# RUMNEY MARSHES AREA OF CRITICAL ENVIRONMENTAL CONCERN

# *Salt Marsh Restoration Plan*


**Commonwealth of Massachusetts**
**Executive Office of Environmental Affairs**
**May 2002**

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MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL MANAGEMENT 1898

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# INTRODUCTION

## *What are Salt Marshes?*

Salt marshes are a type of coastal wetland and are integral components of estuarine ecosystems. They are transition zones, bridging the gap from uplands to the sea. Salt marshes are formed along tidal channels, behind barrier beach and dune systems, and in other low-lying areas subjected to tidal inundation. Most commonly recognized by their unique, salt-tolerant vegetation, salt marshes are dependent on precisely coordinated cycles of tides, sediment deposition, and erosion. These patterns and relationships create a highly stable and productive system that is widely regarded as one of the most productive ecosystems in the world. Throughout coastal North America salt marshes provide crucial habitat for many species of fish, shellfish, birds, and other aquatic and terrestrial species.

*Glassswort adds stunning color to salt marshes in the autumn.*

Unfortunately salt marshes, along with other wetlands, have been abused for centuries. They have largely been viewed as fetid, unhealthful, wastelands and great efforts have been made to eliminate them and use the land for what has been regarded as more beneficial purposes. In many coastal cities, large municipal landfills, such as Boston's Hallet Street Dump and New York's Fresh Kills, are often located on former salt marshes. In Rumney Marsh, the Saugus and RESCO landfills filled about 200 acres of salt marsh. Many major transportation systems, for example Boston's Central Artery and Storrow Drive in Boston pass through destroyed or degraded salt marshes. The MBTA North Shore commuter rail line and the abandoned embankment constructed for Interstate 95 both have caused serious impacts to Rumney Marsh. These urban uses of salt marshes have both direct impacts, such as the complete filling of a marsh, and indirect impacts, such as subtle changes in natural hydrology and tidal cycles that disrupt long-established ecological patterns and relationships.

It is only in recent years that the ecological and social benefits of salt marshes, and other wetlands, have been recognized and efforts made to protect them. It is now widely held that the functions provided by wetlands - flood storage, protection from storm damage, provision of wildlife habitat and recreational opportunities - are invaluable and the

preservation of wetlands is economically more efficient than trying to mitigate the impacts incurred after wetlands are lost. Strong regulations are now in place in Massachusetts to protect and regulate wetlands from development impacts, and wetland restoration is increasingly regarded as a major tool for improving the function of degraded wetlands and increasing wetland acreage.

## *Why Develop a Salt Marsh Restoration Plan?*

Wetlands help control flooding, protect our shorelines from storm damage, purify coastal waters by filtering out sediment and pollutants, provide recreational and educational opportunities, and supply habitat for fish, shellfish, and wildlife. Where there has been significant salt marsh loss, an effort has been made to replace some salt marsh functions, such as flood control, by man-made structures such as seawalls and jetties at great public expense. In the past several years there has been a trend away from such hard structure solutions in favor of restoring wetlands and their critical functions. Potential salt marsh restoration sites can be identified through the development of a salt marsh restoration plan (SMRP).

Cumulative impacts to salt marshes over time have harmed both marine and estuarine ecosystems as well as individual salt marshes. The purpose of preparing a SMRP is 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.

## *The Rumney Marshes ACEC Salt Marsh Restoration Plan*

The Rumney Marshes Area of Critical Environmental Concern (ACEC) has been characterized by the U.S. Fish and Wildlife Service as one of the most biologically significant estuaries in Massachusetts north of Boston. The 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 Massachusetts Wetlands Restoration Program (MWRP) has developed a framework for identifying restorable wetlands (MWRP 1996). This approach is being applied in the Rumney Marshes ACEC. Preparation of a wetland restoration plan is initiated by a study sponsor (such as a watershed association, regional planning agency, or conservation district), but involves a broad range of interests, organizations, and people throughout the region. The ACEC Program and MWRP are the sponsors for the Rumney Marshes ACEC Salt Marsh Restoration Plan. The Rumney Marshes ACEC Salt Marsh Restoration Task Group, an inter-agency working group of municipal, state, and federal officials and representatives from local advocacy groups, collected information about the ACEC and about potential wetland restoration sites. This information is the foundation for establishing a set of salt marsh restoration goals and an

action plan for Rumney Marsh and Belle Isle Marsh. After these initial planning steps, MWRP completed a Draft SMRP and circulated it for public comment and review before preparing this Final Plan. Recognizing the unique importance of Rumney Marsh and Belle Isle Marsh, along with salt marshes throughout the North Shore, the Massachusetts Watershed Initiative, acting through the North Coastal Watershed Team, funded the MWRP staff position of North Shore Salt Marsh Restoration Coordinator to complete the Rumney Marshes ACEC SMRP.

Additional information and input provided by people in the ACEC communities forms the basis for the SMRP. While the primary purpose of preparing a SMRP is to provide a comprehensive ecosystem approach to restoring salt marshes, the information provided can be used by municipalities and other regional stakeholders to support other land-use management and regulatory decision making.

## *ACEC Purpose and Designation*

The purpose of the Areas of Critical Environmental Concern Program is to identify, designate and preserve critical environmental resource areas throughout the Commonwealth, and facilitate and support long-term stewardship of ACECs. The Department of Environmental Management (DEM) administers the ACEC Program on behalf of the Secretary of Environmental Affairs. The Rumney Marshes ACEC was designated in 1988 after being nominated by ten citizens, and after an extensive formal review by the Executive Office of Environmental Affairs.

The objectives of the ACEC Program are: to identify and designate critical resource areas through the review of ACEC nominations; to monitor and actively promote state agency actions to preserve, restore and enhance ACECs; and to encourage and support local and regional actions necessary for long-term management and stewardship of ACECs.


*The Rumney Marshes ACEC was designated in 1988.*

Key elements of the program are environmental analysis and planning; public outreach and education; regulatory reviews and follow-up; technical assistance to municipalities and the public; proactive networking with state, federal, regional and nonprofit agencies; and the development of comprehensive resource management plans and issue-specific plans.

The Rumney Marshes ACEC includes two highly productive estuarine systems - Rumney Marsh in Lynn, Revere, and Saugus, and Belle Isle Marsh in Boston, Revere, and Winthrop. The ACEC boundary for Rumney Marsh is primarily the 100-year floodplain to the north, west, and south, and follows roads and rights-of-way to the east. The ACEC boundary for Belle Isle Marsh includes the 100-year floodplain, wetlands edge, wetlands plus 100-foot buffer, and roads, encompassing the marsh and the tributary of Sales Creek.

