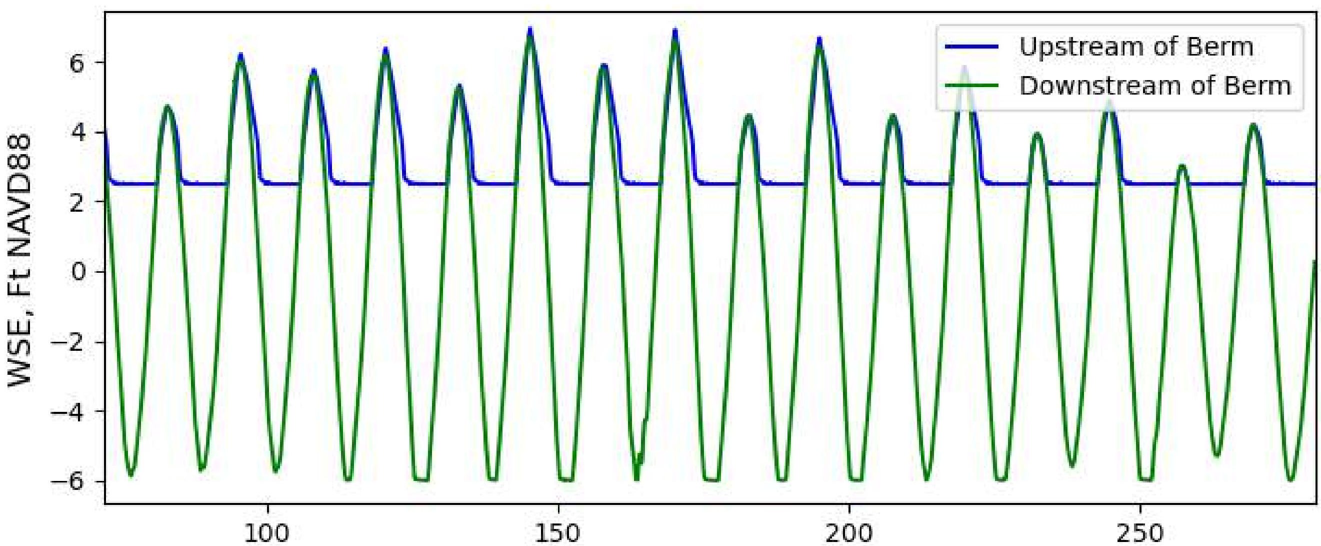


Figure 15. Water levels upstream of the Key berm, and in the main channel during a 5-day snapshot of the existing conditions model.

5.2 Salinity

Salinity results for existing conditions as well as sea level rise conditions are presented in Figure 16 through Figure 19. Salinity is presented in terms of Practical Salinity Units (PSU), for which a value of 0 PSU is equivalent to a freshwater (no salinity) condition, and a value of 35 PSU would be a near average ocean (saltwater) condition. Saltmarsh plants can live in freshwater, and depend on salinity to kill invasive species and freshwater wetland species. Salinities greater than 15-16 PSU create conditions which inhibit the recruitment of species like *Phragmites*. Salinity results are summarized below:

- 2020 – Existing Conditions
    - Salinity in Belle Isle Marsh is highly variable, and ranges from 31.5 PSU at the inlet opening at the Boston Harbor boundary, to 3 PSU at the upstream tide gate.

- Fresh water is introduced into the system through groundwater flow, surface runoff, and a tide gate at Sales Creek connecting the saltmarsh to the Suffolk Downs region and upper Sales Creek.
    - The tide gate releases fresh water once per tidal cycle, freshening the system on the ebb tide. The freshwater flows directly into the main channel and quickly spreads to adjacent low-lying areas, corresponding with a high density of *Phragmites* in such areas.
    - Minimal tidal muting is observed in the upper main channel, and freshwater is typically mixed and flushed to Boston Harbor within one tidal cycle. Therefore, it is not expected that dredging of the main channel would improve conditions in the area of the tide gate.
    - During precipitation events, the whole marsh experiences a freshwater flux that is the most evident on the marsh platforms. Peripheral areas of Belle Isle Marsh experience greater freshening, since flushing by tides is less effective. Capture of stormwater from development's runoff or outfalls would help limit *Phragmites* expansion in these areas.
- 2030 – 1.29 ft SLR
    - The water within the marsh is expected to become more saline as more saltwater from Boston Harbor is introduced through the inlet. Increases in salinity are anticipated to help limit *Phragmites* expansion, and will support saltmarsh vegetation growth. Note that *Phragmites* can be managed by other manual and chemical methods, which often require repetition.
    - The freshwater signal from the tide gate is still evident in 2030 and freshens the system during the ebb tide.
- 2050 – 2.49 ft SLR
    - The salinity distribution is expected to continue becoming more saline as more water is introduced through the inlet that connects the system to Boston Harbor.
    - The freshwater signal from the tide gate is still evident in 2050 and the system is relatively fresher during the ebb tide.
- 2070 – 4.29 ft SLR
    - The salinity distribution is expected to continue becoming more saline as more water is introduced through the inlet that connects the system to Boston Harbor.
    - By 2070, the berm to the Key is overtopped, and the flux of ocean water causes the average salinity to rise (Figure 19).
    - The freshwater signal from the tide gate is still evident in 2070 and freshens the system during the ebb. This signal is weaker and is quickly replaced by the high-salinity ocean water entering the system during the recurring incoming tide.

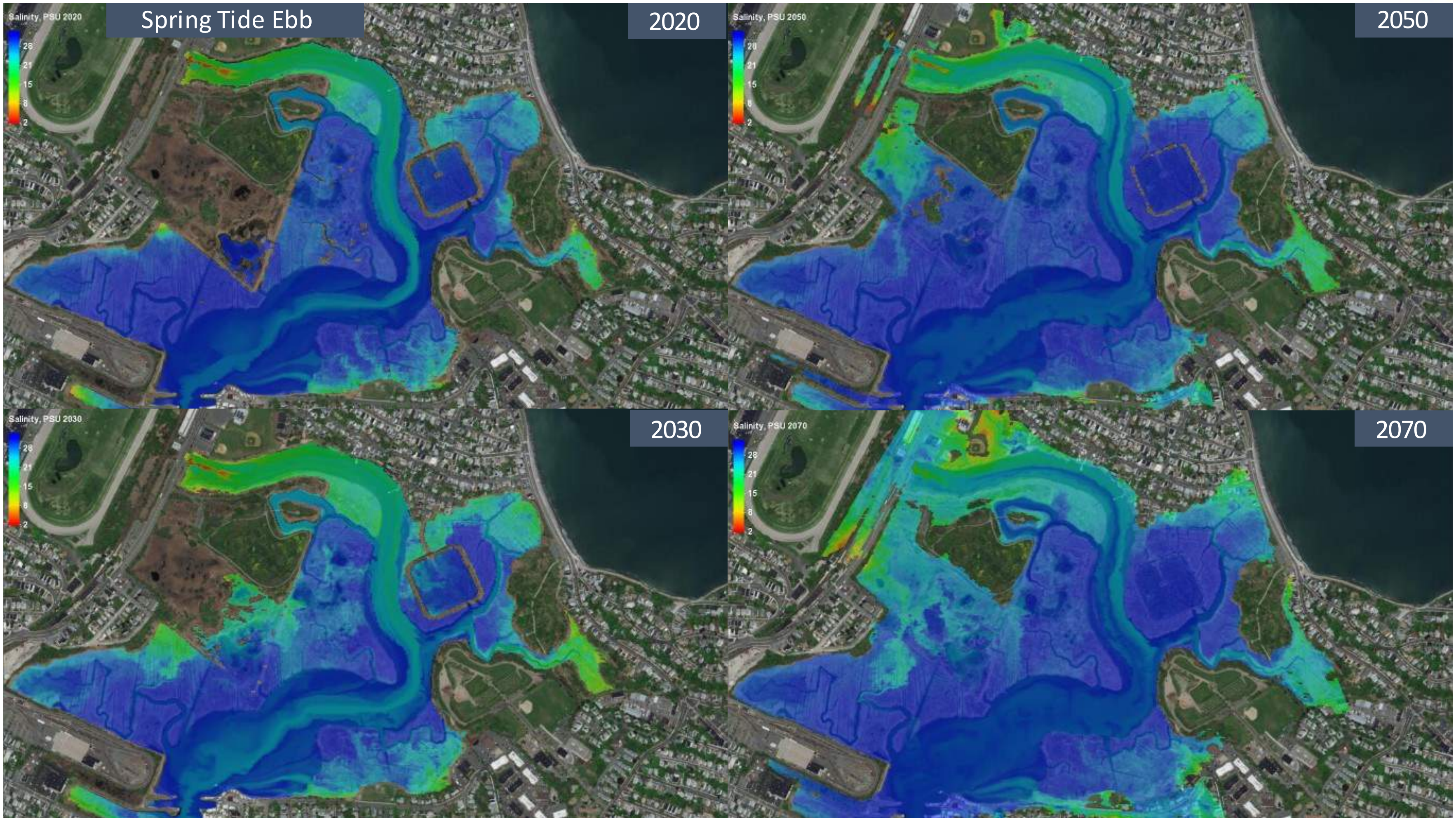


Figure 16. *Salinity distribution during a snapshot of a typical spring tide ebb (three hours after high tide), after a precipitation event, for 2020, 2030, 2050 and 2070.*

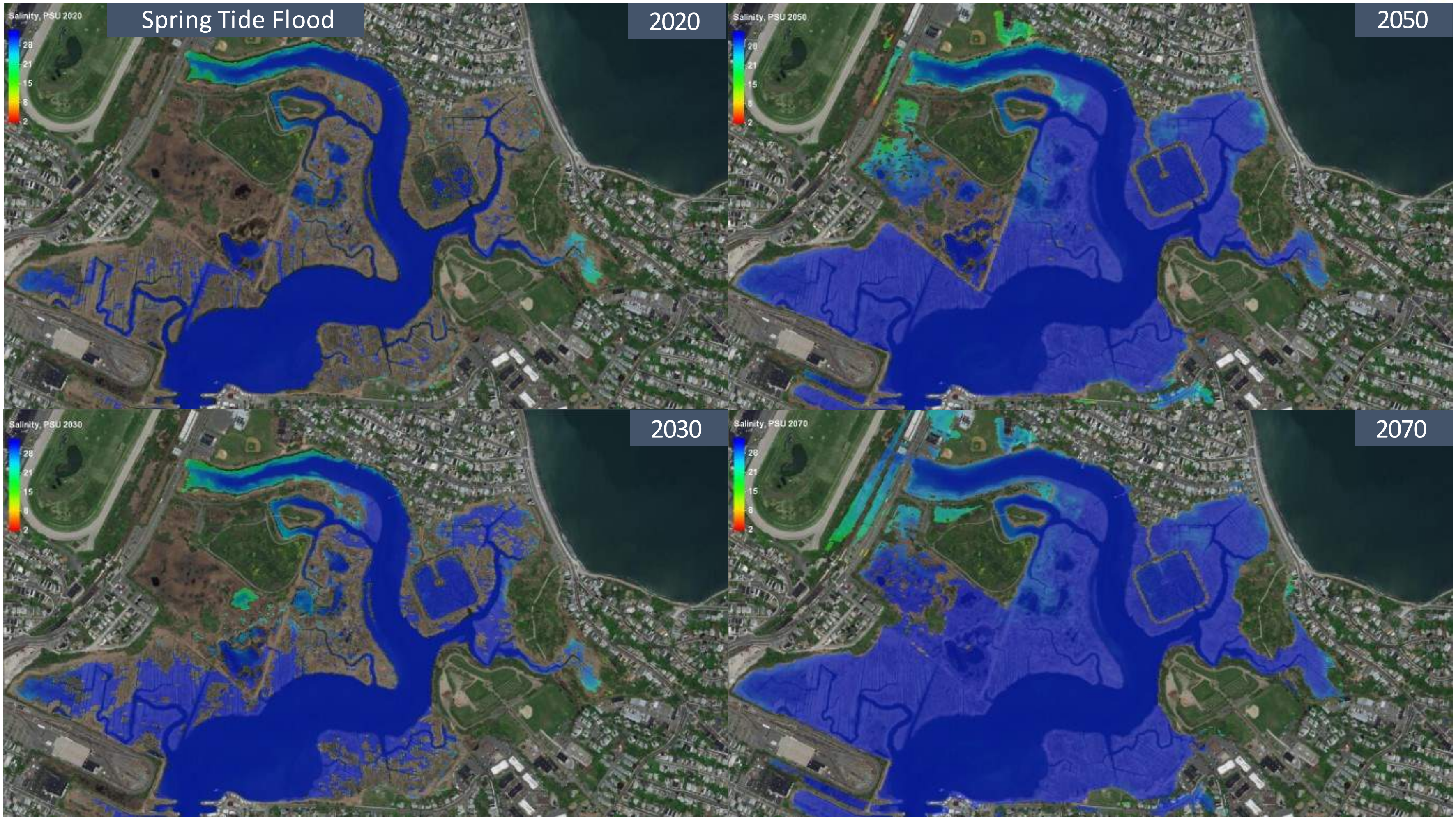


Figure 17. *Salinity distribution during a snapshot of the beginning of a typical mean tide (3 hours after low tide), during a dry-period, for 2020, 2030, 2050 and 2070.*

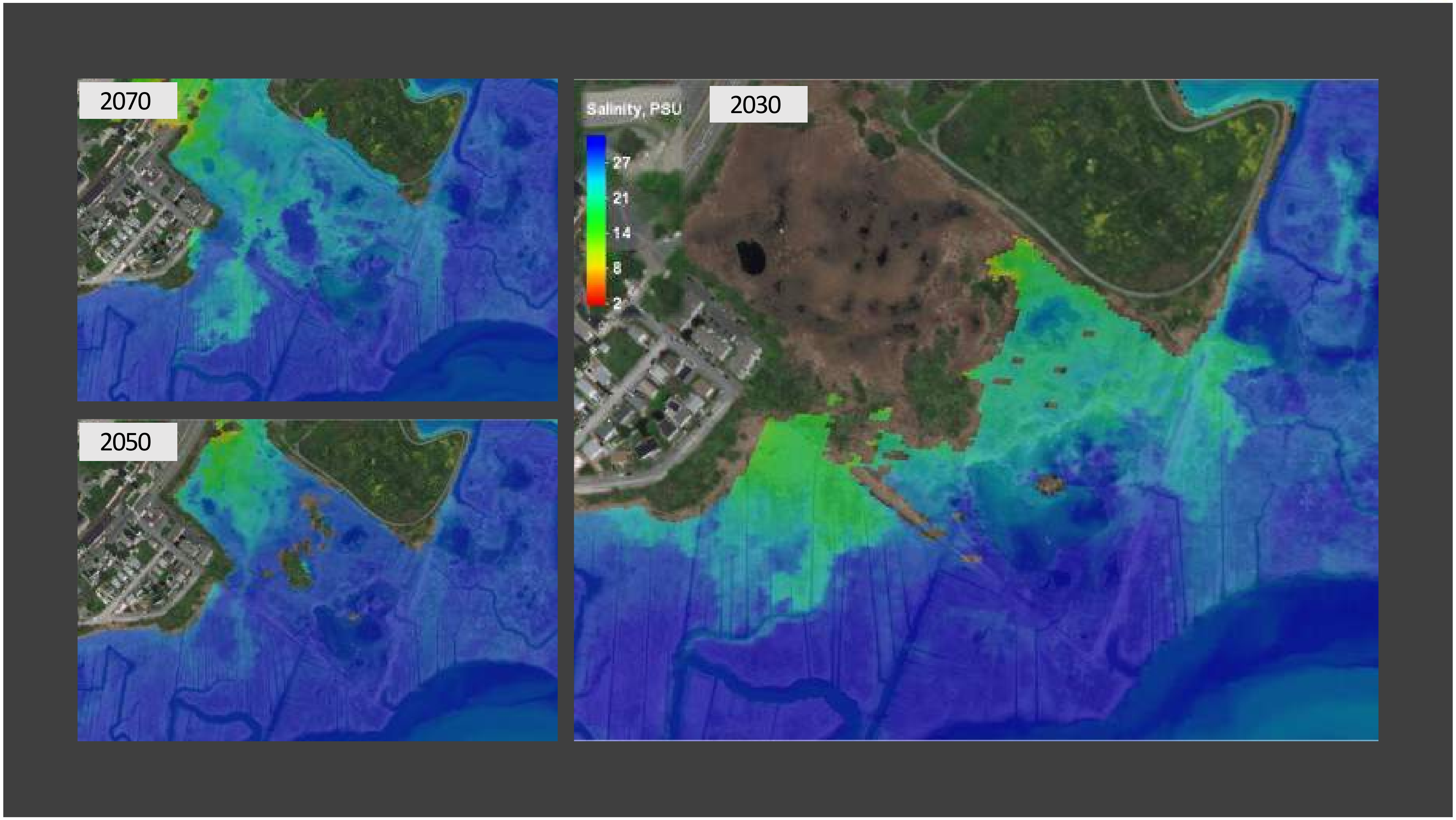


Figure 18. Salinity distribution during a snapshot of a neap tide ebb, zoomed in to the L-Berm for 2030, 2050 and 2070.

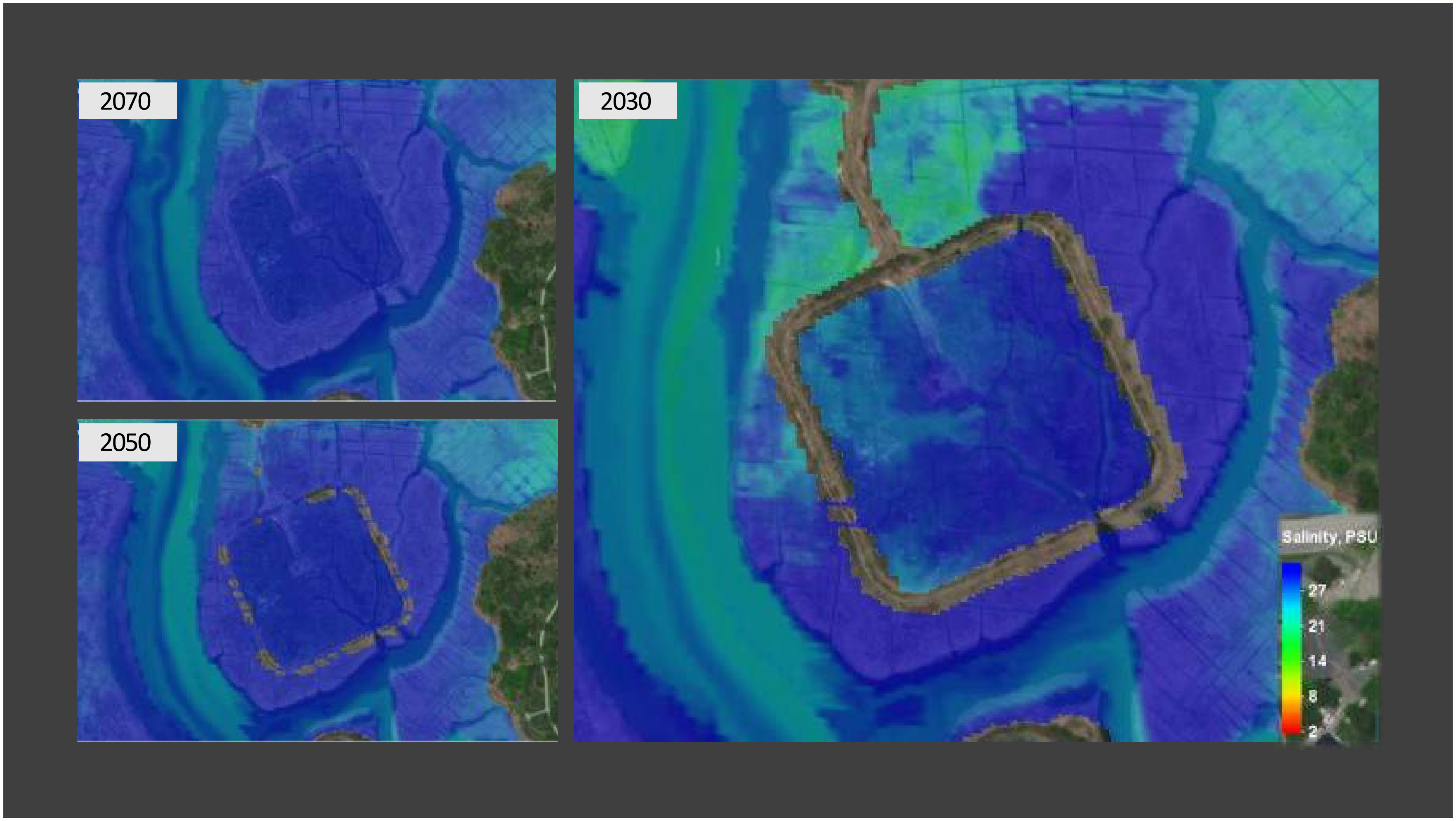


Figure 19. *Salinity distribution during a snapshot of a neap tide ebb, zoomed in to the Key, for 2030, 2050 and 2070T.*

5.3 Tidal Velocities

Tidal velocities within the marsh were found to be highest within the main channel where the channel morphology is constrained by existing or remnant structures including the Saratoga Street Bridge and an area adjacent to the Winthrop boat yard and MBTA Orient Heights railyard which contains deteriorated piles and abutments which used to support a historic rail line. Maximum velocities during spring flood and ebb tides range between 3-4 ft/s in these areas (Figure 20 and Figure 21, respectively). Ebb tidal flows typically exceed flood tidal flows. Within Belle Isle Marsh, the main channel was found to have tidal velocities near 1-2 ft/s. Furthermore, the tidal creeks and bermed areas of Belle Isle Marsh experience low velocity tidal flows less than 1 ft/s. Low tide attenuation and consequently poor drainage is observed throughout tidal creeks, the low marsh plain, and the bermed areas of the L-Berm and the Key. Rosie's Pond, the L-Berm, and the Key retain water at most times, even while tides within the main channel recede. The L-berm and the Key experience partial hydraulic disconnection between the main saltmarsh and the regions behind the berms. Existing breaches in the berms provide hydraulic connection during high and spring tides, which leads to the formation of salt pannes that are affected by spring high tides only and maintain a relatively stable water level.

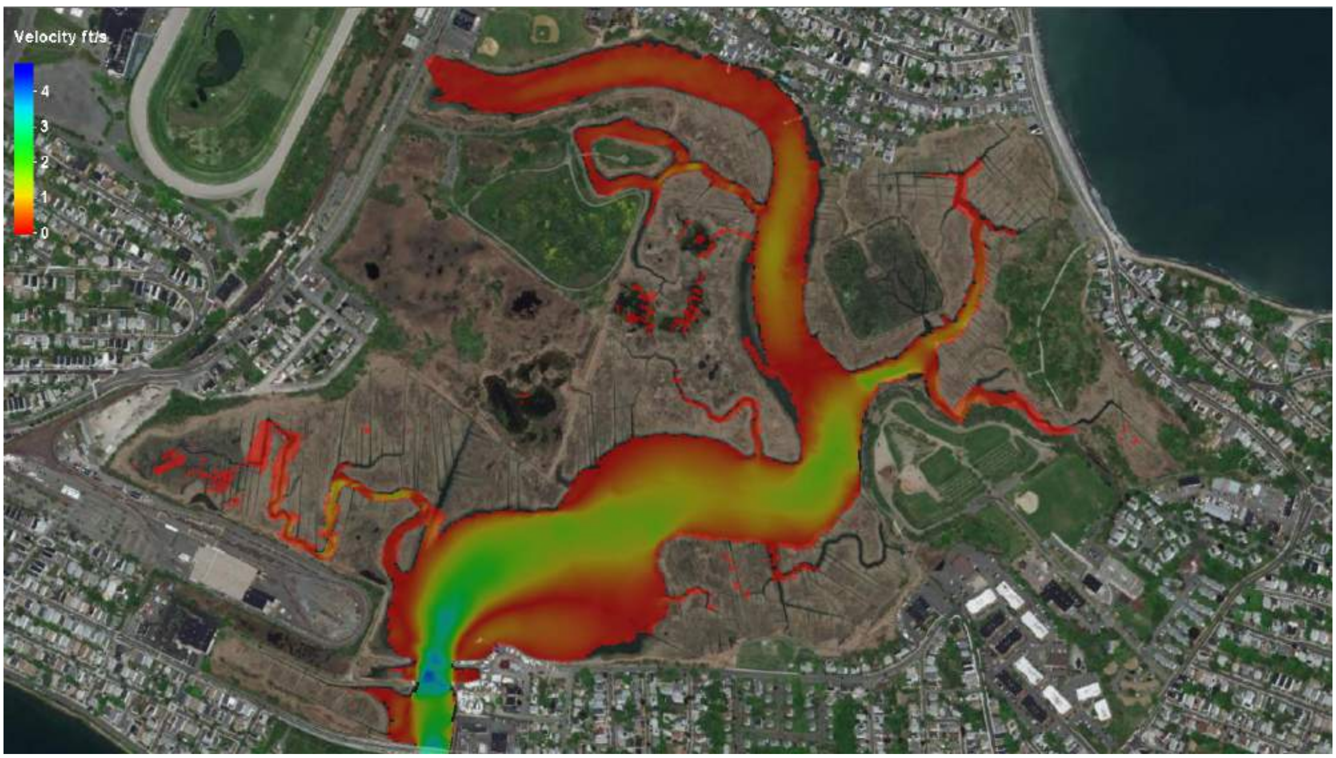


Figure 20. Existing Modeled Velocities, Typical Spring Tide Flood. Velocities are reported in feet/second, with high velocities indicated in blue.

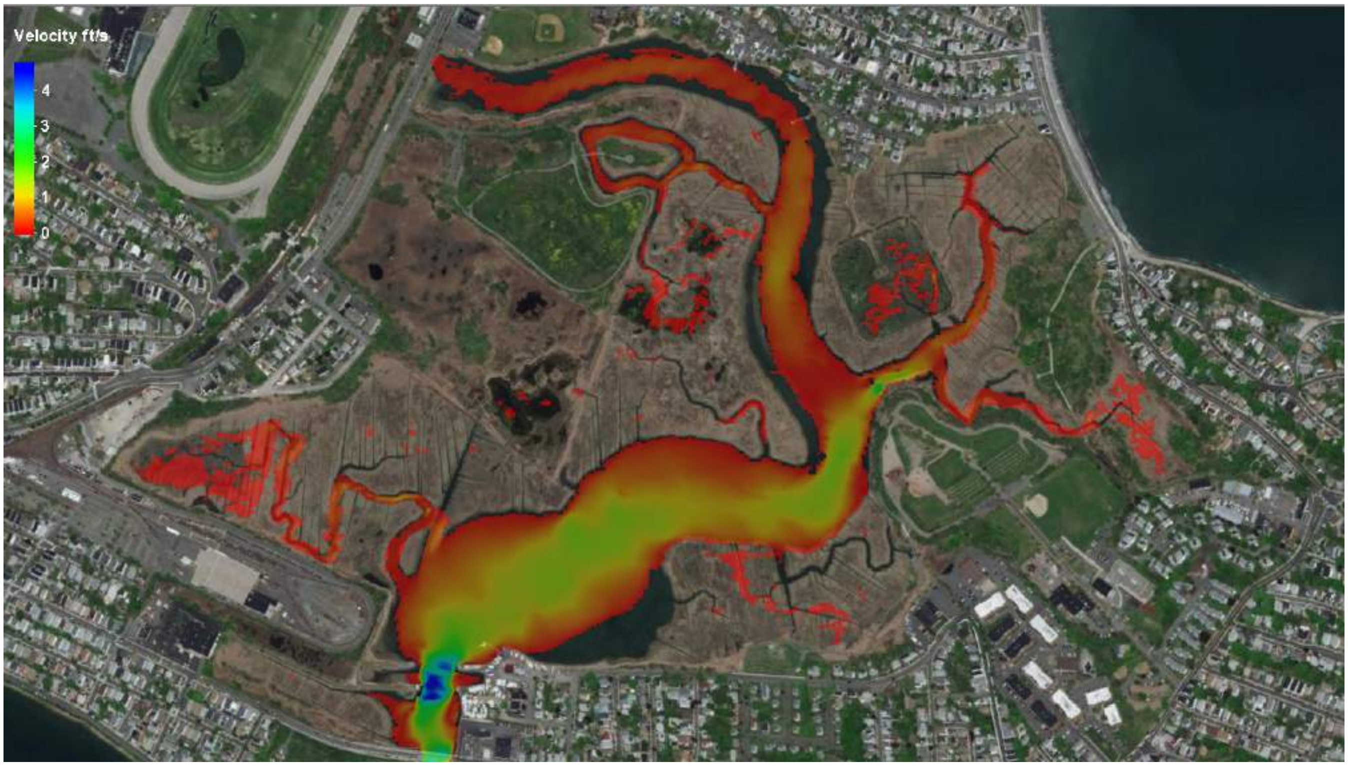


Figure 21. Existing Velocities, typical Spring Tide Ebb. Velocities are reported in feet/second, with high velocities indicated in blue.

6. Restoration Design and Modeling

The EFDC model has been developed and calibrated. A representation of hydrodynamic circulation in the marsh was successfully validated with observations. EFDC was utilized to design and model restoration alternatives. Recommended alternatives were input into the model as a change in the topography, for instance, the creation of a new channel, breaching of a berm, or grading of habitat. Then the model was rerun under these conditions and new water level, velocity, and salinity results were observed to determine if conditions are substantially changed and improved. This section summarizes the restoration goals and alternatives, restoration design, and restoration modeling results.

Sea level rise effect on restoration alternatives was not evaluated. While this can be performed in EFDC, sea level rise effects are better evaluated with the marsh migration model (Woods Hole Group, 2022). Restoration alternatives have been evaluated by this tool, and results will be presented in the final report which synthesizes all tasks of this marsh assessment.

6.1 Restoration Goals and Alternatives

Restoration locations were determined through a series of discussions with the Project Team, including the Mystic River Watershed Association, MA Department of Conservation and Recreation, Friends of Belle Isle Marsh, The Nature Conservancy, and community engagement. Present and future marsh health vulnerabilities were developed alongside discussions of restoration priorities and values. The intersection of vulnerability with priorities and values was used to develop restoration goals, and ultimately restoration alternatives. Restoration goals are summarized below:

- Protect existing resources and marsh health
- Increase marsh resilience in the face of sea level rise
- Increase habitat value for sensitive species, such as saltmarsh sparrow
- Improve water quality
- Restore natural marsh condition
- Address marsh erosion
- Maximize social benefit of Belle Isle Marsh, while minimizing human impact to resources
- Increase carbon sequestration

Through discussions of vulnerability and priorities, three Marsh Management Areas were selected for the focus of this study: Rosie's Pond, L-Berm, and the Key (Figure 22). These three locations are experiencing hydrodynamic constraints resulting in poor drainage, stagnation, oversaturation, and marsh degradation. Table 5 characterized present day vulnerabilities, restoration goals, and a restoration approach at each Management Area. Further details of the establishment of restoration goals and alternatives selection will be provided in the final report.

Figure 22. Selected Marsh Management Areas for restoration design and modeling: Rosie's Pond, L-Berm, and the Key.

Table 5. Key vulnerabilities, restoration goals and restoration approach for selected Marsh Management Areas.

Management Areas	Key Vulnerabilities	Desired Goal	Restoration Approach
West Marsh / Rosie's Pond	A depression within the marsh known as Rosie's Pond has poor tidal and stormwater drainage, resulting in oversaturation of low marsh habitat and resulting degradation. Low tide is not fully observed in the area which increases residence time of nutrients and contaminants and limits habitat diversity. The sparse low marsh vegetation limits sediment capture and elevation of the marsh platform. The primary tidal creek follows mosquito ditches, as opposed to a natural path, resulting in inefficient outgoing tidal and stormwater conveyance. High marsh habitat fringing West Marsh is threatened by coastal squeeze and sea level rise. SLR threatens to convert the marsh to mudflat by 2070.	Revitalize degraded wetland. Enhance tidal and stormwater drainage. Build elevation capital for resilience to sea level rise (i.e., do not let the marsh drown). Create high marsh habitat for marsh migration.	Channel enhancement to increase tidal drainage and exchange. Deepen and widen primary tidal creek to increase tidal penetration back to Rosie's Pond. Use fill material to grade up low marsh, high marsh, and transitional marsh habitat. Plant native vegetation per habitat type.
L-Berm	An artificial berm acts as a barrier to tidal exchange and tidal/stormwater drainage. Poor drainage leads to the expansion of salt pannes, and the degradation of low and high marsh habitat. Oversaturated areas which would be high marsh are converted to low marsh. Poor tidal exchange limits habitat diversity and increases residence time of nutrients and contaminants.	Do not disturb saltmarsh sparrow nesting (i.e. high marsh) and foraging habitat or overwintering owl habitat. Revitalize degraded wetland. Expand high marsh area for saltmarsh sparrow. Enhance tidal exchange and tidal/stormwater drainage. Minimize the expansion of salt pannes with sea level rise.	Restore tidal penetration behind the berm. Partial removal of existing breaches to enhance natural condition and drainage, while protecting existing valuable habitat. Enhance channels through the berm and the bermed area. Under sea level rise, salt panne and high marsh can be preserved through tidal control measures installed at berm breach areas, for example a rudimentary control system like weir boards.

The Key	An artificial berm acts as a barrier to tidal exchange and tidal/stormwater drainage. Poor drainage results in the oversaturation of low marsh habitat and subsequent degradation. The sparse low marsh vegetation limits sediment capture and elevation of the marsh platform. Poor tidal exchange limits habitat diversity and increases residence time of nutrients and contaminants. SLR threatens to convert the marsh to mudflat by 2100.	Revitalize degraded wetland. Enhance tidal exchange and tidal/stormwater drainage. Build elevation capacity for resilience to sea level rise (i.e., do not let the marsh drown). Create high marsh habitat for marsh migration.	Create unrestricted tidal flow and improve drainage by enhancing existing southern breach, breaching the Key berm to the north, and deepening and widening tidal channels within the Key. Import sediment to raise elevation to that of high marsh. Take advantage of the berm to act as a sill which retains fill material. The proposed high marsh habitat is at the low end of its viable elevation range (4.6 ft NAVD88), and is not anticipated to be at risk to vegetation by upland/invasive species such as *Phragmites*.

6.2 Restoration Design

6.2.1 Rosie's Pond

Rosie's Pond currently exists as a "depression" in the saltmarsh at an average elevation of 1.6 ft NAVD88. Vegetation within Rosie's Pond is mostly degraded low marsh with large areas of standing water. The goal of the Rosie's Pond restoration is to dredge a connecting channel between a flooded mosquito ditch network and the center of the pond, branching out in order to deliver tidal water to the area, and drain standing tidal and stormwater. Dredge depths are proposed to -3.2 ft NAVD88. Additionally, healthy low marsh surrounding the pond sits at an elevation of 4.4-4.7 ft NAVD88. Due to the depression in Rosie's Pond being 2.8-3.1 ft lower than the preferred elevation of low marsh and a lack of natural sediment input to the marsh system, filling of the marsh is proposed to allow low marsh habitat to thrive. The restoration design raises the surface of the saltmarsh to the upper elevation of healthy ambient (present-day) low marsh, 4.6 ft NAVD88. This elevation slopes up to an area of fringe high-marsh proposed at an elevation of 5.2 ft NAVD88, which ultimately ties into transitional-upland habitat at 7.2 ft NAVD88. This restoration activity will require roughly 13,000 cubic yards (cy) of fill material to raise Rosie's Pond and expand high marsh habitat. Additionally, restoration aims to dredge roughly 20,000 cy of material for deepening of the primary tidal creek in West Marsh, enhancement of the existing channels, and creation of secondary channels within Rosie's Pond. These volumes were estimated using changes in topobathy between the existing modeling DEM and the designed restoration DEM, presented in Figure 23.

Figure 23. The left panel presents the existing conditions, while the right panel presents the restoration scenario for the Rosie's Pond sub-region of Belle Isle Marsh. Higher regions are presented in orange, brown and yellow, whereas low regions are presented in shades of blue. All elevations are in feet, NAVD88.

6.2.2 L-Berm

The L-Berm is one of the most anthropogenically impacted areas of Belle Isle Marsh. The L-Berm surrounds a region of hydraulic disconnection, and is a tidal barrier for a series of salt pannes and high marsh habitat. Observations and modeling show that the L-Berm acts to trap water, resulting in standing water and expanding salt pannes and low marsh behind the structure. The restoration design for the L-Berm enhances the three main existing breaches in the berm, dredging a channel to -3.2 ft NAVD88 which is the elevation of the mudflat at the edge of the Belle Isle Marsh main channel. Proposed channel enhancement continues behind the L-Berm to areas of poor drainage. The L-Berm dredge areas are proposed to follow existing tidal creeks or mosquito ditches and enhance existing breaches in the man-made berm. Leveraging existing breach areas and low elevation areas is anticipated to benefit the project because it reduces dredge volume and supports the revitalization of habitat types which are struggling to establish in these impacted areas. Furthermore, the enhanced breaches can be adapted under future SLR conditions with weir boards to effectively control water levels behind the L-Berm, allowing salt marsh habitat to persist.

The goal of restoration is to drain the standing water behind the L-Berm, increase the tide range, and halt the expansion of the salt pannes while allowing critical high marsh habitat for saltmarsh sparrow nesting to continue to thrive. This restoration activity will require the excavation/dredging of roughly 52,000 cy of material, mostly surface material in submerged mosquito ditches (existing channels) and at the berm. These volumes were estimated using changes in topobathy between the existing modeling DEM and the designed restoration DEM, presented in Figure 24.

Complete removal of the L-Berm was considered, but was thought to be a heavy-handed approach when the model shows enhancing existing breaches and connecting channels is enough to improve tidal exchange behind the L-Berm. Salt marsh re-establishment within the footprint of the berm is an anticipated result of the proposed restoration. Higher elevation areas currently occupied by phragmites, shrubs, and forest would convert to salt marsh under future SLR conditions, facilitated by the improved tidal exchange of the restoration project.

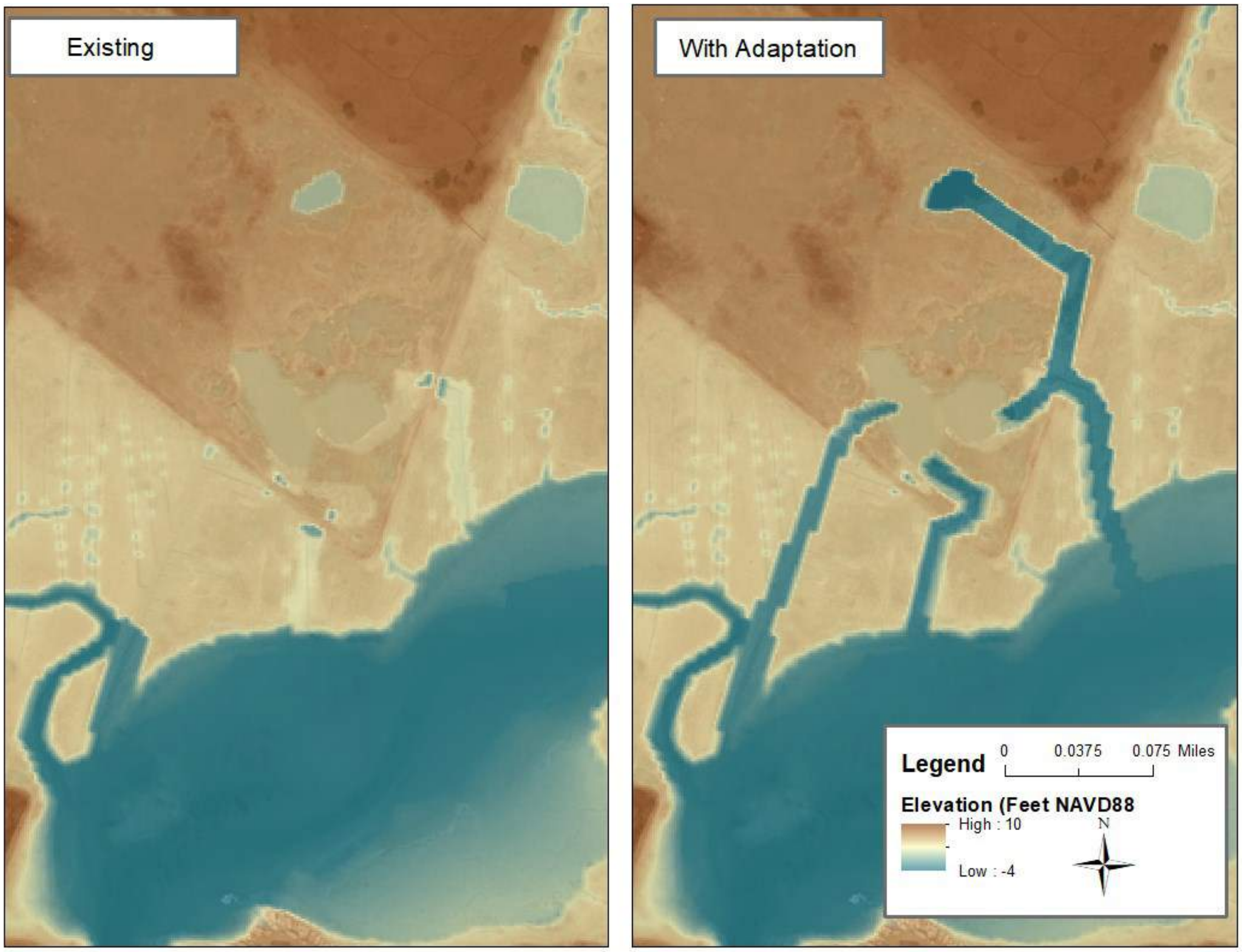


Figure 24. The left panel presents the existing conditions, while the right panel presents the restoration scenario for the L-Berm sub-region of Belle Isle Marsh. Higher regions are presented in orange, brown and yellow, whereas low regions are presented in shades of blue. All elevations are in feet, NAVD88.

6.2.3 The Key

The Key is a small section of Belle Isle Marsh that is experiencing low marsh die off due to a lack of proper drainage via the natural breaches occurring in an anthropogenic berm. Recent breaching by 2018 storms has returned some tidal exchange, improving marsh conditions, but full restoration is still lacking. The goal behind the Key restoration is to increase the tide-range within the Key, eliminating the restriction and creating a transparent tidal signal through the Key breaches. The Key dredge areas are proposed to follow existing tidal creeks or mosquito ditches and enhance existing breaches in the man-made berm. Leveraging existing breach areas and low elevation areas is anticipated to benefit the project because it reduces dredge volume and supports the revitalization of habitat types which are struggling to establish in these impacted areas. Furthermore, the enhanced breaches can be adapted under future SLR conditions with weir boards to effectively control water levels behind the L-Berm, allowing salt marsh habitat to persist. The breaches in the Key are being proposed to be dredged to a depth of -3.2 ft NAVD88, equivalent to the typical mudflat elevation, which through iterative model runs has proven to provide the greatest amount of tidal signal transparency through the breach. Deepening the channels below the grade necessary for appropriate drainage and tidal exchange is not an intention of the proposed restoration. Proposed dredge depths are to accommodate mudflat habitat characteristic of tidal creeks. Future design phases should optimize dredge depths to ensure restoration success while minimizing dredge volumes.

Additionally, the restoration design proposes to raise the surface of the marsh in the Key to an elevation of 4.7 ft NAVD88, which is the elevation of ambient high marsh in the areas surrounding the Key. This will convert the Key into a high marsh "island" protected by the Key berm and isolated from the main park, which aims to attract saltmarsh sparrow and provide protected habitat which is resilient to SLR. This restoration activity will require the removal of roughly 12,000 cy of material, mostly surface material in submerged mosquito ditches (existing channels) and at the berm, and will require roughly 11,000 cy of fill material to raise the surface of the marsh. These volumes were estimated using changes in topobathy between the existing modeling DEM and the designed restoration DEM, presented in Figure 25.

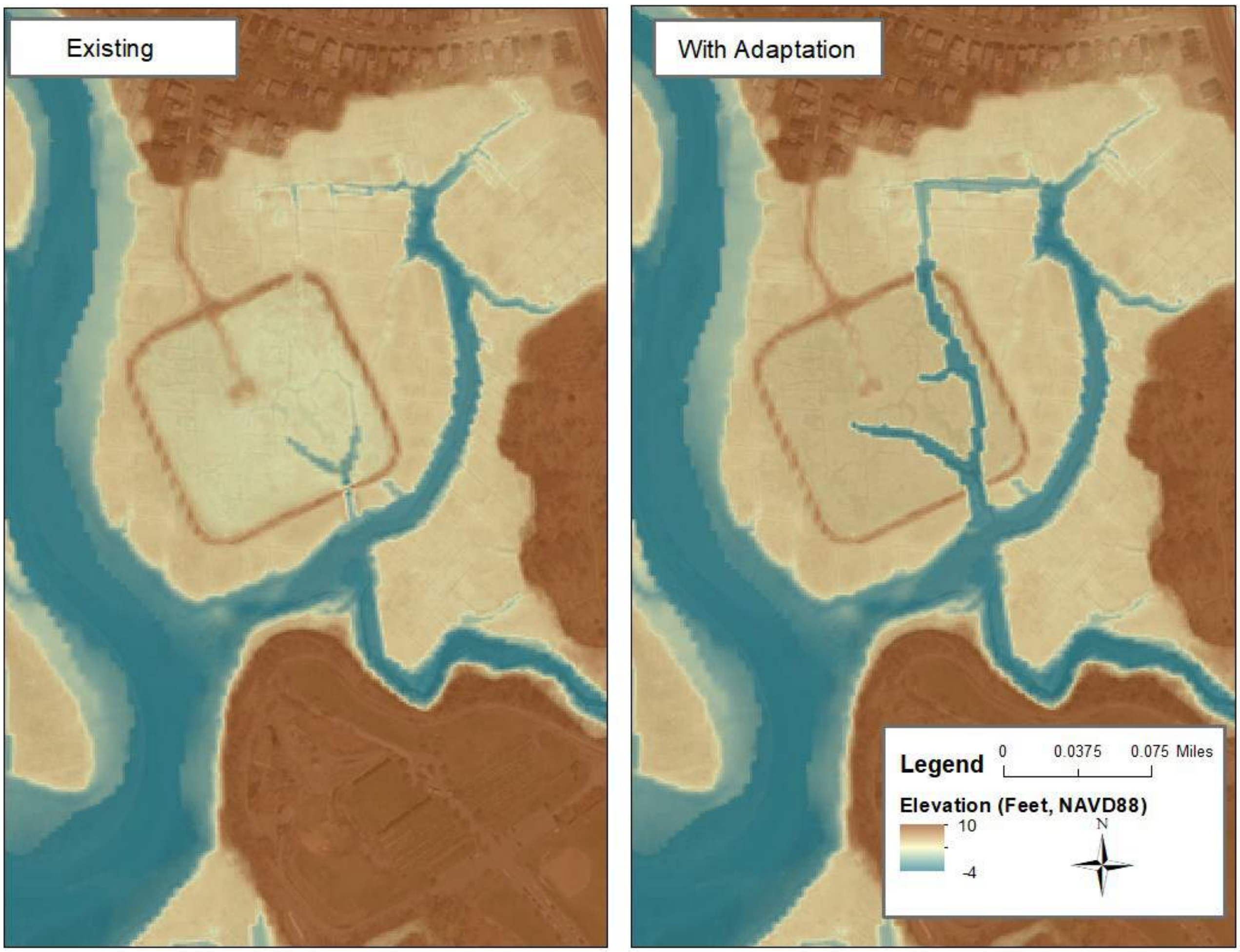


Figure 25. The left panel presents the existing conditions, while the right panel presents the adaptation scenario for the Key sub-region of Belle Isle Marsh. Higher regions are presented in orange, brown and yellow, whereas low regions are presented in shades of blue. All elevations are in feet, NAVD88.

6.3 Restoration Model Results

Restoration modeling was accomplished by applying each of the design elevations to the existing EFDC grid and completing simulations under a present-day spring tide cycle to note changes in circulation, flushing and minimum/maximum water surface elevations. The grid was divided into three sub-sections (Rosie's Pond, the L-Berm, and the Key) of the marsh for simulation and post-processing analysis. Hydraulic modeling results for the proposed restoration were analyzed for conditions representing immediate post-construction, assuming a no sea level rise scenario. The following sections describe the results of each of the modeling simulations.

6.3.1 Rosie's Pond

Rosie's Pond exists as a shallow depression in the marsh where water collects, and therefore contains degraded saltmarsh vegetation. Marsh migration modeling indicates that this section of Belle Isle Marsh is vulnerable to transitioning to mudflat by the year 2070 due to large pockets of low-lying marsh and standing water that exist today (Woods Hole Group, 2022). The Rosie's Pond restoration features a raised marsh and a dredged channel through the center of the newly elevated marsh habitat.

Observed water levels in the depression is ~4 ft NAVD88, while the marsh elevation sits at 1.6 ft NAVD88, indicating that over 2 ft of stagnant water is common in Rosie's Pond. The limited tide range of existing conditions shows tidal attenuation and dampening of the lowest tides. The high tide is able to fully propagate across Rosie's Pond, however, during the outgoing (ebb) tide, drainage of the low marsh plain through tidal creeks is not efficient enough to completely drain the marsh platform. Before drainage from the upper marsh can be completed, the next incoming (flood) tide arrives and begins the cycle over. Restoration design model results indicate that the tidal range in the area of proposed new channels can be increased from 2.5 ft today, to approximately 9 ft under restoration conditions (Figure 26). Restoration results show a near full tidal prism as compared to Boston Harbor; the limited tidal range difference (<0.5 ft) represents limited tidal muting. The proposed project significantly reduces tidal muting and improves circulation in the Rosie's Pond area compared to existing conditions. Furthermore, the full suite of marsh habitats (subtidal, mudflat, low marsh, high marsh, and transitional marsh) require varying inundation frequencies and elevations to establish. Therefore, creating a greater range of tidal elevations by filling, grading, and dredging creates greater habitat diversity.

Water surface elevation results were extracted at a point on the proposed low marsh area which today exists as a shallow depression with standing water, typical of Rosie's Pond (Figure 27). Existing water surface elevations compared to the saltmarsh elevations exhibit standing water of up to approximately 2.5 ft at low tide during the spring tidal cycle. Under proposed conditions, water surface elevations compared to the saltmarsh elevation indicate no standing water during low tides in the spring cycle. This indicates that sufficient drainage can be restored, reversing the negative impacts of standing water, and supporting the expansion of low marsh habitat.

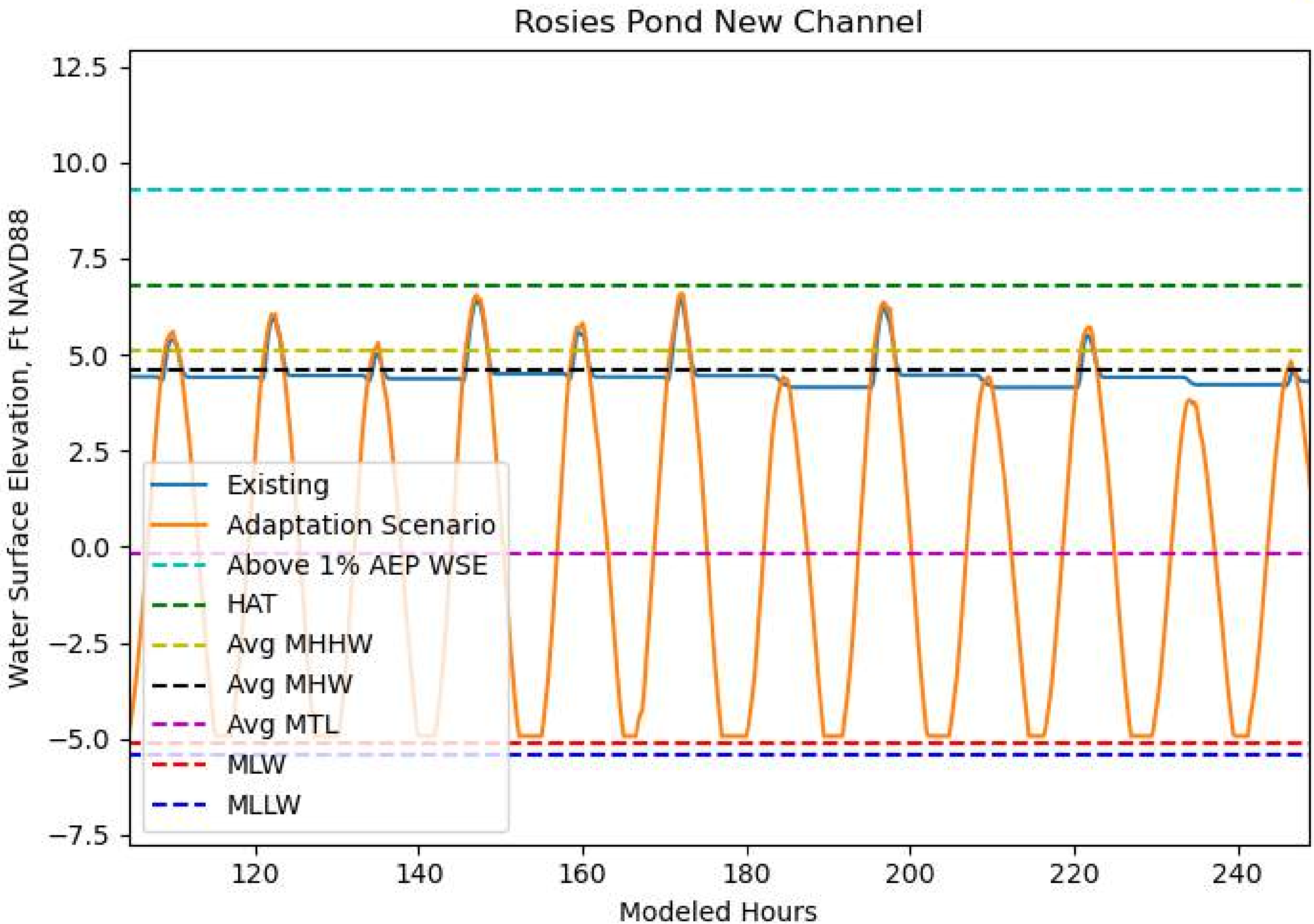


Figure 26. Water surface elevation at today's Rosie's Pond (Existing), and the proposed new channel (Adaptation Scenario). Tidal datums are included as horizontal lines for reference. Results demonstrate that the tidal range is improved from <2.5 ft to up to approximately 9.5 ft under the same conditions.

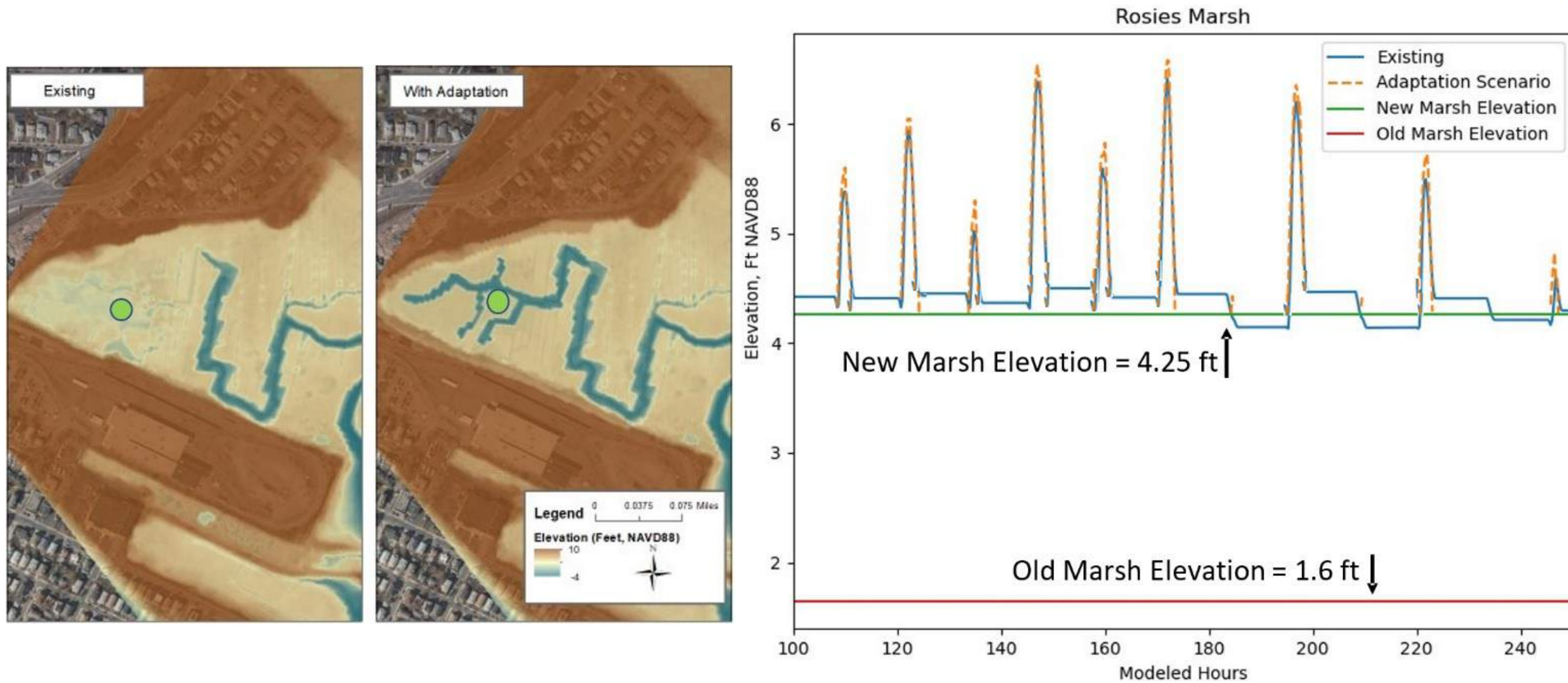


Figure 27. The left panel presents the existing and adaptation scenario for the Rosie's Pond sub-region of Belle Isle Marsh. The right panel presents critical elevations in the marsh, including the New Marsh elevation (green), Old Marsh elevation (red) and the water surface elevation time-series for the existing and adaptation scenarios.

6.3.2 L-Berm

The L-Berm supports high marsh habitat for nesting saltmarsh sparrow which is inundated only by the spring tide. Low marsh habitat behind the L-Berm sits at a higher elevation than the low marsh platforms characteristic of the rest of Belle Isle Marsh; this is a result of poor drainage and oversaturation. Furthermore, the salt pannes behind the L-Berm provide critical habitat for foraging birds and small fish. However, these regions are experiencing expansion due to increased inundation by sea level rise and the inability to properly drain due to the restricting presence of the L-Berm, and are encroaching on high marsh nesting habitat. The only tides that reach the salt pannes are the highest of the spring tides. Salt panne expansion may result from one or two causes: 1 – in the winter, salt pannes have resident water which freezes and expands and expands the salt panned; increasing the tidal prism will help minimize freezing, and 2 – in the summer, salt pannes which do not flush develop higher concentrations of sulfide and salinity due to evaporation, and the resulting water quality kills saltmarsh vegetation; flushing salt pannes can limit this process.

Water Levels

In the marsh, the restoration goal of improving tidal drainage and stormwater conveyance aims to reduce the presence of stagnant water, with the intent to allow low marsh to naturally evolve into high marsh. In the location of the proposed new channel to the northeast, present day tidal range is limited to 2.5 ft, with the low end limited by the elevation of existing marsh. The tidal range of the proposed channel is approximately 9.5 ft (Figure 28). The L-Berm is overtopped in sections during spring high tides, and existing breaches cannot efficiently drain the overtopped water during the outgoing (ebb) tide before the next incoming (flood) tide arrives repeats the cycle. Restoration modeling results show a nearly full tidal prism as compared to Boston Harbor; the limited tidal range difference (<0.5 ft) represents limited muting of the low tides. Since the full suite of marsh habitats (subtidal, mudflat, low marsh, high marsh, and transitional marsh) require varying inundation frequencies and elevations to establish, creating a greater range of tidal elevations by grading/dredging creates an opportunity for greater habitat diversity.

In the salt pannes, the water surface elevation is determined by the L-Berm breaches which keep the water surface at roughly 5.6 ft NAVD88, with slow drainage between high tides. A restoration goal was not to fully drain the salt pannes, which may provide important foraging habitat and marine breeding grounds, but allow for sufficient drainage to minimize the expansion of the salt pannes. The new channel elevations that control water to and from the L-Berm allow the salt pannes to drain, but do not allow them to drain completely, due to the elevations surrounding the salt pannes that supports the ponding that exists today. Existing conditions maintain approximately 1.5 ft of standing water level in the salt panne during a spring low tide, while proposed restoration conditions reduce standing water depths to at or below <0.5 ft during a spring low tide (Figure 29). The restoration design involves opening the channels to allow for future phase adaptations. A future phase adaptation could be to control these channel breaches in the L-Berm with a control structure, such as a weir, to regulate the water levels under future storm and SLR scenarios.

Residence Time

A healthy level and frequency of tidal exchange is needed behind the L-Berm in order to enhance drainage and water quality. Regular surface water replacement due to tidal flushing is important in maintaining healthy salinity, sulfide, dissolved oxygen, and runoff pollutant concentrations. No water quality data of the salt pannes was available for this study, however observed salt panned expansion is an indicator of potential poor water quality and need for improved flushing. It is important to note that salt marshes do provide an ecological function of taking up nutrients and pollutants, and flushing a salt panne may be seen as losing this benefit. However, limiting salt panne expansion and enhancing habitat quality will support vegetation growth and peat development, which improve the ability for marshes to attenuate pollutants.

The performance of a sub-estuary, such as the hydraulically disconnected L-Berm region, at replacing its water (i.e., flushing) can be determined by tracking a numerical tracer, either a numerical dye (diffusive contaminant) or Lagrangian particle (a parcel of water with non-diffusive properties) and analyzing the results. For this study, a particle/chemical tracer, referred to as a numerical dye, was modeled and tracked using EFDC. The initial numerical dye tracer location is presented in Figure 30 in the left panel. The concentration of the dye was set at an initial condition of 100 mg/l and was allowed to diffuse over time during a spring tidal cycle, which represents the time-period with the highest rates of flushing for the system. The results indicate that in the existing condition, the L-Berm region is restricted in its ability to replace water tidally, due to the lack of drainage provided by the breaches in the L-Berm. In the existing condition, the L-Berm reaches a "fully flushed" state (37% of initial concentration) at 48 hours after the initial numerical dye injection (Figure 30, right panel, blue line). Therefore, if a pollutant were spilled into the L-Berm's salt pannes, it would take two days during a spring tidal cycle for this system to be fully flushed. Keeping in mind that only the highest of the spring tides reach the L-Berm's salt pannes as of current, the concentration decay rate during a neap cycle would be far slower. In comparison, the L-Berm flushing time under restoration conditions is roughly 10 hours, or 1/5th of the existing condition (Figure 30, right panel, green dotted line).

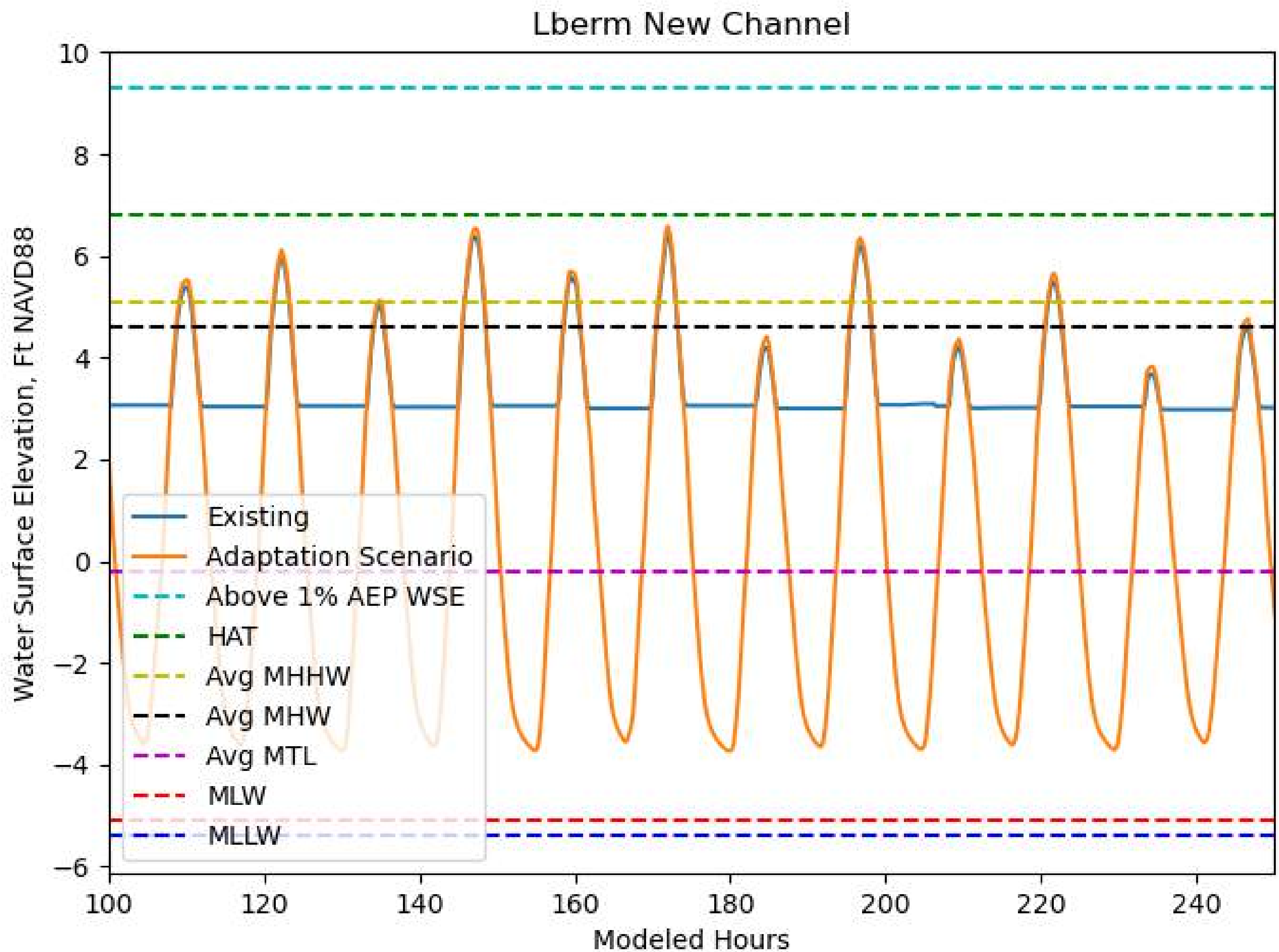


Figure 28. Water surface elevation behind today's L-Berm (Existing), and the proposed new channel (Adaptation Scenario). Tidal datums are included as horizontal lines for reference. Results demonstrate that the tidal range is improved from 2.5 ft to up to approximately 9.5 ft under the same conditions.

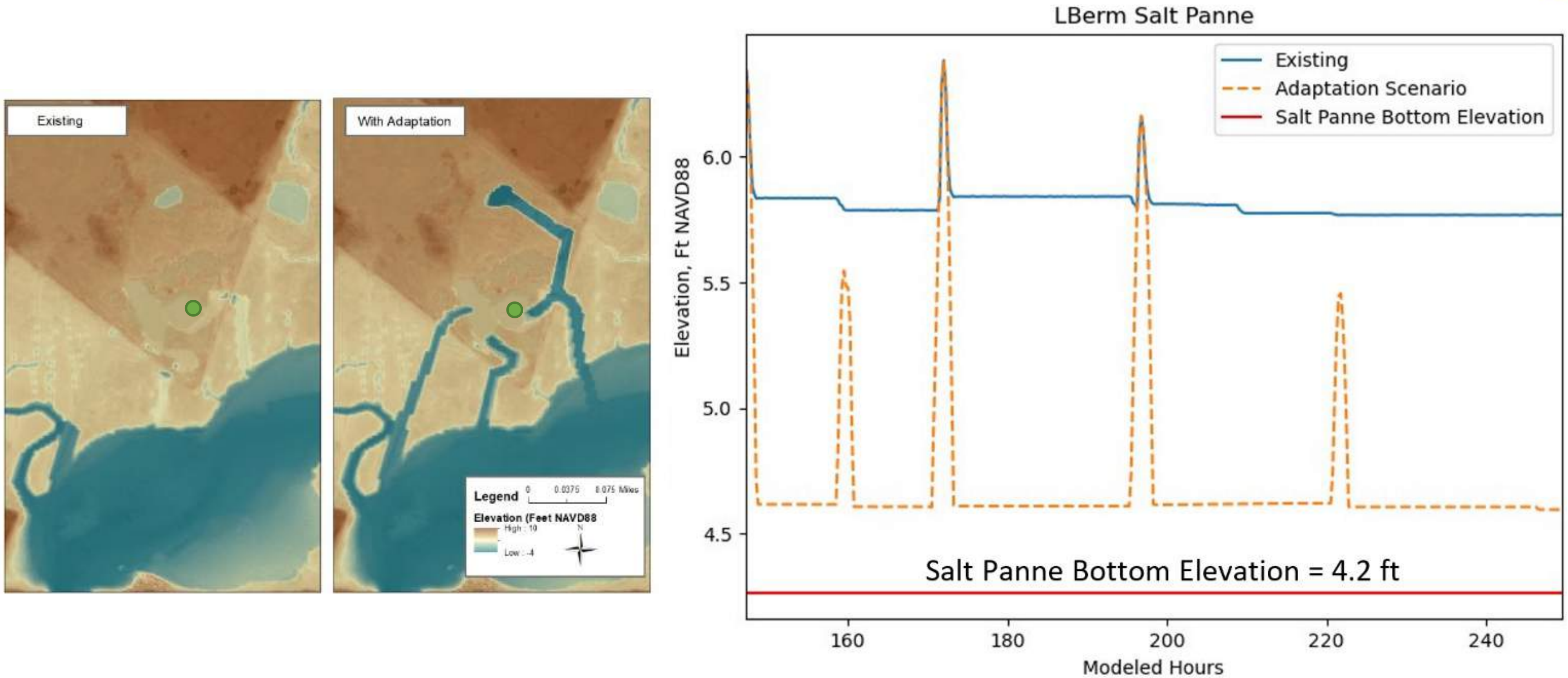


Figure 29. The left panel presents the existing and adaptation scenario for the Rosie's Pond sub-region of Belle Isle Marsh. The right panel presents critical elevations in the marsh, including the New Marsh elevation (green), Old Marsh elevation (red) and the water surface elevation time-series for the existing and adaptation scenarios.

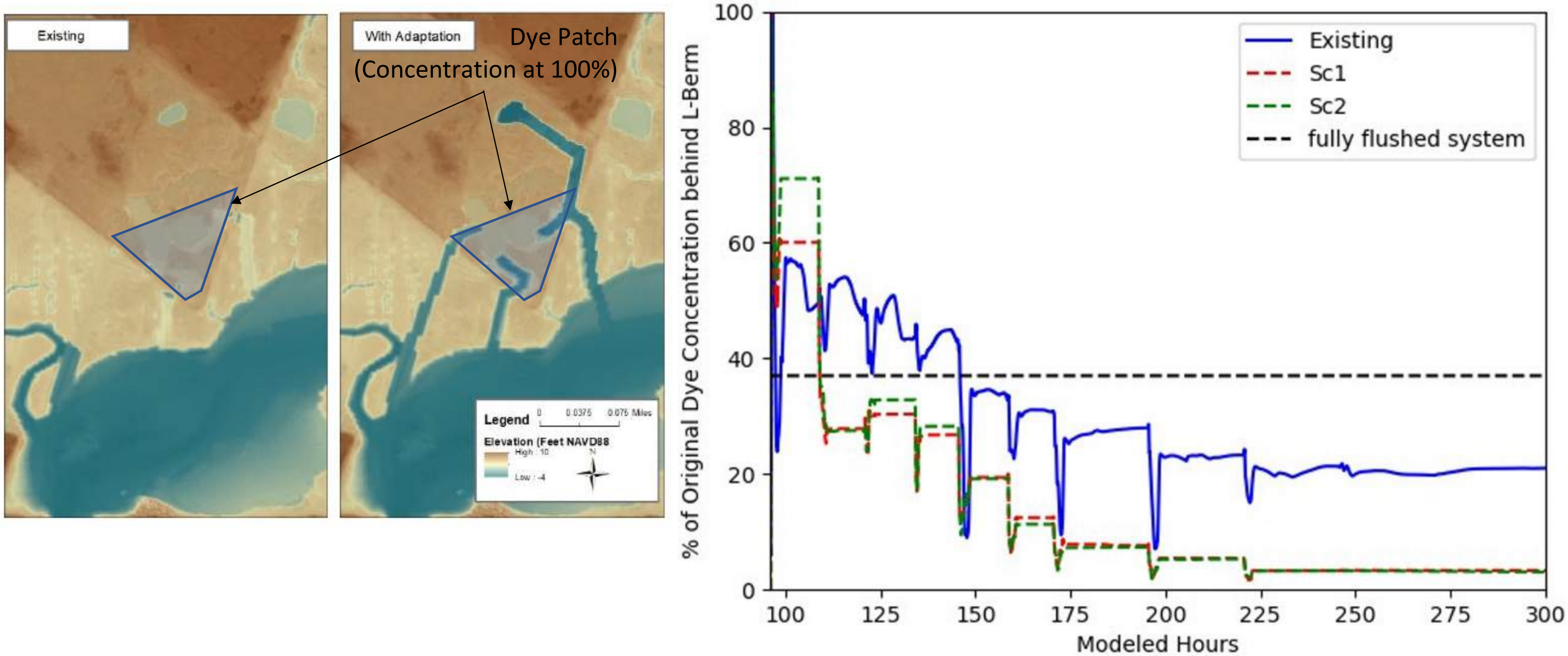


Figure 30. Evolution of a numerical dye patch modeled in EFDC. The left panel represents the location of the dye patch (considered a contaminant) in the numerical model, while the right panel represents the decay over time for the Existing condition (blue) and the adaptation scenarios (red, green dotted lines). The black dotted line represents the concentration of dye left in the system after it reaches a "fully flushed" state (37% of initial concentration). Note that the red dotted line is also presented as "Scenario 1," which represented an initial restoration design with shallower channels. The shallower channels did not produce ideal results for water levels, and therefore "Scenario 2" was developed to achieve hydraulic goals.

6.3.3 The Key

The Key currently exists as a bermed region of the marsh, with the berm acting as a tidal restriction. Two existing breaches in the Key's berm have allowed tides to infiltrate the low marsh with restricted, slow drainage. Water surface level results for the Key shows a concave slope in the water surface elevation signal, indicating slow drainage as compared to the main channel (Figure 31). The water level within the Key channels only falls to above 2.5 ft NAVD88 during the modeled spring low tide, while the tidal creek within the Key nears 1.5 ft NAVD88. The goal of the Key restoration design is two-fold. The first goal with restoration activity is to improve the tidal drainage and exchange between the Key and the main channel in order to promote the health of the marsh, and the second goal is to raise the surface of the Key to an elevation of healthy high marsh habitat.

To achieve hydraulic goals, care was taken to ensure that the entrance channel that connects the inside of the Key through the breach was deep enough to allow for an unrestricted low tide exchange with quicker drainage, as compared to today's low tide attenuation and slow drainage. Restoration design promotes a large exchange of tides, demonstrated by the increased tide range and accelerated drainage compared to the existing conditions (Figure 32). This indicates that sufficient drainage can be restored, reversing the negative impacts of standing water, and supporting the health of marsh habitat. Furthermore, Figure 33 presents the water surface elevations for the Key channel both inside of the Key and just to the outside of the entrance under restoration conditions. The water surface elevations are very similar, indicating that dredging the entrance channel to the Key in the restoration at a depth of -3.2 feet NAVD88 is sufficient to create unrestricted tides.

Restoration proposes to raise the Key by approximately 2 ft, close to the MHHW line, to support high marsh habitat (Figure 34). By creating high marsh habitat and increasing tidal range, the full suite of marsh habitats (subtidal, mudflat, low marsh, high marsh, and transitional marsh) is established. Additionally, the proposed project significantly reduces tidal muting and improves circulation in the Key area compared to existing conditions.

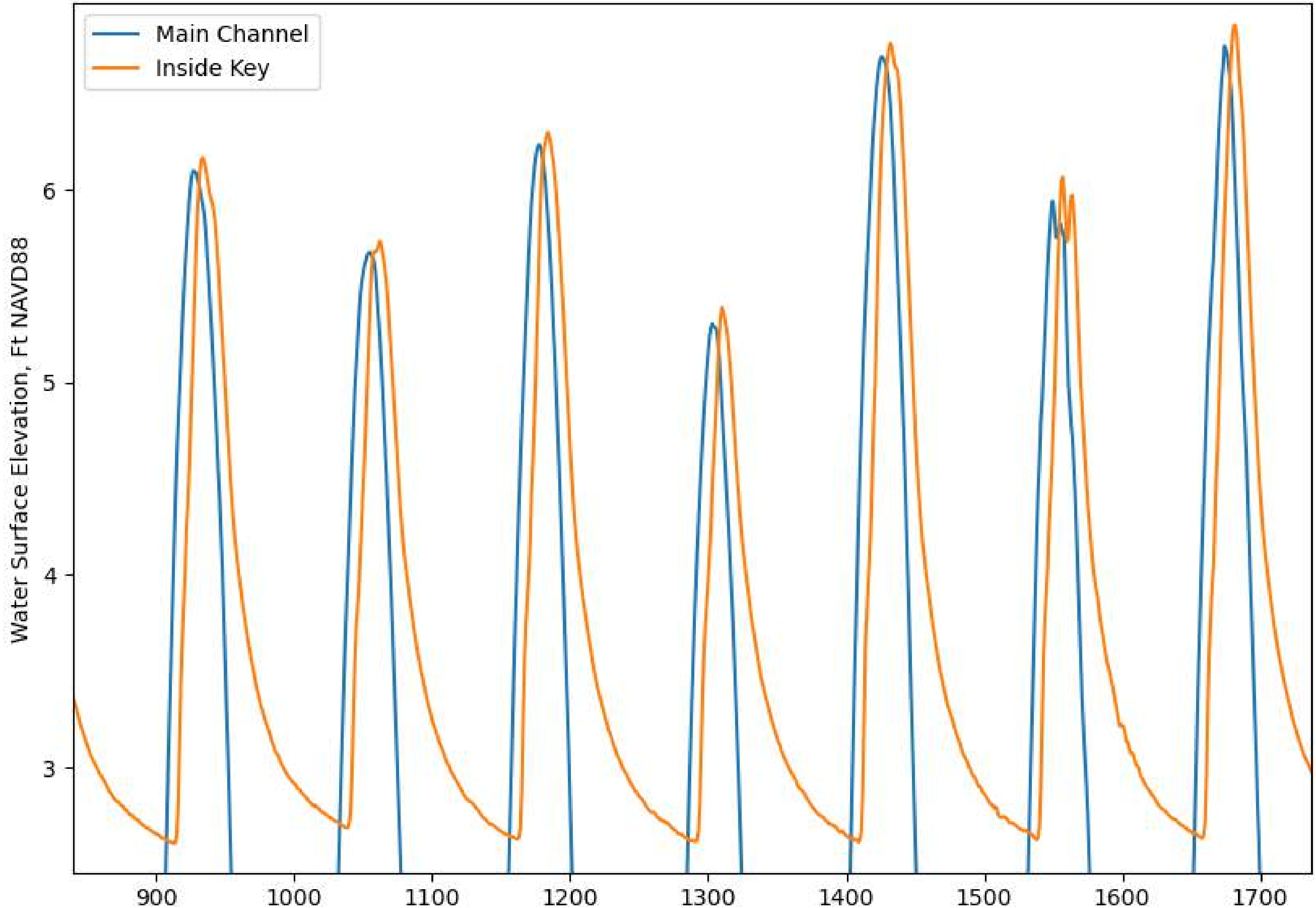


Figure 31. Water surface elevation data for the existing condition, in the main channel outside of the Key (BI1) and the data taken inside the Key (BI2). The x-axis is model time in 24 hour time (i.e., 900 = 9AM, 1000 = 10AM, etc.).

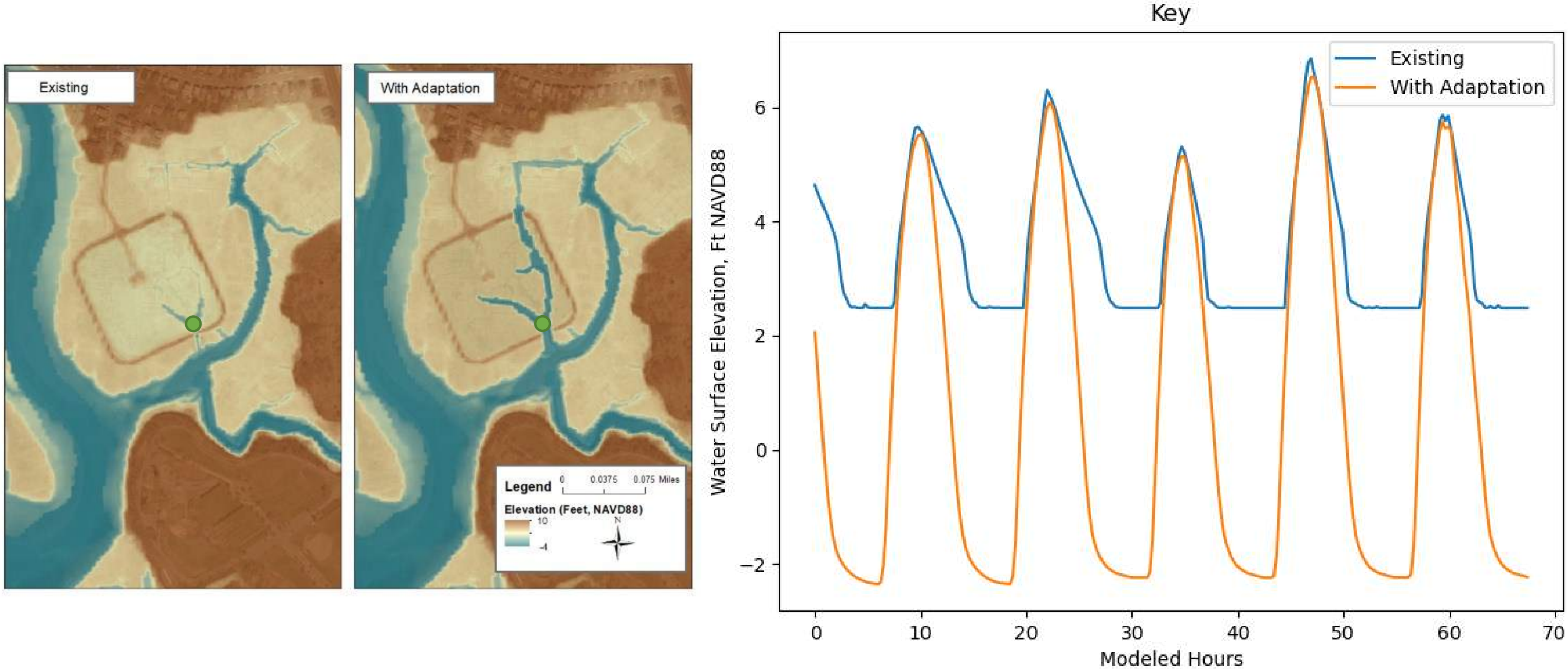


Figure 32. The left panel presents the existing and adaptation scenario for the Key sub-region of Belle Isle Marsh. The right panel presents water surface elevation data within the Key for existing and proposed conditions.

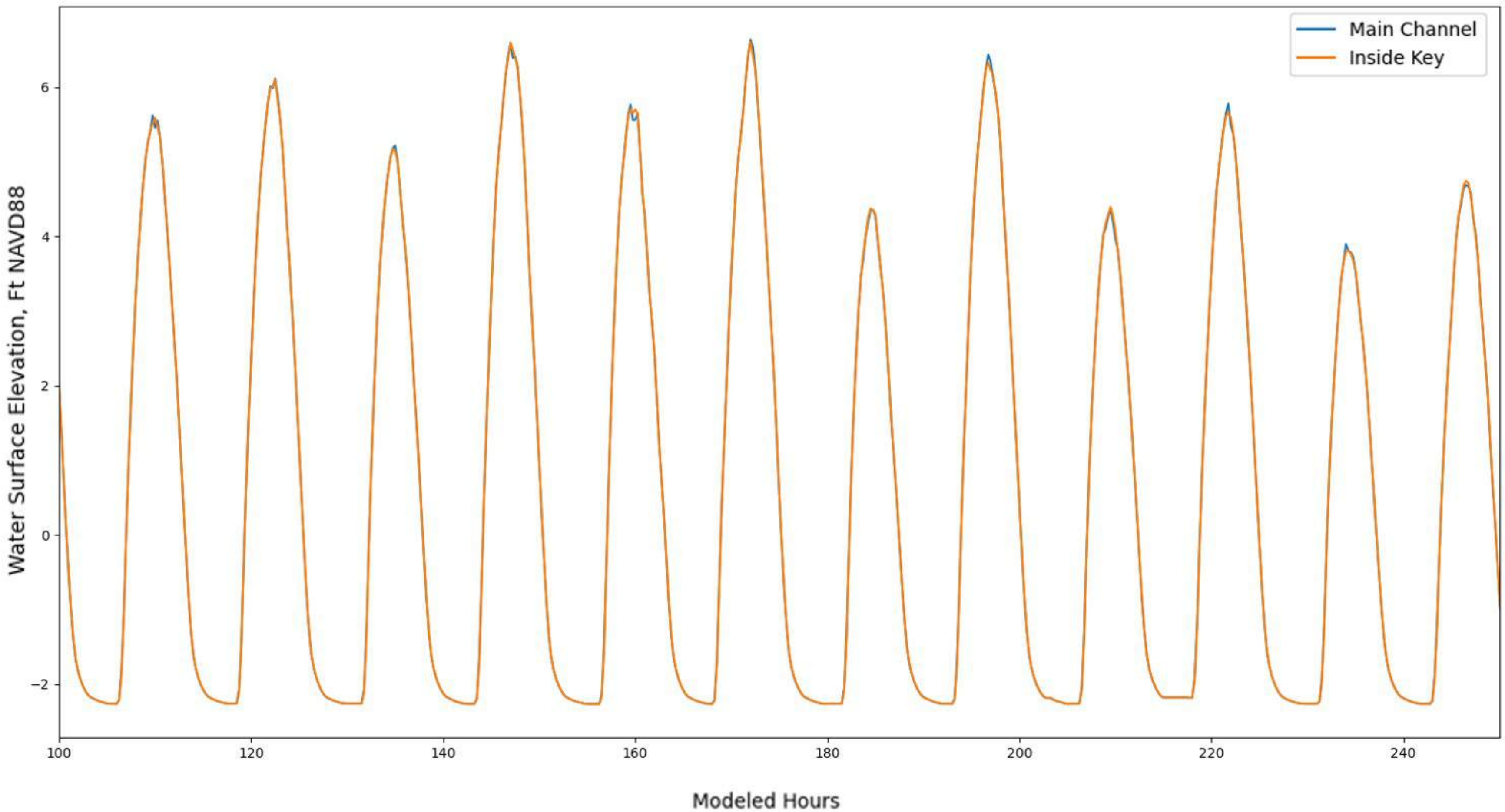


Figure 33. Water surface level results for restoration design of the Key at two locations: one outside of the Key (in the main channel) and one inside the Key (at the location of observation point BI2).

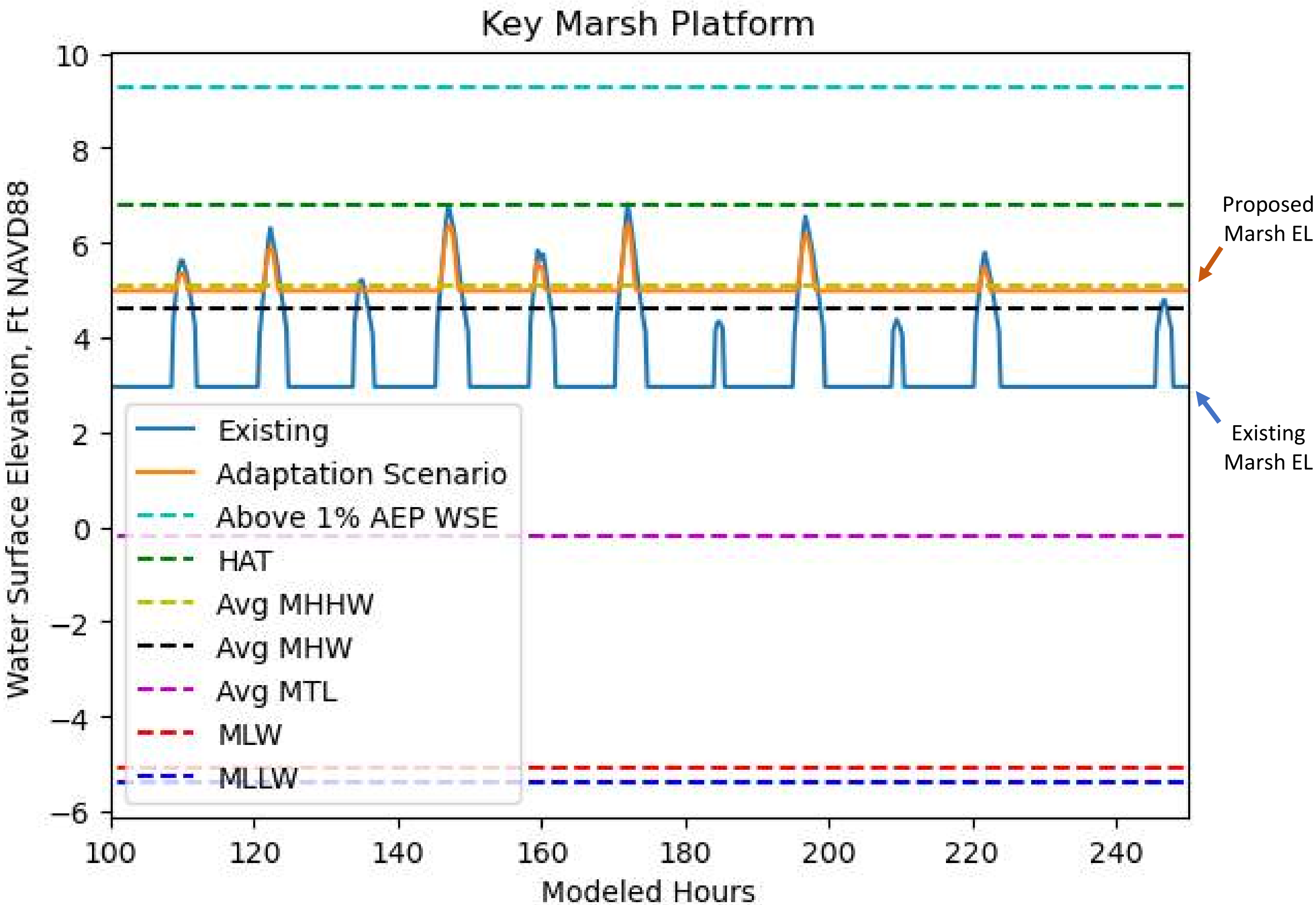


Figure 34. Water surface elevation behind the Key (Existing), and in the proposed new marsh (Adaptation Scenario). Tidal datums are included as horizontal lines for reference. Results demonstrate that the new marsh surface is just below the MHHW level in the Key, providing evidence that high marsh vegetation may be able to sustain at the new elevation.