The Rumney Marshes ACEC is ecologically diverse with salt marsh, tidal flats, subtidal channels and abutting upland. An extraordinary variety of birds use the area, including five state-listed endangered, threatened, or species of special concern according to the Massachusetts Natural Heritage and Endangered Species Program. The marshes also provide habitat for commercial fish and shellfish; a filtering system for improved water quality; and recreational, educational, and scenic resources. The extensive holdings of the Metropolitan District Commission (MDC) in both Rumney Marsh and Belle Isle Marsh offer public access to the marshes and uplands for hiking, nature study, boating, and fishing for area residents and visitors. The recent opening of the Bear Creek Wildlife Sanctuary in Saugus further enhances public access to the ACEC and its salt marshes.

The salt marshes are vitally important to the surrounding human population in their capacity to prevent flood damage by providing floodwater storage. This capacity is lost when marshes are filled. Most of the ACEC lies within the 100-year floodplain of East Boston, Winthrop, Revere, Saugus, and Lynn. Protection and enhancement of the floodplain is vital to these communities for coastal flood control.

## *Rumney Marsh Salt Marsh Restoration Planning Process*

The completion of several salt marsh restoration projects in Rumney Marsh has already realized significant benefits. For example, self-regulating tide gates installed on the Central County Ditch, Town Line Brook, and along Route 1A in Revere, have restored tidal flow to approximately 41 acres of degraded salt marsh and enhanced flood protection to residential neighborhoods and infrastructure. In addition, multiple salt marsh and intertidal habitat restoration projects, conducted as mitigation for the Central Artery/Tunnel project, have restored more than 18 acres and removed several hundred thousand cubic yards of I-95 embankment fill along the Pines River.

Despite these gains, there is substantial progress to be made. This plan documents the considerable impairment of ecological functions within the ACEC that still remain, while at the same time detailing the important public benefits that can arise from restoring these functions. Clearly, given the list of potential projects in Rumney Marsh and Belle Isle Marsh provided in this plan, the opportunity exists to realize these, and perhaps other, public benefits.

## Planning Process to Date

On October 4, 1996, the Friends of Belle Isle Marsh, the MDC, and the ACEC Program called together advocates from Rumney Marsh and Belle Isle Marsh communities - Winthrop, Boston, Revere, and Saugus - along with state and federal agencies to discover the most pressing concerns regarding the ACEC. In that community forum, the one issue that stood out was protecting and restoring remaining salt marshes. From these initial discussions, a collaborative effort was launched to develop and adopt a Rumney Marshes ACEC Salt Marsh Restoration Plan. The purpose of the planning process is for the communities and agencies to reach consensus on priority salt marsh restoration projects that could help improve the ACEC overall.

At the initiative of the ACEC Program, the Rumney Marshes Wetlands Salt Marsh Restoration Task Group was formed which includes representatives from the following groups:

- *Federal Agencies*
  Environmental Protection Agency
  Army Corps of Engineers
  Fish and Wildlife Service
  National Marine Fisheries Service

- *State Agencies*
  Massachusetts Executive Office of Environmental Affairs
  ACEC Program
  MWRP
  Coastal Zone Management
  Riverways Program
  MDC
  Mass. Watershed Initiative
  Mass. Bays Program
  Mass. Department of Environmental Protection
  Massachusetts Highway Department

- *Regional Groups*
  Northeast Mass. Mosquito Control and Wetlands Management District
  Metropolitan Area Planning Council
  Saugus River Watershed Council

- *Local Government*
  Town of Saugus
  Town of Revere

The Task Group agreed to develop a plan to restore, to the extent practicable, the salt marshes of Rumney Marsh and Belle Isle Marsh. The group's strategy is to mobilize and work with communities, advocacy groups, and interested citizens to develop and

implement a restoration plan that can bring back some of the lost salt marshes. Salt marsh restoration project priorities will be locally driven but will be supported by state and federal resources.

The Rumney Marshes ACEC Salt Marsh Restoration Plan was prepared using MWRP's guidelines for watershed wetlands restoration plans. Accordingly, in *Phase I: Initiation of the Planning Process*, the Task Group published a proposal for the plan in the Environmental Monitor on December 23, 1998. The proposal was also distributed directly to those on the official notification list (see Appendix E).

The Task Group met periodically in 1998 and 1999 to complete Phase II of the planning process, *Evaluation and Goal Setting*. Potential salt marsh restoration sites were identified and watershed problems in the ACEC relating to flood storage, water quality, and fish and wildlife habitat were evaluated. Each site has also been screened regarding a set of additional considerations, such as estimated cost of project, fire hazard reduction, recreational and scenic benefits, and mosquito control benefits.

## Public Review and Comment

The information developed through this analysis, as well as draft restoration goals for the ACEC, were presented for public review in the Draft SMRP, released in June 2001. The draft plan was distributed to those on the notification list and a notice of availability is was published in the Environmental Monitor in June 2001. In addition, a public meeting to review the draft plan and address public issues and concerns was held at Saugus Town Hall on June 26, 2001. Written comments received are summarized and addressed here in Appendix G.

## Final Salt Marsh Restoration Plan

The purpose of this plan is to identify lost or degraded salt marshes, document problems in the ACEC's subwatersheds with respect to flooding, water quality, and fish and wildlife habitat, and assess the feasibility of addressing these problems by restoring salt marshes. This analysis relies primarily on site specific information provided by members of the working group and others knowledgeable about the area. The result is a list of potential wetland restoration sites that are not ranked, but are evaluated based on several watershed-level and site-specific criteria. In addition, projects that have recently been completed or are underway are briefly described in order to document the considerable improvements which have already been made.

After public comments were received, new and revised information has been incorporated in the Final SMRP. The Final Plan is being widely distributed to ACEC communities, involved agencies, and other stakeholders. In addition, a notice of availability has been sent to the Notification List and published in the Environmental Monitor. The Final SMRP is intended to assist in the identification and prioritization of salt marsh restoration sites for both proactive and compensatory mitigation.

# ABOUT THE RUMNEY MARSHES ACEC

## *Watershed Characteristics*

Rumney Marsh and Belle Isle Marsh are located in the North Coastal Watershed of Massachusetts, which includes most of the coastal drainage areas north of Boston. The two marsh systems, 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 uplands and filled wetlands within this region are heavily developed urban land, which contribute large volumes of polluted run-off and other non-point source pollution to the 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.

## Rumney Marsh

Rumney Marsh, 2,274 acres, is the northerly and larger marsh complex within the ACEC. It is comprised of extensive estuarine wetlands and located in the towns of Saugus, Revere, and Lynn. The ACEC boundary generally follows the delineation of the 100-year floodplain, as shown on current Flood Insurance Rate Maps. This line corresponds roughly to elevation 10-feet NGVD. There are also small areas of salt marsh outside the ACEC boundary, principally in the stretches of the Saugus River upstream of Lincoln Street and Shute Brook and south of the ACEC boundary.

*Table 1. Rumney Marshes ACEC Area by City/Town (in Acres):*

| ***City/Town*** | ***Rumney Marsh*** | ***Belle Isle Marsh*** | ***Total ACEC*** |
|---|---|---|---|
| *Lynn* | 147 (6%) | *** | 147 (6%) |
| *Saugus* | 1,338 (59%) | *** | 1,338 (51%) |
| *Revere* | 789 (35%) | 95 (26%) | 884 (34%) |
| *Winthrop* | *** | 87 (24%) | 87 (3%) |
| *Boston* | *** | 178 (50%) | 178 (7%) |
| **Total** | **2,274** | **360** | **2,634** |

The Saugus River has a drainage area of approximately 47 square miles and is 13 miles long, originating in Wakefield. The lower 4.7 miles are tidal, up to the Saugus Iron Works Historic National Site. The mouth of the river lies seaward of the General Edwards Bridge.

Shute Brook is located in the upper reaches of the tidal zone, merging with the Saugus River just west of Stocker Park in Saugus. Though it is tidally influenced up to Winter Street, it is not within the ACEC boundary. Several significant stormwater outfalls discharge into Shute Brook near Stocker Park and Riverside Cemetery.

Among the other named rivers and creeks within Rumney Marsh, the Pines River is the most prominent. It originates near the southwest boundary of the ACEC, just east of Route One. The Pines flows into and out of the Sea Plane Basin then meanders through the marsh for about two miles and merges with the Saugus River at Point of Pines. The Pines River is tidal for its full length and receives freshwater run-off from the surrounding neighborhoods in northern Revere and East Saugus, an area of heavily urbanized land use.

Two small creeks, Linden Brook and Town Line Brook, and numerous stormwater outfalls, deliver most of the freshwater to the Pines River. Town Line Brook is tidally influenced for several thousand feet west of Route One, but the channel is confined to a concrete ditch almost two miles long and is not within the ACEC. Linden Brook empties into a small brackish pond just north of the Sea Plane Basin.

Diamond Creek is a small tidal creek with several unnamed tributary streams, meandering through the southeast portion of the ACEC and meeting the Pines River just east of the I-95 fill. The streams originate along the south border of the ACEC and drain much of the area from the Northgate Plaza and east along Route 60. The Central County ditch, a man-made, partially buried drainage channel, is connected to Diamond Creek, just south of Oak Island and west of the Boston and Maine railroad tracks.

Bear Creek is a very short (less than 2,000 feet) tidal creek merging with the Saugus and Pines Rivers near Point of Pines, just north of the RESCO landfill. The landfill is in the process of being closed and is being restored to publicly accessible open space with the new name of Bear Creek Wildlife Sanctuary.

## Belle Isle Marsh

Belle Isle Marsh is a much smaller portion of the overall ACEC and is located approximately 1.5 miles south of Rumney Marsh proper and just north of Logan Airport. Its total size is 359 acres and is located in Boston, Winthrop, and Revere.

The primary surface water feature in Belle Isle Marsh is Belle Isle Inlet. The Inlet traverses the heart of the Belle Isle Marsh from Bennington Street south to the Saratoga Street Bridge, a distance of approximately two miles. The two major tributaries of Belle Isle Inlet are Sales Creek, on the west side of Belle Isle Marsh, and Short Beach Creek to the east.

Sales Creek joins Belle Isle Inlet northwest of Bennington Street. The Creek formerly connected with the Chelsea River, but it is now partially buried and channelized. Remnants of the Creek are present on the infield of Suffolk Downs Race Track and within small portions of remaining salt marsh just north of the track stables. Recognizing the importance of the hydrologic connections among these remaining sections of Sales Creek to the marsh, this area is included in the ACEC boundary.

## *Wetlands of the ACEC*

The predominant ecological and visual features of the Rumney Marshes ACEC are the expansive wetlands that are located along the Saugus and Pines Rivers and Belle Isle Inlet. The wetlands of Rumney Marsh and Belle Isle Marsh were once much more extensive, as shown on Map 3 in Appendix D. Human impacts to the marshes have included filling, dumping, and ditching. One of the first roads built through Rumney Marsh was the Salem Turnpike, constructed in 1803. Travelers were transported by stagecoach over the marshes between Boston and Salem.

In the 1820s the Saugus Racetrack was constructed on the marsh in East Saugus. Later, Atwood Aviation Park utilized the race track as an airfield in 1912. The turn of the century brought residential and summer home development to Lynn and Revere, which filled in hundreds of acres of marshland. In the 1930s, Rumney Marsh, along with most east coast marshes were ditched by the Work Progress Administration (WPA) in an attempt to reduce mosquito populations. Many of these ditches still exist throughout the marsh. From the 1940s to the 1970s, industrial, commercial and residential development continued to fill in hundreds of acres of salt marsh and tidal flats.

One of the most profound impacts to Rumney Marsh was the partial construction of what was intended to be an extension of Interstate Route 95 in the 1960s. With project planning and design starting in 1948, as part of the nationwide federal highway building initiative, construction of the highway embankment began in 1967. Several million cubic yards of sand were placed on approximately 200 acres in the heart of Rumney Marsh, from just south of Ballard Street in Saugus to the area just north of Northgate Plaza in Revere, a distance of almost two miles. Public concern about the social and environmental costs of the project, and the passage of the National Environmental Policy Act, led to the abandonment of the project in 1972. By 1990, plans for reuse of the embankment were developed, which included removal of approximately one million cubic yards of sand for renourishment of Revere Beach, transfer of most of the land from the Massachusetts Highway Department to the care and custody of the MDC and Town of Saugus, and development of the land into a passive linear park. Salt marsh

*A portion of the abandoned I-95 embankment. Note restored area on the right.*

restoration has also been a concern since the highway project was scuttled. Several of the projects identified by this draft salt marsh restoration plan directly address portions of the embankment (see Appendix C, Project Descriptions). However, large scale removal of the embankment is complicated by the flood protection it now provides for residential neighborhoods in East Saugus.

By 1978, state and federal regulations preventing the filling of wetlands were instituted and marsh destruction was slowed. Since ACEC designation in 1988, the Saugus River Watershed Council (SRWC) has been established to protect the Saugus River and its watershed. More recently, the Friends of Rumney Marsh organized to bring similar focus to the Rumney Marshes. In 1992, the MDC acquired and dedicated over 500 acres of the marshes as the Rumney Marsh Reservation. Despite state and federal legislation and efforts by concerned citizens, illegal dumping, filling and pollution continue to threaten Rumney Marsh.