6.4 Vegetation Fate Based on Percent (%) Inundation

Tidal inundation frequency analyses were performed with hydraulic modeling results. Inundation frequency is presented here as the percentage of tidal cycles within a spring/neap cycle that the tidal water level reaches a certain elevation. It is an important factor for habitat design and distribution because saltmarsh vegetation becomes established at particular inundation frequencies. The percentage of high tides in a full spring/neap tidal cycle that wet areas throughout the marsh under existing and restoration scenario modeling simulations is presented in Figure 35 and Figure 36, respectively. Areas with the lightest greens/yellows represent areas that are only inundated by seawater during spring tidal cycles and storms. Areas with the darkest blues and greens are inundated by tides on more of a regular basis, with the darkest blue representing tidal inundation 100% of the time (subtidal). The percentage of tides that reach a given area can be helpful in determining the types of vegetation that could survive in given regions of the marsh. Habitat distribution of existing and restoration conditions based solely on elevation is depicted in Figure 37. It is important to note that the L-Berm is characterized as high marsh in terms of elevation, but supports a wide extent of low marsh vegetation. This, along with model results, is an indication of poor tidal drainage and oversaturation of the L-Berm area. This poor drainage increases the wetting period of high marsh, and converts vegetation types to that of low marsh.

In the existing conditions, Rosie's Pond and the Key are inundated by 80-99% of tides. This limits the ability for low marsh vegetation to survive in these regions. These areas would mostly likely convert to mudflat with greater inundation, as was confirmed in the sea level rise assessment (Woods Hole Group, 2022). The proposed restoration in these same regions reduces daily inundation occurrences to approximately 25% (for the Key) and 55% (for Rosie's Pond) of high tides, which is a target for the survival of healthy high marsh (Key) and healthy low marsh (Rosie's Pond). Results for the L-Berm do not show significant change beyond the proposed channels. This indicates that existing low and high marsh areas will remain. Restoration intends not to impact existing saltmarsh sparrow habitat. However, the improved drainage of the low marsh and salt panne areas is intended to improve stagnation and water quality concerns, and aims to slow salt panne expansion and support high marsh expansion. It is anticipated that low marsh habitat which borders on high marsh will convert to high marsh and consequently increase viable saltmarsh sparrow nesting habitat as a result of the improved drainage conditions. In general, this project proposes creating a greater range of tides and elevations at all three sites by grading and dredging to improve tidal exchange and stormwater flows, and provide greater habitat health and diversity.

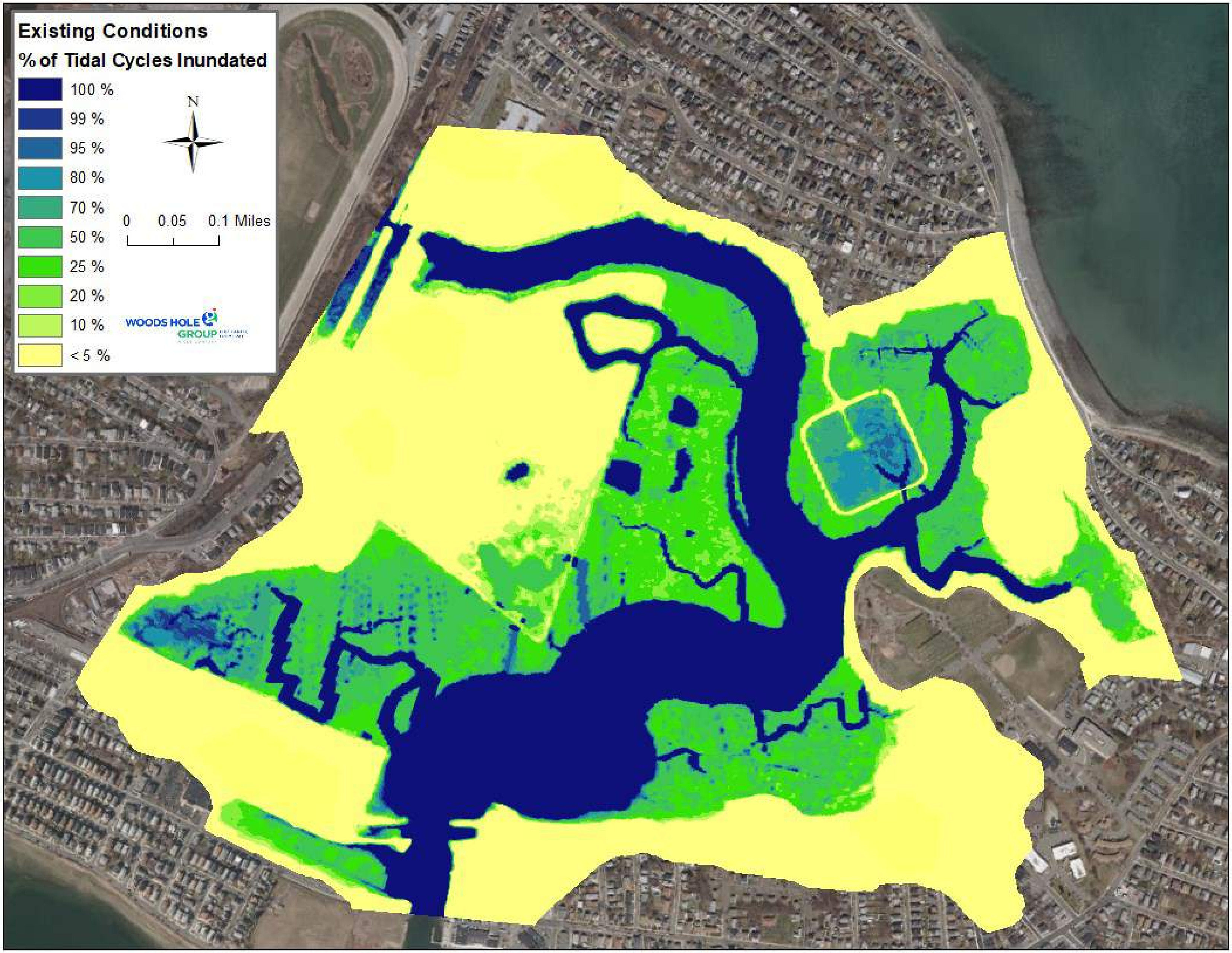


Figure 35. The percentage of high tides that reach specific locations of the Marsh for the existing condition scenario. Higher percentages of high tides are presented in blues and greens, whereas lower percentages of high tides are presented in light greens and yellows.

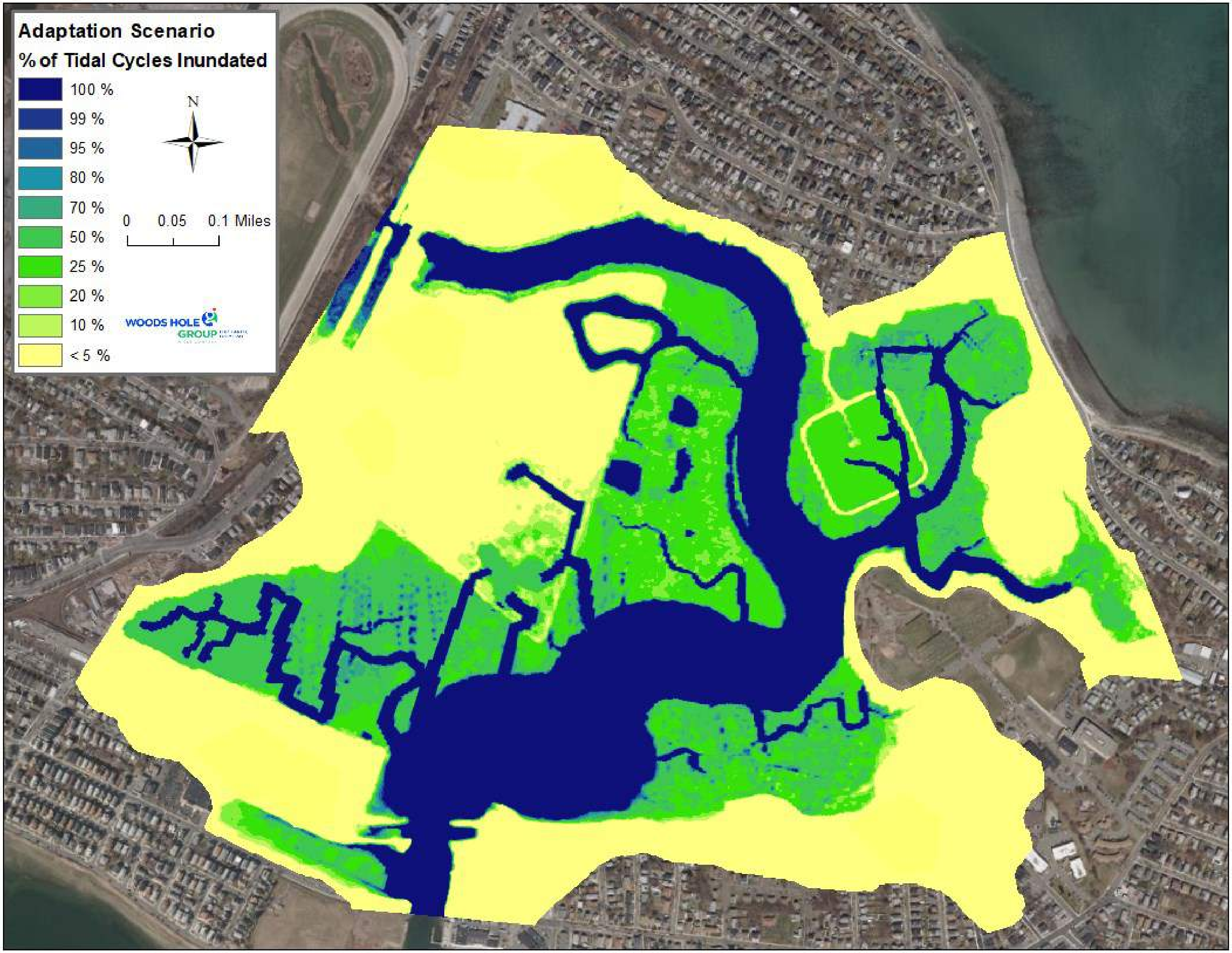


Figure 36. The percentage of high tides that reach specific locations of the Marsh for the adaptation scenario. Higher percentages of high tides are presented in blues and greens, whereas lower percentages of high tides are presented in light greens and yellows

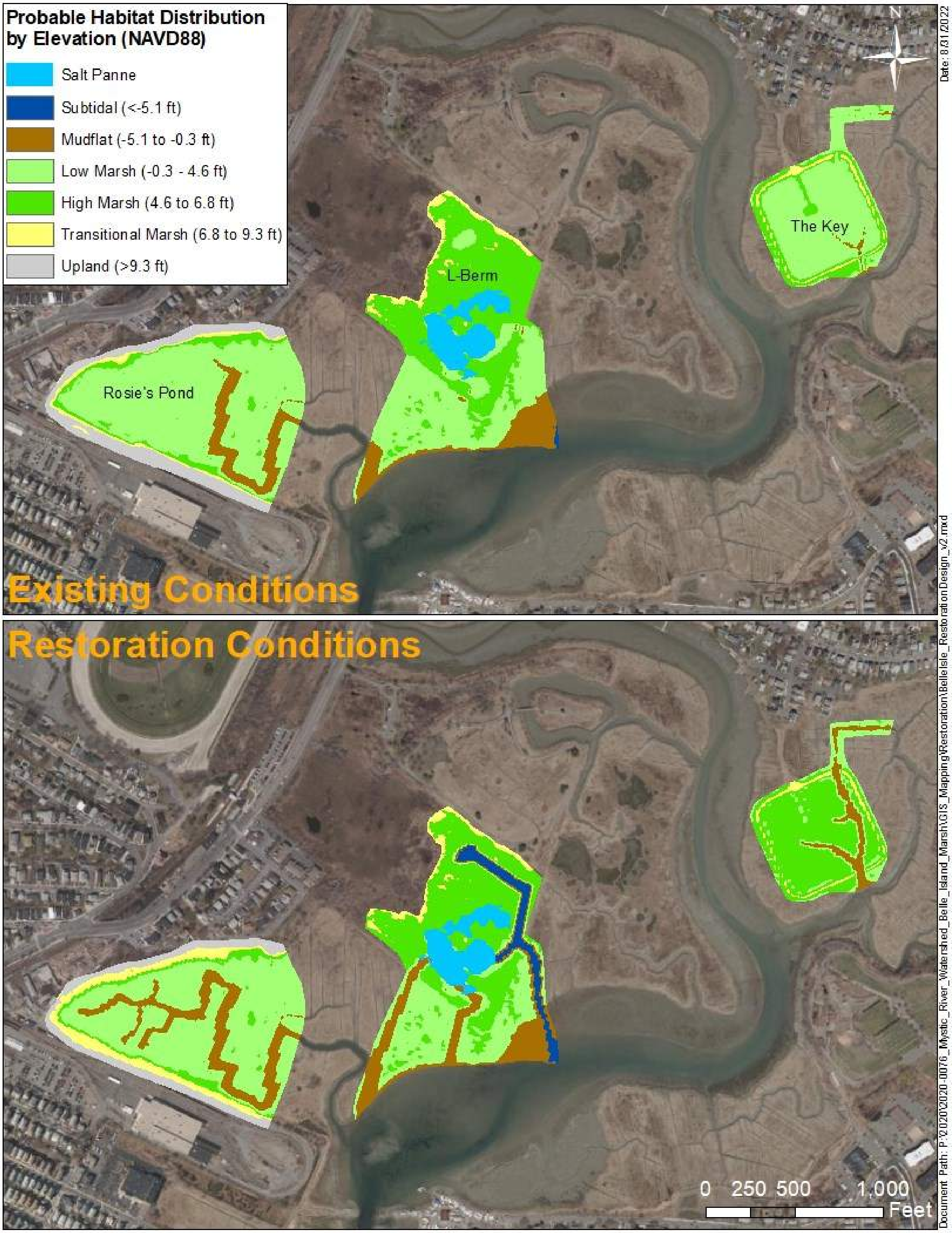


Figure 37. Habitat distribution based on elevations of existing and restored conditions. Note that in actuality, the L-Berm is occupied by significant low marsh area because of poor drainage.

7. Summary and Conclusions

Belle Isle Marsh is a highly anthropogenically influenced system that sits between three major Boston metropolitan municipalities. The following hydrodynamic stressors that affect this salt marsh were characterized by modeling analysis:

- Freshwater input from the Sales Creek tide gate.
- Restricted tidal drainage and circulation in secondary channels, depressions (Rosie's Pond), and behind anthropogenic berms (L-Berm and the Key).
- Sea level rise and an increase in the amount of ocean water entering the system through the inlet.

Other known stressors not evaluated in this memo include:

- Surface water pollution from the surrounding development.
- A restriction to sediment supply due to a tide-gate restriction at the northern apex of the salt marsh. Additionally, sediment inputs from Boston Harbor remain an unknown.
- Limited transitional and upland habitat between marsh and development. This coastal squeeze leads towards loss of marsh acreage with sea level rise. This was evaluated in the marsh migration memo (Woods Hole Group, 2022).

From the simulations of the existing conditions for Belle Isle Marsh, key results include:

- Belle Isle Marsh is predominantly forced by the ocean water entering at the southern inlet. This is emphasized by the fact that the marsh is relatively saline during high tides, and the high tides are able to efficiently propagate throughout the system.
- There is a single, predominant fresh-water source at the apex of the salt marsh, from a tide gate connecting the marsh to the Suffolk Downs region. This tide gate opens once per tidal cycle, and causes variability in the salinity. This variability is present throughout all projected sea level rise scenarios (through year 2070), however the freshwater signal is significantly flushed by the ebb tide, and weakens with increasing sea level rise scenarios.
- Low tide attenuation is common across tidal creeks/low marsh platforms, marsh depressions (Rosie's Pond), and bermed areas. The L-Berm and the Key experience partial hydraulic disconnection between the main saltmarsh and the regions behind man-made berms. Existing breaches in the berms provide hydraulic connection during high and spring tides, which leads to the formation of salt marsh pannes that are affected by spring high tides only and maintain a relatively stable water level. Tidal drainage from depressions and bermed areas is slow during ebb tide, and the returning flood tide returns to the system before these areas are sufficiently drained.
- Water velocities play an important role in sediment transport, and high ebb velocities can help to limit sediment deposition in the main channel or inlet. Velocities and sediment deposition were not found to be of critical concern within the marsh. Water velocities within the main channel found to be typical of a marsh system. Future restoration design phases should utilize velocity data to specify design criteria to promote marsh edge stabilization.

Based on the results of existing conditions modeling, as well as literature review (Woods Hole Group, 2021a), data collection (Woods Hole Group, 2021b), marsh migration modeling (Woods Hole Group, 2022), and stakeholder collaboration, three restoration alternatives were designed and modeled to advance restoration and adaptation goals. Poor drainage of tidal water, loss of saltmarsh sparrow habitat, and SLR resilience in the three focus areas are the critical drivers for proposed restoration. Stormwater conveyance is included in the discussion because the constricted channels/berms affect its drainage, but stormwater is less of a primary driver for restoration than tidal drainage. Proposed restoration involves dredging (cut) and grading (fill) the marsh. Cut and fill volumes across the three sites have to potential to be balanced, eliminating the need for importing/exporting material. Sediment analysis and engineering design will be required to determine the permitting and construction feasibility of this. Restoration results include:

- **Rosie's Pond:** Rosie's Pond is proposed to be filled with marsh material and raised to the elevation of low marsh, while the outer fringes of the marsh are proposed to be raised to the elevation of high marsh. Due to the depression in Rosie's Pond being 2.8-3.1 ft lower than the preferred elevation of low marsh and a lack of natural sediment input to the marsh system, filling of the marsh is proposed to allow low marsh habitat to thrive, while peripheral areas are proposed to support marsh migration. Existing and new tidal creeks are proposed to be dredged to increase tidal exchange and tidal/stormwater drainage from Rosie's Pond. Tidal hydraulic model results show that restoration achieves such goals, reducing stagnant water, improving flushing and consequently water quality, and creating an array of marsh habitats which are inundated at an optimal frequency for survival.
- **L-Berm:** The L-Berm is proposed to be breached in three areas where minor breaches exist. Tidal channels are proposed through these breaches to extend to salt pannes and through low marsh habitat, increasing tidal exchange and tidal/stormwater drainage. Tidal hydraulic model results show that restoration achieves such goals, improving the drainage through the L-Berm which today impounds water once it is overtopped by high tide. Flushing of salt pannes is anticipated to be improved by 80%, improving water quality and hopefully reducing salt panne expansion. High marsh habitat is proposed to remain, while low marsh habitat is given the opportunity to naturally convert to high marsh under improved drainage conditions. The breached berms can be adaptively managed with weir boards to control water levels under future SLR scenarios.
- **The Key:** The Key is proposed to be filled with marsh material and raised to the elevation of high marsh. Tidal channels are proposed through two existing breaches, both of which will be significantly enhanced to create unrestricted tides between the Key and the main channel of Belle Isle Marsh. Existing and new tidal creeks are designed to increase tidal exchange and tidal/stormwater drainage. Tidal hydraulic model results show that restoration achieves such goals, reducing stagnant water, improving flushing and consequently water quality, and creating an isolated high marsh area which could support saltmarsh sparrow nest sites. The breached berms can be adaptively managed with weir boards to control water levels under future SLR scenarios.

The project team - which includes DCR, Mystic River Watershed Association, Friends of Belle Isle Marsh, and The Nature Conservancy - was instrumental in fundraising to secure resources for an environmental inventory, modeling, and restoration assessment. While Mystic River Watershed Association provided support on project management, DCR was and remains the landowner, primary steward, and ultimate decision maker on any work done in Belle Isle Marsh. All members of the project team intend to continue to provide support as needed moving forward.

8. References:

Ambrose, Robert B., John F. Paul, and James L. Martin. 1990. Technical guidance manual for performing waste load allocations.

Bosma et al. 2021. Assessing the vulnerability of MassDOT's coastal transportation systems to future sea level rise and coastal storms, and developing conceptual adaptation strategies.

Danielson, Jeffrey, Dean Tyler, U.S. Geological Survey. 2016. Topobathymetric Model for the New England Region States of New York, Connecticut, Rhode Island, and Massachusetts, 1887 to 2016.

DeConto and Kopp. 2017. Massachusetts Sea Level Assessment and Projections. Technical Memorandum.

Stevens, Rachel, Jamie Carter, and Chris Peter. 2022. An Ecological Approach to Designing Salt Marshes. Tidal Wetland Vegetation Elevation and Ecotone Boundaries in Great Bay, New Hampshire. Great Bay National Estuarine Research Reserve. Technical Report. March 2022.

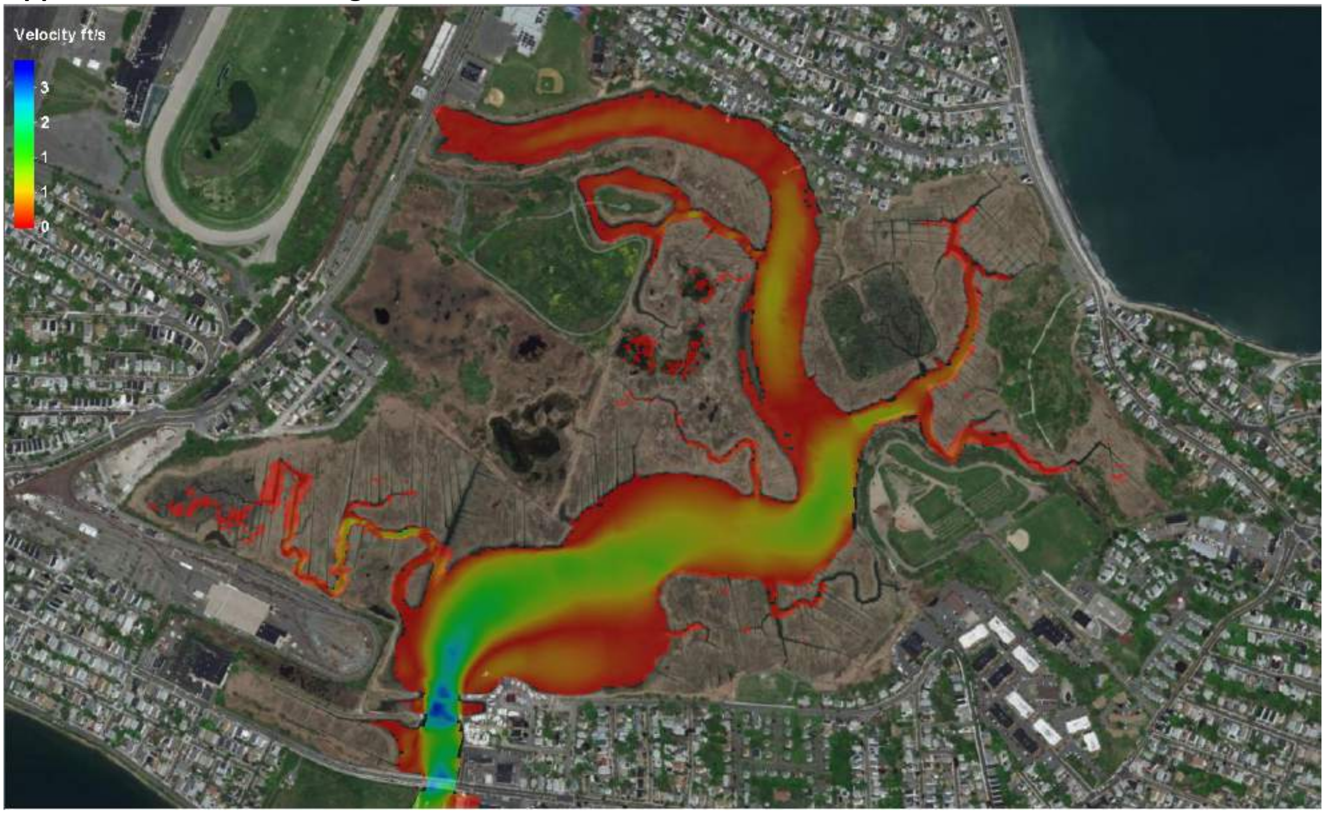
Hamrick, John M. 1996. User's manual for the environmental fluid dynamics computer code.

Woods Hole Group. 2021a. Task 1: Review Existing Conditions – Summary Memo. Prepared for Mystic River Watershed Association. April 7, 2021.

Woods Hole Group. 2021b. Task 2: Data Collection – Summary Memo. Prepared for Mystic River Watershed Association. April 7, 2021.

Woods Hole Group. 2022. Task 4: Sea Level Rise Affecting Marsh Migration – Summary Memo. Prepared by Woods Hole Group. Prepared for Mystic River Watershed Association. May 5, 2022.

Appendix A: Additional Figures



A1. Existing Velocities, typical Neap Tide Flood. Velocities are reported in feet/second, with high velocities indicated in blue.

A2. Existing Velocities, typical Neap Tide Ebb. Velocities are reported in feet/second, with high velocities indicated in blue.

Appendix D: Task 4: Belle Isle Marsh Sea Level Rise Affecting Marsh Migration – Summary Memo

MEMORANDUM

DATE May 5, 2022 **JOB NO.** 2020-0076

TO Catherine Pedemonti
Mystic River Watershed Association
20 Academy Street, Suite 306
Arlington, MA 02476

FROM Conor Ofsthun, Grace Medley
Woods Hole Group, Inc.

Task 4: Belle Isle Marsh Sea Level Rise Affecting Marsh Migration – Summary Memo

1.0 Introduction

Woods Hole Group (WHG) was tasked with utilizing the Sea Level Affecting Marshes Model (SLAMM) to evaluate projected future wetland habitat conditions of Belle Isle Marsh, located in north Boston Harbor, and surrounded by the communities of East Boston, Revere, and Winthrop. SLAMM was developed specifically to evaluate the potential impacts to coastal wetlands from sea-level rise, and incorporates important parameters, such as elevation, wetland classifications, sea-level rise, tide range, and accretion and erosion rates for various habitat types. The Project area for SLAMM evaluation was identified as encompassing Belle Isle Marsh and the immediately adjacent upland developed land (Figure 1). This memorandum summarizes the model setup, supporting data collection, and model results. These results will be utilized to help develop potential recommendations and adaptations of Belle Isle Marsh for sustained and improved future marsh health.

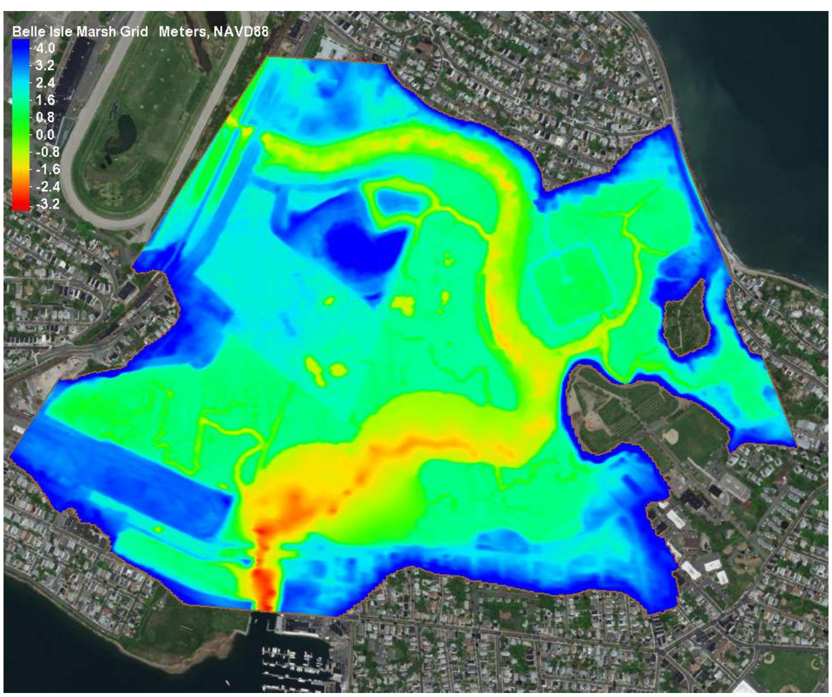


Figure 1. Belle Isle Marsh Project Area footprint, presented with topobathymetric elevations in meters, NAVD88.

2.0 Methodology

The Sea Level Affecting Marshes Model (SLAMM) was commissioned by the Environmental Protection Agency (EPA) in the 1980s and has subsequently undergone a number of updates. SLAMM 6.7, the most current version available, was used to model coastal wetland changes for the Belle Isle Marsh study area. Improvements made to SLAMM 6.7 since its prior iteration include the ability to utilize custom sea level rise (SLR) curves, improved marsh erosion modeling, and incorporation of carbon sequestration into the model. SLAMM was designed to simulate the dominant processes involved with wetland conversion due to sea level rise.

The SLAMM model was chosen for this project because it utilizes the driving physical processes that result in wetland and shoreline changes predicted to occur over a long-term time frame. The SLAMM model utilizes a number of data inputs and parameters including LiDAR elevation data, mapped wetland classifications, sea level rise, tide range, accretion, and erosion rates, resulting in a more comprehensive output result compared to some other ecological models currently available. Outputs from the simulations include both graphical (map) and tabular forms. This undertaking of SLAMM modeling for Belle Isle Marsh builds upon the efforts of the 2016 Massachusetts statewide study Modeling the Effects of Sea-Level Rise on Coastal Wetlands (Woods Hole Group, 2016). Specifically, the following key improvements were made to focus on Belle Isle Marsh:

- Achieve finer resolution utilizing a 1-meter model grid compared to the 5-meter statewide grid;
- Improve the wetland habitat mapping by acquiring wetland delineation boundaries to update the 2011 National Wetlands Index layer from the statewide modeling;
- Refine elevation input with site-specific elevation collected on-site by RTK Global Positioning System (GPS); and
- Improve accuracy of water level data: site specific water level information, including tidal range and the elevation of mean high water (MHW), will be used as inputs to the model (collected in Task 2.3).

2.1 Data Inputs

This section summarizes the various data which were researched, acquired, or assumed as inputs into the SLAMM model.

2.1.1 Elevation

High resolution elevation data is one of the most important inputs for SLAMM, as this dataset is used to determine where salt intrusion is expected to occur, as well as the frequency of salt inundation for wetlands and marshes in combination with tidal range data. Elevation data are also used to define the elevation range of wetlands, beaches, and tidal flats and when these areas should transition into a different land-cover type or even open water due to increased frequency of inundation. For the Belle Isle Marsh study area, 2018 United States Army Corps of Engineers (USACE) LiDAR Digital Elevation Model (DEM) was obtained from the National Oceanic and Atmospheric Administration (NOAA) Digital Coast database. NOAA maintains a public database containing a large variety of elevation data throughout Massachusetts. Due to the methods of data collection, a raw DEM often falls short when capturing bathymetry below the water surface, elevations of marsh platforms in areas of dense vegetation, and narrow channel thalweg profiles. In these cases, it is important to both ground-truth and correct the DEM with elevation data collected in-situ. In December of 2020 and March of 2021, Woods Hole Group collected Real Time Kinematic (RTK) survey data points at various locations around the marsh in order to characterize the site. These points were used as part of the modeling effort to ground truth and adjust the 2018 USACE topobathymetric LiDAR set sourced from NOAA Digital Coast. The LiDAR DEM was adjusted in the following ways: bathymetry from the survey was added, marsh platforms, channel thalwegs and linear features (berms) were adjusted to better align with the survey data. Bathymetric data was unavailable for the salt pools and pannes, therefore reasonable estimates to represent these regions based on water surface elevation data from the instrumentation deployment were applied to the DEM. The combined topobathymetric DEM used in the SLAMM modeling is presented in Figure 2. The DEM was then converted to a horizontal coordinate system consistent with additional data inputs described below, the Massachusetts State Plane Coordinate System (2001). The vertical coordinate system of the elevation data was the North American Vertical Datum 1988 (NAVD88). Both the horizontal coordinate system and the vertical datum are in meter units.

The SLAMM model processes all elevation data in refence to Mean Tide Level (MTL), not NAVD 1988, however. In order to correct this, a correction factor of -0.130 meters was used. This value was calculated using the Vertical Datum Transformation Tool (VDatum), which was developed by NOAA (NOAA 2021a). SLAMM allows for this correction factor to be entered as either a data input file or as a model parameter value; in this case, it was entered as a model parameter value and not as a separate, additional data input.

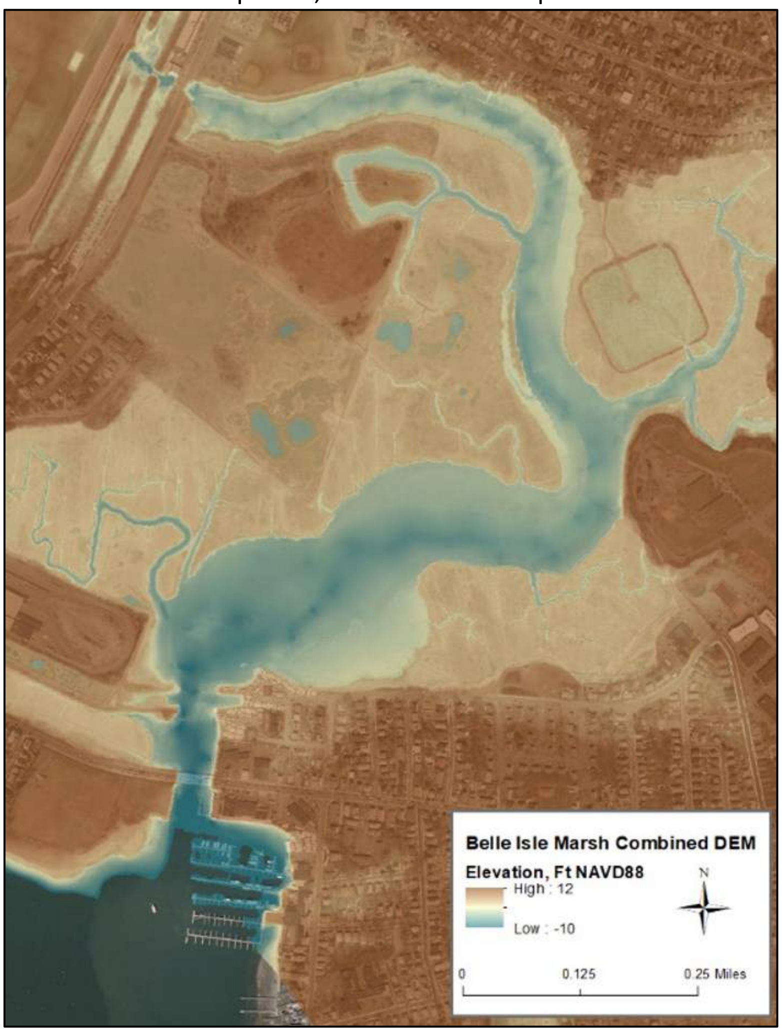


Figure 2. Combined Topobathymetric DEM used for hydrodynamic modeling, overlain on 2018 Orthoimagery for Massachusetts. All elevations are reported in ft, NAVD88.

2.1.2 Slope

In addition to being directly fed into the model as an input, the elevation data was also used to develop a slope file, which was then used as an additional input into the SLAMM model. For each raster cell of the elevation data, percent slope (units specified in the SLAMM technical documentation) was calculated using ESRI ArcMap tools. The slope file is a recharacterization of elevation data to define the change of elevation over horizontal distance, providing a quick approach of identifying a hill or bank.

2.1.3 Wetland Classifications

In addition to the elevation dataset, SLAMM also requires a classified wetland dataset documenting existing wetland conditions in the study area. This is the starting point for SLAMM's conversion algorithms, which assume wetlands inhabit a range of vertical elevations as a function of the tide range. In order to utilize the most recent wetlands data with as fine a resolution as possible, wetland classifications for the site were first mapped in the field to supplement existing publicly available wetlands layers from sources such as the National Wetlands Inventory (NWI). Another advantage in mapping wetlands in the field is that this process simplifies the process of cross-walking (i.e. translating) the observed wetland classifications into SLAMM wetland classifications. For instance, SLAMM distinguishes between regularly-flooded and irregularly flooded salt marsh but MassDEP wetlands layer only contains "salt marsh", which is difficult to accurately break down into different marsh types. Mapping wetland areas in the field allows for the surveyor to be more detailed and descriptive in identification of the various wetland areas.

Wetland classifications present at Belle Isle Marsh were determined by two Woods Hole Group Professional Wetlands Scientists (PWS) using an RTK-GPS in December 2020. GPS points were then brought into ESRI ArcMap software to create a wetlands classification data layer for the study area (Figure 3). Wetland classifications used in the field were then cross-walked to the designated SLAMM wetland categories and SLAMM wetland codes (Table 1), as designated in the SLAMM technical documentation. The wetland classification layer also utilized the Massachusetts State Plane Coordinate System (2001) in meters.

Table 1. Cross-walking of field designated wetland classifications into SLAMM wetland categories and Codes.

Field Designated Classification	SLAMM Wetland Category	SLAMM Wetland Code
Beach	Tidal Flat	11
Forest	Undeveloped Dry Land	2
High Salt Marsh	Irregularly-Flooded Marsh	20
Low Salt Marsh	Regularly-Flooded Marsh	8
Mudflat	Tidal Flat	11
Open Water (Channel)	Estuarine Open Water	17
Open Water (Panne)	Estuarine Open Water	17
Phragmites	Transitional Salt Marsh	7
Rocky/Structure	Undeveloped Dry Land	2
Shrubs	Transitional Salt Marsh	7
(All uncategorized areas within footprint)	Undeveloped Dry Land	2

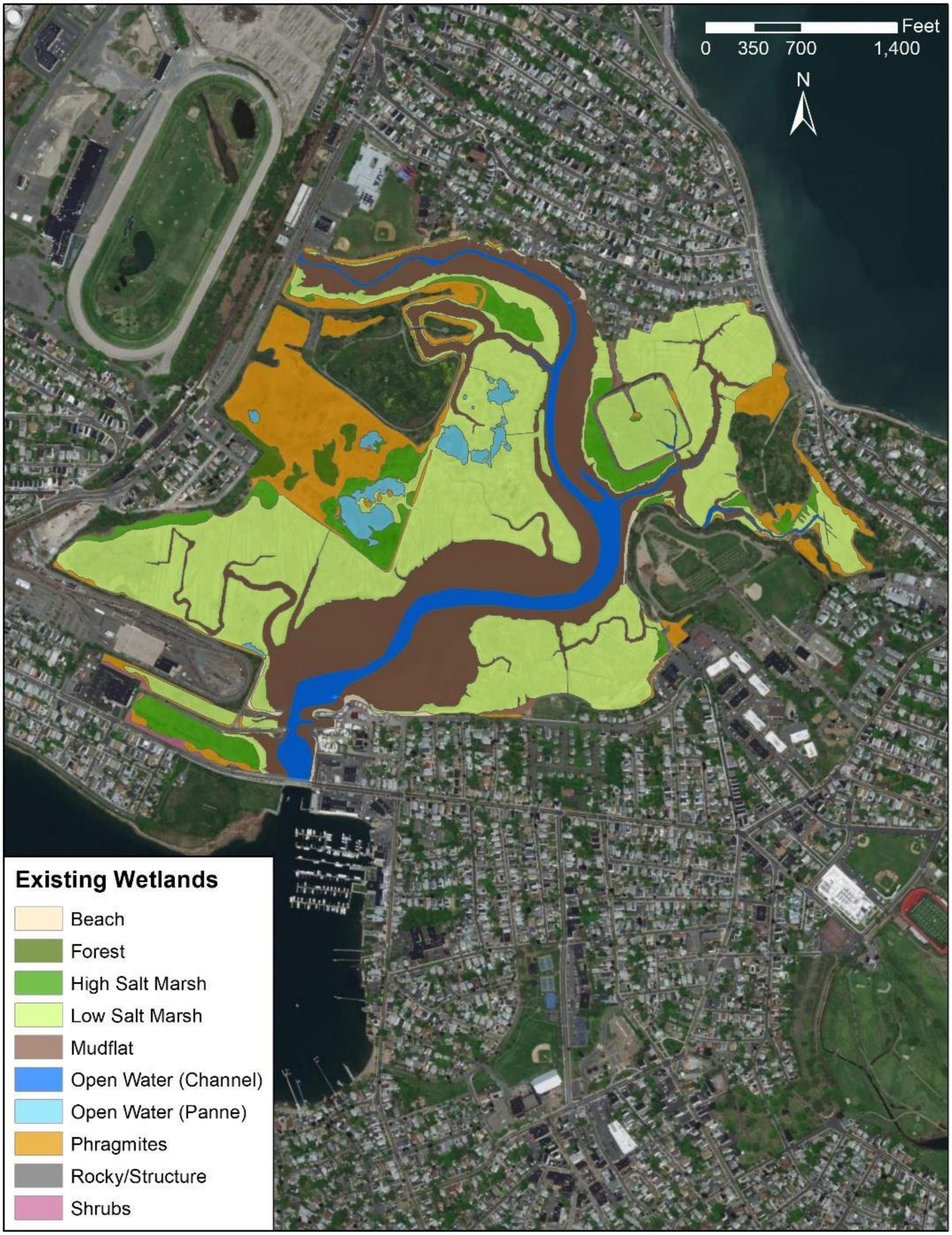


Figure 3. Existing wetland conditions for input to SLAMM modeling.

2.1.4 Dikes (Optional)

SLAMM allows for a number of optional data inputs including one for the locations of any dikes or dams within the study area. Elevations of these structures can be entered in the applicable raster cells and then during the model simulation, SLAMM evaluates potential inundation pathways using an internal connectivity algorithm. This file was not included for the Belle Isle Marsh simulation as there are no dikes or dams (at least not in the traditional sense) within the study area. The anthropogenic berms and other elevational flow control features within the BIM system (e.g., the key, etc.) in some ways act as flow impediments similar to a dike or a dam, but are not sufficiently represented by this optional SLAMM data input, which is intended to represent a more traditional dam structure.

2.1.5 Percent Impervious (Optional)

Impervious surface may be entered into SLAMM as a percent impervious raster file (any dry land with a percent impervious greater than 25% is assumed to be "developed dry land"). While an Impervious Surface raster layer is available from MassGIS, these data were not incorporated into the Belle Isle Marsh simulation. Incorporating these data would "protect" developed upland areas, meaning they would not be allowed to convert to another land-cover type. While in reality, salt marsh migration, for example, would stop at an impervious boundary, this does not inform stakeholders about where salt marshes would migrate if given the opportunity. As such, SLAMM models were conducted without percent impervious data so stakeholders can proactively understand and potentially manage the Belle Isle Marsh system for future salt marsh migration, and therefore persistence of the marsh system, if desired.

2.1.6 VDATUM (Optional)

SLAMM processes all elevation data in refence to Mean Tide Level (MTL), not the NAVD88 vertical datum utilized by the required data inputs. SLAMM allows for an elevation correction factor be entered as either a spatial dataset or as a singular value. In this simulation, the correction factor was entered as a model parameter and not as a spatial dataset.

2.1.7 Uplift/Subsidence (Optional)

This data input links a GIS layer specifying uplift/subsidence to the model simulation, allowing vertical land movement to be specified where applicable. Land movement could affect marsh migration because of the relative sea level change. The sea level rise estimates utilized for this project already include this site specific vertical land movement, and therefore this is already directly incorporated into the analysis.

2.1.8 Salinity (Optional)

Salinity data in raster form, representing cell-by-cell salinity values for the initial conditions, as well as specified outyears, can be input into the SLAMM simulation. However, SLAMM can traditionally be run without this data and based on pervious sensitivity testing and SLAMM usage (Woods Hole Group, 2016), this is unlikely to significantly affect the project results.

2.1.9 Storm Surge (Optional)

Storm surge is another optional data input, which SLAMM can utilize to calculate effects on infrastructure and the extent of storm surge. Considering the Massachusetts Coastal Flood Risk Model (MC-FRM) will be used to assess probability of inundation, as well as depth of inundation during a 1% chance event, and is a much more sophisticated inundation model, storm surge data was not included in this simulation. Additionally, episodic storm events do not have a significant impact on the wetland changes, which will be much more significantly influenced by the more permanent sea level rise changes.