Salt marsh comprises approximately 1,128 acres (954 acres in Rumney Marsh; 174 acres in Belle Isle Marsh) or about 43% of the total ACEC area. Other types of vegetated wetlands account for about 86 acres and tidal flats make up about 367 acres. More than one-third of the ACEC's vegetated wetlands consist of irregularly flooded high salt marsh, a plant community dominated by salt hay grass, *Spartina patens*. In 1988, it was estimated that approximately 126 acres of Rumney Marsh was dominated by common reed, *Phragmites australis*, but that number is currently thought to be significantly higher. Low salt marsh, flooded twice daily and dominated by salt marsh cordgrass, *Spartina alterniflora*, comprises 18% of the ACEC's wetland area. Twenty two percent of the wetland resource area consists of regularly flooded and irregularly exposed tidal flats (IEP 1988).

*Salt marsh hay, Spartina patens, is the dominant plant in irregularly flooded high salt marshes.*

*Table 2. Wetland Types of Rumney Marshes ACEC, in acres, with percent by total ACEC acreage (Source: MA DEP, Wetlands Conservancy Program, 1:5,000 wetlands mapping layer)*

| **Wetland Type** | **Rumney Marsh** | **Belle Isle Marsh** | **Total ACEC** |
|---|---|---|---|
| *Salt Marsh* | 954 (36%) | 174 (7%) | 1,128 (43%) |
| *Tidal Flats* | 312 (12%) | 55 (2%) | 367 (14%) |
| *Other Vegetated Wetlands* | 59 (2%) | 27 (1%) | 86 (3%) |
| *Open Water* | 279 (11%) | 6 (<1%) | 285 (11%) |
| *Total Wetland Acreage* | 1,604 (61%) | 262 (10%) | 1,866 (71%) |

## *Resource Assessment*

Despite the tremendous ecological value of Rumney Marsh and Belle Isle Marsh and their uniqueness as large natural areas within a highly developed and urbanized region, the ACEC suffers from a host of problems which diminishes values and impairs vital ecological functions. Threats include:

- 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.

Disturbances to the ACEC wetlands impact both the marshes themselves, through direct loss of fish and wildlife habitat, and the surrounding communities, demonstrated by widespread flooding in residential areas. Impairments to water quality within the ACEC may extend beyond the boundaries of the Saugus/Pines River watershed and into Massachusetts Bay.

These damaging impacts can be mitigated or eliminated by restoring salt marshes. In addition, salt marsh restoration addresses other local concerns, such as loss of recreational and educational opportunities, threat of brush fires, and lack of aesthetic values. The loss of these values within the Rumney Marsh region contributes to a poor understanding of the importance of the ACEC among the general population. Volunteer and student monitoring programs, beach and marsh clean-ups, and recreational activities sponsored by the Saugus River Watershed Council and local schools have already increased public knowledge of the Rumney Marshes throughout the region. Restoration of these societal functions, and a sense of place among local residents, is an important step in building a constituency for salt marsh restoration in the region.

The following is a brief, qualitative assessment of the ecological resources and other wetland functions of Rumney Marsh and Belle Isle Marsh. It is not comprehensive and, for the purposes of this plan, generally focuses on the impaired functions and values which may be addressed by restoring salt marshes.

## Wildlife Habitat

*Great Egrets are familiar salt marsh residents during summer and fall.*

Despite centuries of filling, ditching, and development in and adjacent to Rumney Marsh and Belle Isle Marsh, the area remains one of the most important fish and wildlife habitat areas on the Massachusetts coast and certainly the most significant natural area in the Greater Boston area. The portions of Rumney Marsh which have remained relatively undisturbed provide high quality habitat for a wide range of finfish, shellfish, birds, mammals, and insects. This is partially so because many species spend only limited portions of their lifecycle in the marsh (for example, most species of finfish and virtually all birds) and are not greatly affected by direct loss of habitat or poor water and sediment quality.

The most direct and visible impact to the habitat resources of the marsh has been filling. Large sections of Rumney Marsh wetlands, for example the southern edge of the ACEC near Northgate Plaza and the RESCO landfill, have been transformed into uplands by the deposit of sand, gravel, rubble, and garbage. Obviously, salt marsh dependent species, such as killifish, grass shrimp, and seaside sparrows, which relied on these wetlands are no longer supported in these filled areas.

Habitat functions of the marsh have also been impaired in more subtle ways. Grid ditching for mosquito control conducted during the 1930s, attempted to drain water from virtually the entire marsh surface. Salt pannes and small tidal creeks, essential habitat areas for killifish and wading birds, were eliminated by the hydrologic alteration. Other direct and indirect alterations to natural hydrology, such as those caused by tide gates and crossings of tidal creeks by roads and train tracks, have also had deleterious effects on salt marsh wildlife by restricting tidal flow and freshwater run-off and fragmenting formally contiguous marshes.

## Invasive Species

Many of the disturbances to Rumney Marsh and Belle Isle Marsh -- filling, tidal restrictions, and ditching -- have resulted in a change of dominant vegetation types. Historically, vegetated tidal wetlands of the ACEC area were dominated by either *Spartina alterniflora* (regularly flooded low marsh) or *S. patens* (irregularly flooded high marsh). This pattern remains in less disturbed portions of the marsh, but extensive areas of former salt marsh are now dominated by invasive plant species, most notably common

reed, *Phragmites australis*. Though not well understood, current research suggests that common reed is native to our area, but was never a dominant species, historically occurring as one of many species in the upper reaches of brackish marshes. Today, in response to widespread land-use changes in eastern North America, increased nutrient input to aquatic and terrestrial ecosystems, and possibly the introduction of non-native genotypes from Europe, common reed has become a well established, and well documented, nuisance plant species in many locations. Its presence in wetlands, and Rumney Marsh in particular, is widely regarded as an indicator of disturbance and subsequent impairment of ecological functions and values. At disturbed sites, common reed frequently forms dense monotypic stands ranging up to four meters (12 feet) tall. The robust growth form of common reed crowds out virtually all other plant species, diminishing the habitat value of the area. In many instances, a dense mat of rhizomes and dead and decaying plant material builds up, raising the level of the marsh surface, further restricting tidal flow and freshwater run off, and increasing the areal extent of common reed onto the marsh surface.

*Common reed, Phragmites australis, rapidly colonizes fresh and brackish shorelines and wetlands.*

## Water Quality

Recent clean-ups and improved regulatory enforcement have removed most major continuous point-sources of pollution within the ACEC. However, major thermal pollution from industrial cooling water releases remains an issue in the Saugus River estuary. Stormwater pollution and intermittent sewage discharges from combined sewer overflows (CSOs) and inadequate pumping stations continue to cause water quality problems during wet weather.

Sampling by the Saugus River Watershed Council shows that the Saugus River and its tributaries are significantly impaired by bacterial pollution. During the period of June 2000 through September 2000, only 40% of samples met the state swimming standard of 200 colonies per 100 milliliters fecal coliform, while 70% of the samples met the boating standard of 1,000 colonies per 100 milliliters (SRWC 2000).

Despite continued bacterial problems, the Council's sampling program indicates that dissolved oxygen levels in the watershed have been improving over the past three years from an average of 6.04 milligrams per liter in 1998 to 7.34 milligrams per litter in 2000. During 2000, 93% of the samples collected were at or above the state recommended minimum of five milligrams per liter of dissolved oxygen, compared to only 76% during 1998 (SRWC 2000).

Tidal reaches above Route 107, in the upper estuary, have more water quality problems during storm events due to greater run-off volumes, with fecal coliform measured as high as 30,000 colonies per 100 milliliters. Fecal coliform standards are also exceeded by two to four orders of magnitude in the lower estuary during storms (USACE 1989). Much of this pollution is traced to input from the Trifone Brook sub-watershed, a highly urbanized and largely subsurface drainage network connected to Town Line Brook and Seaplane Basin. Continuing bacterial pollution has resulted in the closure of all clam flats within the ACEC. Steps are being taken by the City of Revere, in partnership with other state and non-profit agencies, to address water quality and stormwater run-off problems in the Trifone Brook watershed.

The role of salt marshes in reducing bacterial pollution is poorly understood. In the context of the overall watershed, salt marshes by nature are at the bottom of the system and act as sinks for whatever contamination may cycle through the hydrologic system. The most effective method of controlling bacterial pollution, and other pollutants such as suspended solids, is to keep them from entering the system in the first place. Though great improvements have been made in addressing the sources of water pollution, some inputs will likely always remain. These are best treated near the source, in the higher sections of the watershed, with a combination of stormwater treatment Best Management Practices (BMPs), such as proprietary treatment systems, constructed treatment wetlands, and detention basins. The City of Revere is currently evaluating the implementation of these technologies in the Town Line Brook watershed and while the use of natural drainage patterns - "day-lighting" buried streams (opening culverted and piped streams to a more natural condition), and creating or restoring wetlands for stormwater treatment - is encouraged, those practices are beyond the scope of this plan. However, restored salt marshes may further enhance water quality by attenuating storm flows, increasing nutrient and sediment exchange, and improving flow of both freshwater and tidal flow.

## Flooding

Development and filling of salt marshes within, and in close proximity to, Belle Isle Marsh and Rumney Marsh has caused significant flooding problems to nearby residential, commercial, and industrial neighborhoods. Wetlands of the ACEC are

completely within the 100-year floodplain and filling these areas results in a loss of flood storage capacity. Restrictions to tidal flow caused by undersized culverts and tide gates impedes receding floodwater, thereby lengthening the duration of flood events. The presence of large impervious surfaces, such as parking lots, roadways, and roofs, impedes infiltration of water into the soil, increasing both the velocity and volume of stormwater flowing into the marsh.

*Residential flooding is an increasing concern in Saugus and Revere*

The Saugus River and Tributaries Flood Damage Reduction Study, prepared by the Army Corps of Engineers in 1989, documents the extent and importance of the flood storage capacity of Rumney Marsh. Damages from coastal storms occur on an annual basis, with significant flooding on an average of every four to five years. Historically it is nor'easters, not hurricanes, that have caused serious tidal flooding in the study area. Because of the particular topography and tidal hydrology of the study area, floodwaters become trapped from waves pushed inland from the ocean and which overflow seawalls. Resulting interior flood levels are often significantly higher than high tide levels offshore. Only when the storm abates can the floodwaters slowly drain back out through the estuary, the single outlet to the sea (USACE, 1989).

*This Waterman-Nekton Self-Regulating Tidegate on the Central County Ditch was the first of many to be installed in Rumney Marsh.*

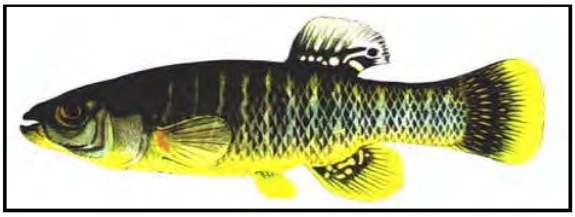
There are approximately 21 tide gates in the Rumney Marshes ACEC. These are intended to prevent water in the estuary from backing up into local drainage systems causing flooding in residential areas during high tides and significant rainfall events (Hayes 1995). Many tide gates have become inoperable over the years and are ineffective in controlling flooding. There has also been a general recognition of the ecological damage caused to salt marshes by standard, flapper-type tide gates, which restrict the normal tidal flow necessary for a marsh to sustain itself. Since 1997, ten standard tide gates in Rumney Marsh have been replaced by self-regulating tide gates, a new technology designed to protect developed areas from flooding, while also allowing daily tidal inundation to the marsh.

Continued protection and enhancement of the flood storage area of Belle Isle Marsh and Rumney Marsh is an essential and fundamental element to flood control in the ACEC and surrounding neighborhoods. Surveys by the Army Corps have determined approximately

11.5 acres of salt marsh were filled between 1978 and 1989, despite the establishment of rigid wetland regulations. Extensive pressures to deposit or dispose of fill in the estuary remain and illegal filling of wetlands continues to be a problem. When there is another storm as severe or greater than the Blizzard of 1978, coincident with 100-year storm runoff, the combined events would require all of the available storage of the estuary (USACE 1989). Beyond protection of existing flood storage areas, restoration of historic flood storage areas by fill removal and elimination of tidal restrictions is the only feasible method to gain more flood capacity and avoid the recurrence of catastrophic damage.

## Mosquitoes

Despite monumental government-sponsored efforts in the 1930s, and other prior attempts to eliminate nuisance insects in Rumney Marsh and Belle Isle Marsh, high mosquito populations continued to annoy local residents into the 1980s and 1990s and continue to a limited extent today. In the 1970s, there was a general recognition that the techniques used to control mosquitoes in the past, primarily grid ditching and filling, actually increased mosquito populations. The negative ecological impacts to salt marshes were also recognized, as evidenced by the spread of common reed and lack of habitat utilization by typical salt marsh species.



*Mummichog, Fundulus heteroclitus, is the most common fish of salt marsh pannes and creeks.*

A key result from grid ditching, and other early mosquito control efforts, was the elimination of killifish (*Fundulus* spp.) from the marsh surface. These small, native fish typically dwell in tidal creeks during low tide. As the tide rises, killifish spread out over the marsh surface to feed on small insects. On the falling tide, groups of fish congregate in tidal pools - salt pannes. They move back into the larger estuarine system, where they become prey for larger fish, on the next high tide. Grid ditching effectively drained pannes and small creeks, restricting killifish to the larger estuarine system. 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. Hence, mosquito populations boomed.