2.1.10 Distance to Mouth (Optional)

These data are required for the optional Submerged Aquatic Vegetation (SAV) model, which predicts areas that will contain SAV and total coverage of SAV for each user specified time step. The SAV model will not be run for the Belle Isle Marsh simulation; therefore, distance to mouth data were not required or utilized.

2.2 Model Parameters

In addition to data input files, SLAMM also requires inputs for multiple parameters including marsh erosion, marsh accretion, tidal range data, historical sea level rise, etc. In addition, the global study area can be divided up into sub-sites, if parameter inputs vary between sub-sites. Due to the varied nature of the study area, seven separate subsites were delineated based on the varied barriers to tidal flow and resulting attenuation of the tidal range (Figure 4). All data parameters for each subsite are summarize in Table 2 discussed in detail below.

Figure 4. Sub-sites delineated for SLAMM based on the hydraulic conditions present within Belle Isle Marsh.

Table 2. Data parameters for all Belle Isle Marsh sub-sites.

Parameter	Site							
Description	**Global (Avg.)**	**Sub-Site 1**	**Sub-Site 2**	**Sub-Site 3**	**Sub-Site 4**	**Sub-Site 5**	**Sub-Site 6**	**Sub-Site 7**
NWI Photo Date (yr)*	2020	2020	2020	2020	2020	2020	2020	2020
DEM Date (yr)*	2018	2018	2018	2018	2018	2018	2018	2018
Direction Offshore	South	South	South	South	South	South	South	South
Historic SLR Trend (mm/yr)	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87
MTL - NAVD88 (m)	-0.130	-0.130	-0.130	-0.130	-0.130	-0.130	-0.130	-0.130
Great Diurnal Tide Range (m)	1.8	3.1	2.4	0.9	0.0	2.0	0.9	3.2
Salt Elevation (m)	0.9	1.5	1.2	0.4	0.0	1.0	0.5	1.6
Marsh Erosion (mm/yr)	0	0	0	0	0	0	0	0
Marsh Accretion (mm/yr)	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.87

**The model start date is assumed at 2020 to match the study's decadal perspective. The 2-year difference between NWI and DEM inputs is considered small, and is not anticipated to significantly affect the results.*

2.2.1 Description

This model parameter allows users to enter the name of the site or subsite. For this simulation, the site was divided up into seven (7) sub-sites (Figure 4), numbered one through seven.

2.2.2 NWI Photo Date

SLAMM is commonly run using the NWI wetland data layer and therefore requires the date of the photo used to delineate wetland classifications in order to accurately model future out years. However, other wetland classification layers can be imported from other sources. In this case, a field survey was conducted in 2020 to delineate wetland classifications at the site. The NWI wetland file was updated per the field survey results, and therefore 2020 was utilized as the start date for the wetland types.

2.2.3 DEM Date

The elevation data used for the Belle Isle Marsh SLAMM simulation was captured in 2018 as a Lidar survey by the U.S. Army Corps of Engineers. An RTK GPS field survey was conducted in 2020 at points of interest to verify the accuracy of the Lidar data. Where RTK GPS recorded elevations varied from the Lidar survey, the GPS was utilized as a correction factor and an updated, combined DEM file was developed. The year 2018 was used as the start date for the DEM file which varies by 2 years from the wetland resource file, however this small difference in time is expected to be insignificant given the decadal timescale the study is focused on.

2.2.4 Direction Offshore

This input allows users to specify the direction of water from the shoreline in order for the model to better determine how inundated areas will change in land-cover over time. The water body to the south of Belle Isle Marsh is the most influential.

2.2.5 Historic Sea Level Rise Trend

SLAMM utilizes historic rates of sea-level rise to estimate subsidence or uplift within the simulation (unless a raster file representing land movement has been included in the simulation). Since a raster file for land movement data was not included, the historic rate of sea level rise was determined using NOAA Boston tide gauge data. Averaged over 79 years from 1921 to 2020, historic sea level rise for Boston is 2.87 mm per year (NOAA 2021b). This is different than the sea level rise projections used in the SLAMM execution (see Section 2.3.1).

2.2.6 MTL Minus NAVD88

SLAMM requires an elevation correction from NAVD88 to MTL. For this simulation, VDatum was used to calculate a correction factor of -0.13 meters.

2.2.7 Great Diurnal Tide Range

One of the most influential SLAMM parameters is tidal range (WHG, 2016). Data are entered in meters as "great diurnal tide range", equivalent to Mean Higher High Water (MHHW) subtract Mean Lower Low Water (MLLW). Tidal range data were obtained from tide gauges installed within Belle Isle Marsh in 2020. One tide gauge was installed in each sub-site, for a total of seven (7) gauges. Tide gauge data indicated that there are several areas within the Belle Isle Marsh study area that are tidally restricted (Table 3); salt elevation is described below, a significant factor when determining future wetland change. By incorporating data on tidally restricted areas, hydraulics within the SLAMM model are improved and avoids overestimating tidal range in restricted areas, while maintaining full tide range along open coast within the same model simulation. Essentially, the SLAMM model results are improved by actual observational variations in the tidal regime. These values can also be further refined by using even more detailed tidal information from the numerical modeling developed as a part of the wider Belle Isle Marsh, Marsh Management Project.

Table 3. Tidal range data for tide gauges installed in Belle Isle Marsh.

Sub-Site	1	2	3	4	5	6	7
Tide Gauge	BI-4	BI-7	BI-2	BI-5	BI-6	BI-3	BI-1
MHHW (ft)	5.2	5.2	1.5	5.6	5.2	5.1	5.1
MHW (ft)	4.7	4.6	1.0	5.6	4.6	4.6	4.6
MTL (ft)	0.0	0.9	-0.1	5.6	1.7	3.3	-0.3
MLW (ft)	-4.7	-2.8	-1.3	5.5	-1.2	2.1	-5.1
MLLW (ft)	-4.9	-2.8	-1.3	5.5	-1.2	2.1	-5.4
Great Diurnal Tide Range* (ft)	10.1	8.0	2.8	0.1	6.4	3.0	10.5
Great Diurnal Tide Range (m)	3.1	2.4	0.9	0.04	2.0	0.9	3.2
Salt Elevation** (m)	1.5	1.2	0.4	0.02	1.0	0.5	1.6

**Great Diurnal Tide Range is the height difference between high and low tide, calculated as MHHW minus MLLW.*
***Salt elevation is defined by SLAMM as half the Great Diurnal Tide Range, and is often referred to as the Diurnal Tide Level.*

2.2.8 Salt Elevation

Salt elevation is another highly sensitive parameter (WHG, 2016) and is the elevation at which dry land and freshwater wetlands begin, which is often the elevation inundated by salt less than every 30 days. This value was calculated by dividing the great diurnal tide range in half, as suggested in the SLAMM technical documentation (Table 3).

2.2.9 Marsh Erosion

Horizontal erosion rate can be specified for marsh, swamp, and tidal flat wetland classifications. However, these specified erosion rates are only incorporated into the model for marsh or swamp when there is at least a 9 km fetch length to an open ocean or other inland water source that is present at the study area. Tidal flat erosion is incorporated regardless of fetch length. Given that the fetch length within the Belle Isle Marsh study area is less than 9 km, the SLAMM processor will not utilize a specified erosion rate for marsh or swamp. Based on the SLAMM fetch requirement, lack of marsh erosion data, and relative unimportance of this parameter as determined through a sensitivity analysis (WHG, 2016), marsh horizontal erosion rate was left at 0 mm per year for this particular evaluation.

Horizontal erosion or accretion of beaches can also be specified by utilizing the Bruun rule in SLAMM. However, implementation of this rule would only result in a horizontal erosion rate that is proportional to sea level rise rate, and not take into account other coastal processes that effect shorelines. As such, the Bruun rule was not applied for the Belle Isle Marsh SLAMM simulation. Additionally, the Bruun rule is most applicable to traditional, open coast coastal beaches which are not present within Belle Isle Marsh.

2.2.10 Marsh Accretion

SLAMM allows for vertical accretion rates (mm/yr) to be entered for a variety of wetland types, including irregularly- and regularly-flooded marsh, tidal flat, tidal fresh marsh, tidal swamp, and swamp. However, there is little site-specific accretion data available for Massachusetts marshes. In the case of Belle Isle Marsh, there is not any available data on vertical accretion rates. Additionally, accretion rates were also not available for any similar, nearby salt marshes that could reasonably serve as a proxy for Belle Isle Marsh. For this reason, an accretion rate of 2.87 mm per year was assumed to allow the Belle Isle Marsh to keep pace with the historical sea level rise trend for the area. This approach has been utilized in past for statewide runs as well as the current simulation. Additionally, a sensitivity analysis indicated that this parameter has minimal influence on Belle Isle Marsh results. The model was run under two conditions, one assuming the vertical accretion rate matches that of historic sea level rise, and another assuming no vertical accretion. The results were nearly equivalent under both conditions, indicating that either condition is acceptable. The reason marsh accretion may have played an insignificant role in migration predictions is that future predicted rates of sea level rise far outpace that of historic sea level rise, and overtake any reasonable assumptions of natural vertical accretion.

2.2.11 Beach Sedimentation Rate

SLAMM additionally allows for input of beach sedimentation, entered as a vertical measurement in mm per year. However, no traditional, open coast beaches exist within the Belle Isle Marsh complex. Short Beach is located nearby, but the Winthrop Parkway acts as a barrier that is assumed to hold the line against erosion which could otherwise encroach on Belle Isle Marsh. Furthermore, the effect of beach erosion is more adequately addressed by horizontal erosion rates, rather than sedimentation. Past analysis of this parameter indicates that only negative values resulted in changes in SLAMM output.

2.2.12 Irregular Flood Collapse

When an irregularly flooded marsh is converted into a regularly flooded marsh due to sea level rise and increased inundation, there can be a resulting loss of elevation. This elevation loss can then be entered into SLAMM to aid in the simulation. However, these data are not available for Belle Isle Marsh and collection of these data are outside the scope of this project.

2.2.13 Regular Flood Collapse

When a regularly flooded marsh is converted into tidal flats due to sea level rise and increased inundation, there can be a resulting loss of elevation. However, these data are not available for Belle Isle Marsh and collection of these data are outside the scope of this project.

2.2.14 Wave-Erosion Model

In the cases where marsh erosion is a significant occurrence, SLAMM can utilize wind direction, fetch length, and water depth to calculate erosion rates. For Belle Isle Marsh, fetch length is less than 9 kilometers, eliminating the need for an erosion model. Essentially, waves are generally small within BIM due to the relatively protective nature of the overall marsh complex and surrounding upland area.

2.3 Model Execution

This section summarizes decisions made in the execution of the SLAMM model.

2.3.1 Sea Level Rise Projections

SLAMM includes a variety of global sea level rise (SLR) projection scenarios from the Intergovernmental Panel on Climate Change (IPCC). However, the most recent update to SLAMM allows users to enter custom SLR projections for specified outyears. SLR projections used in the Belle Isle Marsh SLAMM simulation are listed in Table 4 and are consistent with the current best available, Massachusetts-specific, science, adopted by the Commonwealth of Massachusetts for planning and adaptation. In the case of this simulation, SLR projection outyears match the future time frames for which SLAMM models will be generated. Although the linear approach is not directly accurate (due to the acceleration of SLR expected), given the temporal gap is only 10 years between specified values, this assumption is not expected to cause significant limitations.

Table 4. Sea level rise projections used in the Belle Isle Marsh SLAMM simulation (projections are in reference to 2008).

Outyear	SLR (ft)	SLR (m)
2030	1.29	0.39
2040	1.79	0.55
2050	2.49	0.76
2060	3.29	1.00
2070	4.29	1.31
2080	5.29	1.61
2090	6.49	1.98
2100	7.69	2.34

2.3.2 Soil Saturation

Soil saturation is intended to predict where low elevation upland areas will become inundated by ground water as the water table rises with sea level rise. This requires water table level estimates which were not available for this study. Furthermore, this algorithm frequently causes “streaks” within model outputs according to SLAMM technical documentation and past projects completed by WHG and was therefore not utilized in this simulation.

2.3.3 Connectivity Algorithm

The connectivity algorithm within SLAMM determines whether dry lands or freshwater wetlands will be subject to saline inundation based on an uninterrupted low-elevation pathway to estuarine or ocean water. The “average” cell elevation based on a 4-side search rule was used to estimate whether each portion of the map has regular connectivity to tidal water. Without utilizing this algorithm, isolated low areas would be converted to tidal wetlands, which is not consistent with expected hydrological or ecological response. Using the connectivity algorithm, therefore, produces more realistic results, and is implemented in this study.

2.3.3 Model Time Steps

This analysis produced projected wetland area outputs for decadal time steps from 2020 through 2100. While GIS and tabular results are only presented for 2030, 2050, 2070, and 2100, using a 10-year interval for the model refines the accuracy of results because each wetland cell has more opportunities to experience small changes.

2.3.4 Model Limitations and Uncertainties

As with all models, there are a number of limitations within SLAMM that must be considered when interpreting the results. For instance, the erosion parameters for horizontal marsh and swamp are only triggered when there is a minimum fetch length of 9 kilometers. While this works well for open ocean coasts or expansive inland water systems, given the numerous enclosed bays and estuaries present in Massachusetts, including Belle Isle Marsh, the majority of coastal wetlands do not meet this criterion. In essence, this means even where data are available to document marsh erosion rates, entering these values as input parameters would not be utilized and would not affect the results.

SLAMM is limited in its installation of tide range in respective zones. While the input of varying tide ranges is beneficial to representing existing conditions, and limiting an overprediction of wetland habitat, it does have a drawback because tide range does not adapt with changes which may occur as sea level rises. Specifically, results behind the L-berm were at risk of error as the tidal range is in reality expected to change over time. To account for the simplicity of SLAMM, the model was paused at the outyears of interest (2030, 2050, and 2070), and the tidal range of the L-berm was revised to reflect the range observed in the EFDC hydrodynamic model (developed in support of the Marsh Management Plan).

Uncertainties are also inherently present when modeling future changes in wetland ecosystems. However, the largest uncertainty present may be sea level rise projections. Although the projections used in this model have been well researched and accepted, they remain projections. Despite limitations and uncertainty, sea level change is only trending in the direction of rising, and therefore even if projections are not exact, they are expected to be born out in time. For instance, if projections are slower than expected, the 2070 results may not occur until 2100; while if projections are faster than expected, the 2070 results may occur in 2050. The SLAMM results presented in this report still provide a valuable tool to identify future coastal wetland migration and provide valuable information to help prioritize marsh systems that may be the most vulnerable to climate change.

3.0 Results

This section presents habitat distribution maps under present day, 2030, 2050, 2070, and 2100 sea level rise scenarios (Figure 5, Figure 6, Figure 7, Figure 8, and Figure 9, respectively). Changes in total habitat type acreages referenced throughout this section are detailed in Table 5. A summary of the existing conditions, and projected habitat changes within Belle Isle Marsh from present day through year 2100 is described below. The impervious surface layer (obtained from MassGIS) is overlain on habitat distribution maps and provided as Appendix A. This layer is used to illustrate where marsh migration may be impeded by development in the future.

Table 5. Area (acres) of each wetland classification present within the Belle Isle Marsh study area for present day, 2030, 2050, 2070, and 2100 and change in area (acres) for select year to year comparisons.

SLAMM Code	Wetland Classification	Area (acres)					Change in Wetland Area (acres)					2020 to 2100 % Change
		2020	2030	2050	2070	2100	2020 to 2030	2030 to 2050	2050 to 2070	2070 to 2100	2020 to 2100	
2	**Upland**	159	156	135	102	35	-3	-21	-33	-137	-124	-78%
7	**Transitional Marsh**	35	33	40	39	13	-2	7	-1	-26	-22	-63%
8	**Regularly Flooded Marsh**	121	122	141	169	124	1	19	28	28	3	2%
11	**Tidal Flat**	67	57	54	41	159	-10	-3	-13	118	92	137%
17	**Estuarine Open Water**	22	36	41	65	90	14	5	24	25	68	309%
20	**Irregularly Flooded Marsh**	17	17	10	5	1	0	-7	-5	-4	-16	-94%

Figure 5. Initial wetland conditions used in SLAMM modeling for Belle Isle Marsh and the surrounding area.

Figure 6. SLAMM modeling results for Belle Isle Marsh and the surrounding area during 2030.

Figure 7. SLAMM modeling results for Belle Isle Marsh and the surrounding area during 2050.

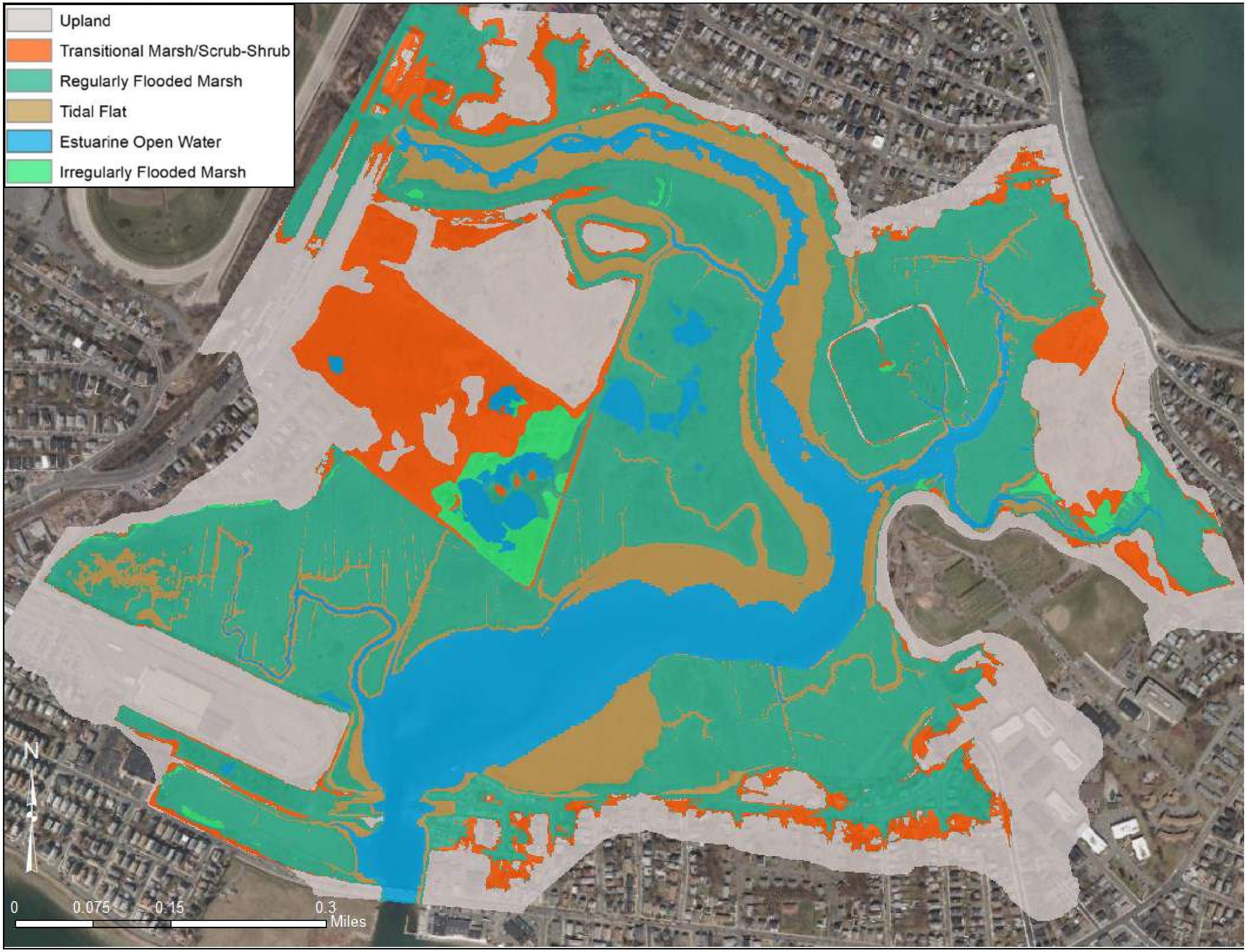


Figure 8. SLAMM modeling results for Belle Isle Marsh and the surrounding area during 2070.

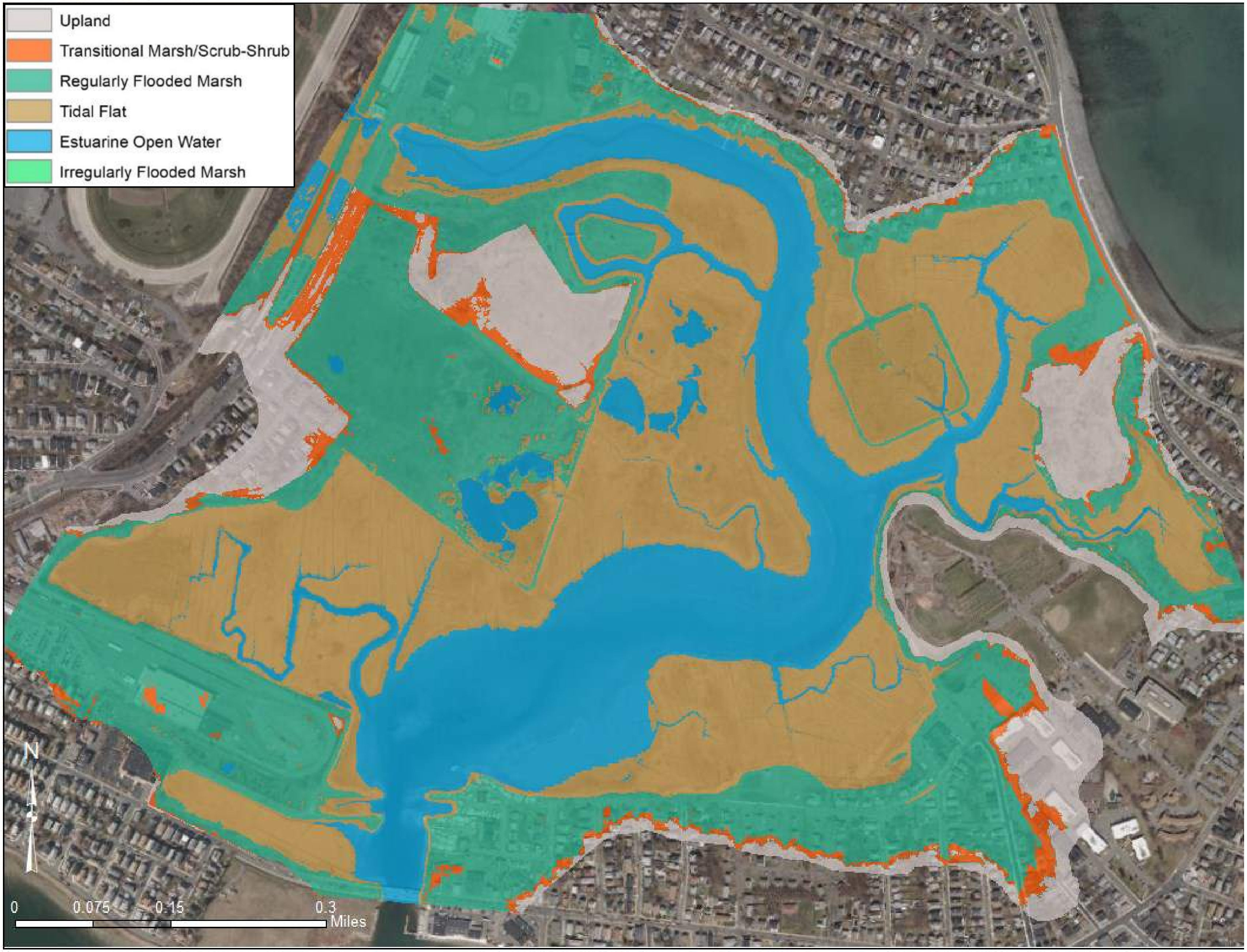


Figure 9. SLAMM modeling results for Belle Isle Marsh and the surrounding area during 2100.

3.1 Existing Conditions

The Belle Isle Marsh is an estuarine wetland system, encompassing of a whole range of wetland resource areas, which occupy specific elevation ranges . From low to high elevation, the basic resource areas modelled in SLAMM are: estuarine open water (subtidal), tidal flat (mudflat), regularly flooded marsh (low marsh), irregularly flooded marsh (high marsh), transitional marsh, and upland. Existing conditions are presented in Figure 5 and summarized by habitat below.

Estuarine Open Water

The marsh inlet connects to Boston Harbor at its southern end. The inlet is in a permanently fixed position, defined by the Main St bridge connecting East Boston to Winthrop. The main channel connects from the inlet north to the Sales Creek tide gate at the boundary of Bennington St and Suffolk Downs. The subtidal (i.e. always inundated) extent of the main channel reaches maximum widths over 100 feet. As indicated by tide gauge observations, tidal penetration is nearly unrestricted within the main channel. The tide range at the inlet was measured at 9.7 ft, and the tide range at the very northern boundary with Sales Creek was measured at 9.4 ft, representing an maximum attenuation by ~0.3 ft within the main channel.

Tidal Flat

Adjacent to subtidal habitat is the tidal flat (i.e. mudflat) habitat, which is frequently submerged. Tidal flats serve as habitat for benthic invertebrates and shellfish, and serve as foraging space for several bird species such as least tern and piping plovers. Mudflat habitat exists in both the main channel and secondary channels (i.e. tidal creeks).

Low Marsh

Adjacent to mudflat, a low marsh platform characterizes a large extent of the marsh. The low marsh supports *Spartina alterniflora* cordgrass and may provide storm surge attenuation benefits. This topic is targeted for future study as a task of a Belle Isle Marsh Municipal Vulnerability Preparedness project.

High Marsh

Adjacent to low marsh exists the high marsh habitat. High marsh habitat, dominated by *Spartina patens* (saltmeadow-hay grass) exists in the upper end of the daily tidal range, and is limited in extent throughout Belle Isle Marsh. The saltmarsh sparrow is the only species of breeding bird endemic to salt marshes of the Northeast. The saltmarsh sparrow nests on or near the ground, just above high tide levels in the cordgrass of high marsh.

Transitional Marsh

Transitional marsh and upland areas occupy the remaining space within the Belle Isle Marsh project area. Transitional marsh is defined as the area just above high marsh, and often represents space within which marsh habitat would migrate upland and inland as sea level rises.

Upland

Upland areas are developed areas surrounding Belle Isle Marsh on all sides, including residential and major development in East Boston, Revere, and Winthrop. Critical infrastructure in these areas include MBTA railyard and Blue Line infrastructure, Suffolk Downs, critical evacuation roadways such as Main St, Bennington St, and the Winthrop Parkway, community supporting resources such as Revere Public Schools, and a power station in Winthrop.

Unique areas within Belle Isle Marsh include salt pannes and bermed areas. Salt pannes exist within the high marsh and transitional habitat, most significantly nearby Belle Isle Marsh Reservation park and behind the L-berm.

Salt pannes were observed to fill with seawater during the highest tides, but are otherwise disconnected from the hydraulic system of the marsh and serve as retention areas for rainwater. Shorebirds utilize salt pannes for feeding on fish and insects. The L-berm and the Key berm areas are reaches of Belle Isle Marsh which were historically filled for purposes of upland development. The L-berm acts as a barrier to tidal penetration between the main channel and the upland Belle Isle Marsh Reservation park salt panne, meadows and forest. The Key berm is a square shaped area in the eastern marsh, which was constructed to protect a World War II radio tower, and now restricts tidal circulation to the low marsh within.

During present day, wetland delineation conducted in the field (and utilized as the initial wetland conditions in SLAMM) indicates that Belle Isle Marsh is dominated by upland (159 acres), closely followed by regularly flooded marsh (121 acres) and then by estuarine beach/tidal flat (67 acres). Less prevalent habitats present include transitional marsh/scrub-shrub, estuarine open water, and irregularly flooded marsh. Note that additional SLAMM wetland categories, such as nontidal swamp or ocean flat, are not present during present day conditions, nor are they predicted to occur in the future based on SLAMM modeling.

3.2 Year 2030 – 1.29 ft of Sea Level Rise

Following 1.29 ft of sea level rise by year 2030, changes predicted to occur in Belle Isle Marsh include a decrease in all habitats besides estuarine open water, which is projected to significantly increase by 14 acres (Figure 6 and Table 5). Estuarine open water increases most within the main channel as it increasingly occupies space currently defined as tidal flat. Additionally, subtidal habitat begins to reach penetrate further into tidal creeks. Tidal flats see the greatest loss to 1.29 ft of SLR of any habitat type (-10 acres). Low marsh habitat persists through year 2030 with no significant change. The bermed areas of Belle Isle Marsh, within the Key and upland of the L-Berm, do not see significant change. There is little change to low marsh and high marsh, except for the migration of about 1 acre of high marsh into inland transitional areas. However, this migration would be impeded by impervious surfaces under current development conditions. Upland habitat is projected to decrease by 3 acres, indicating marsh habitat begins to migrate upland and inland with SLR.

3.3 Year 2050 – 2.49 ft of Sea Level Rise

Following 2.49 ft of SLR by year 2050, a continued increase in estuarine open water is projected, with a gain of 5 additional acres (Figure 7 and Table 5). Open water gains correspond to a loss of tidal flat (-3 acres). While subtidal habitat expands, mudflat is unable to migrate into low marsh habitat due to the steep scarp which exists between mudflat and the low marsh platform. As a result, subtidal habitat encroaches on low marsh habitat, and increases the opportunity for limited wave and tidal current action to impact and potentially erode the edge of marsh. There is a modeled gain of 19 acres of low marsh as it migrates into high marsh areas south of the MBTA railyard in East Boston. There is also a projected gain of 7 acres of transitional marsh (7 acres). Low marsh and transitional marsh gains correspond to a loss of high marsh (-7 acres) and a loss of upland area (-3 acres).

The two bermed areas do not change significantly, neither does the tidal creek and low marsh habitat abutting Winthrop. Expansion of estuarine open water will not be impeded by any current existing impervious areas. However, migration of approximately 1,300 square feet (sf) of tidal flat and 2,000 sf of regularly flooded marsh will be impeded by impervious surface.

3.4 Year 2070 – 4.29 ft of Sea Level Rise

Following 4.29 ft of SLR by year 2070, wetland areas that increase include regularly flooded marsh (28 acres) and estuarine open water (24 acres) (Figure 8 and Table 5). These habitats expand into adjacent areas, where losses are projected in upland (-33 acres) transitional marsh (-1 acres), irregularly flooded marsh (-5 acres), and tidal flat (-13 acres). Near the inlet, subtidal habitat in the main channel overtops almost all tidal flat and abuts low marsh. As a result, wave action will further interact with low marsh habitat and potentially increase edge erosion. Low marsh is shown to persist through year 2070, maintaining most of its existing extent indicating that the marsh platform exists near the top of its viable elevation range. Low marsh habitat struggles to migrate inland in East Boston, likely due to the steep banks circumscribing the marsh by the MBTA railyard and former casket company parcel. Low marsh habitat migrates into low elevation residential neighborhoods of Winthrop and Revere. Additionally, transitional habitat migrates into Bennington St, Suffolk Downs, and Revere Public Schools. High marsh struggles to migrate into transitional habitat. By 2070, a much greater degree of wetland migration will be prevented by development. Transitional marsh and regularly flooded marsh will be prevented from migrating and these wetland types will be lost to sea level rise without the ability to shift location. No significant change is projected in the bermed areas of the Key and L-berm in 2070.

3.5 Year 2100 – 7.69 ft of Sea Level Rise

Following 7.69 ft of SLR by year 2100, wetland areas see the most extreme change of any timestep. Habitat acreage increases are seen in subtidal habitat (25 acres) and tidal flat (118 acres). Habitat acreage losses are projected in low marsh (-45 acres), high marsh (-4 acres), transitional marsh (-26 acres), and upland (-67 acres) (Figure 9 and Table 5). The subtidal habitat is anticipated to continue its expansion within the main channel and tidal creeks. Tidal flats are anticipated to finally make the jump onto what today is the low marsh platform, and as a result this habitat reverses its downward trend and expands dramatically in area. Low marsh within the Key berm converts to tidal flat as well. The low marsh is pushed out of its existing footprint and migrates almost entirely into and throughout adjacent jurisdictions, what is today the L-berm area, and developed/impervious land of East Boston, Revere, and Winthrop. Belle Isle Marsh almost entirely converts to a subtidal and mudflat wetland system with the L-berm are representing the only remaining viable marsh habitat within the Reserve. High marsh habitat is further squeezed out of functional space, as it struggles to migrate into transitional areas. Transitional habitat migrates further into the developed areas of East Boston, Revere, and Winthrop, and would also be expected to expand far beyond the project area boundary.

Multiple iterations of SLAMM analysis, paired with hydrodynamic modeling performed as a parallel task to SLAMM, was required to achieve reasonable projections of marsh migration behind the L-berm. Hydrodynamic model water level results were obtained behind the L-berm at the 2030, 2050, and 2070 planning horizons and manually input to represent tidal conditions at the L-berm. This allowed for the recognition that from the perspective of land elevation and tidal penetration, the L-berm can serve as future marsh habitat in long-term sea level rise scenarios. In this project, the tipping point for converting the L-berm to low marsh habitat occurs around 2080.

3.6 SLAMM Summary

Belle Isle Marsh habitat migration with sea level rise is characterized in two phases:

- **Present day to 2070:** Changes that occur from 2020 to 2070 include gains in estuarine open water (43 acres), low marsh (48 acres), and transitional marsh (4 acres). The most significant corresponding losses occur in tidal flat (-26 acres) and upland (-57 acres). High marsh losses are observed at a smaller scale (-12 acres), however, this represents over 70% of its current footprint. The increases in low marsh and transitional marsh are only able to become reality if development retreats and open space is provided for this migration.
- **2070 to 2100:** Changes that occur from 2070 to 2100 include gains in estuarine open water (25 acres) and tidal flat (118 acres). Significant corresponding losses occur in low marsh (-45 acres), high marsh (-4 acres), transitional marsh (-26) and upland (-67 acres). This represents a near complete conversion of the existing marsh habitat to open water and mudflat. Low, high, and transitional marsh habitat attempt to migrate inland and upland but will meet the barriers in existing development, except in the L-berm area where open space currently exists in the Reserve.

Subtidal habitat is found to continuously expand, increasing by 309% in acreage by year 2100. The main channel specifically increases in width by up to 100's of feet, potentially increasing marsh vulnerability as wave and tidal current forces may increase.

The year 2080 was found to represent a tipping point between the tidal flat and low marsh relationship. Low marsh was noted to persist through 2070. The Massachusetts Statewide SLAMM model (WHG 2016) projects low marsh to generally be converted to tidal flats under a 4.29 ft SLR scenario. However, at Belle Isle Marsh, low marsh habitat exists within the high end of its viable elevation range. With small amounts of marsh accretion (~2.8 mm/yr), the low marsh will be maintained through about year 2080 (5.29 ft SLR). This persistence of low marsh results in a loss of tidal flat, as tidal flats are squeezed between increasingly widening and deepening channels. Beyond 2080, the effects of sea level rise on low marsh reach a tipping point, where tidal inundation overtops the low marsh platform at an increased frequency and it converts nearly entirely to tidal flat, converting the marsh into a primarily subtidal/mudflat condition. It is anticipated that low marsh will continuously encroach on upland developed areas, especially the areas of the MBTA Blue Line/Suffolk Downs, Revere Public Schools, residential areas of Revere, and residential areas of Winthrop, especially along Morton St.

High marsh habitat most notably struggles to migrate into transitional areas, and there is a projected 94% loss of high marsh acreages from present day through 2100. This result is critical to the saltmarsh sparrow as the high marsh is the only viable nesting habitat for saltmarsh sparrow. The population has declined 85% since 1995 and is predicted to become extinct by year 2050.

Transitional marsh is observed to over time migrate into East Boston especially in the MBTA railyard, the Town of Revere by Sales Creek tide gate, and Winthrop residential areas. Through year 2070, the perimeter of the marsh in many reaches is too steep in elevation for habitat to migrate inland and upland with SLR. However, by 2100, low marsh and transitional habitats are projected to nearly entirely migrate out of the current marsh area and into low-lying areas of the surrounding communities. This is indicated by the estimated 78% loss in upland acreage between present day and 2100. If developed areas were not present, marsh habitat could potentially persist, migrating inland and upland in relation to sea level rise. However, under the current heavily developed conditions surrounding Belle Isle Marsh, marsh habitat is not likely to successfully migrate with sea level rise, and Belle Isle Marsh would no longer support extensive vegetated marsh habitat.

4.0 Next Steps

Belle Isle Marsh habitat is threatened by sea level rise. Tidal flat and the critical high marsh habitat are projected to decrease in acreage through 2070, while low marsh habitat may persist. However, by year 2100, the entire Belle Isle Marsh system is expected to convert to a predominantly subtidal and tidal flat habitat. In order to protect Belle Isle Marsh and for inland development to continue benefiting from storm damage and flood protection, management practices should focus on the following key areas:

- Areas where marsh elevation is not accreting, and is not sloped to promote gradual marsh migration,
- Areas where marsh migration is predicted to occur but would be impeded by existing development,
- Areas where steep slopes prevent the gradual migration of marsh habitat inland and upland,
- Areas where tidal flows are attenuated or nearly fully restricted by topography, which consequently limit the accretion, migration, and expansion of habitat, and
- Areas where increased open water fetch may create vulnerabilities in marsh edge erosion.

The Belle Isle Marsh complex contains a wide variety of habitat types and unique anthropogenic influences which have resulted in areas with distinct characteristics and function. As a result, marsh-wide generalizations do not bring clarity to developing management actions. The marsh was divided into eleven management areas for developing restoration alternatives which can address the specific concerns of each unique area. Belle Isle Marsh Management Areas are depicted in Figure 10, and the vulnerability results are organized by area in Table 6. Table 6 environmental vulnerability presents results from literature reviews, data collection, and EFDC existing conditions modeling in addition to the above SLAMM exercise. Next steps will utilize vulnerability results in combination with owner and stakeholder values, priorities, and goals to develop restoration alternatives. The top 2-3 restoration alternatives will then be modeled in EFDC to assess effectiveness and refine design.

Table 6. Environmental Vulnerability of Belle Isle Marsh Management Areas

No.	Management Areas	Environmental Vulnerability
1	Lower Main Channel	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Wave energy and tidal current velocities may increase and exacerbate marsh erosion. Tidal current velocities pull sediment loose and cause calving and erosion of marsh edge. Increased velocities would exacerbate this issue. Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Saratoga Bridge is a source of minor tidal constriction
2	Upper Main Channel	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Transitional marsh wants to migrate into developed areas of East Boston and Revere, • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage • Wave energy and tidal current velocities may increase and exacerbate marsh erosion. Tidal current velocities pull sediment loose and cause calving and erosion of marsh edge. Increased velocities would exacerbate this issue. Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Sales Creek Tide Gate is point source for widely collected freshwater discharge and coliform bacteria. Upstream sediment impoundment reduces ability of marsh to capture sediment and increase in elevation with sea level rise. Pump station pump events dramatically freshen the system and decrease water clarity Extensive phragmites in the Reservation park area. Phragmites does support rare and common nesting birds
3	Excel Academy	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat

		• High marsh habitat losses anticipated at all time horizons • Transitional marsh wants to migrate into developed areas of East Boston • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation
4	West Marsh / Rosie's Pond	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons (saltmarsh sparrow nesting and foraging habitat) • Transitional marsh wants to migrate into developed areas of East Boston • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Marsh migration is not feasible in most low-lying areas due to steep slopes around the perimeter, backed by developmentRevitalize degraded wetland. Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Perched tides cannot properly drain in certain areas, leading to quasi-salt panned development, such as Rosie's Pond in the western area by Austin St/MBTA railyard. Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues. Improve stormwater and tide water conveyance.
5	Central Marsh	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons

		Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues. Improve stormwater and tide water conveyance.
6	L-Berm	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • High marsh habitat losses anticipated at all time horizons (saltmarsh sparrow nesting and foraging habitat) • Salinity is increasing around deciduous trees in the transitional zone/coastal thickets, causing die off and "ghost forests" Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) L-berm is a barrier to tides and drainage, as is the upland fill material placed behind the L-berm Marsh migration is not feasible in most low-lying areas due to steep slopes around the perimeter, backed by development Extensive phragmites in the Reservation park area behind the L-Berm. Phragmites does support rare and common nesting birds. Japanese Honeysuckle established in transitional marsh/coastal thickets. Multiflora Rose and other invasive trees (Black Locust, Eastern Cottonwood, Tree of Heaven, Quaking Aspen and Norway Maple) in upland habitat/mid-canopy woodland do not maximize habitat value. Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation
7	Grassland Meadow / Main Park	Main Park is squeezed between development and the ocean (i.e. coastal squeeze)
8	Morton St Marsh / Belle Isle Marine Ecology Park	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons • Transitional marsh wants to migrate into developed areas of Winthrop • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze)

		Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues. Improve stormwater and tide water conveyance.
9	The Key	Sea level rise causes habitat conversion: • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons Key berm constricts tides to anthropogenically influenced marsh
10	East Marsh / Short Beach	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons • Transitional marsh wants to migrate into developed areas of Revere and Winthrop • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues. Improve stormwater and tide water conveyance.
11	Revere St Marsh / John Kilmartin Pathway	Sea level rise causes habitat conversion: • Subtidal habitat expansion, • Mudflat losses through 2080, then jumps onto the low marsh platform and expands greatly • Low marsh persists through 2080, then converts to mudflat • High marsh habitat losses anticipated at all time horizons

		• Transitional marsh wants to migrate into developed areas of Winthrop • Upland areas vulnerable to marsh migration, tidal inundation, and especially storm flooding. Flooding of supporting and surrounding assets and infrastructure predicted to increase in frequency and damage Marsh habitat is squeezed between development and the ocean (i.e. coastal squeeze) Runoff washes unmanaged into the marsh from nearby municipalities. Nutrients and chemicals decrease dissolved oxygen, degrade and alter plant structures, and lead to marsh degradation Mosquito ditches drain water from most of the marsh surface, eliminating salt pannes and small tidal creeks. • Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. • This eliminated killifish habitat, resulting in loss of ecological function and continued mosquito population issues. Improve stormwater and tide water conveyance.

Figure 10. Belle Isle Marsh Management Areas

5.0 References

National Atmospheric and Oceanic Administration (NOAA). 2021a. Vertical Datum Transformation (VDatum) v4.3. https://vdatum.noaa.gov/

National Atmospheric and Oceanic Administration (NOAA). 2021b. Relative Sea Level trend 8443970 Boston, Massachusetts. https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8443970

University of Massachusetts Boston, 2018. Technical memo: Sea level rise scenarios for coastal modeling (updated). Prepared by Ellen Douglas. Prepared for Massachusetts Department of Transportation. April 25, 2018.

Warren Pinnacle Consulting, Inc. 2016a. SLAMM 6.7 Technical Documentation: Sea Level Affecting Marshes Model, Version 6.7 Beta.

Warren Pinnacle Consulting, Inc. 2016b. SLAMM 6.7 Beta User's Manual.

Woods Hole Group. 2016. Modeling the Effects of Sea-Level Rise on Coastal Wetlands. Prepared for the Massachusetts Office of Coastal Zone Management.