*Salt pannes created for control of mosquitos at Park Street Marsh, Saugus*

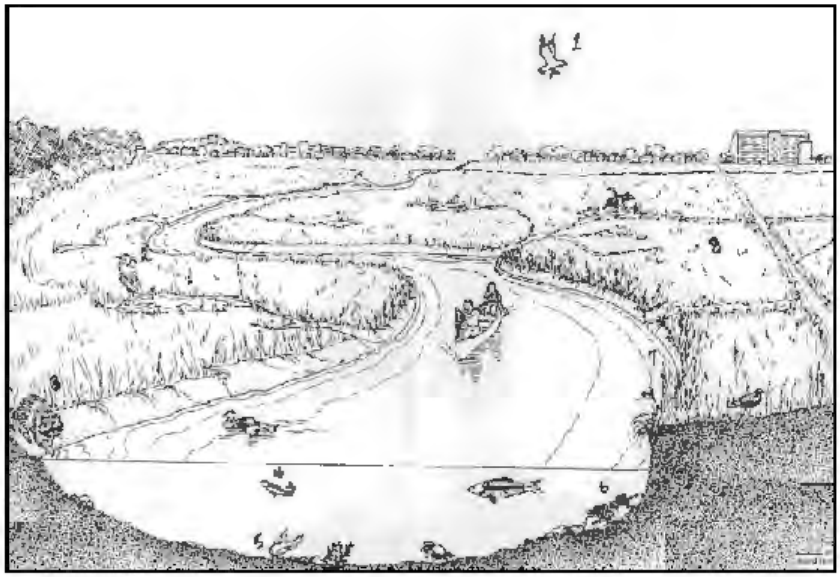
Documentation of the relationship between mosquito larvae, killifish, and grid ditching eventually led to the development of Open Marsh Water Management (OMWM) as an innovative

technique for mosquito control. The process 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 to consume mosquito larvae. Implementation of OMWM has been extremely effective in both controlling mosquitoes and restoring lost ecological functions and values to salt marshes. The Northeast Massachusetts Mosquito Control and Wetlands Management District (NMMCWMD, formerly the Essex County Mosquito Control District) is a national leader in the use of OMWM and has implemented a number of projects in Rumney Marsh and Belle Isle Marsh. In addition, other OMWM projects are planned in the future to specifically address continuing mosquito problems. Salt marsh restoration, in general, promotes mosquito control by improving or increasing habitat for killifish, improving tidal flushing, and improving the ecological functions described above.

## Fire

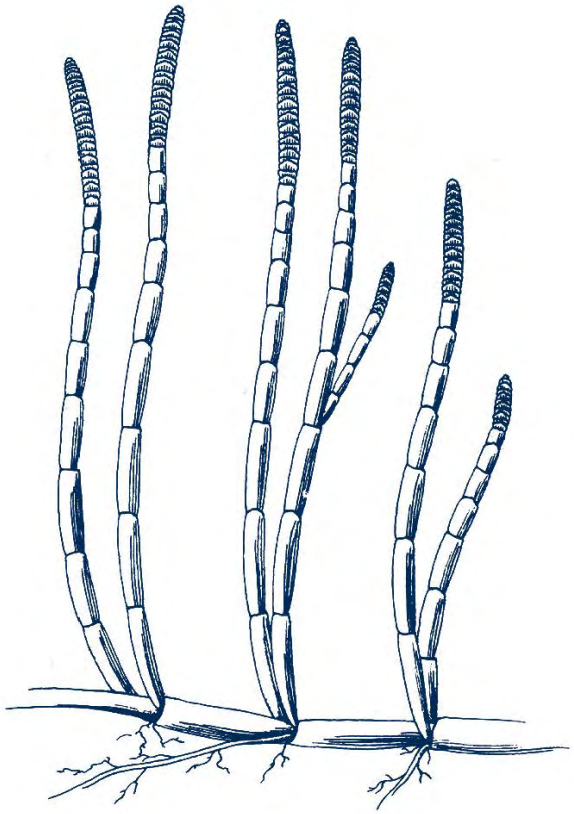
Brush fires, particularly in dense stands of common reed, are a continuing problem in Rumney Marsh and Belle Isle Marsh. Monotypic stands of common reed typically contain several years worth of dead plant material, both on the ground and standing, that burns readily. In some locations, common reed occurs close to residential neighborhoods and the possibility of brush fires threatens dwellings and infrastructure. Where possible, salt marsh restoration is the most sustainable method of controlling common reed, thereby reducing the threat of brush fires.

## Recreation, Aesthetics, and Education



Rumney Marsh and Belle Isle Marsh have been regarded as important areas for recreation, and as important visual amenities, ever since there were people in the region to appreciate these values. The marshes have been used for recreational fishing, shellfishing, hunting, trapping, boating, hiking, and bird watching, and have inspired paintings, photographic art, and literature. All of these activities are precluded to varying degrees by the existing condition of the marsh. Shellfishing and fishing are limited by loss of habitat, boating is restricted by poor water quality and lack of access, and visual appreciation of the marsh is blocked by tall stands of common reed. Salt marsh restoration in Rumney Marsh and Belle Isle Marsh will

improve these conditions. In addition, as restoration projects are implemented and improvements are realized, local citizens will gain a new appreciation for the marsh, thereby strengthening public awareness and stewardship for the ACEC. In many instances, salt marsh restoration projects make ideal outdoor classrooms, involving students on many levels. Revere High School students already conduct biological monitoring projects in Rumney Marsh. Implementation of plans by the MDC to increase access and programming will further engage people and encourage public enjoyment of the ACEC.



# Site Evaluation

## *What is Salt Marsh Restoration?*

Wetland restoration is defined as "the act, process, or result of returning a wetland or a former wetland to a close approximation of its condition prior to disturbance". The goal of wetland restoration is to bring back wetland functions - including water quality improvement, flood storage and flood protection, and fish, shellfish, and wildlife habitat - that have been lost through wetland destruction and degradation. This definition applies to both freshwater and coastal wetlands.

Given the wide range of activities meeting this definition, wetland restoration can involve a variety of actions based on the intended purpose of the project. Wetland restoration may involve reestablishing a wetland on a former wetland site or returning a damaged, degraded, or otherwise functionally impaired wetland to its prior (pre-disturbance) condition, or one similar to it. Some wetland restorations will result in an increase in wetland acreage. Others may improve or enhance the condition and value of an existing wetland, typically with no gain in wetland acreage. A single wetland restoration project may combine these two general approaches. Successful salt marsh restorations should be persistent, self-sustaining, and not dependent on continuing management activities.

### Excavation of Filled Salt Marshes

Previously filled areas of wetlands can potentially be restored with landowner consent or through enforcement actions for excavation of unpermitted fill. In Rumney Marsh, some filled wetlands around the edges of the General Electric landfill and the RESCO landfill site, both in Saugus, have been excavated to restore salt marsh and control *Phragmites*. In the designation document for the Rumney Marshes ACEC, the Secretary of Environmental Affairs spoke of the goal of removing the entire abandoned I-95 highway embankment.

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.

### Removal of Tidal Restrictions

Salt marshes can also be adversely affected by roads or railway crossings and tide gates. For example, many culverts installed under road crossings, intended to allow a creek to flow under the road, are not large enough and the full range of the tide cannot enter a marsh. Small culverts also tend to impede drainage of freshwater run-off from the salt marsh surface. The major effect of both of these conditions is a lowering of salinity levels and the establishment of common reed, *Phragmites australis*, an invasive plant species that crowds out native salt marsh vegetation. Undersized culverts also restrict the passage of fish into the marsh.

The Massachusetts Highway Department, in addressing flood control needs for maintenance of existing tide gates in Revere, agreed to install nine self-regulating tide gates (SRTs) in lieu of conventional flapper gates. This innovative technology will help restore and maintain salt marshes which were dependent on leakage from broken or missing tide gates while still providing flood protection benefits.

## Open Marsh Water Management (OMWM)

Some previously ditched and drained marshes lacking salt marsh pannes can be restored for improved mosquito control and wildlife habitat using Open Marsh Water Management (OMWM) techniques, as practiced by the Northeast Massachusetts Mosquito Control and Wetlands Management District (NMMCWMP).

The appropriate method for restoring a salt marsh or other wetland depends on the nature and extent of impacts. For example, at the Park Street Marsh, near the Old Saugus Race Track, ash piles of unknown origin were placed on the salt marsh in the 1970s and the marsh became dominated by the invasive plant species *Phragmites australis*. In a cooperative effort sponsored by the MWRP, MAPC, and NMMCWMP, the ash piles were removed in 1998 and the marsh was restored using OMWM at this nine-acre site.

## Proactive vs. Compensatory Restoration

There are two basic means by which a salt marsh restoration project can occur, proactively or for regulatory compensation. Wetland restoration conducted proactively is not as a condition of a permit (although permits are required), but is undertaken voluntarily for environmental improvement. Under proactive restoration, private wetland owners cannot be required to participate in a wetland restoration project and there is no infringement on private property rights. It is hoped, however, that many private landowners will recognize the value of wetland restoration and voluntarily authorize wetland restoration projects on their property. Restoration work would proceed at no cost to the landowner, unless they chose to contribute to the project.

Compensatory salt marsh restoration is conducted to mitigate the unavoidable impacts of a permitted activity or can be required under an enforcement order to replace salt marsh acreage that has been illegally destroyed. For example, the Massachusetts Highway Department Central Artery/Tunnel Project restored 18.3 acres of intertidal habitats at Rumney Marsh to compensate for wetland impacts in Boston. All of the potential wetland restoration sites identified and evaluated in the plan could be restored either proactively or for compensatory mitigation.

## *Evaluation Criteria: Salt Marsh Functions and Values*

The potential benefits of salt marsh restoration in general can include ecological benefits:

- water quality improvements,
- increased flood storage,
- estuarine wildlife habitat enhancement.

Other public benefits include:

- additional or higher-quality recreational opportunities,
- visual and aesthetic enhancement,
- fire safety, and
- mosquito control.

In order to evaluate potential salt marsh restoration sites in the project area, a qualitative assessment of potential benefits has been utilized. This information was compiled and evaluated by the Rumney Marsh Salt Marsh Restoration Task Group in 1998. The Task Group addressed questions relating to water quality, flood storage, wildlife habitat, mosquito control, fire control, recreation, and aesthetics. The following considerations and assumptions were used to compile a qualitative ranking of the specific benefits for each potential restoration project identified:

### Water Quality

Salt marshes influence the maintenance and improvement of water quality by trapping and retaining organic and inorganic sediment, attenuating erosive stormwater flows, and storing metals and other pollutants in vegetative tissues (Shafer and Yozzo 1998). In general, these functions are enhanced by marsh size, degree of tidal flushing, density of salt marsh vegetation, degree of overland sheet flow, and the presence of adjacent pollution sources. The rationale for each of these factors and their application to salt marsh restoration is described below.

- Size of marsh:

*Rationale:* Large marshes treat and store more water.
*Application:* Restoration projects that increase salt marsh area by removal of fill are presumed to improve water quality. The magnitude of the benefit is directly correlated to the area of fill removed.

- Level of tidal flow or flushing:

*Rationale:* Free flow of tides and drainage of freshwater maintains acceptable water temperatures, normal dissolved oxygen levels, and balances nutrient and carbon exchange.
*Application:* Restoration projects that increase flow to tidally restricted salt marshes and promote drainage of freshwater, are recognized to improve water quality. The level of water quality improvement is a combined function of the degree of restriction, extent of freshwater influence to the marsh, and the extent of restored flow.

- Density of salt marsh vegetation:

*Rationale*: Dense stands of salt marsh vegetation help slow down run-off velocities, promote sediment deposition and uptake of nutrients, metals, and pollutants, and balance the import/export of carbon, nitrogen, and phosphorus between the marsh and adjacent estuarine systems.
*Application:* Restoration projects which result in dense, sustainable stands of native salt marsh vegetation, whether by fill removal, elimination of a tidal restriction, or revegetating denuded marshes, improve water quality. The magnitude of improvement is related to pre-project vegetative conditions and the areal extent and stem density of reestablished native salt marsh plant communities.

- Overland sheet flow:

*Rationale*: Marsh areas that are not ditched and drain over a broad surface maintain more contact between water, vegetation, and soil, furthering sediment deposition, pollutant uptake, and nutrient/carbon exchange.
*Application:* Restoration projects in unditched marshes or projects in locations where overland sheet flow can be established by plugging ditches are presumed to improve water quality. The level of improvement is related to the quantity of water diverted from a ditch to sheet flow, or, where applicable, the areal extent of marsh subject to sheet flow.

- Proximity to upstream pollutant sources:

*Rationale:* Marshes adjacent to outfalls, large impervious surfaces (i.e. parking lots, roofs), and other pollution sources may provide opportunities for water quality renovation.
*Application:* Restoration projects that are hydrologically connected, or can feasibly be connected, to point or non-point discharges, will benefit water quality by treating polluted run-off. The magnitude of water quality improvement can be measured by the ability of the marsh treatment system to reduce pollutant levels and the quantity of run-off treated.