Appendix E: Mystic River Watershed Association – Water Quality Monitoring Program Data Tables – 2004 to 2019

	DateHour	LocationID	VisitID	ID	CharacteristicID	ResultValu	Units	Qualifier	FlagID	MethodID	ResultCom	SampleDepth	UniqueID	Datetime	ProjectID	SampleTyp	HasFlow
1	8/24/2004 8:00	BEI002	26942	135471	TEMP_WATER	17.9	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:11	HOTSPOT	S	1
2	8/24/2004 8:00	BEI002	26942	135472	ENT	8	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:11	HOTSPOT	S	1
3	8/24/2004 8:00	BEIBT1	26939	135455	SALINITY	25.3	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:02	HOTSPOT	S	1
4	8/24/2004 8:00	BEIBT1	26939	135450	ENT	163	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:02	HOTSPOT	S	1
5	8/24/2004 8:00	BEI003	26945	135491	SPCOND	43950	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:38	HOTSPOT	S	1
6	8/24/2004 8:00	BEI003	26945	135487	ENT	8	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:38	HOTSPOT	S	1
7	8/24/2004 8:00	BEI004	26947	135503	TEMP_WATER	18.8	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:52	HOTSPOT	S	1
8	8/24/2004 8:00	BEIBT4	26943	135476	TEMP_WATER	18.7	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:19	HOTSPOT	S	1
9	8/24/2004 8:00	BEIBT1	26939	135452	DO_SAT	77.7851	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:02	HOTSPOT	S	1
10	8/24/2004 8:00	BEIBT1	26939	135451	TEMP_WATER	18.1	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:02	HOTSPOT	S	1
11	8/24/2004 8:00	BEI002	26942	135470	DO_SAT	78.21883	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:11	HOTSPOT	S	1
12	8/24/2004 8:00	BEI004	26947	135502	ENT	34	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:52	HOTSPOT	S	1
13	8/24/2004 8:00	BEI005	26948	135505	TEMP_WATER	18.9	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:57	HOTSPOT	S	1
14	8/24/2004 8:00	BEI001	26938	135449	ENT	12	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:00	HOTSPOT	S	1
15	8/24/2004 8:00	BEI005	26948	135506	DO_SAT	72.45331	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:57	HOTSPOT	S	1
16	8/24/2004 8:00	BEIBT1	26939	135454	SPCOND	39620	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:02	HOTSPOT	S	1
17	8/24/2004 8:00	BEI003	26945	135490	DO	7.07	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:38	HOTSPOT	S	1
18	8/24/2004 8:00	BEIWT1	26946	135496	SPCOND	43040	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:46	HOTSPOT	S	1
19	8/24/2004 8:00	BEIWT1	26946	135493	TEMP_WATER	19.5	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:46	HOTSPOT	S	1
20	8/24/2004 8:00	BEI003	26945	135488	TEMP_WATER	18.3	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:38	HOTSPOT	S	1
21	8/24/2004 8:00	BEI002	26942	135468	DO	7.29	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:11	HOTSPOT	S	1
22	8/24/2004 8:00	BEI005	26948	135508	SPCOND	44140	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:57	HOTSPOT	S	1
23	8/24/2004 8:00	BEI005	26948	135509	SALINITY	28.5	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:57	HOTSPOT	S	1
24	8/24/2004 8:00	BEIBT3	26941	135463	ENT	215	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:07	HOTSPOT	S	1
25	8/24/2004 8:00	BEIBT3	26941	135466	SPCOND	35890	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:07	HOTSPOT	S	1
26	8/24/2004 8:00	BEIBT2	26940	135457	SPCOND	39370	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:04	HOTSPOT	S	1
27	8/24/2004 8:00	BEI004	26947	135499	SALINITY	28.5	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:52	HOTSPOT	S	1
28	8/24/2004 8:00	BEI005	26948	135507	DO	6.61	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:57	HOTSPOT	S	1
29	8/24/2004 8:00	BEIBT3	26941	135467	SALINITY	22.7	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:07	HOTSPOT	S	1
30	8/24/2004 8:00	BEIBT3	26941	135462	DO	5.59	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:07	HOTSPOT	S	1
31	8/24/2004 8:00	BEI004	26947	135500	SPCOND	44000	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:52	HOTSPOT	S	1
32	8/24/2004 8:00	BEIBT2	26940	135461	SALINITY	25.1	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:04	HOTSPOT	S	1
33	8/24/2004 8:00	BEI002	26942	135469	SPCOND	43520	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:11	HOTSPOT	S	1
34	8/24/2004 8:00	BEIBT2	26940	135456	DO	6.26	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:04	HOTSPOT	S	1
35	8/24/2004 8:00	BEIBT4	26943	135475	ENT	12	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:19	HOTSPOT	S	1
36	8/24/2004 8:00	BEI005	26948	135504	ENT	4	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:57	HOTSPOT	S	1
37	8/24/2004 8:00	BEIBT3	26941	135465	DO_SAT	60.30875	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:07	HOTSPOT	S	1
38	8/24/2004 8:00	BEI001	26938	135448	SALINITY	24.3	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:00	HOTSPOT	S	1
39	8/24/2004 8:00	BEIBT2	26940	135460	ENT	138	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:04	HOTSPOT	S	1
40	8/24/2004 8:00	BEIBT4	26943	135478	DO	5.05	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:19	HOTSPOT	S	1
41	8/24/2004 8:00	BEI002	26942	135473	SALINITY	28.1	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:11	HOTSPOT	S	1
42	8/24/2004 8:00	BEI001	26938	135444	TEMP_WATER	18	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:00	HOTSPOT	S	1
43	8/24/2004 8:00	BEI003	26945	135489	DO_SAT	76.51744	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:38	HOTSPOT	S	1
44	8/24/2004 8:00	BEIBT4	26943	135474	SALINITY	28	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:19	HOTSPOT	S	1
45	8/24/2004 8:00	BEIBT3	26941	135464	TEMP_WATER	18.3	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:07	HOTSPOT	S	1
46	8/24/2004 8:00	BEIBT5	26944	135481	SPCOND	43660	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:29	HOTSPOT	S	1
47	8/24/2004 8:00	BEI004	26947	135501	DO_SAT	73.17413	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:52	HOTSPOT	S	1
48	8/24/2004 8:00	BEIWT1	26946	135492	SALINITY	27.8	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:46	HOTSPOT	S	1
49	8/24/2004 8:00	BEIWT1	26946	135495	DO	5.24	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:46	HOTSPOT	S	1
50	8/24/2004 8:00	BEIWT1	26946	135494	DO_SAT	58.13327	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:46	HOTSPOT	S	1
51	8/24/2004 8:00	BEI001	26938	135447	SPCOND	38200	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:00	HOTSPOT	S	1
52	8/24/2004 8:00	BEIBT5	26944	135485	TEMP_WATER	18.2	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:29	HOTSPOT	S	1
53	8/24/2004 8:00	BEIBT4	26943	135479	SPCOND	43410	uS/cm	NA	NA	71	NA	NA	20040824C	8/24/2004 8:19	HOTSPOT	S	1
54	8/24/2004 8:00	BEIBT4	26943	135477	DO_SAT	55.10608	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:19	HOTSPOT	S	1
55	8/24/2004 8:00	BEIBT2	26940	135458	DO_SAT	68.19725	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:04	HOTSPOT	S	1
56	8/24/2004 8:00	BEIWT1	26946	135497	ENT	30	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:46	HOTSPOT	S	1
57	8/24/2004 8:00	BEIBT5	26944	135482	DO	4.63	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:29	HOTSPOT	S	1
58	8/24/2004 8:00	BEI003	26945	135486	SALINITY	28.4	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:38	HOTSPOT	S	1
59	8/24/2004 8:00	BEI001	26938	135446	DO	8.09	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:00	HOTSPOT	S	1
60	8/24/2004 8:00	BEIBT5	26944	135484	ENT	58	MPN/100n	NA	NA	12	NA	NA	20040824C	8/24/2004 8:29	HOTSPOT	S	1
61	8/24/2004 8:00	BEIBT1	26939	135453	DO	7.23	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:02	HOTSPOT	S	1
62	8/24/2004 8:00	BEIBT5	26944	135480	SALINITY	28.2	ppt	NA	NA	69	NA	NA	20040824C	8/24/2004 8:29	HOTSPOT	S	1
63	8/24/2004 8:00	BEIBT5	26944	135483	DO_SAT	49.99847	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:29	HOTSPOT	S	1
64	8/24/2004 8:00	BEI004	26947	135498	DO	6.69	mg/l	NA	NA	24	NA	NA	20040824C	8/24/2004 8:52	HOTSPOT	S	1
65	8/24/2004 8:00	BEI001	26938	135445	DO_SAT	86.80599	%	NA	NA	24	NA	NA	20040824C	8/24/2004 8:00	HOTSPOT	S	1
66	8/24/2004 8:00	BEIBT2	26940	135459	TEMP_WATER	18.7	deg C	NA	NA	68	NA	NA	20040824C	8/24/2004 8:04	HOTSPOT	S	1
67	8/24/2004 9:00	BEIWT2	26950	135518	DO_SAT	60.25795	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:07	HOTSPOT	S	1
68	8/24/2004 9:00	SHCWT3	26952	135529	SALINITY	26.6	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:22	HOTSPOT	S	1
69	8/24/2004 9:00	SHC002	26954	135544	DO_SAT	71.27712	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:34	HOTSPOT	S	1
70	8/24/2004 9:00	SHCWT3	26952	135528	DO_SAT	98.80311	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:22	HOTSPOT	S	1
71	8/24/2004 9:00	BEI007	26951	135523	SALINITY	28.5	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:13	HOTSPOT	S	1
72	8/24/2004 9:00	SHC002	26954	135543	DO	6.23	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:34	HOTSPOT	S	1
73	8/24/2004 9:00	SHC002	26954	135542	SPCOND	43120	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:34	HOTSPOT	S	1
74	8/24/2004 9:00	BEIWT2	26950	135520	ENT	178	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:07	HOTSPOT	S	1
75	8/24/2004 9:00	BEIWT2	26950	135517	SPCOND	41670	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:07	HOTSPOT	S	1
76	8/24/2004 9:00	BEIWT2	26950	135519	TEMP_WATER	19.9	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:07	HOTSPOT	S	1
77	8/24/2004 9:00	BEI007	26951	135522	TEMP_WATER	19.5	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:13	HOTSPOT	S	1
78	8/24/2004 9:00	BEIBT6	26956	135554	TEMP_WATER	23.3	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:57	HOTSPOT	S	1
79	8/24/2004 9:00	BEIWT2	26950	135521	SALINITY	26.8	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:07	HOTSPOT	S	1
80	8/24/2004 9:00	BEIWT2	26950	135516	DO	5.39	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:07	HOTSPOT	S	1
81	8/24/2004 9:00	SHCWT3	26952	135530	DO	8.66	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:22	HOTSPOT	S	1
82	8/24/2004 9:00	SHC002	26954	135545	TEMP_WATER	21	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:34	HOTSPOT	S	1

	SampleDep	Comment	LocationDe	WaterBody	Municipali	Latitude	Longitude	LocationTy	LocationM	Coordinate	InWatersh	RegionalID	WaterType	Owner	StaffGage	County	Catchment	Precip.48	Weather
1	S	NA		Belle Isle Ir	East Bostor	42.38417	-70.9945	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
2	S	NA		Belle Isle Ir	East Bostor	42.38417	-70.9945	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
3	S	NA		Belle Isle Ir	East Bostor	42.38298	-70.9953	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
4	S	NA		Belle Isle Ir	East Bostor	42.38298	-70.9953	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
5	S	NA		Belle Isle Ir	East Bostor	42.38533	-70.9933	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
6	S	NA		Belle Isle Ir	East Bostor	42.38533	-70.9933	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
7	S	NA	NA	Belle Isle Ir	East Bostor	42.38583	-70.9915	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
8	S	NA	NA	Belle Isle Ir	East Bostor	42.38639	-70.9944	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
9	S	NA		Belle Isle Ir	East Bostor	42.38298	-70.9953	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
10	S	NA		Belle Isle Ir	East Bostor	42.38298	-70.9953	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
11	S	NA		Belle Isle Ir	East Bostor	42.38417	-70.9945	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
12	S	NA	NA	Belle Isle Ir	East Bostor	42.38583	-70.9915	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
13	S	NA		Belle Isle Ir	East Bostor	42.38633	-70.9897	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
14	S	NA		Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
15	S	NA		Belle Isle Ir	East Bostor	42.38633	-70.9897	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
16	S	NA		Belle Isle Ir	East Bostor	42.38298	-70.9953	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
17	S	NA		Belle Isle Ir	East Bostor	42.38533	-70.9933	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
18	S	NA		Belle Isle Ir	East Bostor	42.38509	-70.9907	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
19	S	NA		Belle Isle Ir	East Bostor	42.38509	-70.9907	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
20	S	NA		Belle Isle Ir	East Bostor	42.38533	-70.9933	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
21	S	NA		Belle Isle Ir	East Bostor	42.38417	-70.9945	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
22	S	NA		Belle Isle Ir	East Bostor	42.38633	-70.9897	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
23	S	NA		Belle Isle Ir	East Bostor	42.38633	-70.9897	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
24	S	NA		Belle Isle Ir	East Bostor	42.38398	-70.995	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
25	S	NA		Belle Isle Ir	East Bostor	42.38398	-70.995	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
26	S	NA		Belle Isle Ir	East Bostor	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
27	S	NA	NA	Belle Isle Ir	East Bostor	42.38583	-70.9915	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
28	S	NA		Belle Isle Ir	East Bostor	42.38633	-70.9897	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
29	S	NA		Belle Isle Ir	East Bostor	42.38398	-70.995	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
30	S	NA		Belle Isle Ir	East Bostor	42.38398	-70.995	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
31	S	NA	NA	Belle Isle Ir	East Bostor	42.38583	-70.9915	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
32	S	NA		Belle Isle Ir	East Bostor	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
33	S	NA		Belle Isle Ir	East Bostor	42.38417	-70.9945	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
34	S	NA		Belle Isle Ir	East Bostor	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
35	S	NA	NA	Belle Isle Ir	East Bostor	42.38639	-70.9944	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
36	S	NA		Belle Isle Ir	East Bostor	42.38633	-70.9897	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
37	S	NA		Belle Isle Ir	East Bostor	42.38398	-70.995	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
38	S	NA		Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
39	S	NA		Belle Isle Ir	East Bostor	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
40	S	NA	NA	Belle Isle Ir	East Bostor	42.38639	-70.9944	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
41	S	NA		Belle Isle Ir	East Bostor	42.38417	-70.9945	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
42	S	NA		Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
43	S	NA		Belle Isle Ir	East Bostor	42.38533	-70.9933	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
44	S	NA	NA	Belle Isle Ir	East Bostor	42.38639	-70.9944	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
45	S	NA		Belle Isle Ir	East Bostor	42.38398	-70.995	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
46	S	NA	NA	Belle Isle Ir	East Bostor	42.38676	-70.994	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
47	S	NA	NA	Belle Isle Ir	East Bostor	42.38583	-70.9915	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
48	S	NA		Belle Isle Ir	East Bostor	42.38509	-70.9907	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
49	S	NA		Belle Isle Ir	East Bostor	42.38509	-70.9907	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
50	S	NA		Belle Isle Ir	East Bostor	42.38509	-70.9907	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
51	S	NA		Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
52	S	NA	NA	Belle Isle Ir	East Bostor	42.38676	-70.994	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
53	S	NA	NA	Belle Isle Ir	East Bostor	42.38639	-70.9944	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
54	S	NA	NA	Belle Isle Ir	East Bostor	42.38639	-70.9944	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
55	S	NA		Belle Isle Ir	East Bostor	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
56	S	NA		Belle Isle Ir	East Bostor	42.38509	-70.9907	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
57	S	NA	NA	Belle Isle Ir	East Bostor	42.38676	-70.994	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
58	S	NA		Belle Isle Ir	East Bostor	42.38533	-70.9933	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
59	S	NA		Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
60	S	NA	NA	Belle Isle Ir	East Bostor	42.38676	-70.994	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
61	S	NA		Belle Isle Ir	East Bostor	42.38298	-70.9953	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
62	S	NA	NA	Belle Isle Ir	East Bostor	42.38676	-70.994	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
63	S	NA	NA	Belle Isle Ir	East Bostor	42.38676	-70.994	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
64	S	NA	NA	Belle Isle Ir	East Bostor	42.38583	-70.9915	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
65	S	NA		Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
66	S	NA		Belle Isle Ir	East Bostor	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
67	S	NA	NA	Belle Isle Ir	Winthrop	42.38534	-70.9871	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
68	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.38789	-70.9819	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
69	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.39071	-70.9828	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
70	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.38789	-70.9819	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
71	S	NA		Belle Isle Ir	East Bostor	42.387	-70.986	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
72	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.39071	-70.9828	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
73	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.39071	-70.9828	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
74	S	NA	NA	Belle Isle Ir	Winthrop	42.38534	-70.9871	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
75	S	NA	NA	Belle Isle Ir	Winthrop	42.38534	-70.9871	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
76	S	NA	NA	Belle Isle Ir	Winthrop	42.38534	-70.9871	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
77	S	NA		Belle Isle Ir	East Bostor	42.387	-70.986	22	GPS-Unspe	WGS84	1	Lower Mys	Fresh		0	Suffolk	NA	0	Dry
78	S	NA		Belle Isle Ir	East Bostor	42.39165	-70.9888	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
79	S	NA	NA	Belle Isle Ir	Winthrop	42.38534	-70.9871	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
80	S	NA	NA	Belle Isle Ir	Winthrop	42.38534	-70.9871	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
81	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.38789	-70.9819	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
82	S	NA	Short Beac	Belle Isle Ir	Winthrop	42.39071	-70.9828	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry

83	8/24/2004 9:00	BEI007	26951	135524	SPCOND	44020	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:13	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.387	-70.986	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
84	8/24/2004 9:00	SHCWT3	26952	135532	ENT	34	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:22	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38789	-70.9819	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
85	8/24/2004 9:00	SHCWT3	26952	135531	TEMP_WATER	20.9	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:22	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38789	-70.9819	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
86	8/24/2004 9:00	BEIBT6	26956	135556	DO	9.67	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:57	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.39165	-70.9888	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
87	8/24/2004 9:00	BEIBT6	26956	135557	SPCOND	44580	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:57	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.39165	-70.9888	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
88	8/24/2004 9:00	SHCWT3	26952	135533	SPCOND	41390	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:22	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38789	-70.9819	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
89	8/24/2004 9:00	BEI007	26951	135527	DO	6.39	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:13	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.387	-70.986	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
90	8/24/2004 9:00	BEI007	26951	135525	DO_SAT	70.91919	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:13	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.387	-70.986	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
91	8/24/2004 9:00	BEI006	26949	135512	TEMP_WATER	19.1	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:02	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38633	-70.9877	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
92	8/24/2004 9:00	SHC002	26954	135541	SALINITY	27.8	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:34	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.39071	-70.9828	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
93	8/24/2004 9:00	BEIBT6	26956	135553	ENT	43	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:57	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.39165	-70.9888	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
94	8/24/2004 9:00	BEI006	26949	135515	SALINITY	28.5	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:02	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38633	-70.9877	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
95	8/24/2004 9:00	BEI009	26955	135548	DO_SAT	76.06305	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:48	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38967	-70.9873	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
96	8/24/2004 9:00	BEI009	26955	135550	SPCOND	44040	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:48	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38967	-70.9873	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
97	8/24/2004 9:00	WINTSHCK	26953	135535	DO	5.14	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:28	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38923	-70.984	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
98	8/24/2004 9:00	BEI009	26955	135549	DO	6.7	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:48	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38967	-70.9873	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
99	8/24/2004 9:00	WINTSHCK	26953	135534	DO_SAT	57.27925	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:28	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38923	-70.984	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
100	8/24/2004 9:00	BEIBT6	26956	135552	SALINITY	28.8	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:57	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.39165	-70.9888	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
101	8/24/2004 9:00	BEI007	26951	135526	ENT	10	MPN/100n	<	NA	12	NA	NA	200408241	8/24/2004 9:13	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.387	-70.986	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
102	8/24/2004 9:00	BEI009	26955	135546	ENT	21	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:48	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38967	-70.9873	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
103	8/24/2004 9:00	BEI006	26949	135513	DO_SAT	71.76464	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:02	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38633	-70.9877	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
104	8/24/2004 9:00	BEI009	26955	135547	TEMP_WATER	20.6	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:48	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38967	-70.9873	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
105	8/24/2004 9:00	WINTSHCK	26953	135538	TEMP_WATER	19.7	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 9:28	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38923	-70.984	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
106	8/24/2004 9:00	WINTSHCK	26953	135536	SPCOND	43880	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:28	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38923	-70.984	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
107	8/24/2004 9:00	BEI006	26949	135514	DO	6.52	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 9:02	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38633	-70.9877	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
108	8/24/2004 9:00	SHC002	26954	135540	ENT	120	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:34	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.39071	-70.9828	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
109	8/24/2004 9:00	BEIBT6	26956	135555	DO_SAT	115.9091	%	NA	NA	24	NA	NA	200408241	8/24/2004 9:57	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.39165	-70.9888	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
110	8/24/2004 9:00	BEI006	26949	135510	SPCOND	44090	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 9:02	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38633	-70.9877	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
111	8/24/2004 9:00	WINTSHCK	26953	135539	ENT	417	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:28	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38923	-70.984	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
112	8/24/2004 9:00	BEI006	26949	135511	ENT	4	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 9:02	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38633	-70.9877	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
113	8/24/2004 9:00	WINTSHCK	26953	135537	SALINITY	28.4	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:28	HOTSPOT	S	1 S	NA	Short Beac	Belle Isle Ir Winthrop	42.38923	-70.984	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
114	8/24/2004 9:00	BEI009	26955	135551	SALINITY	28.5	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 9:48	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.38967	-70.9873	22 GPS-Unspe	WGS84	1 Lower Mys	Fresh		0 Suffolk	NA	0 Dry
115	8/24/2004 10:00	REVBelleIsl	26958	135567	DO_SAT	70.30293	%	NA	NA	24	NA	NA	200408241	8/24/2004 10:14	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir Revere	42.39365	-70.991	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.05125	0 Dry
116	8/24/2004 10:00	REVBelleIsl	26958	135568	ENT	2747	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 10:14	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir Revere	42.39365	-70.991	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.05125	0 Dry
117	8/24/2004 10:00	REVBelleIsl	26958	135565	SALINITY	22.5	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 10:14	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir Revere	42.39365	-70.991	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.05125	0 Dry
118	8/24/2004 10:00	REVBelleIsl	26958	135566	DO	6.19	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 10:14	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir Revere	42.39365	-70.991	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.05125	0 Dry
119	8/24/2004 10:00	BEI013	26959	135575	SPCOND	39350	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 10:18	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir East Bosto	42.39317	-70.9908	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
120	8/24/2004 10:00	REVBelleIsl	26958	135569	SPCOND	35560	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 10:14	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir Revere	42.39365	-70.991	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.05125	0 Dry
121	8/24/2004 10:00	BEI011	26957	135561	SALINITY	28.3	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 10:05	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.3925	-70.9872	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
122	8/24/2004 10:00	BEI011	26957	135563	DO	6.57	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 10:05	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.3925	-70.9872	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
123	8/24/2004 10:00	BEI011	26957	135562	SPCOND	43740	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 10:05	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.3925	-70.9872	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
124	8/24/2004 10:00	REVBennin	26960	135576	SPCOND	26450	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 10:26	HOTSPOT	S	1 S	NA	North corn	Belle Isle Ir Revere	42.39336	-70.9942	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.02467	0 Dry
125	8/24/2004 10:00	BEI011	26957	135558	TEMP_WATER	20.6	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 10:05	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.3925	-70.9872	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
126	8/24/2004 10:00	REVBennin	26960	135581	ENT	2202	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 10:26	HOTSPOT	S	1 S	NA	North corn	Belle Isle Ir Revere	42.39336	-70.9942	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.02467	0 Dry
127	8/24/2004 10:00	BEI013	26959	135572	DO_SAT	75.8052	%	NA	NA	24	NA	NA	200408241	8/24/2004 10:18	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir East Bosto	42.39317	-70.9908	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
128	8/24/2004 10:00	REVBennin	26960	135579	DO_SAT	68.79479	%	NA	NA	24	NA	NA	200408241	8/24/2004 10:26	HOTSPOT	S	1 S	NA	North corn	Belle Isle Ir Revere	42.39336	-70.9942	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.02467	0 Dry
129	8/24/2004 10:00	BEI015	26961	135587	DO	4.06	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 10:30	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
130	8/24/2004 10:00	BEI013	26959	135574	SALINITY	25.1	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 10:18	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir East Bosto	42.39317	-70.9908	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
131	8/24/2004 10:00	BEI015	26961	135585	DO_SAT	45.01119	%	NA	NA	24	NA	NA	200408241	8/24/2004 10:30	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
132	8/24/2004 10:00	BEI011	26957	135559	DO_SAT	74.57932	%	NA	NA	24	NA	NA	200408241	8/24/2004 10:05	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.3925	-70.9872	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
133	8/24/2004 10:00	REVBennin	26960	135577	SALINITY	16.2	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 10:26	HOTSPOT	S	1 S	NA	North corn	Belle Isle Ir Revere	42.39336	-70.9942	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.02467	0 Dry
134	8/24/2004 10:00	REVBelleIsl	26958	135564	TEMP_WATER	20.8	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 10:14	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir Revere	42.39365	-70.991	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.05125	0 Dry
135	8/24/2004 10:00	BEI015	26961	135582	TEMP_WATER	19.8	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 10:30	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
136	8/24/2004 10:00	BEI013	26959	135571	TEMP_WATER	21.2	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 10:18	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir East Bosto	42.39317	-70.9908	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
137	8/24/2004 10:00	BEI015	26961	135586	ENT	939	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 10:30	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
138	8/24/2004 10:00	BEI011	26957	135560	ENT	25	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 10:05	HOTSPOT	S	1 S	NA		Belle Isle Ir East Bosto	42.3925	-70.9872	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
139	8/24/2004 10:00	REVBennin	26960	135580	TEMP_WATER	20.8	deg C	NA	NA	68	NA	NA	200408241	8/24/2004 10:26	HOTSPOT	S	1 S	NA	North corn	Belle Isle Ir Revere	42.39336	-70.9942	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.02467	0 Dry
140	8/24/2004 10:00	BEI015	26961	135583	SALINITY	15.9	ppt	NA	NA	69	NA	NA	200408241	8/24/2004 10:30	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
141	8/24/2004 10:00	BEI013	26959	135573	DO	6.61	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 10:18	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir East Bosto	42.39317	-70.9908	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
142	8/24/2004 10:00	BEI015	26961	135584	SPCOND	26010	uS/cm	NA	NA	71	NA	NA	200408241	8/24/2004 10:30	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
143	8/24/2004 10:00	BEI013	26959	135570	ENT	24	MPN/100n	NA	NA	12	NA	NA	200408241	8/24/2004 10:18	HOTSPOT	S	1 S	NA	NA	Belle Isle Ir East Bosto	42.39317	-70.9908	22 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0 Dry
144	8/24/2004 10:00	REVBennin	26960	135578	DO	6.08	mg/l	NA	NA	24	NA	NA	200408241	8/24/2004 10:26	HOTSPOT	S	1 S	NA	North corn	Belle Isle Ir Revere	42.39336	-70.9942	27 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.02467	0 Dry
145	11/30/2004 7:00	BEIWBAYO	27165	135905	DO	6.25	mg/l	NA	NA	24	NA	NA	20041130C	11/30/2004 7:58	HOTSPOT	S	1 S	fish fry seen (herring?		Belle Isle Ir Winthrop	42.38756	-70.9785	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
146	11/30/2004 7:00	BEIWBAYO	27165	135906	SALINITY	0.6	ppt	NA	NA	69	NA	NA	20041130C	11/30/2004 7:58	HOTSPOT	S	1 S	fish fry seen (herring?		Belle Isle Ir Winthrop	42.38756	-70.9785	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
147	11/30/2004 7:00	BEIWBOAR	27164	135897	SPCOND	16460	uS/cm	NA	NA	71	NA	NA	20041130C	11/30/2004 7:43	HOTSPOT	S	1 S	at boardwa	NA	Belle Isle Ir Winthrop	42.3857	-70.9844	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.03095	0.8 Wet
148	11/30/2004 7:00	BEIWBAYO	27165	135902	SPCOND	1106	uS/cm	NA	NA	71	NA	NA	20041130C	11/30/2004 7:58	HOTSPOT	S	1 S	fish fry seen (herring?		Belle Isle Ir Winthrop	42.38756	-70.9785	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
149	11/30/2004 7:00	BEIWBAYO	27165	135904	DO_SAT	56.01602	%	NA	NA	24	NA	NA	20041130C	11/30/2004 7:58	HOTSPOT	S	1 S	fish fry seen (herring?		Belle Isle Ir Winthrop	42.38756	-70.9785	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
150	11/30/2004 7:00	BEIWBAYO	27165	135903	TEMP_WATER	10.4	deg C	NA	NA	68	NA	NA	20041130C	11/30/2004 7:58	HOTSPOT	S	1 S	fish fry seen (herring?		Belle Isle Ir Winthrop	42.38756	-70.9785	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
151	11/30/2004 7:00	BEIWBAYO	27165	135901	FCOLI	3200	CFU/100m	NA	NA	17	NA	NA	20041130C	11/30/2004 7:58	HOTSPOT	S	1 S	fish fry seen (herring?		Belle Isle Ir Winthrop	42.38756	-70.9785	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
152	11/30/2004 7:00	BEIWBOAR	27164	135898	DO	5.77	mg/l	NA	NA	24	NA	NA	20041130C	11/30/2004 7:43	HOTSPOT	S	1 S	at boardwa	NA	Belle Isle Ir Winthrop	42.3857	-70.9844	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.03095	0.8 Wet
153	11/30/2004 7:00	BEIWBOAR	27164	135899	SALINITY	9.6	ppt	NA	NA	69	NA	NA	20041130C	11/30/2004 7:43	HOTSPOT	S	1 S	at boardwa	NA	Belle Isle Ir Winthrop	42.3857	-70.9844	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.03095	0.8 Wet
154	11/30/2004 7:00	BEIWBOAR	27164	135900	DO_SAT	48.62621	%	NA	NA	24	NA	NA	20041130C	11/30/2004 7:43	HOTSPOT	S	1 S	at boardwa	NA	Belle Isle Ir Winthrop	42.3857	-70.9844	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.03095	0.8 Wet
155	11/30/2004 7:00	BEIWBOAR	27164	135895	TEMP_WATER	7.7	deg C	NA	NA	68	NA	NA	20041130C	11/30/2004 7:43	HOTSPOT	S	1 S	at boardwa	NA	Belle Isle Ir Winthrop	42.3857	-70.9844	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.03095	0.8 Wet
156	11/30/2004 7:00	BEIWBOAR	27164	135896	FCOLI	55	CFU/100m	NA	NA	17	NA	NA	20041130C	11/30/2004 7:43	HOTSPOT	S	1 S	at boardwa	NA	Belle Isle Ir Winthrop	42.3857	-70.9844	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	0.03095	0.8 Wet
157	11/30/2004 8:00	BEI015N	27168	135919	DO_SAT	54.20007	%	NA	NA	24	NA	NA	20041130C	11/30/2004 8:25	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39336	-70.9942	7 GPS-Unspe	WGS84	1 Lower Mys	Saline	NA	0 Suffolk	NA	0.8 Wet
158	11/30/2004 8:00	BEI015	27167	135913	SALINITY	2.8	ppt	NA	NA	69	NA	NA	20041130C	11/30/2004 8:19	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
159	11/30/2004 8:00	BEI015N	27168	135916	SPCOND	7300	uS/cm	NA	NA	71	NA	NA	20041130C	11/30/2004 8:25	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39336	-70.9942	7 GPS-Unspe	WGS84	1 Lower Mys	Saline	NA	0 Suffolk	NA	0.8 Wet
160	11/30/2004 8:00	BEI015N	27168	135915	SALINITY	4	ppt	NA	NA	69	NA	NA	20041130C	11/30/2004 8:25	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39336	-70.9942	7 GPS-Unspe	WGS84	1 Lower Mys	Saline	NA	0 Suffolk	NA	0.8 Wet
161	11/30/2004 8:00	BEI015N	27168	135917	DO	6.69	mg/l	NA	NA	24	NA	NA	20041130C	11/30/2004 8:25	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39336	-70.9942	7 GPS-Unspe	WGS84	1 Lower Mys	Saline	NA	0 Suffolk	NA	0.8 Wet
162	11/30/2004 8:00	BEI015	27167	135909	SPCOND	5210	uS/cm	NA	NA	71	NA	NA	20041130C	11/30/2004 8:19	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
163	11/30/2004 8:00	BEI015	27167	135908	DO	6.75	mg/l	NA	NA	24	NA	NA	20041130C	11/30/2004 8:19	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
164	11/30/2004 8:00	BEI015	27167	135911	TEMP_WATER	6.1	deg C	NA	NA	68	NA	NA	20041130C	11/30/2004 8:19	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39325	-70.9943	7 GPS-Unspe	WGS84	1 Lower Mys	Saline		0 Suffolk	NA	0.8 Wet
165	11/30/2004 8:00	BEI015N	27168	135914	FCOLI	2000	CFU/100m	NA	NA	17	NA	NA	20041130C	11/30/2004 8:25	HOTSPOT	S	1 S	NA	Main tideg	Belle Isle Ir East Bosto	42.39336	-70.9942	7 GPS-Unspe	WGS84	1 Lower Mys	Saline	NA	0 Suffolk	NA	0.8 Wet

166	11/30/2004 8:00	BEI015N	27168	135918	TEMP_WATER	6.2	deg C	NA	NA	68	NA	NA	20041130C	11/30/2004 8:25	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39336	-70.9942	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	NA	0	Suffolk	NA	0.8	Wet
167	11/30/2004 8:00	BOS084	27166	135907	FCOLI	193	CFU/100m	NA	NA	17	NA	NA	20041130C	11/30/2004 8:15	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.8	Wet
168	11/30/2004 8:00	BEI015	27167	135910	DO_SAT	54.52589	%	NA	NA	24	NA	NA	20041130C	11/30/2004 8:19	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.8	Wet
169	11/30/2004 8:00	BEI015	27167	135912	FCOLI	1721	CFU/100m	NA	NA	17	NA	NA	20041130C	11/30/2004 8:19	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.8	Wet
170	3/29/2005 7:00	BEIBAYOU	27235	136178	DO_SAT	71.9	%	NA	NA	24	NA	NA	20050329C	3/29/2005 7:20	HOTSPOT	S	1	S	1.8" rain in 24 hours e		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
171	3/29/2005 7:00	BEIBAYOU	27235	136180	SALINITY	0.6	ppt	NA	NA	69	NA	NA	20050329C	3/29/2005 7:20	HOTSPOT	S	1	S	1.8" rain in 24 hours e		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
172	3/29/2005 7:00	BEIBAYOU	27235	136179	TEMP_WATER	5.6	deg C	NA	NA	68	NA	NA	20050329C	3/29/2005 7:20	HOTSPOT	S	1	S	1.8" rain in 24 hours e		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
173	3/29/2005 7:00	BEIBAYOU	27235	136175	SPCOND	1238	uS/cm	NA	NA	71	NA	NA	20050329C	3/29/2005 7:20	HOTSPOT	S	1	S	1.8" rain in 24 hours e		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
174	3/29/2005 7:00	BEIBAYOU	27235	136177	DO	9	mg/l	NA	NA	24	NA	NA	20050329C	3/29/2005 7:20	HOTSPOT	S	1	S	1.8" rain in 24 hours e		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
175	3/29/2005 7:00	BEIBAYOU	27235	136176	FCOLI	793	CFU/100m	NA	NA	17	NA	NA	20050329C	3/29/2005 7:20	HOTSPOT	S	1	S	1.8" rain in 24 hours e		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
176	4/26/2005 5:00	BEIBAYOU	27251	136267	TEMP_WATER	9.3	deg C	NA	NA	68	NA	NA	20050426C	4/26/2005 5:27	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.21	Dry
177	4/26/2005 5:00	BEIBAYOU	27251	136270	FCOLI	22	CFU/100m	NA	NA	17	NA	NA	20050426C	4/26/2005 5:27	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.21	Dry
178	4/26/2005 5:00	BEIBAYOU	27251	136266	SPCOND	2457	uS/cm	NA	NA	71	NA	NA	20050426C	4/26/2005 5:27	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.21	Dry
179	4/26/2005 5:00	BEIBAYOU	27251	136269	DO	7.28	mg/l	NA	NA	24	NA	NA	20050426C	4/26/2005 5:27	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.21	Dry
180	4/26/2005 5:00	BEIBAYOU	27251	136271	SALINITY	1.3	ppt	NA	NA	69	NA	NA	20050426C	4/26/2005 5:27	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.21	Dry
181	4/26/2005 5:00	BEIBAYOU	27251	136268	DO_SAT	63.58954	%	NA	NA	24	NA	NA	20050426C	4/26/2005 5:27	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.21	Dry
182	4/26/2005 6:00	REVBelleIsl	27261	136331	DO	6.51	mg/l	NA	NA	24	NA	NA	20050426C	4/26/2005 6:50	HOTSPOT	S	1	S	dry for 24 l	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.18	Dry
183	4/26/2005 6:00	BEIBT2	27258	136313	DO_SAT	64.09256	%	NA	NA	24	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
184	4/26/2005 6:00	BEIBT2	27258	136312	DO	7.65	mg/l	NA	NA	24	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
185	4/26/2005 6:00	BEIBT2	27258	136315	ENT	12	MPN/100n	NA	NA	12	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
186	4/26/2005 6:00	REVBelleIsl	27261	136330	SALINITY	9.7	ppt	NA	NA	69	NA	NA	20050426C	4/26/2005 6:50	HOTSPOT	S	1	S	dry for 24 l	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.18	Dry
187	4/26/2005 6:00	REVBelleIsl	27261	136332	TEMP_WATER	10.1	deg C	NA	NA	68	NA	NA	20050426C	4/26/2005 6:50	HOTSPOT	S	1	S	dry for 24 l	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.18	Dry
188	4/26/2005 6:00	REVBelleIsl	27261	136329	DO_SAT	58.14761	%	NA	NA	24	NA	NA	20050426C	4/26/2005 6:50	HOTSPOT	S	1	S	dry for 24 l	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.18	Dry
189	4/26/2005 6:00	BEIBT2	27258	136311	SALINITY	21.6	ppt	NA	NA	69	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
190	4/26/2005 6:00	BEIBT2	27258	136314	TEMP_WATER	7.3	deg C	NA	NA	68	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
191	4/26/2005 6:00	BEIBT2	27258	136310	SPCOND	34630	uS/cm	NA	NA	71	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
192	4/26/2005 6:00	REVBelleIsl	27261	136333	FCOLI	1	CFU/100m	<	NA	17	NA	NA	20050426C	4/26/2005 6:50	HOTSPOT	S	1	S	dry for 24 l	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.18	Dry
193	4/26/2005 6:00	REVBelleIsl	27261	136334	SPCOND	16530	uS/cm	NA	NA	71	NA	NA	20050426C	4/26/2005 6:50	HOTSPOT	S	1	S	dry for 24 l	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.18	Dry
194	4/26/2005 6:00	BEIBT2	27258	136316	FCOLI	120	CFU/100m	NA	NA	17	NA	NA	20050426C	4/26/2005 6:19	HOTSPOT	S	1	S	dry for 24 hours prior		Belle Isle Ir	East Bosto	42.38368	-70.9957	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.18	Dry
195	4/26/2005 7:00	BEI015	27263	136344	DO_SAT	48.86759	%	NA	NA	24	NA	NA	20050426C	4/26/2005 7:07	HOTSPOT	S	1	S	dry for 24 l	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.15	Dry
196	4/26/2005 7:00	BEI015	27263	136341	SALINITY	2.8	ppt	NA	NA	69	NA	NA	20050426C	4/26/2005 7:07	HOTSPOT	S	1	S	dry for 24 l	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.15	Dry
197	4/26/2005 7:00	BEI015	27263	136342	SPCOND	5230	uS/cm	NA	NA	71	NA	NA	20050426C	4/26/2005 7:07	HOTSPOT	S	1	S	dry for 24 l	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.15	Dry
198	4/26/2005 7:00	BEI015	27263	136343	DO	5.7	mg/l	NA	NA	24	NA	NA	20050426C	4/26/2005 7:07	HOTSPOT	S	1	S	dry for 24 l	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.15	Dry
199	4/26/2005 7:00	BEI015	27263	136345	TEMP_WATER	8.5	deg C	NA	NA	68	NA	NA	20050426C	4/26/2005 7:07	HOTSPOT	S	1	S	dry for 24 l	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.15	Dry
200	4/26/2005 7:00	BEI015	27263	136346	FCOLI	14	CFU/100m	NA	NA	17	NA	NA	20050426C	4/26/2005 7:07	HOTSPOT	S	1	S	dry for 24 l	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.15	Dry
201	5/23/2007 6:00	REVBelleIsl	27902	139291	TEMP_WATER	4.2	deg C	NA	NA	68	NA	NA	20070523C	5/23/2007 6:01	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0	Dry
202	5/23/2007 6:00	REVBelleIsl	27902	139289	ECOLI	869	CFU/100m	NA	NA	3	NA	NA	20070523C	5/23/2007 6:01	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0	Dry
203	5/23/2007 6:00	REVBelleIsl	27902	139287	DO	11.6	mg/l	NA	NA	24	NA	NA	20070523C	5/23/2007 6:01	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0	Dry
204	5/23/2007 6:00	REVBelleIsl	27902	139290	SPCOND	2775	uS/cm	NA	NA	71	NA	NA	20070523C	5/23/2007 6:01	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0	Dry
205	5/23/2007 6:00	REVBelleIsl	27902	139288	DO_SAT	89.9	%	NA	NA	24	NA	NA	20070523C	5/23/2007 6:01	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0	Dry
206	10/24/2007 6:00	REVBelleIsl	27975	139521	SPCOND	29740	uS/cm	NA	NA	71	NA	NA	20071024C	10/24/2007 6:03	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.05	Dry
207	10/24/2007 6:00	BEI015	27976	139522	ECOLI	5199	CFU/100m	NA	NA	3	NA	NA	20071024C	10/24/2007 6:18	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.05	Dry
208	10/24/2007 6:00	BEI015	27976	139523	SPCOND	43790	uS/cm	NA	NA	71	NA	NA	20071024C	10/24/2007 6:18	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.05	Dry
209	10/24/2007 6:00	REVBelleIsl	27975	139517	ECOLI	1549	CFU/100m	NA	NA	3	NA	NA	20071024C	10/24/2007 6:03	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.05	Dry
210	10/24/2007 6:00	BEI015	27976	139526	DO_SAT	62.1	%	NA	NA	24	NA	NA	20071024C	10/24/2007 6:18	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.05	Dry
211	10/24/2007 6:00	REVBelleIsl	27975	139519	DO_SAT	45	%	NA	NA	24	NA	NA	20071024C	10/24/2007 6:03	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.05	Dry
212	10/24/2007 6:00	BEI015	27976	139525	TEMP_WATER	16.5	deg C	NA	NA	68	NA	NA	20071024C	10/24/2007 6:18	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.05	Dry
213	10/24/2007 6:00	REVBelleIsl	27975	139518	DO	3.88	mg/l	NA	NA	24	NA	NA	20071024C	10/24/2007 6:03	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.05	Dry
214	10/24/2007 6:00	REVBelleIsl	27975	139520	TEMP_WATER	17	deg C	NA	NA	68	NA	NA	20071024C	10/24/2007 6:03	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.05	Dry
215	10/24/2007 6:00	BEI015	27976	139524	DO	5.1	mg/l	NA	NA	24	NA	NA	20071024C	10/24/2007 6:18	HOTSPOT	S	1	S	NA	Main tideg	Belle Isle Ir	East Bosto	42.39325	-70.9943	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.05	Dry
216	11/13/2007 6:00	WINTBAYC	27988	139583	ECOLI	1439	CFU/100m	NA	NA	3	NA	NA	20071113C	11/13/2007 6:40	HOTSPOT	S	1	S	broken pipe		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
217	11/13/2007 6:00	WINTBAYC	27988	139581	DO_SAT	93.1	%	NA	NA	24	NA	NA	20071113C	11/13/2007 6:40	HOTSPOT	S	1	S	broken pipe		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
218	11/13/2007 6:00	WINTBAYC	27988	139582	TEMP_WATER	9.7	deg C	NA	NA	68	NA	NA	20071113C	11/13/2007 6:40	HOTSPOT	S	1	S	broken pipe		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
219	11/13/2007 6:00	BEIBAYOU	27987	139577	SALINITY	0.1	ppt	NA	NA	69	NA	NA	20071113C	11/13/2007 6:30	HOTSPOT	S	1	S	NA		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
220	11/13/2007 6:00	BEIBAYOU	27987	139575	DO	10.37	mg/l	NA	NA	24	NA	NA	20071113C	11/13/2007 6:30	HOTSPOT	S	1	S	NA		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
221	11/13/2007 6:00	BEIBAYOU	27987	139574	DO_SAT	91.4	%	NA	NA	24	NA	NA	20071113C	11/13/2007 6:30	HOTSPOT	S	1	S	NA		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
222	11/13/2007 6:00	BEIBAYOU	27987	139573	TEMP_WATER	9.8	deg C	NA	NA	68	NA	NA	20071113C	11/13/2007 6:30	HOTSPOT	S	1	S	NA		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
223	11/13/2007 6:00	WINTBAYC	27988	139579	SPCOND	112	uS/cm	NA	NA	71	NA	NA	20071113C	11/13/2007 6:40	HOTSPOT	S	1	S	broken pipe		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
224	11/13/2007 6:00	WINTBAYC	27988	139580	DO	10.57	mg/l	NA	NA	24	NA	NA	20071113C	11/13/2007 6:40	HOTSPOT	S	1	S	broken pipe		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
225	11/13/2007 6:00	BEIBAYOU	27987	139578	ECOLI	1576	CFU/100m	NA	NA	3	NA	NA	20071113C	11/13/2007 6:30	HOTSPOT	S	1	S	NA		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
226	11/13/2007 6:00	BEIBAYOU	27987	139576	SPCOND	135	uS/cm	NA	NA	71	NA	NA	20071113C	11/13/2007 6:30	HOTSPOT	S	1	S	NA		Belle Isle Ir	Winthrop	42.38698	-70.9786	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
227	11/13/2007 6:00	WINTBAYC	27988	139584	SALINITY	0.1	ppt	NA	NA	69	NA	NA	20071113C	11/13/2007 6:40	HOTSPOT	S	1	S	broken pipe		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.08	Dry
228	1/30/2008 6:00	WINTBAYC	28021	139732	DO_SAT	40.8	%	NA	NA	24	NA	NA	20080130C	1/30/2008 6:58	HOTSPOT	S	1	S	orange deposition, die		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
229	1/30/2008 6:00	WINTBAYC	28021	139731	DO	4.64	mg/l	NA	NA	24	NA	NA	20080130C	1/30/2008 6:58	HOTSPOT	S	1	S	orange deposition, die		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
230	1/30/2008 6:00	WINTBAYC	28021	139733	ECOLI	12	CFU/100m	NA	NA	3	NA	NA	20080130C	1/30/2008 6:58	HOTSPOT	S	1	S	orange deposition, die		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
231	1/30/2008 6:00	WINTBAYC	28021	139735	TEMP_WATER	9.4	deg C	NA	NA	68	NA	NA	20080130C	1/30/2008 6:58	HOTSPOT	S	1	S	orange deposition, die		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
232	1/30/2008 6:00	WINTBAYC	28021	139734	SPCOND	1445	uS/cm	NA	NA	71	NA	NA	20080130C	1/30/2008 6:58	HOTSPOT	S	1	S	orange deposition, die		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
233	9/23/2008 10:00	REVBelleIsl	28164	140346	SURF_ANIONIC	0.08	mg/l	NA	NA	59	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
234	9/23/2008 10:00	REVBelleIsl	28164	140348	SPCOND	25290	uS/cm	NA	NA	71	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
235	9/23/2008 10:00	REVBelleIsl	28166	140361	DO_SAT	38.9	%	NA	NA	24	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
236	9/23/2008 10:00	REVBelleIsl	28166	140364	NH3	4.4	mg/l	NA	NA	42	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
237	9/23/2008 10:00	REVBelleIsl	28164	140350	DO	4.98	mg/l	NA	NA	24	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
238	9/23/2008 10:00	REVBelleIsl	28166	140362	TP	0.469	mg/l	NA	NA	49	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
239	9/23/2008 10:00	REVBelleIsl	28164	140349	TEMP_WATER	17.2	deg C	NA	NA	68	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
240	9/23/2008 10:00	REVBelleIsl	28166	140359	SPCOND	16010	uS/cm	NA	NA	71	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
241	9/23/2008 10:00	REVBelleIsl	28164	140347	NH3	1.21	mg/l	NA	NA	42	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
242	9/23/2008 10:00	REVBelleIsl	28166	140360	DO	3.35	mg/l	NA	NA	24	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
243	9/23/2008 10:00	REVBelleIsl	28164	140345	ENT	24196	MPN/100n	>	NA	13	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
244	9/23/2008 10:00	REVBelleIsl	28166	140357	TEMP_WATER	19.8	deg C	NA	NA	68	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
245	9/23/2008 10:00	REVBelleIsl	28164	140344	DO_SAT	56.9	%	NA	NA	24	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
246	9/23/2008 10:00	REVBelleIsl	28166	140358	ENT	801	MPN/100n	NA	NA	13	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
247	9/23/2008 10:00	REVBelleIsl	28166	140363	SURF_ANIONIC	0.1	mg/l	NA	NA	59	NA	NA	200809231	9/23/2008 10:46	HOTSPOT	S	1	S	suds, plasti	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
248	9/23/2008 10:00	REVBelleIsl	28164	140351	TP	0.073	mg/l	NA	NA	49	NA	NA	200809231	9/23/2008 10:40	HOTSPOT	S	1	S	old, concre	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet

249	4/28/2009 5:00	BEI093	126	1163	DO_SAT	77.52465	%	NA	NA	23	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
250	4/28/2009 5:00	BEI093	126	1166	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
251	4/28/2009 5:00	BEI093	126	1167	TEMP_WATER	12	deg C	NA	NA	67	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
252	4/28/2009 5:00	BEI093	126	1168	TP	0.07	mg/l	NA	NA	49	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
253	4/28/2009 5:00	BEI093	126	1164	ENT	44	CFU/100m	NA	NA	9	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
254	4/28/2009 5:00	BEI093	126	1169	TSS	30	mg/l	NA	NA	26	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
255	4/28/2009 5:00	BEI093	126	1162	DO	8.2	mg/l	NA	NA	23	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
256	4/28/2009 5:00	BEI093	126	1165	NO23	0.18	mg/l	NA	NA	38	NA	NA	20090428C	4/28/2009 5:17	BASE	S	1	NA	Scum comi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
257	5/12/2009 5:00	BEI093	132	1207	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20090512C	5/12/2009 5:08	BASE	S	1	NA	Small birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
258	5/12/2009 5:00	BEI093	132	1205	ENT	7	CFU/100m	NA	NA	9	NA	NA	20090512C	5/12/2009 5:08	BASE	S	1	NA	Small birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
259	5/12/2009 5:00	BEI093	132	1210	TSS	16	mg/l	NA	NA	26	NA	NA	20090512C	5/12/2009 5:08	BASE	S	1	NA	Small birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
260	5/12/2009 5:00	BEI093	132	1206	NO23	0.14	mg/l	NA	NA	38	NA	NA	20090512C	5/12/2009 5:08	BASE	S	1	NA	Small birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
261	5/12/2009 5:00	BEI093	132	1208	TEMP_WATER	12.5	deg C	NA	NA	67	NA	NA	20090512C	5/12/2009 5:08	BASE	S	1	NA	Small birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
262	5/12/2009 5:00	BEI093	132	1209	TP	0.05	mg/l	NA	NA	49	NA	NA	20090512C	5/12/2009 5:08	BASE	S	1	NA	Small birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
263	6/11/2009 5:00	BEI093	139	1255	TSS	12	mg/l	NA	NA	26	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
264	6/11/2009 5:00	BEI093	139	1252	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
265	6/11/2009 5:00	BEI093	139	1251	NO23	0.25	mg/l	NA	NA	38	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
266	6/11/2009 5:00	BEI093	139	1248	DO	6.2	mg/l	NA	NA	23	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
267	6/11/2009 5:00	BEI093	139	1254	TP	0.068	mg/l	NA	NA	49	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
268	6/11/2009 5:00	BEI093	139	1249	DO_SAT	62.62078	%	NA	NA	23	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
269	6/11/2009 5:00	BEI093	139	1250	ENT	23	CFU/100m	NA	NA	9	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
270	6/11/2009 5:00	BEI093	139	1253	TEMP_WATER	15	deg C	NA	NA	67	NA	NA	20090611C	6/11/2009 5:31	BASE	S	1	NA	Cooler 2C,	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.1	Dry
271	7/9/2009 5:00	BEI093	147	1316	SPCOND	20000	uS/cm	NA	NA	31	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
272	7/9/2009 5:00	BEI093	147	1313	DO_SAT	66.35634	%	NA	NA	23	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
273	7/9/2009 5:00	BEI093	147	1318	TP	0.109	mg/l	NA	NA	49	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
274	7/9/2009 5:00	BEI093	147	1317	TEMP_WATER	17	deg C	NA	NA	67	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
275	7/9/2009 5:00	BEI093	147	1319	TSS	15	mg/l	NA	NA	26	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
276	7/9/2009 5:00	BEI093	147	1315	NO23	0.51	mg/l	NA	NA	38	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
277	7/9/2009 5:00	BEI093	147	1314	ENT	260	CFU/100m	NA	NA	9	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
278	7/9/2009 5:00	BEI093	147	1312	DO	6.35	mg/l	NA	NA	23	NA	NA	20090709C	7/9/2009 5:08	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.71	Wet
279	8/10/2009 5:00	BEI093	154	1373	TEMP_WATER	19	deg C	NA	NA	67	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
280	8/10/2009 5:00	BEI093	154	1375	TSS	32	mg/l	NA	NA	26	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
281	8/10/2009 5:00	BEI093	154	1371	NO23	0.1	mg/l	<	NA	38	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
282	8/10/2009 5:00	BEI093	154	1374	TP	0.107	mg/l	NA	NA	49	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
283	8/10/2009 5:00	BEI093	154	1368	DO	5.6	mg/l	NA	NA	23	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
284	8/10/2009 5:00	BEI093	154	1369	DO_SAT	61.68444	%	NA	NA	23	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
285	8/10/2009 5:00	BEI093	154	1370	ENT	40	CFU/100m	NA	NA	9	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
286	8/10/2009 5:00	BEI093	154	1372	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20090810C	8/10/2009 5:46	BASE	S	1	NA	Cooler Ten	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
287	9/8/2009 5:00	BEI093	158	1407	TSS	56	mg/l	NA	NA	26	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
288	9/8/2009 5:00	BEI093	158	1405	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
289	9/8/2009 5:00	BEI093	158	1402	ENT	120	CFU/100m	NA	NA	9	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
290	9/8/2009 5:00	BEI093	158	1400	DO	5.9	mg/l	NA	NA	23	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
291	9/8/2009 5:00	BEI093	158	1404	SPCOND	46000	uS/cm	NA	NA	31	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
292	9/8/2009 5:00	BEI093	158	1403	NO23	0.24	mg/l	NA	NA	38	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
293	9/8/2009 5:00	BEI093	158	1406	TP	0.123	mg/l	NA	NA	49	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
294	9/8/2009 5:00	BEI093	158	1401	DO_SAT	63.68704	%	NA	NA	23	NA	NA	20090908C	9/8/2009 5:21	BASE	S	1	NA	Cooler 1.5(	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
295	10/8/2009 5:00	BEI093	165	1457	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
296	10/8/2009 5:00	BEI093	165	1455	ENT	76	CFU/100m	NA	NA	9	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
297	10/8/2009 5:00	BEI093	165	1456	NO23	0.1	mg/l	<	NA	38	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
298	10/8/2009 5:00	BEI093	165	1459	TP	0.155	mg/l	NA	NA	49	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
299	10/8/2009 5:00	BEI093	165	1460	TSS	92	mg/l	NA	NA	26	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
300	10/8/2009 5:00	BEI093	165	1458	TEMP_WATER	13	deg C	NA	NA	67	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
301	10/8/2009 5:00	BEI093	165	1454	DO_SAT	66.74253	%	NA	NA	23	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
302	10/8/2009 5:00	BEI093	165	1453	DO	6.9	mg/l	NA	NA	23	NA	NA	20091008C	10/8/2009 5:55	BASE	S	1	NA	Cooler tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.61	Wet
303	11/23/2009 7:00	BEI093	172	1516	TSS	17	mg/l	NA	NA	26	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
304	11/23/2009 7:00	BEI093	172	1514	TEMP_WATER	7.5	deg C	NA	NA	67	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
305	11/23/2009 7:00	BEI093	172	1509	DO	9.2	mg/l	NA	NA	23	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
306	11/23/2009 7:00	BEI093	172	1510	DO_SAT	77.6052	%	NA	NA	23	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
307	11/23/2009 7:00	BEI093	172	1513	SPCOND	28000	uS/cm	NA	NA	31	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
308	11/23/2009 7:00	BEI093	172	1512	NO23	0.26	mg/l	NA	NA	38	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
309	11/23/2009 7:00	BEI093	172	1515	TP	0.115	mg/l	NA	NA	49	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
310	11/23/2009 7:00	BEI093	172	1511	ENT	230	CFU/100m	NA	NA	9	NA	NA	20091123C	11/23/2009 7:10	BASE	S	1	NA	A couple o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
311	12/7/2009 7:00	BEI093	179	1567	TEMP_WATER	4.5	deg C	NA	NA	67	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
312	12/7/2009 7:00	BEI093	179	1562	DO	8.9	mg/l	NA	NA	23	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
313	12/7/2009 7:00	BEI093	179	1565	NO23	0.28	mg/l	NA	F	38	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
314	12/7/2009 7:00	BEI093	179	1569	TSS	20	mg/l	NA	NA	26	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
315	12/7/2009 7:00	BEI093	179	1568	TP	0.06	mg/l	NA	L	49	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
316	12/7/2009 7:00	BEI093	179	1566	SPCOND	37000	uS/cm	NA	NA	31	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
317	12/7/2009 7:00	BEI093	179	1563	DO_SAT	69.76965	%	NA	NA	23	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
318	12/7/2009 7:00	BEI093	179	1564	ENT	78	CFU/100m	NA	NA	9	NA	NA	20091207C	12/7/2009 7:20	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.37	Wet
319	1/21/2010 7:00	BEI093	184	1603	DO_SAT	70.81834	%	NA	NA	23	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
320	1/21/2010 7:00	BEI093	184	1609	TSS	26	mg/l	NA	NA	26	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
321	1/21/2010 7:00	BEI093	184	1608	TP	0.069	mg/l	NA	NA	49	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
322	1/21/2010 7:00	BEI093	184	1602	DO	10.2	mg/l	NA	NA	23	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
323	1/21/2010 7:00	BEI093	184	1607	TEMP_WATER	0	deg C	NA	NA	67	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
324	1/21/2010 7:00	BEI093	184	1605	NO23	0.22	mg/l	NA	NA	38	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
325	1/21/2010 7:00	BEI093	184	1606	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
326	1/21/2010 7:00	BEI093	184	1604	ENT	58	CFU/100m	NA	NA	9	NA	NA	20100121C	1/21/2010 7:22	BASE	S	1	NA	Floating slu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.3	Wet
327	2/18/2010 6:00	BEI093	189	1649	TSS	52	mg/l	NA	NA	26	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
328	2/18/2010 6:00	BEI093	189	1643	DO_SAT	72.58668	%	NA	NA	23	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
329	2/18/2010 6:00	BEI093	189	1647	TEMP_WATER	0.5	deg C	NA	NA	67	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
330	2/18/2010 6:00	BEI093	189	1645	NO23	0.1	mg/l	<	NA	38	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
331	2/18/2010 6:00	BEI093	189	1646	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet

332	2/18/2010 6:00	BEI093	189	1642	DO	10.3	mg/l	NA	NA	23	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
333	2/18/2010 6:00	BEI093	189	1644	ENT	62	CFU/100m	NA	NA	9	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
334	2/18/2010 6:00	BEI093	189	1648	TP	0.078	mg/l	NA	NA	49	NA	NA	20100218C	2/18/2010 6:55	BASE	S	1	NA	1 Swan, 10	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.4	Wet
335	3/18/2010 7:00	BEI093	197	1711	TEMP_WATER	7.5	deg C	NA	NA	67	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
336	3/18/2010 7:00	BEI093	197	1708	ENT	230	CFU/100m	NA	NA	9	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
337	3/18/2010 7:00	BEI093	197	1713	TSS	58	mg/l	NA	NA	26	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
338	3/18/2010 7:00	BEI093	197	1712	TP	0.367	mg/l	NA	NA	49	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
339	3/18/2010 7:00	BEI093	197	1709	NO23	1.8	mg/l	NA	NA	38	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
340	3/18/2010 7:00	BEI093	197	1710	SPCOND	4200	uS/cm	NA	NA	31	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
341	3/18/2010 7:00	BEI093	197	1707	DO_SAT	58.57415	%	NA	NA	23	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
342	3/18/2010 7:00	BEI093	197	1706	DO	7	mg/l	NA	NA	23	NA	NA	20100318C	3/18/2010 7:08	BASE	S	1	NA	Previous 9	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
343	4/19/2010 7:00	BEI093	201	1745	TSS	47	mg/l	NA	NA	26	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
344	4/19/2010 7:00	BEI093	201	1738	DO	8.9	mg/l	NA	NA	23	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
345	4/19/2010 7:00	BEI093	201	1742	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
346	4/19/2010 7:00	BEI093	201	1743	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
347	4/19/2010 7:00	BEI093	201	1740	ENT	8	CFU/100m	NA	NA	9	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
348	4/19/2010 7:00	BEI093	201	1741	NO23	0.13	mg/l	NA	NA	38	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
349	4/19/2010 7:00	BEI093	201	1744	TP	0.129	mg/l	NA	NA	49	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
350	4/19/2010 7:00	BEI093	201	1739	DO_SAT	76.41926	%	NA	NA	23	NA	NA	20100419C	4/19/2010 7:05	BASE	S	1	NA	1 duck flyi	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.13	Dry
351	5/17/2010 5:00	BEI093	208	1786	DO	7.9	mg/l	NA	NA	23	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
352	5/17/2010 5:00	BEI093	208	1789	NO23	0.1	mg/l	<	NA	38	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
353	5/17/2010 5:00	BEI093	208	1791	TEMP_WATER	12	deg C	NA	NA	67	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
354	5/17/2010 5:00	BEI093	208	1793	TSS	29	mg/l	NA	NA	26	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
355	5/17/2010 5:00	BEI093	208	1788	ENT	490	CFU/100m	NA	NA	9	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
356	5/17/2010 5:00	BEI093	208	1790	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
357	5/17/2010 5:00	BEI093	208	1787	DO_SAT	74.62383	%	NA	NA	23	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
358	5/17/2010 5:00	BEI093	208	1792	TP	0.092	mg/l	NA	NA	49	NA	NA	20100517C	5/17/2010 5:37	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
359	6/15/2010 5:00	BEI093	215	1835	DO	7.3	mg/l	NA	NA	23	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
360	6/15/2010 5:00	BEI093	215	1841	TSS	29	mg/l	NA	NA	26	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
361	6/15/2010 5:00	BEI093	215	1839	TEMP_WATER	14.5	deg C	NA	NA	67	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
362	6/15/2010 5:00	BEI093	215	1838	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
363	6/15/2010 5:00	BEI093	215	1840	TP	0.051	mg/l	NA	NA	49	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
364	6/15/2010 5:00	BEI093	215	1837	NO23	0.1	mg/l	<	NA	38	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
365	6/15/2010 5:00	BEI093	215	1836	DO_SAT	72.95708	%	NA	NA	23	NA	NA	20100615C	6/15/2010 5:15	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
366	7/15/2010 5:00	BEI093	218	1856	DO	4.3	mg/l	NA	NA	23	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
367	7/15/2010 5:00	BEI093	218	1857	DO_SAT	49.17647	%	NA	NA	23	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
368	7/15/2010 5:00	BEI093	218	1861	TP	0.147	mg/l	NA	L	49	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
369	7/15/2010 5:00	BEI093	218	1859	SPCOND	39000	uS/cm	NA	NA	31	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
370	7/15/2010 5:00	BEI093	218	1858	NO23	0.1	mg/l	<	NA	38	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
371	7/15/2010 5:00	BEI093	218	1860	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
372	7/15/2010 5:00	BEI093	218	1862	TSS	37	mg/l	NA	NA	26	NA	NA	20100715C	7/15/2010 5:44	BASE	S	1	NA	Clear, no s	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.15	Dry
373	8/12/2010 5:00	BEI093	224	1901	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
374	8/12/2010 5:00	BEI093	224	1902	TEMP_WATER	19	deg C	NA	NA	67	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
375	8/12/2010 5:00	BEI093	224	1904	TSS	100	mg/l	NA	NA	26	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
376	8/12/2010 5:00	BEI093	224	1899	DO_SAT	61.62509	%	NA	NA	23	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
377	8/12/2010 5:00	BEI093	224	1898	DO	5.6	mg/l	NA	NA	23	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
378	8/12/2010 5:00	BEI093	224	1903	TP	0.228	mg/l	NA	NA	49	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
379	8/12/2010 5:00	BEI093	224	1900	NO23	0.1	mg/l	<	NA	38	NA	NA	20100812C	8/12/2010 5:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
380	8/25/2010 5:00	REVBelleIsl	28417	141777	TEMP_WATER	20.6	deg C	NA	NA	68	NA	NA	20100825C	8/25/2010 5:20	HOTSPOT	S	1	S	45 gpm flo	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	1.42	Wet
381	8/25/2010 5:00	REVBelleIsl	28417	141773	DO_SAT	56.41066	%	NA	NA	24	NA	NA	20100825C	8/25/2010 5:20	HOTSPOT	S	1	S	45 gpm flo	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	1.42	Wet
382	8/25/2010 5:00	REVBelleIsl	28415	141760	DO	7.54	mg/l	NA	NA	24	NA	NA	20100825C	8/25/2010 5:10	HOTSPOT	S	1	S	50 gpm	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	1.42	Wet
383	8/25/2010 5:00	REVBelleIsl	28415	141763	SALINITY	1.9	ppt	NA	NA	69	NA	NA	20100825C	8/25/2010 5:10	HOTSPOT	S	1	S	50 gpm	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	1.42	Wet
384	8/25/2010 5:00	REVBelleIsl	28415	141761	DO_SAT	81.10746	%	NA	NA	24	NA	NA	20100825C	8/25/2010 5:10	HOTSPOT	S	1	S	50 gpm	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	1.42	Wet
385	8/25/2010 5:00	REVBelleIsl	28415	141765	TEMP_WATER	18.7	deg C	NA	NA	68	NA	NA	20100825C	8/25/2010 5:10	HOTSPOT	S	1	S	50 gpm	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	1.42	Wet
386	8/25/2010 5:00	REVBelleIsl	28417	141775	SALINITY	1.2	ppt	NA	NA	69	NA	NA	20100825C	8/25/2010 5:20	HOTSPOT	S	1	S	45 gpm flo	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	1.42	Wet
387	8/25/2010 5:00	REVBelleIsl	28417	141772	DO	5.05	mg/l	NA	NA	24	NA	NA	20100825C	8/25/2010 5:20	HOTSPOT	S	1	S	45 gpm flo	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	1.42	Wet
388	8/25/2010 5:00	REVBelleIsl	28417	141774	ENT	198630	CFU/100m	NA	NA	12	NA	NA	20100825C	8/25/2010 5:20	HOTSPOT	S	1	S	45 gpm flo	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	1.42	Wet
389	8/25/2010 5:00	REVBelleIsl	28417	141776	SPCOND	2321	uS/cm	NA	NA	71	NA	NA	20100825C	8/25/2010 5:20	HOTSPOT	S	1	S	45 gpm flo	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	1.42	Wet
390	8/25/2010 5:00	REVBelleIsl	28415	141762	ENT	48840	CFU/100m	NA	NA	12	NA	NA	20100825C	8/25/2010 5:10	HOTSPOT	S	1	S	50 gpm	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	1.42	Wet
391	8/25/2010 5:00	REVBelleIsl	28415	141764	SPCOND	3651	uS/cm	NA	NA	71	NA	NA	20100825C	8/25/2010 5:10	HOTSPOT	S	1	S	50 gpm	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	1.42	Wet
392	9/10/2010 5:00	BEI093	232	1959	TP	0.398	mg/l	NA	NA	49	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
393	9/10/2010 5:00	BEI093	232	1954	DO	5	mg/l	NA	NA	23	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
394	9/10/2010 5:00	BEI093	232	1955	DO_SAT	52.74855	%	NA	NA	23	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
395	9/10/2010 5:00	BEI093	232	1956	NO23	0.27	mg/l	NA	NA	38	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
396	9/10/2010 5:00	BEI093	232	1957	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
397	9/10/2010 5:00	BEI093	232	1958	TEMP_WATER	17	deg C	NA	NA	67	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
398	9/10/2010 5:00	BEI093	232	1960	TSS	430	mg/l	NA	NA	26	NA	NA	20100910C	9/10/2010 5:45	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.28	Wet
399	10/12/2010 6:00	BEI093	237	1990	DO_SAT	58.22882	%	NA	NA	23	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
400	10/12/2010 6:00	BEI093	237	1993	TEMP_WATER	12	deg C	NA	NA	67	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
401	10/12/2010 6:00	BEI093	237	1991	NO23	0.29	mg/l	NA	NA	38	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
402	10/12/2010 6:00	BEI093	237	1989	DO	6.2	mg/l	NA	NA	23	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
403	10/12/2010 6:00	BEI093	237	1992	SPCOND	28000	uS/cm	NA	NA	31	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
404	10/12/2010 6:00	BEI093	237	1995	TSS	17	mg/l	NA	NA	26	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
405	10/12/2010 6:00	BEI093	237	1994	TP	0.18	mg/l	NA	NA	49	NA	NA	20101012C	10/12/2010 6:13	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.05	Dry
406	11/10/2010 7:00	REVBelleIsl	28459	142012	SALINITY	1.17	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet
407	11/10/2010 7:00	REVBelleIsl	28459	142016	TEMP_WATER	15	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet
408	11/10/2010 7:00	REVBelleIsl	28459	142013	SPCOND	2269	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet
409	11/10/2010 7:00	REVBelleIsl	28459	142015	DO_SAT	42.77008	%	NA	NA	24	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet
410	11/10/2010 7:00	REVBelleIsl	28458	142007	ENT	6570	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0.31	Wet
411	11/10/2010 7:00	REVBelleIsl	28459	142010	NH3	6	mg/l	>	NA	76	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet
412	11/10/2010 7:00	REVBelleIsl	28458	142008	CHLORINE	0	mg/l	NA	NA	78	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0.31	Wet
413	11/10/2010 7:00	REVBelleIsl	28459	142017	SURF_ANIONIC	3	mg/l	>	NA	77	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet
414	11/10/2010 7:00	REVBelleIsl	28459	142011	CHLORINE	0	mg/l	NA	NA	78	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.05125	0.31	Wet

415	11/10/2010 7:00	REVBelleIsl	28458	142001	TEMP_WATER	10.4	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
416	11/10/2010 7:00	REVBelleIsl	28458	142004	SPCOND	11986	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
417	11/10/2010 7:00	REVBelleIsl	28458	142006	NH3	0	mg/l	NA	NA	76	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
418	11/10/2010 7:00	REVBelleIsl	28459	142014	DO	4.3	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
419	11/10/2010 7:00	REVBelleIsl	28458	142002	DO_SAT	64.77027	%	NA	NA	24	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
420	11/10/2010 7:00	REVBelleIsl	28458	142003	DO	7.2	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
421	11/10/2010 7:00	REVBelleIsl	28459	142009	ENT	325500	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 7:37	HOTSPOT	S	1	S	Strong sme	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.31	Wet
422	11/10/2010 7:00	REVBelleIsl	28458	142005	SALINITY	6.87	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 7:12	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.31	Wet
423	11/10/2010 8:00	BEI013	28460	142025	TEMP_WATER	9.2	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
424	11/10/2010 8:00	REVBeachr	28461	142027	TEMP_WATER	8.3	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
425	11/10/2010 8:00	REVBeachr	28461	142034	NH3	0	mg/l	NA	NA	76	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
426	11/10/2010 8:00	BEI013	28460	142020	CHLORINE	0	mg/l	NA	NA	78	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
427	11/10/2010 8:00	BEI013	28460	142024	DO_SAT	70.19405	%	NA	NA	24	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
428	11/10/2010 8:00	BEI013	28460	142026	ENT	64880	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
429	11/10/2010 8:00	REVBeachr	28461	142028	ENT	2430	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
430	11/10/2010 8:00	BEI013	28460	142019	SURF_ANIONIC	3	mg/l	NA	NA	77	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
431	11/10/2010 8:00	BEI013	28460	142021	SALINITY	13.28	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
432	11/10/2010 8:00	BEI013	28460	142018	NH3	1	mg/l	NA	NA	76	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
433	11/10/2010 8:00	REVBeachr	28461	142029	DO_SAT	96.30356	%	NA	NA	24	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
434	11/10/2010 8:00	REVBeachr	28461	142035	SURF_ANIONIC	0.12	mg/l	NA	NA	77	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
435	11/10/2010 8:00	BEI013	28460	142022	SPCOND	22111	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
436	11/10/2010 8:00	REVBeachr	28461	142032	SALINITY	0.03	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
437	11/10/2010 8:00	BEI013	28460	142023	DO	8	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 8:17	HOTSPOT	S	1	S	Tide may h	NA	Belle Isle Ir	East Bostor	42.39317	-70.9908	22	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.27	Wet
438	11/10/2010 8:00	REVBeachr	28461	142030	DO	11.3	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
439	11/10/2010 8:00	REVBeachr	28461	142031	SPCOND	59.7	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
440	11/10/2010 8:00	REVBeachr	28461	142033	CHLORINE	0	mg/l	NA	NA	78	NA	NA	20101110C	11/10/2010 8:44	HOTSPOT	S	1	S	NA	NA	Belle Isle Ir	Revere	42.39325	-70.988	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00691	0.27	Wet
441	11/10/2010 9:00	REVBAYOU	28462	142041	DO	7.7	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
442	11/10/2010 9:00	BOS084	28464	142059	SPCOND	2609	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
443	11/10/2010 9:00	REVBAYOU	28462	142044	SPCOND	1826	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
444	11/10/2010 9:00	BOS084	28464	142058	DO	9.6	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
445	11/10/2010 9:00	WINTBAYC	28463	142049	DO	8.7	mg/l	NA	NA	24	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
446	11/10/2010 9:00	WINTBAYC	28463	142048	DO_SAT	77.41707	%	NA	NA	24	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
447	11/10/2010 9:00	REVBAYOU	28462	142042	TEMP_WATER	9.7	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
448	11/10/2010 9:00	WINTBAYC	28463	142047	TEMP_WATER	10.1	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
449	11/10/2010 9:00	REVBAYOU	28462	142043	SURF_ANIONIC	0.63	mg/l	NA	NA	77	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
450	11/10/2010 9:00	WINTBAYC	28463	142050	SPCOND	407.4	uS/cm	NA	NA	71	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
451	11/10/2010 9:00	BOS084	28464	142060	SURF_ANIONIC	1.25	mg/l	NA	NA	77	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
452	11/10/2010 9:00	WINTBAYC	28463	142046	SURF_ANIONIC	0.63	mg/l	NA	NA	77	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
453	11/10/2010 9:00	WINTBAYC	28463	142052	CHLORINE	0	mg/l	NA	NA	78	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
454	11/10/2010 9:00	WINTBAYC	28463	142051	SALINITY	0.2	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
455	11/10/2010 9:00	BOS084	28464	142056	TEMP_WATER	10.2	deg C	NA	NA	68	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
456	11/10/2010 9:00	WINTBAYC	28463	142053	NH3	0	mg/l	NA	NA	76	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
457	11/10/2010 9:00	REVBAYOU	28462	142038	CHLORINE	0	mg/l	NA	NA	78	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
458	11/10/2010 9:00	WINTBAYC	28463	142045	ENT	6910	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 9:28	HOTSPOT	S	1	S	Water was cloudy and		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
459	11/10/2010 9:00	BOS084	28464	142055	ENT	1220	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
460	11/10/2010 9:00	REVBAYOU	28462	142039	SALINITY	0.93	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
461	11/10/2010 9:00	REVBAYOU	28462	142036	DO_SAT	67.90411	%	NA	NA	24	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
462	11/10/2010 9:00	BOS084	28464	142054	SALINITY	1.36	ppt	NA	NA	69	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
463	11/10/2010 9:00	REVBAYOU	28462	142037	NH3	0	mg/l	NA	NA	76	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
464	11/10/2010 9:00	BOS084	28464	142057	DO_SAT	85.68713	%	NA	NA	24	NA	NA	20101110C	11/10/2010 9:54	HOTSPOT	S	1	S	NA	Benningtor	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.29	Wet
465	11/10/2010 9:00	REVBAYOU	28462	142040	ENT	7540	CFU/100m	NA	NA	12	NA	NA	20101110C	11/10/2010 9:16	HOTSPOT	S	1	S	Sampled at	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0.29	Wet
466	11/12/2010 7:00	BEI093	242	2027	SPCOND	43	uS/cm	NA	NA	31	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
467	11/12/2010 7:00	BEI093	242	2026	NO23	0.17	mg/l	NA	NA	38	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
468	11/12/2010 7:00	BEI093	242	2025	DO_SAT	61.98213	%	NA	NA	23	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
469	11/12/2010 7:00	BEI093	242	2028	TEMP_WATER	6	deg C	NA	NA	67	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
470	11/12/2010 7:00	BEI093	242	2024	DO	7.7	mg/l	NA	NA	23	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
471	11/12/2010 7:00	BEI093	242	2029	TP	0.093	mg/l	NA	NA	49	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
472	11/12/2010 7:00	BEI093	242	2030	TSS	13	mg/l	NA	NA	26	NA	NA	20101112C	11/12/2010 7:22	BASE	S	1	NA	Water leve	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
473	12/10/2010 7:00	BEI093	250	2091	TSS	25	mg/l	NA	NA	26	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
474	12/10/2010 7:00	BEI093	250	2089	TEMP_WATER	-2	deg C	NA	NA	67	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
475	12/10/2010 7:00	BEI093	250	2085	DO_SAT	60.22649	%	NA	NA	23	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
476	12/10/2010 7:00	BEI093	250	2087	NO23	0.17	mg/l	NA	NA	38	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
477	12/10/2010 7:00	BEI093	250	2084	DO	9.2	mg/l	NA	NA	23	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
478	12/10/2010 7:00	BEI093	250	2088	SPCOND	40000	uS/cm	NA	NA	31	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
479	12/10/2010 7:00	BEI093	250	2090	TP	0.092	mg/l	NA	NA	49	NA	NA	20101210C	12/10/2010 7:14	BASE	S	1	NA	Mussel she	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
480	1/25/2011 7:00	BEI093	252	2101	SPCOND	40000	uS/cm	NA	NA	31	NA	NA	20110125C	1/25/2011 7:13	BASE	S	1	NA	Mud flat fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.03	Dry
481	1/25/2011 7:00	BEI093	252	2102	TEMP_WATER	-1.5	deg C	NA	NA	67	NA	NA	20110125C	1/25/2011 7:13	BASE	S	1	NA	Mud flat fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.03	Dry
482	1/25/2011 7:00	BEI093	252	2104	TSS	170	mg/l	NA	NA	26	NA	NA	20110125C	1/25/2011 7:13	BASE	S	1	NA	Mud flat fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.03	Dry
483	1/25/2011 7:00	BEI093	252	2103	TP	0.027	mg/l	NA	NA	49	NA	NA	20110125C	1/25/2011 7:13	BASE	S	1	NA	Mud flat fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.03	Dry
484	1/25/2011 7:00	BEI093	252	2100	NO23	0.24	mg/l	NA	NA	38	NA	NA	20110125C	1/25/2011 7:13	BASE	S	1	NA	Mud flat fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.03	Dry
485	3/23/2011 5:00	BEI093	264	2172	TEMP_WATER	4	deg C	NA	NA	67	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
486	3/23/2011 5:00	BEI093	264	2170	NO23	0.28	mg/l	NA	NA	38	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
487	3/23/2011 5:00	BEI093	264	2169	DO_SAT	73.6332	%	NA	NA	23	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
488	3/23/2011 5:00	BEI093	264	2173	TP	0.103	mg/l	NA	F	49	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
489	3/23/2011 5:00	BEI093	264	2171	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
490	3/23/2011 5:00	BEI093	264	2174	TSS	18	mg/l	NA	NA	26	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
491	3/23/2011 5:00	BEI093	264	2168	DO	9.5	mg/l	NA	NA	23	NA	NA	20110323C	3/23/2011 5:50	BASE	S	1	NA	Field replic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.16	Dry
492	4/8/2011 6:00	BEI093	273	2226	DO	8.1	mg/l	NA	NA	23	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle:	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
493	4/8/2011 6:00	BEI093	273	2229	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle:	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
494	4/8/2011 6:00	BEI093	273	2231	TP	0.141	mg/l	NA	NA	49	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle:	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
495	4/8/2011 6:00	BEI093	273	2232	TSS	15	mg/l	NA	NA	26	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle:	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
496	4/8/2011 6:00	BEI093	273	2228	NO23	0.16	mg/l	NA	NA	38	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle:	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
497	4/8/2011 6:00	BEI093	273	2230	TEMP_WATER	6.5	deg C	NA	NA	67	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle:	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry

498	4/8/2011 6:00	BEI093	273	2227	DO_SAT	66.98774	%	NA	NA	23	NA	NA	20110408C	4/8/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
499	5/6/2011 5:00	BEI093	274	2233	DO	7.5	mg/l	NA	NA	23	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
500	5/6/2011 5:00	BEI093	274	2238	TP	0.103	mg/l	NA	NA	49	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
501	5/6/2011 5:00	BEI093	274	2239	TSS	45	mg/l	NA	NA	26	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
502	5/6/2011 5:00	BEI093	274	2235	NO23	0.1	mg/l	NA	NA	38	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
503	5/6/2011 5:00	BEI093	274	2237	TEMP_WATER	10.5	deg C	NA	NA	67	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
504	5/6/2011 5:00	BEI093	274	2234	DO_SAT	68.40816	%	NA	NA	23	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
505	5/6/2011 5:00	BEI093	274	2236	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20110506C	5/6/2011 5:08	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.38	Wet
506	6/6/2011 6:00	BEI093	285	2306	DO	6.8	mg/l	NA	NA	23	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
507	6/6/2011 6:00	BEI093	285	2308	NO23	0.13	mg/l	NA	NA	38	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
508	6/6/2011 6:00	BEI093	285	2307	DO_SAT	70.22094	%	NA	NA	23	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
509	6/6/2011 6:00	BEI093	285	2312	TSS	26	mg/l	NA	NA	26	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
510	6/6/2011 6:00	BEI093	285	2311	TP	0.121	mg/l	NA	NA	49	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
511	6/6/2011 6:00	BEI093	285	2310	TEMP_WATER	16	deg C	NA	NA	67	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
512	6/6/2011 6:00	BEI093	285	2309	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20110606C	6/6/2011 6:20	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
513	7/19/2011 5:00	BEI093	287	2322	DO_SAT	61.30872	%	NA	NA	23	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
514	7/19/2011 5:00	BEI093	287	2325	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
515	7/19/2011 5:00	BEI093	287	2323	FCOLI	98	CFU/100m	NA	NA	15	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
516	7/19/2011 5:00	BEI093	287	2321	DO	5.2	mg/l	NA	NA	23	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
517	7/19/2011 5:00	BEI093	287	2327	TP	0.12	mg/l	NA	NA	49	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
518	7/19/2011 5:00	BEI093	287	2328	TSS	57	mg/l	NA	NA	26	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
519	7/19/2011 5:00	BEI093	287	2326	TEMP_WATER	22.5	deg C	NA	NA	67	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
520	7/19/2011 5:00	BEI093	287	2324	NO23	0.13	mg/l	NA	NA	38	NA	NA	20110719C	7/19/2011 5:52	BASE	S	1	NA	Ducks	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
521	8/18/2011 5:00	BEI093	293	2368	DO	5	mg/l	NA	NA	23	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
522	8/18/2011 5:00	BEI093	293	2372	TEMP_WATER	20	deg C	NA	NA	67	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
523	8/18/2011 5:00	BEI093	293	2373	TP	0.128	mg/l	NA	NA	49	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
524	8/18/2011 5:00	BEI093	293	2370	NO23	0.1	mg/l	<	NA	38	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
525	8/18/2011 5:00	BEI093	293	2369	DO_SAT	55.91723	%	NA	NA	23	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
526	8/18/2011 5:00	BEI093	293	2374	TSS	60	mg/l	NA	NA	26	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
527	8/18/2011 5:00	BEI093	293	2371	SPCOND	34000	uS/cm	NA	NA	31	NA	NA	20110818C	8/18/2011 5:53	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
528	9/2/2011 5:00	BEI093	298	2405	NO23	0.13	mg/l	NA	NA	38	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
529	9/2/2011 5:00	BEI093	298	2406	SPCOND	33000	uS/cm	NA	NA	31	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
530	9/2/2011 5:00	BEI093	298	2403	DO	4.6	mg/l	NA	NA	23	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
531	9/2/2011 5:00	BEI093	298	2409	TSS	47	mg/l	NA	NA	26	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
532	9/2/2011 5:00	BEI093	298	2404	DO_SAT	49.35685	%	NA	NA	23	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
533	9/2/2011 5:00	BEI093	298	2408	TP	0.109	mg/l	NA	NA	49	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
534	9/2/2011 5:00	BEI093	298	2407	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20110902C	9/2/2011 5:57	BASE	S	1	NA	Seagulls, c	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
535	10/11/2011 6:00	WINTBAYC	28653	143064	ENT	332	MPN/100n	NA	NA	12	NA	NA	20111011C	10/11/2011 6:20	HOTSPOT	S	1	S	Orange/brown (iron) p		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
536	10/11/2011 6:00	REVBelleIsl	28654	143069	SPCOND	8286	uS/cm	NA	NA	71	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
537	10/11/2011 6:00	REVBelleIsl	28654	143070	SALINITY	4.62	ppt	NA	NA	69	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
538	10/11/2011 6:00	REVBelleIsl	28654	143068	DO	4.3	mg/l	NA	NA	24	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
539	10/11/2011 6:00	REVBelleIsl	28654	143065	ENT	10	MPN/100n	NA	NA	12	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
540	10/11/2011 6:00	REVBelleIsl	28654	143066	TEMP_WATER	18.6	deg C	NA	NA	68	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
541	10/11/2011 6:00	WINTBAYC	28653	143063	NH3	0	mg/l	NA	NA	42	NA	NA	20111011C	10/11/2011 6:20	HOTSPOT	S	1	S	Orange/brown (iron) p		Belle Isle Ir	Winthrop	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
542	10/11/2011 6:00	REVBelleIsl	28654	143071	NH3	0	mg/l	NA	NA	42	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
543	10/11/2011 6:00	REVBelleIsl	28654	143067	DO_SAT	46.24029	%	NA	NA	24	NA	NA	20111011C	10/11/2011 6:31	HOTSPOT	S	1	S	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	0.00695	0	Dry
544	10/17/2011 6:00	BEI093	307	2464	TEMP_WATER	14.5	deg C	NA	NA	67	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
545	10/17/2011 6:00	BEI093	307	2462	NO23	0.1	mg/l	<	NA	38	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
546	10/17/2011 6:00	BEI093	307	2466	TSS	28	mg/l	NA	NA	26	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
547	10/17/2011 6:00	BEI093	307	2460	DO	7.3	mg/l	NA	NA	23	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
548	10/17/2011 6:00	BEI093	307	2463	SPCOND	34000	uS/cm	NA	NA	31	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
549	10/17/2011 6:00	BEI093	307	2461	DO_SAT	72.70316	%	NA	NA	23	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
550	10/17/2011 6:00	BEI093	307	2465	TP	0.068	mg/l	NA	NA	49	NA	NA	20111017C	10/17/2011 6:12	BASE	S	1	NA	Ibises, tern	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
551	11/30/2011 6:00	BEI093	313	2501	SPCOND	33000	uS/cm	NA	NA	31	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
552	11/30/2011 6:00	BEI093	313	2499	DO_SAT	70.88353	%	NA	NA	23	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
553	11/30/2011 6:00	BEI093	313	2503	TP	0.219	mg/l	NA	NA	49	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
554	11/30/2011 6:00	BEI093	313	2498	DO	7.8	mg/l	NA	NA	23	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
555	11/30/2011 6:00	BEI093	313	2500	NO23	0.44	mg/l	NA	NA	38	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
556	11/30/2011 6:00	BEI093	313	2502	TEMP_WATER	10.5	deg C	NA	NA	67	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
557	11/30/2011 6:00	BEI093	313	2504	TSS	150	mg/l	NA	L	26	NA	NA	20111130C	11/30/2011 6:48	BASE	S	1	NA	Seagulls, e	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.76	Wet
558	12/16/2011 7:00	BEI093	321	2571	TSS	160	mg/l	NA	L	26	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
559	12/16/2011 7:00	BEI093	321	2566	FCOLI	120	CFU/100m	NA	NA	15	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
560	12/16/2011 7:00	BEI093	321	2564	DO_SAT	62.70626	%	NA	NA	23	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
561	12/16/2011 7:00	BEI093	321	2563	DO	7.3	mg/l	NA	NA	23	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
562	12/16/2011 7:00	BEI093	321	2565	ENT	220	MPN/100n	NA	NA	8	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
563	12/16/2011 7:00	BEI093	321	2570	TP	2.25	mg/l	NA	NA	49	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
564	12/16/2011 7:00	BEI093	321	2568	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
565	12/16/2011 7:00	BEI093	321	2569	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
566	12/16/2011 7:00	BEI093	321	2567	NO23	0.18	mg/l	NA	NA	38	NA	NA	20111216C	12/16/2011 7:21	BASE	S	1	NA	Turbidity o	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.06	Dry
567	1/13/2012 6:00	BEI093	325	2594	DO	8.8	mg/l	NA	NA	23	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
568	1/13/2012 6:00	BEI093	325	2601	TSS	55	mg/l	NA	F	26	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
569	1/13/2012 6:00	BEI093	325	2599	TEMP_WATER	5	deg C	NA	NA	67	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
570	1/13/2012 6:00	BEI093	325	2597	NO23	0.25	mg/l	NA	NA	38	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
571	1/13/2012 6:00	BEI093	325	2596	ENT	2200	MPN/100n	NA	NA	8	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
572	1/13/2012 6:00	BEI093	325	2598	SPCOND	19000	uS/cm	NA	NA	31	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
573	1/13/2012 6:00	BEI093	325	2600	TP	0.128	mg/l	NA	F	49	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
574	1/13/2012 6:00	BEI093	325	2595	DO_SAT	69.45461	%	NA	NA	23	NA	NA	20120113C	1/13/2012 6:58	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.92	Wet
575	2/13/2012 7:00	BEI093	331	2647	TEMP_WATER	0	deg C	NA	NA	67	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
576	2/13/2012 7:00	BEI093	331	2645	NO23	0.2	mg/l	NA	NA	38	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
577	2/13/2012 7:00	BEI093	331	2642	DO	9.7	mg/l	NA	NA	23	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
578	2/13/2012 7:00	BEI093	331	2648	TP	0.135	mg/l	NA	NA	49	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
579	2/13/2012 7:00	BEI093	331	2646	SPCOND	39000	uS/cm	NA	NA	31	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
580	2/13/2012 7:00	BEI093	331	2644	ENT	7700	MPN/100n	NA	NA	8	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry

581	2/13/2012 7:00	BEI093	331	2649	TSS	48	mg/l	NA	NA	26	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02 Dry
582	2/13/2012 7:00	BEI093	331	2643	DO_SAT	67.27784	%	NA	NA	23	NA	NA	20120213C	2/13/2012 7:23	BASE	S	1	NA	Down featl	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02 Dry
583	3/27/2012 6:00	BEI093	335	2670	DO	8.8	mg/l	NA	NA	23	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
584	3/27/2012 6:00	BEI093	335	2676	TP	0.06	mg/l	NA	NA	49	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
585	3/27/2012 6:00	BEI093	335	2673	NO23	0.1	mg/l	<	NA	38	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
586	3/27/2012 6:00	BEI093	335	2674	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
587	3/27/2012 6:00	BEI093	335	2675	TEMP_WATER	4	deg C	NA	NA	67	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
588	3/27/2012 6:00	BEI093	335	2671	DO_SAT	68.25891	%	NA	NA	23	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
589	3/27/2012 6:00	BEI093	335	2677	TSS	45	mg/l	NA	NA	26	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
590	3/27/2012 6:00	BEI093	335	2672	ENT	41	MPN/100n	NA	NA	8	NA	NA	20120327C	3/27/2012 6:19	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
591	4/10/2012 5:00	BEI093	343	2731	ENT	110	MPN/100n	NA	NA	8	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
592	4/10/2012 5:00	BEI093	343	2732	NO23	0.1	mg/l	<	NA	38	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
593	4/10/2012 5:00	BEI093	343	2730	DO_SAT	72.24356	%	NA	NA	23	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
594	4/10/2012 5:00	BEI093	343	2729	DO	8.4	mg/l	NA	NA	23	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
595	4/10/2012 5:00	BEI093	343	2735	TP	0.143	mg/l	NA	NA	49	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
596	4/10/2012 5:00	BEI093	343	2736	TSS	39	mg/l	NA	NA	26	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
597	4/10/2012 5:00	BEI093	343	2734	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
598	4/10/2012 5:00	BEI093	343	2733	SPCOND	46000	uS/cm	NA	NA	31	NA	NA	20120410C	4/10/2012 5:52	BASE	S	1	NA	Much strav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
599	5/9/2012 5:00	BEI093	351	2795	ENT	73	MPN/100n	NA	NA	8	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
600	5/9/2012 5:00	BEI093	351	2797	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
601	5/9/2012 5:00	BEI093	351	2793	DO	6	mg/l	NA	NA	23	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
602	5/9/2012 5:00	BEI093	351	2796	NO23	0.24	mg/l	NA	NA	38	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
603	5/9/2012 5:00	BEI093	351	2798	TEMP_WATER	13	deg C	NA	NA	67	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
604	5/9/2012 5:00	BEI093	351	2799	TP	0.849	mg/l	NA	NA	49	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
605	5/9/2012 5:00	BEI093	351	2794	DO_SAT	57.9608	%	NA	NA	23	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
606	5/9/2012 5:00	BEI093	351	2800	TSS	200	mg/l	NA	NA	26	NA	NA	20120509C	5/9/2012 5:52	BASE	S	1	NA	Straw, seav	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17 Dry
607	6/8/2012 6:00	BEI093	354	2819	ENT	360	MPN/100n	NA	NA	8	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
608	6/8/2012 6:00	BEI093	354	2822	TEMP_WATER	17	deg C	NA	NA	67	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
609	6/8/2012 6:00	BEI093	354	2820	NO23	0.18	mg/l	NA	NA	38	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
610	6/8/2012 6:00	BEI093	354	2818	DO_SAT	56.73802	%	NA	NA	23	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
611	6/8/2012 6:00	BEI093	354	2823	TP	0.068	mg/l	NA	NA	49	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
612	6/8/2012 6:00	BEI093	354	2821	SPCOND	33000	uS/cm	NA	NA	31	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
613	6/8/2012 6:00	BEI093	354	2824	TSS	21	mg/l	NA	NA	26	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
614	6/8/2012 6:00	BEI093	354	2817	DO	5.4	mg/l	NA	NA	23	NA	NA	20120608C	6/8/2012 6:02	BASE	S	1	NA	Field duplic	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.04 Dry
615	7/23/2012 6:00	BEI093	2062	17655	NO23	0.1	mg/l	<	NA	38	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
616	7/23/2012 6:00	BEI093	2062	17656	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
617	7/23/2012 6:00	BEI093	2062	17659	TSS	220	mg/l	NA	NA	26	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
618	7/23/2012 6:00	BEI093	2062	17658	TP	0.424	mg/l	NA	NA	49	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
619	7/23/2012 6:00	BEI093	2062	17654	ENT	130	MPN/100n	NA	NA	8	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
620	7/23/2012 6:00	BEI093	2062	17657	TEMP_WATER	22	deg C	NA	NA	67	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
621	7/23/2012 6:00	BEI093	2062	17652	DO	4.4	mg/l	NA	NA	23	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
622	7/23/2012 6:00	BEI093	2062	17653	DO_SAT	51.39818	%	NA	NA	23	NA	NA	20120723C	7/23/2012 6:05	BASE	S	1	NA	Crab shells	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01 Dry
623	8/22/2012 6:00	BEI093	2065	17680	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
624	8/22/2012 6:00	BEI093	2065	17681	TEMP_WATER	20	deg C	NA	NA	67	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
625	8/22/2012 6:00	BEI093	2065	17678	ENT	63	MPN/100n	NA	NA	8	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
626	8/22/2012 6:00	BEI093	2065	17679	NO23	0.1	mg/l	<	NA	38	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
627	8/22/2012 6:00	BEI093	2065	17676	DO	5	mg/l	NA	NA	23	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
628	8/22/2012 6:00	BEI093	2065	17683	TSS	39	mg/l	NA	NA	26	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
629	8/22/2012 6:00	BEI093	2065	17682	TP	0.095	mg/l	NA	NA	49	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
630	8/22/2012 6:00	BEI093	2065	17677	DO_SAT	56.12798	%	NA	NA	23	NA	NA	20120822C	8/22/2012 6:07	BASE	S	1	NA	Down strea	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
631	9/5/2012 6:00	BEI093	2074	17744	NO23	0.24	mg/l	NA	NA	38	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
632	9/5/2012 6:00	BEI093	2074	17742	DO_SAT	71.72383	%	NA	NA	23	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
633	9/5/2012 6:00	BEI093	2074	17743	ENT	34000	MPN/100n	NA	NA	8	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
634	9/5/2012 6:00	BEI093	2074	17748	TSS	260	mg/l	NA	NA	26	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
635	9/5/2012 6:00	BEI093	2074	17747	TP	0.711	mg/l	NA	NA	49	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
636	9/5/2012 6:00	BEI093	2074	17741	DO	6.2	mg/l	NA	NA	23	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
637	9/5/2012 6:00	BEI093	2074	17746	TEMP_WATER	22	deg C	NA	NA	67	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
638	9/5/2012 6:00	BEI093	2074	17745	SPCOND	21000	uS/cm	NA	NA	31	NA	NA	20120905C	9/5/2012 6:09	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.89 Wet
639	10/4/2012 5:00	BEI093	2079	17784	TEMP_WATER	17	deg C	NA	NA	67	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
640	10/4/2012 5:00	BEI093	2079	17782	NO23	0.1	mg/l	NA	NA	38	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
641	10/4/2012 5:00	BEI093	2079	17779	DO	5.5	mg/l	NA	NA	23	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
642	10/4/2012 5:00	BEI093	2079	17781	ENT	130	MPN/100n	NA	NA	8	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
643	10/4/2012 5:00	BEI093	2079	17786	TSS	35	mg/l	NA	NA	26	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
644	10/4/2012 5:00	BEI093	2079	17783	SPCOND	30000	uS/cm	NA	NA	31	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
645	10/4/2012 5:00	BEI093	2079	17780	DO_SAT	57.71357	%	NA	NA	23	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
646	10/4/2012 5:00	BEI093	2079	17785	TP	0.1	mg/l	NA	NA	49	NA	NA	20121004C	10/4/2012 5:31	BASE	S	1	NA	Crickets, te	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.11 Dry
647	11/5/2012 7:00	BEI093	2083	17813	ENT	31	MPN/100n	NA	NA	8	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
648	11/5/2012 7:00	BEI093	2083	17818	TSS	45	mg/l	NA	NA	26	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
649	11/5/2012 7:00	BEI093	2083	17812	DO_SAT	66.87404	%	NA	NA	23	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
650	11/5/2012 7:00	BEI093	2083	17811	DO	7.6	mg/l	NA	NA	23	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
651	11/5/2012 7:00	BEI093	2083	17815	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
652	11/5/2012 7:00	BEI093	2083	17817	TP	0.033	mg/l	NA	NA	49	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
653	11/5/2012 7:00	BEI093	2083	17814	NO23	0.17	mg/l	NA	NA	38	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
654	11/5/2012 7:00	BEI093	2083	17816	TEMP_WATER	9	deg C	NA	NA	67	NA	NA	20121105C	11/5/2012 7:08	BASE	S	1	NA	It appears	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
655	12/4/2012 7:00	BEI093	2093	17893	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
656	12/4/2012 7:00	BEI093	2093	17895	TP	0.035	mg/l	NA	NA	49	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
657	12/4/2012 7:00	BEI093	2093	17890	DO_SAT	73.07359	%	NA	NA	23	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
658	12/4/2012 7:00	BEI093	2093	17892	NO23	0.25	mg/l	NA	NA	38	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
659	12/4/2012 7:00	BEI093	2093	17889	DO	8.5	mg/l	NA	NA	23	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
660	12/4/2012 7:00	BEI093	2093	17894	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
661	12/4/2012 7:00	BEI093	2093	17891	ENT	10	MPN/100n	NA	NA	8	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
662	12/4/2012 7:00	BEI093	2093	17896	TSS	50	mg/l	NA	NA	26	NA	NA	20121204C	12/4/2012 7:48	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0 Dry
663	1/31/2013 8:00	BEI093	28900	144059	TP	0.801	mg/l	NA	NA	49	NA	NA	20130131C	1/31/2013 8:20	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33 Wet

664	1/31/2013 8:00	BEI093	28900	144060	TSS	300	mg/l	NA	NA	26	NA	NA	20130131C	1/31/2013 8:20	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.33	Wet
665	1/31/2013 8:00	BEI093	28900	144057	NO23	0.29	mg/l	NA	NA	38	NA	NA	20130131C	1/31/2013 8:20	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.33	Wet
666	1/31/2013 8:00	BEI093	28900	144056	ENT	230	MPN/100n	NA	NA	8	NA	NA	20130131C	1/31/2013 8:20	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.33	Wet
667	1/31/2013 8:00	BEI093	28900	144058	SPCOND	8400	uS/cm	NA	NA	31	NA	NA	20130131C	1/31/2013 8:20	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.33	Wet
668	1/31/2013 8:00	BEI093	28900	144055	DO	6.2	mg/l	NA	NA	23	NA	NA	20130131C	1/31/2013 8:20	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.33	Wet
669	2/14/2013 7:00	BEI093	28904	144091	TP	0.177	mg/l	NA	NA	49	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
670	2/14/2013 7:00	BEI093	28904	144089	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
671	2/14/2013 7:00	BEI093	28904	144090	TEMP_WATER	5	deg C	NA	NA	67	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
672	2/14/2013 7:00	BEI093	28904	144085	DO	9	mg/l	NA	NA	23	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
673	2/14/2013 7:00	BEI093	28904	144087	ENT	590	MPN/100n	NA	NA	8	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
674	2/14/2013 7:00	BEI093	28904	144092	TSS	120	mg/l	NA	NA	26	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
675	2/14/2013 7:00	BEI093	28904	144088	NO23	0.14	mg/l	NA	NA	38	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
676	2/14/2013 7:00	BEI093	28904	144086	DO_SAT	71.67071	%	NA	NA	23	NA	NA	20130214C	2/14/2013 7:06	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
677	3/14/2013 5:00	BEI093	28910	144136	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20130314C	3/14/2013 5:50	BASE	S	1	NA	Temperatu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
678	3/14/2013 5:00	BEI093	28910	144133	DO	8.7	mg/l	NA	NA	23	NA	NA	20130314C	3/14/2013 5:50	BASE	S	1	NA	Temperatu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
679	3/14/2013 5:00	BEI093	28910	144135	NO23	0.24	mg/l	NA	NA	38	NA	NA	20130314C	3/14/2013 5:50	BASE	S	1	NA	Temperatu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
680	3/14/2013 5:00	BEI093	28910	144137	TP	0.201	mg/l	NA	NA	49	NA	NA	20130314C	3/14/2013 5:50	BASE	S	1	NA	Temperatu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
681	3/14/2013 5:00	BEI093	28910	144134	ENT	10	MPN/100n	<	NA	8	NA	NA	20130314C	3/14/2013 5:50	BASE	S	1	NA	Temperatu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
682	3/14/2013 5:00	BEI093	28910	144138	TSS	110	mg/l	NA	NA	26	NA	NA	20130314C	3/14/2013 5:50	BASE	S	1	NA	Temperatu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.29	Wet
683	4/29/2013 5:00	BEI093	28917	144189	TP	0.049	mg/l	NA	NA	49	NA	NA	20130429C	4/29/2013 5:53	BASE	S	1	NA	Water tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
684	4/29/2013 5:00	BEI093	28917	144188	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20130429C	4/29/2013 5:53	BASE	S	1	NA	Water tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
685	4/29/2013 5:00	BEI093	28917	144190	TSS	53	mg/l	NA	NA	26	NA	NA	20130429C	4/29/2013 5:53	BASE	S	1	NA	Water tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
686	4/29/2013 5:00	BEI093	28917	144186	ENT	10	MPN/100n	<	NA	8	NA	NA	20130429C	4/29/2013 5:53	BASE	S	1	NA	Water tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
687	4/29/2013 5:00	BEI093	28917	144187	NO23	0.1	mg/l	<	NA	38	NA	NA	20130429C	4/29/2013 5:53	BASE	S	1	NA	Water tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
688	4/29/2013 5:00	BEI093	28917	144185	DO	7.9	mg/l	NA	NA	23	NA	NA	20130429C	4/29/2013 5:53	BASE	S	1	NA	Water tem	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
689	5/28/2013 5:00	BEI093	28922	144227	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
690	5/28/2013 5:00	BEI093	28922	144228	TEMP_WATER	13.7	deg C	NA	NA	67	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
691	5/28/2013 5:00	BEI093	28922	144226	NO23	0.1	mg/l	<	NA	38	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
692	5/28/2013 5:00	BEI093	28922	144223	DO	6.4	mg/l	NA	NA	23	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
693	5/28/2013 5:00	BEI093	28922	144225	ENT	110	MPN/100n	NA	NA	8	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
694	5/28/2013 5:00	BEI093	28922	144229	TP	0.103	mg/l	NA	NA	49	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
695	5/28/2013 5:00	BEI093	28922	144230	TSS	96	mg/l	NA	NA	26	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
696	5/28/2013 5:00	BEI093	28922	144224	DO_SAT	62.89031	%	NA	NA	23	NA	NA	20130528C	5/28/2013 5:46	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.02	Dry
697	6/27/2013 6:00	BEI093	28927	144259	DO_SAT	64.12903	%	NA	NA	23	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
698	6/27/2013 6:00	BEI093	28927	144262	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
699	6/27/2013 6:00	BEI093	28927	144260	NO23	0.1	mg/l	<	NA	38	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
700	6/27/2013 6:00	BEI093	28927	144261	SPCOND	24000	uS/cm	NA	NA	31	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
701	6/27/2013 6:00	BEI093	28927	144258	DO	6	mg/l	NA	NA	23	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
702	6/27/2013 6:00	BEI093	28927	144263	TP	0.074	mg/l	NA	NA	49	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
703	6/27/2013 6:00	BEI093	28927	144264	TSS	22	mg/l	NA	NA	26	NA	NA	20130627C	6/27/2013 6:06	BASE	S	1	NA	Periwinkle	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.04	Dry
704	7/25/2013 5:00	BEI093	28932	144298	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
705	7/25/2013 5:00	BEI093	28932	144301	TSS	200	mg/l	NA	NA	26	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
706	7/25/2013 5:00	BEI093	28932	144297	NO23	0.1	mg/l	NA	NA	38	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
707	7/25/2013 5:00	BEI093	28932	144296	ENT	1600	MPN/100n	NA	NA	8	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
708	7/25/2013 5:00	BEI093	28932	144300	TP	0.262	mg/l	NA	NA	49	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
709	7/25/2013 5:00	BEI093	28932	144295	DO_SAT	53.87069	%	NA	NA	23	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
710	7/25/2013 5:00	BEI093	28932	144299	TEMP_WATER	19	deg C	NA	NA	67	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
711	7/25/2013 5:00	BEI093	28932	144294	DO	4.9	mg/l	NA	NA	23	NA	NA	20130725C	7/25/2013 5:57	BASE	S	1	NA	Flock of sa	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.75	Wet
712	8/9/2013 5:00	BEI093	29069	145292	ENT	300	MPN/100n	NA	NA	8	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
713	8/9/2013 5:00	BEI093	29069	145297	TSS	78	mg/l	NA	NA	26	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
714	8/9/2013 5:00	BEI093	29069	145295	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
715	8/9/2013 5:00	BEI093	29069	145291	DO_SAT	52.68377	%	NA	NA	23	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
716	8/9/2013 5:00	BEI093	29069	145296	TP	0.104	mg/l	NA	NA	49	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
717	8/9/2013 5:00	BEI093	29069	145294	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
718	8/9/2013 5:00	BEI093	29069	145293	NO23	0.1	mg/l	<	NA	38	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
719	8/9/2013 5:00	BEI093	29069	145290	DO	4.6	mg/l	NA	NA	23	NA	NA	20130809C	8/9/2013 5:40	BASE	S	1	NA	Film of scu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.07	Dry
720	9/10/2013 6:00	BEI093	29073	145329	TSS	62	mg/l	NA	NA	26	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
721	9/10/2013 6:00	BEI093	29073	145324	ENT	20	MPN/100n	NA	NA	8	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
722	9/10/2013 6:00	BEI093	29073	145323	DO_SAT	67.21574	%	NA	NA	23	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
723	9/10/2013 6:00	BEI093	29073	145327	TEMP_WATER	16	deg C	NA	NA	67	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
724	9/10/2013 6:00	BEI093	29073	145328	TP	0.086	mg/l	NA	NA	49	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
725	9/10/2013 6:00	BEI093	29073	145322	DO	6.5	mg/l	NA	NA	23	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
726	9/10/2013 6:00	BEI093	29073	145325	NO23	0.1	mg/l	<	NA	38	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
727	9/10/2013 6:00	BEI093	29073	145326	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20130910C	9/10/2013 6:10	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
728	10/9/2013 6:00	BEI093	30589	160234	DO_SAT	58.69567	%	NA	NA	23	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
729	10/9/2013 6:00	BEI093	30589	160239	TP	0.058	mg/l	NA	NA	49	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
730	10/9/2013 6:00	BEI093	30589	160233	DO	6	mg/l	NA	NA	23	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
731	10/9/2013 6:00	BEI093	30589	160238	TEMP_WATER	13.5	deg C	NA	NA	67	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
732	10/9/2013 6:00	BEI093	30589	160235	ENT	52	MPN/100n	NA	NA	8	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
733	10/9/2013 6:00	BEI093	30589	160237	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
734	10/9/2013 6:00	BEI093	30589	160236	NO23	0.1	mg/l	<	NA	38	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
735	10/9/2013 6:00	BEI093	30589	160240	TSS	60	mg/l	NA	NA	26	NA	NA	20131009C	10/9/2013 6:05	BASE	S	1	NA	Birds	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.1	Dry
736	11/7/2013 6:00	BEI093	30594	160280	TSS	64	mg/l	NA	NA	26	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
737	11/7/2013 6:00	BEI093	30594	160273	DO	7.6	mg/l	NA	NA	23	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
738	11/7/2013 6:00	BEI093	30594	160279	TP	0.13	mg/l	NA	NA	49	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
739	11/7/2013 6:00	BEI093	30594	160276	NO23	0.1	mg/l	<	NA	38	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
740	11/7/2013 6:00	BEI093	30594	160277	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
741	11/7/2013 6:00	BEI093	30594	160275	ENT	550	MPN/100n	NA	NA	8	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
742	11/7/2013 6:00	BEI093	30594	160274	DO_SAT	69.40836	%	NA	NA	23	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
743	11/7/2013 6:00	BEI093	30594	160278	TEMP_WATER	10.5	deg C	NA	NA	67	NA	NA	20131107C	11/7/2013 6:45	BASE	S	1	NA	No dock fo	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
744	12/4/2013 8:00	BOS084	30748	161227	ENT	110	MPN/100n	NA	NA	12	NA	NA	20131204C	12/4/2013 8:40	HOTSPOT	S	1	NA	NA	Bennington	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0	Dry
745	12/4/2013 9:00	REVBAYOU	30749	161229	NH3	1	mg/l	NA	NA	76	NA	NA	20131204C	12/4/2013 9:10	HOTSPOT	S	1	NA	NA	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0	Dry
746	12/4/2013 9:00	REVBAYOU	30749	161228	ENT	20	MPN/100n	NA	NA	12	NA	NA	20131204C	12/4/2013 9:10	HOTSPOT	S	1	NA	NA	From Bayo	Belle Isle Ir	Revere	42.38689	-70.9785	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	NA	0	Dry

747	12/6/2013 6:00	BEI093	30601	160330	ENT	97	MPN/100n	NA	NA	8	NA	NA	20131206C	12/6/2013 6:22	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.01	Dry
748	12/6/2013 6:00	BEI093	30601	160331	NO23	0.1	mg/l	<	NA	38	NA	NA	20131206C	12/6/2013 6:22	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.01	Dry
749	12/6/2013 6:00	BEI093	30601	160334	TSS	30	mg/l	NA	NA	26	NA	NA	20131206C	12/6/2013 6:22	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.01	Dry
750	12/6/2013 6:00	BEI093	30601	160332	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20131206C	12/6/2013 6:22	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.01	Dry
751	12/6/2013 6:00	BEI093	30601	160329	DO	8.9	mg/l	NA	NA	23	NA	NA	20131206C	12/6/2013 6:22	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.01	Dry
752	12/6/2013 6:00	BEI093	30601	160333	TP	0.08	mg/l	NA	NA	49	NA	NA	20131206C	12/6/2013 6:22	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.01	Dry
753	1/6/2014 7:00	BEI093	30624	160529	NO23	0.24	mg/l	NA	NA	38	NA	NA	20140106C	1/6/2014 7:12	BASE	S	1	NA	Frozen mu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.17	Dry
754	1/6/2014 7:00	BEI093	30624	160528	ENT	240	MPN/100n	NA	NA	8	NA	NA	20140106C	1/6/2014 7:12	BASE	S	1	NA	Frozen mu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.17	Dry
755	1/6/2014 7:00	BEI093	30624	160527	DO	9.7	mg/l	NA	NA	23	NA	NA	20140106C	1/6/2014 7:12	BASE	S	1	NA	Frozen mu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.17	Dry
756	1/6/2014 7:00	BEI093	30624	160532	TSS	25	mg/l	NA	NA	26	NA	NA	20140106C	1/6/2014 7:12	BASE	S	1	NA	Frozen mu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.17	Dry
757	1/6/2014 7:00	BEI093	30624	160530	SPCOND	30000	uS/cm	NA	NA	31	NA	NA	20140106C	1/6/2014 7:12	BASE	S	1	NA	Frozen mu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.17	Dry
758	1/6/2014 7:00	BEI093	30624	160531	TP	0.083	mg/l	NA	NA	49	NA	NA	20140106C	1/6/2014 7:12	BASE	S	1	NA	Frozen mu	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.17	Dry
759	2/4/2014 6:00	BEI093	30703	161046	NO23	0.1	mg/l	<	NA	38	NA	NA	20140204C	2/4/2014 6:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.19	Dry
760	2/4/2014 6:00	BEI093	30703	161049	TSS	37	mg/l	NA	NA	26	NA	NA	20140204C	2/4/2014 6:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.19	Dry
761	2/4/2014 6:00	BEI093	30703	161044	DO	10.4	mg/l	NA	NA	23	NA	NA	20140204C	2/4/2014 6:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.19	Dry
762	2/4/2014 6:00	BEI093	30703	161047	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20140204C	2/4/2014 6:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.19	Dry
763	2/4/2014 6:00	BEI093	30703	161045	ENT	120	MPN/100n	NA	NA	8	NA	NA	20140204C	2/4/2014 6:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.19	Dry
764	2/4/2014 6:00	BEI093	30703	161048	TP	0.059	mg/l	NA	NA	49	NA	NA	20140204C	2/4/2014 6:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.19	Dry
765	3/6/2014 7:00	BEI093	30798	161779	TP	0.048	mg/l	NA	NA	49	NA	NA	20140306C	3/6/2014 7:01	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
766	3/6/2014 7:00	BEI093	30798	161778	SPCOND	39000	uS/cm	NA	NA	31	NA	NA	20140306C	3/6/2014 7:01	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
767	3/6/2014 7:00	BEI093	30798	161780	TSS	17	mg/l	NA	NA	26	NA	NA	20140306C	3/6/2014 7:01	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
768	3/6/2014 7:00	BEI093	30798	161777	NO23	0.18	mg/l	NA	L	38	The Labora	NA	20140306C	3/6/2014 7:01	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
769	3/6/2014 7:00	BEI093	30798	161776	ENT	150	MPN/100n	NA	NA	8	NA	NA	20140306C	3/6/2014 7:01	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
770	3/6/2014 7:00	BEI093	30798	161775	DO	9.8	mg/l	NA	NA	23	NA	NA	20140306C	3/6/2014 7:01	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
771	4/2/2014 6:00	BOS084	30836	162065	DO	10.83	mg/l	NA	NA	24	NA	NA	20140402C	4/2/2014 6:50	HOTSPOT	S	1	NA	NA	Bennington	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.11	Dry
772	4/2/2014 6:00	BOS084	30836	162066	ENT	75	MPN/100n	NA	NA	12	NA	NA	20140402C	4/2/2014 6:50	HOTSPOT	S	1	NA	NA	Bennington	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.11	Dry
773	4/2/2014 6:00	BOS084	30836	162068	SALINITY	5.9	ppt	NA	NA	69	NA	NA	20140402C	4/2/2014 6:50	HOTSPOT	S	1	NA	NA	Bennington	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.11	Dry
774	4/2/2014 6:00	BOS084	30836	162067	NH3	0.5	mg/l	NA	NA	76	NA	NA	20140402C	4/2/2014 6:50	HOTSPOT	S	1	NA	NA	Bennington	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.11	Dry
775	4/2/2014 6:00	BOS084	30836	162069	TEMP_WATER	4.8	deg C	NA	NA	68	NA	NA	20140402C	4/2/2014 6:50	HOTSPOT	S	1	NA	NA	Bennington	Belle Isle Ir	Boston	42.39313	-70.9943	27	GPS-Unspe	WGS84	1	Lower Mys	Fresh	NA	0	Suffolk	0.01603	0.11	Dry
776	4/2/2014 7:00	REVBelleIsl	30838	162079	TEMP_WATER	5.7	deg C	NA	NA	68	NA	NA	20140402C	4/2/2014 7:30	HOTSPOT	S	1	NA	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.11	Dry
777	4/2/2014 7:00	REVBelleIsl	30838	162078	SALINITY	3.5	ppt	NA	NA	69	NA	NA	20140402C	4/2/2014 7:30	HOTSPOT	S	1	NA	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.11	Dry
778	4/2/2014 7:00	REVBennin	30837	162073	SALINITY	16.4	ppt	NA	NA	69	NA	NA	20140402C	4/2/2014 7:05	HOTSPOT	S	1	NA	NA	North corn	Belle Isle Ir	Revere	42.39336	-70.9942	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.02467	0.11	Dry
779	4/2/2014 7:00	REVBelleIsl	30838	162076	ENT	10	MPN/100n	<	NA	12	NA	NA	20140402C	4/2/2014 7:30	HOTSPOT	S	1	NA	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.11	Dry
780	4/2/2014 7:00	REVBelleIsl	30839	162080	DO	8.3	mg/l	NA	NA	24	NA	NA	20140402C	4/2/2014 7:40	HOTSPOT	S	1	NA	NA	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.11	Dry
781	4/2/2014 7:00	REVBelleIsl	30839	162084	TEMP_WATER	6	deg C	NA	NA	68	NA	NA	20140402C	4/2/2014 7:40	HOTSPOT	S	1	NA	NA	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.11	Dry
782	4/2/2014 7:00	REVBennin	30837	162072	NH3	0	mg/l	NA	NA	76	NA	NA	20140402C	4/2/2014 7:05	HOTSPOT	S	1	NA	NA	North corn	Belle Isle Ir	Revere	42.39336	-70.9942	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.02467	0.11	Dry
783	4/2/2014 7:00	REVBennin	30837	162070	DO	8.48	mg/l	NA	NA	24	NA	NA	20140402C	4/2/2014 7:05	HOTSPOT	S	1	NA	NA	North corn	Belle Isle Ir	Revere	42.39336	-70.9942	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.02467	0.11	Dry
784	4/2/2014 7:00	REVBelleIsl	30839	162081	ENT	833	MPN/100n	NA	NA	12	NA	NA	20140402C	4/2/2014 7:40	HOTSPOT	S	1	NA	NA	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.11	Dry
785	4/2/2014 7:00	REVBelleIsl	30839	162082	NH3	1	mg/l	NA	NA	76	NA	NA	20140402C	4/2/2014 7:40	HOTSPOT	S	1	NA	NA	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.11	Dry
786	4/2/2014 7:00	REVBennin	30837	162074	TEMP_WATER	4.6	deg C	NA	NA	68	NA	NA	20140402C	4/2/2014 7:05	HOTSPOT	S	1	NA	NA	North corn	Belle Isle Ir	Revere	42.39336	-70.9942	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.02467	0.11	Dry
787	4/2/2014 7:00	REVBelleIsl	30838	162077	NH3	1	mg/l	NA	NA	76	NA	NA	20140402C	4/2/2014 7:30	HOTSPOT	S	1	NA	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.11	Dry
788	4/2/2014 7:00	REVBelleIsl	30839	162083	SALINITY	5.1	ppt	NA	NA	69	NA	NA	20140402C	4/2/2014 7:40	HOTSPOT	S	1	NA	NA	NA	Belle Isle Ir	Revere	42.39365	-70.991	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.05125	0.11	Dry
789	4/2/2014 7:00	REVBelleIsl	30838	162075	DO	10.3	mg/l	NA	NA	24	NA	NA	20140402C	4/2/2014 7:30	HOTSPOT	S	1	NA	NA	Stormwate	Belle Isle Ir	Revere	42.3935	-70.9907	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.00695	0.11	Dry
790	4/2/2014 7:00	REVBennin	30837	162071	ENT	10	MPN/100n	NA	NA	12	NA	NA	20140402C	4/2/2014 7:05	HOTSPOT	S	1	NA	NA	North corn	Belle Isle Ir	Revere	42.39336	-70.9942	27	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	0.02467	0.11	Dry
791	4/3/2014 5:00	BEI093	30898	162649	TP	0.042	mg/l	NA	NA	49	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
792	4/3/2014 5:00	BEI093	30898	162647	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
793	4/3/2014 5:00	BEI093	30898	162650	TSS	55	mg/l	NA	NA	26	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
794	4/3/2014 5:00	BEI093	30898	162648	TEMP_WATER	4	deg C	NA	NA	67	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
795	4/3/2014 5:00	BEI093	30898	162644	DO_SAT	71.30794	%	NA	NA	23	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
796	4/3/2014 5:00	BEI093	30898	162643	DO	9.2	mg/l	NA	NA	23	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
797	4/3/2014 5:00	BEI093	30898	162645	ENT	20	MPN/100n	NA	NA	8	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
798	4/3/2014 5:00	BEI093	30898	162646	NO23	0.1	mg/l	<	NA	38	NA	NA	20140403C	4/3/2014 5:55	BASE	S	1	NA	Sampled fr	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
799	5/1/2014 5:00	BEI093	30900	162662	NO23	0.1	mg/l	<	NA	38	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
800	5/1/2014 5:00	BEI093	30900	162666	TSS	1900	mg/l	NA	NA	26	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
801	5/1/2014 5:00	BEI093	30900	162665	TP	3.65	mg/l	NA	NA	49	NC--both s	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
802	5/1/2014 5:00	BEI093	30900	162664	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
803	5/1/2014 5:00	BEI093	30900	162660	DO_SAT	40.68858	%	NA	NA	23	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
804	5/1/2014 5:00	BEI093	30900	162663	SPCOND	6300	uS/cm	NA	NA	31	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
805	5/1/2014 5:00	BEI093	30900	162659	DO	4.8	mg/l	NA	NA	23	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
806	5/1/2014 5:00	BEI093	30900	162661	ENT	28	MPN/100n	NA	NA	8	NA	NA	20140501C	5/1/2014 5:27	BASE	S	1	NA	Water gray	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0.64	Wet
807	6/2/2014 6:00	BEI093	30908	162728	TEMP_WATER	16	deg C	NA	NA	67	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
808	6/2/2014 6:00	BEI093	30908	162723	DO	6.9	mg/l	NA	NA	23	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
809	6/2/2014 6:00	BEI093	30908	162725	ENT	20	MPN/100n	NA	NA	8	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
810	6/2/2014 6:00	BEI093	30908	162730	TSS	46	mg/l	NA	NA	26	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
811	6/2/2014 6:00	BEI093	30908	162727	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
812	6/2/2014 6:00	BEI093	30908	162724	DO_SAT	71.31905	%	NA	NA	23	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
813	6/2/2014 6:00	BEI093	30908	162726	NO23	0.1	mg/l	<	NA	38	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
814	6/2/2014 6:00	BEI093	30908	162729	TP	0.033	mg/l	NA	NA	49	NA	NA	20140602C	6/2/2014 6:18	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
815	7/1/2014 5:00	BEI093	43300	277381	TSS	42	mg/l	NA	L	26	Flag: F	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
816	7/1/2014 5:00	BEI093	43300	277380	ENT	41	MPN/100n	NA	NA	8	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
817	7/1/2014 5:00	BEI093	43300	277383	DO_SAT	51.52726	%	NA	NA	23	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
818	7/1/2014 5:00	BEI093	43300	277377	TP	0.076	mg/l	NA	NA	49	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
819	7/1/2014 5:00	BEI093	43300	277379	NO23	0.1	mg/l	<	NA	38	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
820	7/1/2014 5:00	BEI093	43300	277382	TEMP_WATER	22	deg C	NA	NA	67	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
821	7/1/2014 5:00	BEI093	43300	277378	SPCOND	47000	uS/cm	NA	NA	31	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
822	7/1/2014 5:00	BEI093	43300	277384	DO	4.4	mg/l	NA	NA	23	NA	NA	20140701C	7/1/2014 5:52	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	0	Dry
823	8/14/2014 5:00	BEI093	43315	277520	TEMP_WATER	18.5	deg C	NA	NA	67	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet
824	8/14/2014 5:00	BEI093	43315	277519	DO	5.9	mg/l	NA	NA	23	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet
825	8/14/2014 5:00	BEI093	43315	277521	NO23	0.1	mg/l	<	NA	38	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet
826	8/14/2014 5:00	BEI093	43315	277516	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet
827	8/14/2014 5:00	BEI093	43315	277522	DO_SAT	64.32195	%	NA	NA	23	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet
828	8/14/2014 5:00	BEI093	43315	277518	TP	0.066	mg/l	NA	NA	49	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet
829	8/14/2014 5:00	BEI093	43315	277517	TSS	45	mg/l	NA	NA	26	NA	NA	20140814C	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline		0	Suffolk	NA	1.03	Wet

830	8/14/2014 5:00	BEI093	43315	277515	ENT	100	MPN/100n	<	NA	8	NA	NA	201408140	8/14/2014 5:30	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.03	Wet
831	9/29/2014 6:00	BEI093	43333	277683	ENT	10	MPN/100n	NA	NA	8	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
832	9/29/2014 6:00	BEI093	43333	277686	TP	0.096	mg/l	NA	L	49	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
833	9/29/2014 6:00	BEI093	43333	277685	TSS	83	mg/l	NA	NA	26	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
834	9/29/2014 6:00	BEI093	43333	277690	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
835	9/29/2014 6:00	BEI093	43333	277689	DO_SAT	71.24313	%	NA	NA	23	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
836	9/29/2014 6:00	BEI093	43333	277688	NO23	0.1	mg/l	<	NA	38	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
837	9/29/2014 6:00	BEI093	43333	277684	SPCOND	46000	uS/cm	NA	NA	31	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
838	9/29/2014 6:00	BEI093	43333	277687	DO	6.6	mg/l	NA	NA	23	NA	NA	201409290	9/29/2014 6:17	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
839	10/28/2014 5:00	BEI093	43355	277883	DO_SAT	60.53693	%	NA	NA	23	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
840	10/28/2014 5:00	BEI093	43355	277887	DO	6.8	mg/l	NA	NA	23	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
841	10/28/2014 5:00	BEI093	43355	277885	TEMP_WATER	9.5	deg C	NA	NA	67	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
842	10/28/2014 5:00	BEI093	43355	277884	ENT	150	MPN/100n	NA	NA	8	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
843	10/28/2014 5:00	BEI093	43355	277886	TSS	33	mg/l	NA	NA	26	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
844	10/28/2014 5:00	BEI093	43355	277882	NO23	0.5	mg/l	<	NA	38	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
845	10/28/2014 5:00	BEI093	43355	277881	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
846	10/28/2014 5:00	BEI093	43355	277880	TP	0.071	mg/l	NA	NA	49	NA	NA	201410280	10/28/2014 5:59	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
847	11/12/2014 6:00	BEI093	43371	278031	NO23	0.34	mg/l	NA	NA	38	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
848	11/12/2014 6:00	BEI093	43371	278032	DO_SAT	68.63388	%	NA	NA	23	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
849	11/12/2014 6:00	BEI093	43371	278033	TEMP_WATER	9	deg C	NA	NA	67	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
850	11/12/2014 6:00	BEI093	43371	278026	ENT	20	MPN/100n	NA	NA	8	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
851	11/12/2014 6:00	BEI093	43371	278028	TSS	26	mg/l	NA	NA	26	Flagged as	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
852	11/12/2014 6:00	BEI093	43371	278027	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
853	11/12/2014 6:00	BEI093	43371	278030	DO	7.8	mg/l	NA	NA	23	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
854	11/12/2014 6:00	BEI093	43371	278029	TP	0.044	mg/l	NA	NA	49	NA	NA	201411120	11/12/2014 6:40	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
855	12/12/2014 7:00	BEI093	43391	278210	TEMP_WATER	3.5	deg C	NA	NA	67	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
856	12/12/2014 7:00	BEI093	43391	278212	DO	9.2	mg/l	NA	NA	23	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
857	12/12/2014 7:00	BEI093	43391	278209	NO23	0.38	mg/l	NA	NA	38	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
858	12/12/2014 7:00	BEI093	43391	278208	TP	0.057	mg/l	NA	NA	49	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
859	12/12/2014 7:00	BEI093	43391	278207	ENT	190	MPN/100n	NA	NA	8	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
860	12/12/2014 7:00	BEI093	43391	278214	DO_SAT	70.2868	%	NA	NA	23	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
861	12/12/2014 7:00	BEI093	43391	278211	TSS	41	mg/l	NA	NA	26	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
862	12/12/2014 7:00	BEI093	43391	278213	SPCOND	39000	uS/cm	NA	NA	31	NA	NA	201412120	12/12/2014 7:05	BASE	S	1	NA	NA	Belle Isle Ir	Belle Isle Ir	Revere	42.39207	-70.9868	7	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
863	1/23/2015 6:00	BEI001	137336	446328	ENT	10	MPN/100n	<	NA	8	NA	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
864	1/23/2015 6:00	BEI001	137336	446330	TEMP_WATER	-0.5	deg C	NA	NA	67	NA	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
865	1/23/2015 6:00	BEI001	137336	446325	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
866	1/23/2015 6:00	BEI001	137336	446326	NO23	0.5	mg/l	<	NA	38	NC	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
867	1/23/2015 6:00	BEI001	137336	446331	DO	10	mg/l	NA	NA	23	Some bubt	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
868	1/23/2015 6:00	BEI001	137336	446329	TSS	32	mg/l	NA	NA	26	NC	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
869	1/23/2015 6:00	BEI001	137336	446327	DO_SAT	68.512	%	NA	NA	23	NA	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
870	1/23/2015 6:00	BEI001	137336	446324	TP	0.053	mg/l	NA	NA	49	NA	NA	201501230	1/23/2015 6:30	BASE	S	1	NA	Noticed large ice cryst		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
871	3/10/2015 6:00	BEI001	137340	446360	TSS	13	mg/l	NA	NA	26	NA	NA	201503100	3/10/2015 6:05	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
872	3/10/2015 6:00	BEI001	137340	446358	NO23	0.1	mg/l	<	NA	38	NA	NA	201503100	3/10/2015 6:05	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
873	3/10/2015 6:00	BEI001	137340	446357	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	201503100	3/10/2015 6:05	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
874	3/10/2015 6:00	BEI001	137340	446361	DO	9.3	mg/l	NA	NA	23	NA	NA	201503100	3/10/2015 6:05	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
875	3/10/2015 6:00	BEI001	137340	446356	TP	0.027	mg/l	NA	NA	49	NA	NA	201503100	3/10/2015 6:05	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
876	3/10/2015 6:00	BEI001	137340	446359	ENT	20	MPN/100n	NA	NA	8	NA	NA	201503100	3/10/2015 6:05	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
877	4/8/2015 5:00	BEI001	137346	446407	TEMP_WATER	5	deg C	NA	NA	67	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
878	4/8/2015 5:00	BEI001	137346	446403	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
879	4/8/2015 5:00	BEI001	137346	446409	DO_SAT	73.26339	%	NA	NA	23	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
880	4/8/2015 5:00	BEI001	137346	446406	DO	9.2	mg/l	NA	NA	23	Holding tin	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
881	4/8/2015 5:00	BEI001	137346	446404	NO23	0.1	mg/l	<	NA	38	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
882	4/8/2015 5:00	BEI001	137346	446408	TSS	23	mg/l	NA	NA	26	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
883	4/8/2015 5:00	BEI001	137346	446402	TP	0.026	mg/l	NA	NA	49	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
884	4/8/2015 5:00	BEI001	137346	446405	ENT	41	MPN/100n	NA	NA	8	NA	NA	201504080	4/8/2015 5:45	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.03	Dry
885	5/8/2015 6:00	BEI001	137352	446455	DO	7.1	mg/l	NA	NA	23	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
886	5/8/2015 6:00	BEI001	137352	446450	ENT	10	MPN/100n	NA	NA	8	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
887	5/8/2015 6:00	BEI001	137352	446451	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
888	5/8/2015 6:00	BEI001	137352	446452	TSS	17	mg/l	NA	NA	26	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
889	5/8/2015 6:00	BEI001	137352	446448	NO23	0.5	mg/l	<	F	38	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
890	5/8/2015 6:00	BEI001	137352	446454	DO_SAT	68.6771	%	NA	NA	23	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
891	5/8/2015 6:00	BEI001	137352	446449	TP	0.048	mg/l	NA	NA	49	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
892	5/8/2015 6:00	BEI001	137352	446453	TEMP_WATER	13	deg C	NA	NA	67	NA	NA	201505080	5/8/2015 6:03	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
893	6/5/2015 5:00	BEI001	137356	446487	TEMP_WATER	13	deg C	NA	NA	67	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
894	6/5/2015 5:00	BEI001	137356	446483	TP	0.054	mg/l	NA	NA	49	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
895	6/5/2015 5:00	BEI001	137356	446481	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
896	6/5/2015 5:00	BEI001	137356	446485	NO23	0.57	mg/l	NA	NA	38	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
897	6/5/2015 5:00	BEI001	137356	446484	DO	7.4	mg/l	NA	NA	23	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
898	6/5/2015 5:00	BEI001	137356	446480	ENT	41	MPN/100n	NA	NA	8	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
899	6/5/2015 5:00	BEI001	137356	446482	TSS	38	mg/l	NA	NA	26	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
900	6/5/2015 5:00	BEI001	137356	446486	DO_SAT	71.57895	%	NA	NA	23	NA	NA	201506050	6/5/2015 5:20	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
901	7/6/2015 6:00	BEI001	137366	446564	DO	5.6	mg/l	NA	NA	23	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
902	7/6/2015 6:00	BEI001	137366	446562	NO23	0.1	mg/l	<	NA	38	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
903	7/6/2015 6:00	BEI001	137366	446566	DO_SAT	62.92431	%	NA	NA	23	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
904	7/6/2015 6:00	BEI001	137366	446563	ENT	52	MPN/100n	NA	NA	8	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
905	7/6/2015 6:00	BEI001	137366	446567	TEMP_WATER	20	deg C	NA	NA	67	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
906	7/6/2015 6:00	BEI001	137366	446561	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
907	7/6/2015 6:00	BEI001	137366	446565	TSS	28	mg/l	NA	NA	26	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
908	7/6/2015 6:00	BEI001	137366	446560	TP	0.063	mg/l	NA	NA	49	NA	NA	201507060	7/6/2015 6:22	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
909	8/4/2015 6:00	BEI001	137379	446615	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	201508040	8/4/2015 6:07	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
910	8/4/2015 6:00	BEI001	137379	446614	ENT	52	MPN/100n	NA	NA	8	NA	NA	201508040	8/4/2015 6:07	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
911	8/4/2015 6:00	BEI001	137379	446616	TSS	66	mg/l	NA	NA	26	NA	NA	201508040	8/4/2015 6:07	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
912	8/4/2015 6:00	BEI001	137379	446619	NO23	0.1	mg/l	<	NA	38	NA	NA	201508040	8/4/2015 6:07	BASE	S	1	NA	NA		Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry

913	8/4/2015 6:00	BEI001	137379	446620	DO_SAT	59.64361	%	NA	NA	23	NA	NA	20150804C	8/4/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
914	8/4/2015 6:00	BEI001	137379	446621	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20150804C	8/4/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
915	8/4/2015 6:00	BEI001	137379	446618	DO	5.2	mg/l	NA	NA	23	NA	NA	20150804C	8/4/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
916	8/4/2015 6:00	BEI001	137379	446617	TP	0.077	mg/l	NA	NA	49	NA	NA	20150804C	8/4/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
917	9/2/2015 5:00	BEI001	137380	446624	TSS	25	mg/l	NA	NA	26	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
918	9/2/2015 5:00	BEI001	137380	446628	DO_SAT	61.49868	%	NA	NA	23	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
919	9/2/2015 5:00	BEI001	137380	446627	NO23	0.1	mg/l	<	NA	38	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
920	9/2/2015 5:00	BEI001	137380	446626	DO	5.7	mg/l	NA	NA	23	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
921	9/2/2015 5:00	BEI001	137380	446629	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
922	9/2/2015 5:00	BEI001	137380	446623	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
923	9/2/2015 5:00	BEI001	137380	446622	ENT	63	MPN/100n	NA	NA	8	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
924	9/2/2015 5:00	BEI001	137380	446625	TP	0.052	mg/l	NA	NA	49	NA	NA	20150902C	9/2/2015 5:37	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
925	10/2/2015 6:00	BEI001	137389	446696	TSS	32	mg/l	NA	NA	26	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
926	10/2/2015 6:00	BEI001	137389	446694	ENT	220	MPN/100n	NA	NA	8	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
927	10/2/2015 6:00	BEI001	137389	446697	TP	0.056	mg/l	NA	NA	49	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
928	10/2/2015 6:00	BEI001	137389	446699	NO23	0.1	mg/l	<	NA	38	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
929	10/2/2015 6:00	BEI001	137389	446695	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
930	10/2/2015 6:00	BEI001	137389	446698	DO	6.3	mg/l	NA	NA	23	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
931	10/2/2015 6:00	BEI001	137389	446701	TEMP_WATER	13	deg C	NA	NA	67	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
932	10/2/2015 6:00	BEI001	137389	446700	DO_SAT	60.912	%	NA	NA	23	NA	NA	20151002C	10/2/2015 6:07	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	1.86	Wet
933	11/17/2015 6:00	BEI001	137395	446747	DO	7.8	mg/l	NA	NA	23	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
934	11/17/2015 6:00	BEI001	137395	446744	ENT	10	MPN/100n	<	NA	8	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
935	11/17/2015 6:00	BEI001	137395	446743	DO_SAT	64.55756	%	NA	NA	23	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
936	11/17/2015 6:00	BEI001	137395	446746	TEMP_WATER	6.5	deg C	NA	NA	67	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
937	11/17/2015 6:00	BEI001	137395	446742	NO23	0.6	mg/l	NA	NA	38	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
938	11/17/2015 6:00	BEI001	137395	446740	TP	0.027	mg/l	NA	NA	49	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
939	11/17/2015 6:00	BEI001	137395	446741	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
940	11/17/2015 6:00	BEI001	137395	446745	TSS	7.7	mg/l	NA	NA	26	NA	NA	20151117C	11/17/2015 6:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
941	12/16/2015 6:00	BEI001	137402	446796	ENT	63	MPN/100n	NA	NA	8	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
942	12/16/2015 6:00	BEI001	137402	446801	TSS	7.5	mg/l	NA	NA	26	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
943	12/16/2015 6:00	BEI001	137402	446799	DO_SAT	72.15514	%	NA	NA	23	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
944	12/16/2015 6:00	BEI001	137402	446797	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
945	12/16/2015 6:00	BEI001	137402	446800	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
946	12/16/2015 6:00	BEI001	137402	446798	DO	8.4	mg/l	NA	NA	23	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
947	12/16/2015 6:00	BEI001	137402	446802	TP	0.025	mg/l	NA	NA	49	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
948	12/16/2015 6:00	BEI001	137402	446803	NO23	0.1	mg/l	<	NA	38	NA	NA	20151216C	12/16/2015 6:41	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.61	Wet
949	1/15/2016 7:00	BEI001	137809	448515	DO_SAT	70.04253	%	NA	NA	23	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
950	1/15/2016 7:00	BEI001	137809	448509	TP	0.036	mg/l	NA	NA	49	Not calcula	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
951	1/15/2016 7:00	BEI001	137809	448513	DO	9.8	mg/l	NA	NA	23	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
952	1/15/2016 7:00	BEI001	137809	448511	NO23	0.12	mg/l	NA	NA	38	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
953	1/15/2016 7:00	BEI001	137809	448512	ENT	52	MPN/100n	NA	NA	8	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
954	1/15/2016 7:00	BEI001	137809	448514	TSS	27	mg/l	NA	NA	26	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
955	1/15/2016 7:00	BEI001	137809	448516	TEMP_WATER	1	deg C	NA	NA	67	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
956	1/15/2016 7:00	BEI001	137809	448510	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20160115C	1/15/2016 7:10	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
957	2/29/2016 7:00	BEI001	137811	448527	TSS	7	mg/l	NA	NA	26	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
958	2/29/2016 7:00	BEI001	137811	448526	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
959	2/29/2016 7:00	BEI001	137811	448532	TEMP_WATER	4	deg C	NA	NA	67	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
960	2/29/2016 7:00	BEI001	137811	448530	NO23	0.11	mg/l	NA	NA	38	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
961	2/29/2016 7:00	BEI001	137811	448531	DO_SAT	68.25891	%	NA	NA	23	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
962	2/29/2016 7:00	BEI001	137811	448525	ENT	10	MPN/100n	<	NA	8	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
963	2/29/2016 7:00	BEI001	137811	448529	DO	8.8	mg/l	NA	NA	23	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
964	2/29/2016 7:00	BEI001	137811	448528	TP	0.02	mg/l	NA	NA	49	NA	NA	20160229C	2/29/2016 7:15	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
965	3/28/2016 5:00	BEI001	139061	455328	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
966	3/28/2016 5:00	BEI001	139061	455334	TEMP_WATER	5	deg C	NA	NA	67	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
967	3/28/2016 5:00	BEI001	139061	455330	TP	0.018	mg/l	NA	NA	49	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
968	3/28/2016 5:00	BEI001	139061	455332	DO	9.4	mg/l	NA	NA	23	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
969	3/28/2016 5:00	BEI001	139061	455327	ENT	10	MPN/100n	NA	NA	8	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
970	3/28/2016 5:00	BEI001	139061	455329	TSS	14	mg/l	NA	NA	26	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
971	3/28/2016 5:00	BEI001	139061	455331	NO23	0.1	mg/l	<	NA	38	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
972	3/28/2016 5:00	BEI001	139061	455333	DO_SAT	74.88502	%	NA	NA	23	NA	NA	20160328C	3/28/2016 5:50	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
973	4/26/2016 5:00	BEI001	139070	455404	TEMP_WATER	8.5	deg C	NA	NA	67	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
974	4/26/2016 5:00	BEI001	139070	455398	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
975	4/26/2016 5:00	BEI001	139070	455402	TSS	45	mg/l	NA	NA	26	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
976	4/26/2016 5:00	BEI001	139070	455403	DO_SAT	79.97229	%	NA	NA	23	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
977	4/26/2016 5:00	BEI001	139070	455399	NO23	0.1	mg/l	<	NA	38	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
978	4/26/2016 5:00	BEI001	139070	455401	DO	9.2	mg/l	NA	NA	23	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
979	4/26/2016 5:00	BEI001	139070	455397	TP	0.031	mg/l	NA	NA	49	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
980	4/26/2016 5:00	BEI001	139070	455400	ENT	10	MPN/100n	<	NA	8	NA	NA	20160426C	4/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
981	5/26/2016 6:00	BEI001	139077	455454	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
982	5/26/2016 6:00	BEI001	139077	455457	DO	7.3	mg/l	NA	NA	23	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
983	5/26/2016 6:00	BEI001	139077	455456	TP	0.039	mg/l	NA	NA	49	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
984	5/26/2016 6:00	BEI001	139077	455453	ENT	20	MPN/100n	NA	NA	8	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
985	5/26/2016 6:00	BEI001	139077	455460	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
986	5/26/2016 6:00	BEI001	139077	455459	DO_SAT	78.72397	%	NA	NA	23	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
987	5/26/2016 6:00	BEI001	139077	455455	TSS	29	mg/l	NA	NA	26	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
988	5/26/2016 6:00	BEI001	139077	455458	NO23	0.14	mg/l	NA	NA	38	NA	NA	20160526C	5/26/2016 6:30	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0.02	Dry
989	6/24/2016 6:00	BEI001	139081	455491	NO23	0.1	mg/l	<	NA	38	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
990	6/24/2016 6:00	BEI001	139081	455490	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
991	6/24/2016 6:00	BEI001	139081	455488	TP	0.097	mg/l	NA	L	49	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
992	6/24/2016 6:00	BEI001	139081	455489	DO	6.4	mg/l	NA	NA	23	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
993	6/24/2016 6:00	BEI001	139081	455485	ENT	10	MPN/100n	<	NA	8	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
994	6/24/2016 6:00	BEI001	139081	455492	DO_SAT	69.05115	%	NA	NA	23	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry
995	6/24/2016 6:00	BEI001	139081	455486	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys Saline	0	Suffolk	NA	0	Dry

996	6/24/2016 6:00	BEI001	139081	455487	TSS	26	mg/l	NA	NA	26	NA	NA	20160624C	6/24/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
997	7/8/2016 6:00	BEI001	139087	455535	DO	6.6	mg/l	NA	NA	23	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
998	7/8/2016 6:00	BEI001	139087	455532	SPCOND	46000	uS/cm	NA	NA	31	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
999	7/8/2016 6:00	BEI001	139087	455531	ENT	41	MPN/100n	NA	NA	8	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
1000	7/8/2016 6:00	BEI001	139087	455537	DO_SAT	69.75867	%	NA	NA	23	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
1001	7/8/2016 6:00	BEI001	139087	455536	NO23	0.1	mg/l	<	NA	38	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
1002	7/8/2016 6:00	BEI001	139087	455533	TSS	20	mg/l	NA	NA	26	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
1003	7/8/2016 6:00	BEI001	139087	455534	TP	0.042	mg/l	NA	NA	49	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
1004	7/8/2016 6:00	BEI001	139087	455538	TEMP_WATER	17	deg C	NA	NA	67	NA	NA	20160708C	7/8/2016 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.02	Dry
1005	8/22/2016 6:00	BEI001	139092	455574	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1006	8/22/2016 6:00	BEI001	139092	455569	DO_SAT	57.32122	%	NA	NA	23	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1007	8/22/2016 6:00	BEI001	139092	455567	NO23	0.1	mg/l	<	NA	38	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1008	8/22/2016 6:00	BEI001	139092	455570	TP	0.08	mg/l	NA	NA	49	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1009	8/22/2016 6:00	BEI001	139092	455568	TSS	26	mg/l	NA	NA	26	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1010	8/22/2016 6:00	BEI001	139092	455572	DO	5	mg/l	NA	NA	23	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1011	8/22/2016 6:00	BEI001	139092	455571	ENT	1400	MPN/100n	NA	NA	8	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1012	8/22/2016 6:00	BEI001	139092	455573	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20160822C	8/22/2016 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.9	Wet
1013	9/20/2016 5:00	BEI001	139098	455614	TEMP_WATER	20	deg C	NA	NA	67	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1014	9/20/2016 5:00	BEI001	139098	455609	NO23	0.1	mg/l	<	NA	38	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1015	9/20/2016 5:00	BEI001	139098	455612	DO	5	mg/l	NA	NA	23	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1016	9/20/2016 5:00	BEI001	139098	455608	SPCOND	46000	uS/cm	NA	NA	31	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1017	9/20/2016 5:00	BEI001	139098	455610	TP	0.069	mg/l	NA	NA	49	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1018	9/20/2016 5:00	BEI001	139098	455611	ENT	150	MPN/100n	NA	NA	8	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1019	9/20/2016 5:00	BEI001	139098	455613	DO_SAT	56.23757	%	NA	NA	23	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1020	9/20/2016 5:00	BEI001	139098	455607	TSS	42	mg/l	NA	NA	26	NA	NA	20160920C	9/20/2016 5:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.33	Wet
1021	10/26/2016 5:00	BEI001	139101	455637	DO_SAT	63.95142	%	NA	NA	23	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1022	10/26/2016 5:00	BEI001	139101	455633	NO23	0.1	mg/l	<	NA	38	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1023	10/26/2016 5:00	BEI001	139101	455634	ENT	10	MPN/100n	<	NA	8	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1024	10/26/2016 5:00	BEI001	139101	455632	SPCOND	15000	uS/cm	NA	NA	31	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1025	10/26/2016 5:00	BEI001	139101	455631	TP	0.049	mg/l	NA	NA	49	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1026	10/26/2016 5:00	BEI001	139101	455635	DO	6.4	mg/l	NA	NA	23	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1027	10/26/2016 5:00	BEI001	139101	455636	TSS	28	mg/l	NA	NA	26	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1028	10/26/2016 5:00	BEI001	139101	455638	TEMP_WATER	15	deg C	NA	NA	67	NA	NA	20161026C	10/26/2016 5:55	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1029	11/4/2016 6:00	BEI001	139111	455715	DO_SAT	65.19054	%	NA	NA	23	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1030	11/4/2016 6:00	BEI001	139111	455711	TSS	11	mg/l	NA	NA	26	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1031	11/4/2016 6:00	BEI001	139111	455713	DO	7.3	mg/l	NA	NA	23	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1032	11/4/2016 6:00	BEI001	139111	455716	TEMP_WATER	10	deg C	NA	NA	67	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1033	11/4/2016 6:00	BEI001	139111	455712	TP	0.041	mg/l	NA	NA	49	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1034	11/4/2016 6:00	BEI001	139111	455710	SPCOND	18000	uS/cm	NA	NA	31	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1035	11/4/2016 6:00	BEI001	139111	455714	NO23	0.1	mg/l	<	NA	38	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1036	11/4/2016 6:00	BEI001	139111	455709	ENT	31	MPN/100n	NA	NA	8	NA	NA	20161104C	11/4/2016 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.07	Dry
1037	12/5/2016 7:00	BEI001	139116	455747	TP	0.018	mg/l	NA	NA	49	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1038	12/5/2016 7:00	BEI001	139116	455752	TSS	8.2	mg/l	NA	NA	26	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1039	12/5/2016 7:00	BEI001	139116	455750	ENT	20	MPN/100n	NA	NA	8	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1040	12/5/2016 7:00	BEI001	139116	455753	DO_SAT	72.54059	%	NA	NA	23	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1041	12/5/2016 7:00	BEI001	139116	455754	TEMP_WATER	5	deg C	NA	NA	67	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1042	12/5/2016 7:00	BEI001	139116	455748	SPCOND	16000	uS/cm	NA	NA	31	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1043	12/5/2016 7:00	BEI001	139116	455749	NO23	0.1	mg/l	<	NA	38	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1044	12/5/2016 7:00	BEI001	139116	455751	DO	9.2	mg/l	NA	NA	23	NA	NA	20161205C	12/5/2016 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1045	1/17/2017 8:00	BEI001	141106	465758	TSS	18	mg/l	NA	F	26	NA	NA	20170117C	1/17/2017 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1046	1/17/2017 8:00	BEI001	141106	465761	TEMP_WATER	1	deg C	NA	NA	67	NA	NA	20170117C	1/17/2017 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1047	1/17/2017 8:00	BEI001	141106	465756	TP	0.023	mg/l	NA	NA	49	NA	NA	20170117C	1/17/2017 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1048	1/17/2017 8:00	BEI001	141106	465759	NO23	0.1	mg/l	<	NA	38	NA	NA	20170117C	1/17/2017 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1049	1/17/2017 8:00	BEI001	141106	465760	ENT	10	MPN/100n	<	NA	8	NA	NA	20170117C	1/17/2017 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1050	1/17/2017 8:00	BEI001	141106	465757	SPCOND	13000	uS/cm	NA	NA	31	NA	NA	20170117C	1/17/2017 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1051	2/16/2017 7:00	BEI001	141114	465810	TP	0.011	mg/l	NA	NA	49	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1052	2/16/2017 7:00	BEI001	141114	465808	TSS	15	mg/l	NA	NA	26	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1053	2/16/2017 7:00	BEI001	141114	465813	TEMP_WATER	0	deg C	NA	NA	67	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1054	2/16/2017 7:00	BEI001	141114	465812	DO_SAT	68.81712	%	NA	NA	23	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1055	2/16/2017 7:00	BEI001	141114	465809	NO23	0.1	mg/l	<	NA	38	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1056	2/16/2017 7:00	BEI001	141114	465806	SPCOND	14000	uS/cm	NA	NA	31	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1057	2/16/2017 7:00	BEI001	141114	465807	ENT	10	MPN/100n	NA	NA	8	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1058	2/16/2017 7:00	BEI001	141114	465811	DO	10	mg/l	NA	NA	23	NA	NA	20170216C	2/16/2017 7:07	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.29	Wet
1059	3/17/2017 6:00	BEI001	141119	465846	TP	0.015	mg/l	NA	NA	49	NA	NA	20170317C	3/17/2017 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1060	3/17/2017 6:00	BEI001	141119	465844	TSS	14	mg/l	NA	NA	26	NA	NA	20170317C	3/17/2017 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1061	3/17/2017 6:00	BEI001	141119	465847	ENT	10	MPN/100n	<	NA	8	NA	NA	20170317C	3/17/2017 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1062	3/17/2017 6:00	BEI001	141119	465848	SPCOND	47000	uS/cm	NA	NA	31	NA	NA	20170317C	3/17/2017 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1063	3/17/2017 6:00	BEI001	141119	465845	NO23	0.1	mg/l	<	NA	38	NA	NA	20170317C	3/17/2017 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1064	5/15/2017 6:00	BEI001	141129	465924	ENT	41	MPN/100n	NA	NA	8	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1065	5/15/2017 6:00	BEI001	141129	465918	TEMP_WATER	10	deg C	NA	NA	67	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1066	5/15/2017 6:00	BEI001	141129	465921	TSS	24	mg/l	NA	NA	26	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1067	5/15/2017 6:00	BEI001	141129	465923	TP	0.023	mg/l	NA	NA	49	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1068	5/15/2017 6:00	BEI001	141129	465917	DO_SAT	37.85647	%	NA	NA	23	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1069	5/15/2017 6:00	BEI001	141129	465920	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1070	5/15/2017 6:00	BEI001	141129	465922	NO23	0.1	mg/l	<	NA	38	NA	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1071	5/15/2017 6:00	BEI001	141129	465919	DO	4.2	mg/l	NA	NA	23	Very pale s	NA	20170515C	5/15/2017 6:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.01	Wet
1072	6/13/2017 6:00	BEI001	141134	465959	NO23	0.1	mg/l	<	NA	38	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1073	6/13/2017 6:00	BEI001	141134	465961	TSS	28	mg/l	NA	NA	26	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1074	6/13/2017 6:00	BEI001	141134	465957	ENT	20	MPN/100n	NA	NA	8	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1075	6/13/2017 6:00	BEI001	141134	465963	DO	7.2	mg/l	NA	NA	23	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1076	6/13/2017 6:00	BEI001	141134	465962	SPCOND	14000	uS/cm	NA	NA	31	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1077	6/13/2017 6:00	BEI001	141134	465964	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1078	6/13/2017 6:00	BEI001	141134	465958	TP	0.055	mg/l	NA	NA	49	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bostoı	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry

1079	6/13/2017 6:00	BEI001	141134	465960	DO_SAT	81.43534	%	NA	NA	23	NA	NA	20170613C	6/13/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1080	7/13/2017 6:00	BEI001	141142	466021	ENT	880	MPN/100n	NA	NA	8	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1081	7/13/2017 6:00	BEI001	141142	466022	TP	0.068	mg/l	NA	NA	49	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1082	7/13/2017 6:00	BEI001	141142	466025	TSS	32	mg/l	NA	NA	26	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1083	7/13/2017 6:00	BEI001	141142	466027	DO	5.7	mg/l	NA	NA	23	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1084	7/13/2017 6:00	BEI001	141142	466026	SPCOND	16000	uS/cm	NA	NA	31	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1085	7/13/2017 6:00	BEI001	141142	466023	NO23	0.1	mg/l	<	NA	38	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1086	7/13/2017 6:00	BEI001	141142	466028	TEMP_WATER	18.5	deg C	NA	NA	67	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1087	7/13/2017 6:00	BEI001	141142	466024	DO_SAT	61.35363	%	NA	NA	23	NA	NA	20170713C	7/13/2017 6:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.38	Wet
1088	8/11/2017 6:00	BEI001	141147	466066	DO_SAT	62.99676	%	NA	NA	23	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1089	8/11/2017 6:00	BEI001	141147	466059	TP	0.081	mg/l	NA	NA	49	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1090	8/11/2017 6:00	BEI001	141147	466060	ENT	20	MPN/100n	NA	NA	8	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1091	8/11/2017 6:00	BEI001	141147	466064	DO	5.8	mg/l	NA	NA	23	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1092	8/11/2017 6:00	BEI001	141147	466065	TEMP_WATER	19	deg C	NA	NA	67	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1093	8/11/2017 6:00	BEI001	141147	466062	SPCOND	13000	uS/cm	NA	NA	31	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1094	8/11/2017 6:00	BEI001	141147	466061	TSS	24	mg/l	NA	NA	26	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1095	8/11/2017 6:00	BEI001	141147	466063	NO23	0.1	mg/l	<	NA	38	NA	NA	20170811C	8/11/2017 6:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1096	9/25/2017 6:00	BEI001	141150	466085	TP	0.045	mg/l	NA	NA	49	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1097	9/25/2017 6:00	BEI001	141150	466087	DO_SAT	59.68254	%	NA	NA	23	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1098	9/25/2017 6:00	BEI001	141150	466088	TEMP_WATER	18	deg C	NA	NA	67	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1099	9/25/2017 6:00	BEI001	141150	466084	NO23	0.1	mg/l	<	NA	38	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1100	9/25/2017 6:00	BEI001	141150	466083	TSS	32	mg/l	NA	NA	26	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1101	9/25/2017 6:00	BEI001	141150	466081	ENT	10	MPN/100n	<	NA	8	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1102	9/25/2017 6:00	BEI001	141150	466086	DO	5.6	mg/l	NA	NA	23	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1103	9/25/2017 6:00	BEI001	141150	466082	SPCOND	17000	uS/cm	NA	NA	31	NA	NA	20170925C	9/25/2017 6:03	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1104	10/24/2017 6:00	BEI001	141159	466143	NO23	0.1	mg/l	<	NA	38	NA	NA	20171024C	10/24/2017 6:13	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
1105	10/24/2017 6:00	BEI001	141159	466140	TP	0.05	mg/l	NA	NA	49	NA	NA	20171024C	10/24/2017 6:13	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
1106	10/24/2017 6:00	BEI001	141159	466144	ENT	10	MPN/100n	<	NA	8	NA	NA	20171024C	10/24/2017 6:13	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
1107	10/24/2017 6:00	BEI001	141159	466145	TEMP_WATER	15	deg C	NA	NA	67	NA	NA	20171024C	10/24/2017 6:13	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
1108	10/24/2017 6:00	BEI001	141159	466142	TSS	22	mg/l	NA	NA	26	NA	NA	20171024C	10/24/2017 6:13	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
1109	10/24/2017 6:00	BEI001	141159	466141	SPCOND	46000	uS/cm	NA	NA	31	NA	NA	20171024C	10/24/2017 6:13	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.01	Dry
1110	11/9/2017 7:00	BEI001	141164	466178	NO23	0.12	mg/l	NA	NA	38	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1111	11/9/2017 7:00	BEI001	141164	466176	TSS	18	mg/l	NA	NA	26	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1112	11/9/2017 7:00	BEI001	141164	466179	DO_SAT	67.05577	%	NA	NA	23	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1113	11/9/2017 7:00	BEI001	141164	466181	TP	0.053	mg/l	NA	NA	49	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1114	11/9/2017 7:00	BEI001	141164	466180	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1115	11/9/2017 7:00	BEI001	141164	466183	ENT	10	MPN/100n	<	NA	8	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1116	11/9/2017 7:00	BEI001	141164	466182	DO	7.8	mg/l	NA	NA	23	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1117	11/9/2017 7:00	BEI001	141164	466177	TEMP_WATER	8	deg C	NA	NA	67	NA	NA	20171109C	11/9/2017 7:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1118	12/8/2017 6:00	BEI001	141167	466202	ENT	10	MPN/100n	<	NA	8	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1119	12/8/2017 6:00	BEI001	141167	466204	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1120	12/8/2017 6:00	BEI001	141167	466198	TP	0.039	mg/l	NA	NA	49	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1121	12/8/2017 6:00	BEI001	141167	466203	TSS	21	mg/l	NA	NA	26	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1122	12/8/2017 6:00	BEI001	141167	466205	DO	8.6	mg/l	NA	NA	23	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1123	12/8/2017 6:00	BEI001	141167	466200	TEMP_WATER	4.5	deg C	NA	NA	67	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1124	12/8/2017 6:00	BEI001	141167	466201	NO23	0.1	mg/l	<	NA	38	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1125	12/8/2017 6:00	BEI001	141167	466199	DO_SAT	67.59463	%	NA	NA	23	NA	NA	20171208C	12/8/2017 6:45	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1126	1/22/2018 8:00	BEI001	144777	474326	TSS	21	mg/l	NA	NA	26	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1127	1/22/2018 8:00	BEI001	144777	474330	DO_SAT	72.01555	%	NA	NA	23	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1128	1/22/2018 8:00	BEI001	144777	474327	TP	0.026	mg/l	NA	NA	49	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1129	1/22/2018 8:00	BEI001	144777	474329	NO23	0.13	mg/l	NA	NA	38	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1130	1/22/2018 8:00	BEI001	144777	474324	ENT	10	MPN/100n	<	NA	8	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1131	1/22/2018 8:00	BEI001	144777	474325	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1132	1/22/2018 8:00	BEI001	144777	474328	DO	9.8	mg/l	NA	NA	23	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1133	1/22/2018 8:00	BEI001	144777	474331	TEMP_WATER	2	deg C	NA	NA	67	NA	NA	20180122C	1/22/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1134	2/5/2018 8:00	BEI001	144784	474374	DO	9.6	mg/l	NA	NA	23	NA	NA	20180205C	2/5/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.65	Wet
1135	2/5/2018 8:00	BEI001	144784	474375	NO23	0.1	mg/l	<	NA	38	NA	NA	20180205C	2/5/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.65	Wet
1136	2/5/2018 8:00	BEI001	144784	474372	TSS	53	mg/l	NA	NA	26	NA	NA	20180205C	2/5/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.65	Wet
1137	2/5/2018 8:00	BEI001	144784	474371	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180205C	2/5/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.65	Wet
1138	2/5/2018 8:00	BEI001	144784	474370	ENT	74	MPN/100n	NA	NA	8	NA	NA	20180205C	2/5/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.65	Wet
1139	2/5/2018 8:00	BEI001	144784	474373	TP	0.105	mg/l	NA	NA	49	NA	NA	20180205C	2/5/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.65	Wet
1140	3/7/2018 7:00	BEI001	144787	474394	DO_SAT	68.43191	%	NA	NA	23	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1141	3/7/2018 7:00	BEI001	144787	474397	DO	8.9	mg/l	NA	NA	23	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1142	3/7/2018 7:00	BEI001	144787	474398	TEMP_WATER	4	deg C	NA	NA	67	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1143	3/7/2018 7:00	BEI001	144787	474395	TP	0.031	mg/l	NA	NA	49	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1144	3/7/2018 7:00	BEI001	144787	474393	TSS	10	mg/l	NA	NA	26	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1145	3/7/2018 7:00	BEI001	144787	474396	ENT	10	MPN/100n	<	NA	8	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1146	3/7/2018 7:00	BEI001	144787	474392	NO23	0.1	mg/l	<	NA	38	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1147	3/7/2018 7:00	BEI001	144787	474399	SPCOND	19000	uS/cm	NA	NA	31	NA	NA	20180307C	3/7/2018 7:10	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1148	4/5/2018 6:00	BEI001	144792	474426	SPCOND	43000	uS/cm	NA	NA	31	NA	NA	20180405C	4/5/2018 6:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.67	Wet
1149	4/5/2018 6:00	BEI001	144792	474425	ENT	20	MPN/100n	NA	NA	8	NA	NA	20180405C	4/5/2018 6:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.67	Wet
1150	4/5/2018 6:00	BEI001	144792	474428	NO23	0.1	mg/l	<	F	38	NA	NA	20180405C	4/5/2018 6:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.67	Wet
1151	4/5/2018 6:00	BEI001	144792	474429	TP	0.03	mg/l	NA	NA	49	NA	NA	20180405C	4/5/2018 6:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.67	Wet
1152	4/5/2018 6:00	BEI001	144792	474427	TSS	26	mg/l	NA	NA	26	NA	NA	20180405C	4/5/2018 6:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.67	Wet
1153	5/4/2018 7:00	BEI001	144801	474473	ENT	10	MPN/100n	NA	NA	8	NA	NA	20180504C	5/4/2018 7:35	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.09	Dry
1154	5/4/2018 7:00	BEI001	144801	474472	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180504C	5/4/2018 7:35	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.09	Dry
1155	5/4/2018 7:00	BEI001	144801	474470	NO23	0.1	mg/l	<	NA	38	NA	NA	20180504C	5/4/2018 7:35	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.09	Dry
1156	5/4/2018 7:00	BEI001	144801	474469	TP	0.035	mg/l	NA	NA	49	NA	NA	20180504C	5/4/2018 7:35	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.09	Dry
1157	5/4/2018 7:00	BEI001	144801	474471	TSS	21	mg/l	NA	NA	26	NA	NA	20180504C	5/4/2018 7:35	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.09	Dry
1158	6/1/2018 7:00	BEI001	144807	474505	ENT	51	MPN/100n	NA	NA	8	NA	NA	20180601C	6/1/2018 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1159	6/1/2018 7:00	BEI001	144807	474502	NO23	0.1	mg/l	<	NA	38	NA	NA	20180601C	6/1/2018 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1160	6/1/2018 7:00	BEI001	144807	474503	TSS	15	mg/l	NA	NA	26	NA	NA	20180601C	6/1/2018 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1161	6/1/2018 7:00	BEI001	144807	474504	TP	0.041	mg/l	NA	NA	49	NA	NA	20180601C	6/1/2018 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry

1162	6/1/2018 7:00	BEI001	144807	474506	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180601C	6/1/2018 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1163	7/2/2018 6:00	BEI001	144811	474531	TP	0.052	mg/l	NA	NA	49	NA	NA	20180702C	7/2/2018 6:02	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1164	7/2/2018 6:00	BEI001	144811	474532	ENT	10	MPN/100n	NA	NA	8	NA	NA	20180702C	7/2/2018 6:02	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1165	7/2/2018 6:00	BEI001	144811	474534	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180702C	7/2/2018 6:02	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1166	7/2/2018 6:00	BEI001	144811	474530	TSS	25	mg/l	NA	NA	26	NA	NA	20180702C	7/2/2018 6:02	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1167	7/2/2018 6:00	BEI001	144811	474533	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20180702C	7/2/2018 6:02	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1168	7/2/2018 6:00	BEI001	144811	474529	NO23	0.1	mg/l	<	NA	38	NA	NA	20180702C	7/2/2018 6:02	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1169	8/1/2018 6:00	BEI001	144818	474575	TP	0.01	mg/l	<	NA	49	NA	NA	20180801C	8/1/2018 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1170	8/1/2018 6:00	BEI001	144818	474577	NO23	0.1	mg/l	<	NA	38	NA	NA	20180801C	8/1/2018 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1171	8/1/2018 6:00	BEI001	144818	474579	TEMP_WATER	21	deg C	NA	NA	67	NA	NA	20180801C	8/1/2018 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1172	8/1/2018 6:00	BEI001	144818	474580	TSS	20	mg/l	NA	NA	26	NA	NA	20180801C	8/1/2018 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1173	8/1/2018 6:00	BEI001	144818	474578	ENT	120	MPN/100n	NA	NA	8	NA	NA	20180801C	8/1/2018 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1174	8/1/2018 6:00	BEI001	144818	474576	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180801C	8/1/2018 6:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1175	9/14/2018 6:00	BEI001	144822	474603	NO23	0.1	mg/l	<	NA	38	NA	NA	20180914C	9/14/2018 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.69	Wet
1176	9/14/2018 6:00	BEI001	144822	474601	TSS	20	mg/l	NA	NA	26	NA	NA	20180914C	9/14/2018 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.69	Wet
1177	9/14/2018 6:00	BEI001	144822	474602	TP	0.061	mg/l	NA	NA	49	NA	NA	20180914C	9/14/2018 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.69	Wet
1178	9/14/2018 6:00	BEI001	144822	474599	TEMP_WATER	18.5	deg C	NA	NA	67	NA	NA	20180914C	9/14/2018 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.69	Wet
1179	9/14/2018 6:00	BEI001	144822	474598	ENT	470	MPN/100n	NA	NA	8	NA	NA	20180914C	9/14/2018 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.69	Wet
1180	9/14/2018 6:00	BEI001	144822	474600	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20180914C	9/14/2018 6:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.69	Wet
1181	10/29/2018 8:00	BEI001	144830	474646	ENT	959.4	MPN/100n	NA	NA	8	NA	NA	20181029C	10/29/2018 8:05	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.26	Wet
1182	11/13/2018 8:00	BEI001	144835	474682	TP	0.047	mg/l	NA	NA	49	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1183	11/13/2018 8:00	BEI001	144835	474683	DO	8.8	mg/l	NA	NA	23	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1184	11/13/2018 8:00	BEI001	144835	474686	TEMP_WATER	9	deg C	NA	NA	67	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1185	11/13/2018 8:00	BEI001	144835	474685	DO_SAT	77.30796	%	NA	NA	23	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1186	11/13/2018 8:00	BEI001	144835	474680	SPCOND	38000	uS/cm	NA	NA	31	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1187	11/13/2018 8:00	BEI001	144835	474681	TSS	15	mg/l	NA	NA	26	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1188	11/13/2018 8:00	BEI001	144835	474684	NO23	0.12	mg/l	NA	NA	38	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1189	11/13/2018 8:00	BEI001	144835	474679	ENT	259	MPN/100n	NA	NA	8	NA	NA	20181113C	11/13/2018 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.56	Wet
1190	12/13/2018 8:00	BEI001	144841	474724	ENT	10	MPN/100n	<	NA	8	NA	NA	20181213C	12/13/2018 8:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1191	12/13/2018 8:00	BEI001	144841	474725	TP	0.036	mg/l	NA	NA	49	NA	NA	20181213C	12/13/2018 8:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1192	12/13/2018 8:00	BEI001	144841	474722	TSS	12	mg/l	NA	NA	26	NA	NA	20181213C	12/13/2018 8:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1193	12/13/2018 8:00	BEI001	144841	474721	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20181213C	12/13/2018 8:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1194	12/13/2018 8:00	BEI001	144841	474723	NO23	0.23	mg/l	NA	NA	38	NA	NA	20181213C	12/13/2018 8:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1195	1/25/2019 8:00	BEI001	144981	476110	NO23	0.44	mg/l	NA	NA	38	NA	NA	20190125C	1/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1	Wet
1196	1/25/2019 8:00	BEI001	144981	476111	TP	0.134	mg/l	NA	NA	49	NA	NA	20190125C	1/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1	Wet
1197	1/25/2019 8:00	BEI001	144981	476108	SPCOND	13000	uS/cm	NA	NA	31	NA	NA	20190125C	1/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1	Wet
1198	1/25/2019 8:00	BEI001	144981	476109	TSS	69	mg/l	NA	NA	26	NA	NA	20190125C	1/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1	Wet
1199	1/25/2019 8:00	BEI001	144981	476107	ENT	2045.9	MPN/100n	NA	NA	8	NA	NA	20190125C	1/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1	Wet
1200	2/25/2019 8:00	BEI001	144985	476130	ENT	96	MPN/100n	NA	NA	8	NA	NA	20190225C	2/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.48	Wet
1201	2/25/2019 8:00	BEI001	144985	476131	TSS	25	mg/l	NA	NA	26	NA	NA	20190225C	2/25/2019 8:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.48	Wet
1202	3/25/2019 7:00	BEI001	144991	476170	NO23	0.1	mg/l	<	NA	38	NA	NA	20190325C	3/25/2019 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1203	3/25/2019 7:00	BEI001	144991	476173	ENT	41.3	MPN/100n	NA	NA	8	NA	NA	20190325C	3/25/2019 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1204	3/25/2019 7:00	BEI001	144991	476172	TP	0.021	mg/l	NA	NA	49	NA	NA	20190325C	3/25/2019 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1205	3/25/2019 7:00	BEI001	144991	476171	TSS	15	mg/l	NA	NA	26	NA	NA	20190325C	3/25/2019 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1206	3/25/2019 7:00	BEI001	144991	476174	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20190325C	3/25/2019 7:25	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1207	4/23/2019 7:00	BEI001	144997	476217	TP	0.164	mg/l	NA	NA	49	NA	NA	20190423C	4/23/2019 7:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	2.34	Wet
1208	4/23/2019 7:00	BEI001	144997	476214	SPCOND	24000	uS/cm	NA	NA	31	NA	NA	20190423C	4/23/2019 7:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	2.34	Wet
1209	4/23/2019 7:00	BEI001	144997	476213	ENT	5172.1	MPN/100n	NA	NA	8	NA	NA	20190423C	4/23/2019 7:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	2.34	Wet
1210	4/23/2019 7:00	BEI001	144997	476218	DO	8	mg/l	NA	NA	23	NA	NA	20190423C	4/23/2019 7:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	2.34	Wet
1211	4/23/2019 7:00	BEI001	144997	476215	TSS	54	mg/l	NA	NA	26	NA	NA	20190423C	4/23/2019 7:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	2.34	Wet
1212	4/23/2019 7:00	BEI001	144997	476216	NO23	0.2	mg/l	NA	NA	38	NA	NA	20190423C	4/23/2019 7:15	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	2.34	Wet
1213	5/22/2019 7:00	BEI001	145002	476254	DO	7.8	mg/l	NA	NA	23	NA	NA	20190522C	5/22/2019 7:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1214	5/22/2019 7:00	BEI001	145002	476250	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20190522C	5/22/2019 7:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1215	5/22/2019 7:00	BEI001	145002	476252	TP	0.043	mg/l	NA	NA	49	NA	NA	20190522C	5/22/2019 7:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1216	5/22/2019 7:00	BEI001	145002	476253	ENT	10	MPN/100n	NA	NA	8	NA	NA	20190522C	5/22/2019 7:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1217	5/22/2019 7:00	BEI001	145002	476249	TSS	20	mg/l	NA	NA	26	NA	NA	20190522C	5/22/2019 7:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1218	5/22/2019 7:00	BEI001	145002	476251	NO23	0.1	mg/l	<	NA	38	NA	NA	20190522C	5/22/2019 7:20	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1219	7/22/2019 7:00	BEI001	145011	476314	DO_SAT	68.05999	%	NA	NA	23	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1220	7/22/2019 7:00	BEI001	145011	476311	TP	0.054	mg/l	NA	NA	49	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1221	7/22/2019 7:00	BEI001	145011	476312	DO	5.6	mg/l	NA	NA	23	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1222	7/22/2019 7:00	BEI001	145011	476309	SPCOND	44000	uS/cm	NA	NA	31	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1223	7/22/2019 7:00	BEI001	145011	476315	TEMP_WATER	24	deg C	NA	NA	67	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1224	7/22/2019 7:00	BEI001	145011	476308	ENT	20.2	MPN/100n	NA	NA	8	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1225	7/22/2019 7:00	BEI001	145011	476313	NO23	0.1	mg/l	<	NA	38	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1226	7/22/2019 7:00	BEI001	145011	476310	TSS	20	mg/l	NA	F	26	NA	NA	20190722C	7/22/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1227	8/19/2019 5:00	BEI001	145014	476332	NO23	0.1	mg/l	<	NA	38	NA	NA	20190819C	8/19/2019 5:50	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1228	8/19/2019 5:00	BEI001	145014	476334	TP	0.065	mg/l	NA	NA	49	NA	NA	20190819C	8/19/2019 5:50	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1229	8/19/2019 5:00	BEI001	145014	476333	TSS	18	mg/l	NA	NA	26	NA	NA	20190819C	8/19/2019 5:50	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1230	8/19/2019 5:00	BEI001	145014	476335	ENT	27	CFU/100m	NA	NA	8	NA	NA	20190819C	8/19/2019 5:50	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1231	8/19/2019 5:00	BEI001	145014	476336	SPCOND	45000	uS/cm	NA	NA	31	NA	NA	20190819C	8/19/2019 5:50	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1232	8/19/2019 5:00	BEI001	145014	476337	DO	7.3	mg/l	NA	NA	23	NA	NA	20190819C	8/19/2019 5:50	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.16	Dry
1233	9/19/2019 8:00	BEI001	145024	476406	NO23	0.1	mg/l	<	NA	38	NA	NA	20190919C	9/19/2019 8:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1234	9/19/2019 8:00	BEI001	145024	476411	SPCOND	41000	uS/cm	NA	NA	31	NA	NA	20190919C	9/19/2019 8:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1235	9/19/2019 8:00	BEI001	145024	476407	TSS	19	mg/l	NA	NA	26	NA	NA	20190919C	9/19/2019 8:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1236	9/19/2019 8:00	BEI001	145024	476410	DO	7.6	mg/l	NA	NA	23	NA	NA	20190919C	9/19/2019 8:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1237	9/19/2019 8:00	BEI001	145024	476409	ENT	46	CFU/100m	NA	NA	8	NA	NA	20190919C	9/19/2019 8:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1238	9/19/2019 8:00	BEI001	145024	476408	TP	0.05	mg/l	NA	NA	49	NA	NA	20190919C	9/19/2019 8:00	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0	Dry
1239	10/18/2019 6:00	BEI001	145027	476429	NO23	0.1	mg/l	<	NA	38	NA	NA	20191018C	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1240	10/18/2019 6:00	BEI001	145027	476428	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	20191018C	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1241	10/18/2019 6:00	BEI001	145027	476433	TSS	22	mg/l	NA	NA	26	NA	NA	20191018C	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1242	10/18/2019 6:00	BEI001	145027	476431	DO	8.2	mg/l	NA	NA	23	NA	NA	20191018C	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1243	10/18/2019 6:00	BEI001	145027	476427	DO_SAT	73.91025	%	NA	NA	23	NA	NA	20191018C	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1244	10/18/2019 6:00	BEI001	145027	476430	ENT	885.9	MPN/100n	NA	NA	8	NA	NA	20191018C	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bosto	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet

1245	10/18/2019 6:00	BEI001	145027	476426	TP	0.06	mg/l	NA	L	49	NA	NA	201910180	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1246	10/18/2019 6:00	BEI001	145027	476432	TEMP_WATER	10	deg C	NA	NA	67	NA	NA	201910180	10/18/2019 6:29	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	1.2	Wet
1247	11/1/2019 7:00	BEI001	145035	476471	ENT	85.2	MPN/100n	NA	NA	8	NA	NA	201911010	11/1/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17	Dry
1248	11/1/2019 7:00	BEI001	145035	476470	SPCOND	42000	uS/cm	NA	NA	31	NA	NA	201911010	11/1/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17	Dry
1249	11/1/2019 7:00	BEI001	145035	476472	TP	0.19	mg/l	NA	NA	49	NA	NA	201911010	11/1/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17	Dry
1250	11/1/2019 7:00	BEI001	145035	476474	TSS	120	mg/l	NA	NA	26	NA	NA	201911010	11/1/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17	Dry
1251	11/1/2019 7:00	BEI001	145035	476473	NO23	0.12	mg/l	NA	NA	38	NA	NA	201911010	11/1/2019 7:30	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.17	Dry
1252	12/2/2019 8:00	BEI001	145039	476493	TSS	26	mg/l	NA	NA	26	NA	NA	201912020	12/2/2019 8:40	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.75	Wet
1253	12/2/2019 8:00	BEI001	145039	476492	ENT	726.99	MPN/100n	NA	NA	8	NA	NA	201912020	12/2/2019 8:40	BASE	S	1	NA	NA	Belle Isle Ir	East Bostor	42.38283	-70.9943	22	GPS-Unspe	WGS84	1	Lower Mys	Saline	0	Suffolk	NA	0.75	Wet