## Fish and Wildlife Habitat

Salt marshes provide critical habitat for a wide range of fish, shellfish, invertebrates, birds, and mammals (Shafer and Yozzo 1998). Many species, such as killifish, grass shrimp, salt marsh dragonfly, and seaside sparrows, spend almost all their time in salt marshes and utilize them for virtually all life functions - feeding, breeding, protection, resting, etc. Other species use the marshes only for specific functions or are restricted to specific microhabitats according to water temperature, salinity, plant community, substrate, and many other factors. For example, snowy and great egrets commonly are found feeding in marshes while they nest on rocky, off-shore islands. Winter flounder inhabit marshes during spring and autumn, preferring more moderate deep water during extreme hot and cold periods. Many other species of fish, such as striped bass and American eel, pass through marshes during annual migrations.

Salt marsh habitat requirements, such as vegetation characteristics, water temperature, salinity, soil type, and hydrology, vary widely for each species using the marsh. In general, however, the quality of salt 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 proximity to and complexity of tidal creeks and salt pannes. The rationale for each of these factors and their application to salt marsh restoration is described below.

- Marsh size

*Rationale*: Large marshes provide more habitat for more species. Larger marshes are generally more complex, containing a range of microhabitats which support more diverse fish and wildlife assemblages. Some species, such as sora, will only utilize marshes of a certain minimum size, further increasing the biodiversity values of larger marshes.
*Application:* Restoration projects that increase salt marsh area by removal of fill create more salt marsh habitat. The magnitude of the benefit is directly correlated to the area of fill removed and the marsh area restored.

- Extent and duration of tidal flow

*Rationale:* Free flow of tides and drainage of freshwater maintains water and soil chemistry and diverse, native plant communities, critical habitat components of estuarine marsh systems.
*Application:* Restoration projects that increase flow to tidally restricted salt marshes and promote drainage of freshwater improve salt marsh habitat. The level of water quality improvement is a combined function of the degree of restriction, extent of freshwater influence on the marsh, and the extent of restored flow.

- Composition of salt marsh plant communities

*Rationale*: Salt marsh plant communities are a crucial element to salt marsh habitats. The influence of vegetation is both direct and indirect. Plants provide food, cover, and nesting material to many species. Plant tissues play an important role in maintaining water quality and sediment/nutrient balance.
*Application:* Restoration projects that promote native salt marsh plant communities improve fish and wildlife habitat. The magnitude of the improvement is a function of area of invasive species or denuded marsh surface replaced by native salt marsh species, density and structure of native salt marsh species, and diversity of native plant community types restored (i.e. low marsh/high marsh).

- Connectivity

*Rationale*: For many species, salt marshes are one of a variety of terrestrial and aquatic habitats used for foraging, nesting, cover, resting, and/or migration. Willets and some other shorebirds, for example, nest in marsh vegetation, but need nearby areas of open water or mud flat to forage for insects. Swallows feed on mosquitoes and other insects over the marsh, but retreat to adjacent uplands to roost in trees. Many species of fish forage over the marsh surface at high tide and retreat to deep water at low tide. Mammals, such as raccoons, and some birds may move onto the marsh surface for feeding while spending most of their time in nearby uplands. In addition, adjacent

terrestrial and aquatic habitat areas may provide corridors between several habitat components, connecting several marshes into a larger salt marsh complex.
*Application*: Projects which restore salt marsh in close proximity to tidal creeks, salt pannes, and other terrestrial and/or aquatic habitats supporting generally native plant communities, will improve overall fish and wildlife habitat. Projects that restore or enhance connections or migration corridors among isolated habitats will also improve fish and wildlife habitat. The level of improvement to fish and wildlife habitat is correlated with the acreage and diversity of habitat types connected by the restoration.

- Configuration of tidal creeks

*Rationale:* 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 those in Rumney Marsh, which have been subjected to grid ditching for mosquito control.
*Application*: Salt marsh restoration projects that restore natural hydrology, particularly by plugging grid ditches, establishing sheet flow, and/or constructing naturalistic drainage networks, will improve fish and wildlife habitat. The magnitude of the improvement to fish and wildlife habitat can be measured by the length of grid ditches plugged or filled and/or the area of marsh surface restored to natural hydrology.

## Flood Control

Within an estuarine system, salt marshes occur in varying landscape positions, such as fringing marshes near the estuary outlet, “back bay” marshes behind barrier beaches, and high salt marshes located at the upper extent of tidal influence. Each of these sub-systems is subject to different patterns of freshwater input, tidal surge, stormwater run-off, tidal frequency and duration and, therefore, plays a different role in flood control and storage. Marshes high in the tidal system may be important areas for attenuation and treatment of run-off from developed areas, while back bay marshes are critical for protecting shorelines from storm surges (Shafer and Yozzo 1998).

In confined or partially confined coastal wetlands bordered by densely developed areas, such as Rumney Marsh and Belle Isle Marsh, improvements to flood storage and control are considered to have significant ecological benefits. Flow of normal run-off, stormwater, and tidal surges over impervious surfaces within urbanized coastal regions, is a major cause of water pollution, affecting estuarine and near-shore habitat quality, public health, and infrastructure maintenance. Salt marshes help mitigate these impacts by storing and attenuating storm flows, thereby promoting sediment deposition, stabilizing and protecting shorelines, and maintaining nutrient and carbon exchange. In general, flood control functions of salt marshes are determined by their landscape position, proximity to tidal creeks and ditches, and the nearby presence of tide gates, dikes, berms, or levees. The rationale and application to salt marsh restoration projects for each of these factors is discussed below.

- Landscape position

*Rationale*: The majority of salt marshes lie within the 100-year floodplain and, as such, are critical storage areas for extreme high tides and stormwater.
*Application*: Salt marsh restoration projects which remove fill to final elevations below the 100-year floodplain will improve and increase flood storage. The extent of the improvement is a function of the acreage of the restored area and the final elevations of the restored area.

- Proximity to creeks and ditches

*Rationale*: Salt marsh areas that are close to streams, creeks, or ditches play a more important role in floodwater storage and attenuation than marshes that are more isolated from surface water flow.
*Application:* Restoration activities that remove fill near tidal creeks, streams, or other conduits to stormwater flow (i.e. floodways, outfall pipes), or that involve hydrologic alterations that result in reconnection of salt marshes to surface water flow, will enhance regional flood control. Depending on the type of project involved, the level of enhancement relates to the acreage of marsh restored by fill removal or the areal and temporal extent of restored tidal hydrology.

- Presence of tide gates, dikes, berms, or levees

*Rationale*: These structures have historically been used to protect low-lying developed areas, which, by nature, are natural flood storage reservoirs. In most cases, low-laying areas are former salt marshes which have been filled and developed or existing marshes that are degraded by the alteration in hydrology. Tide gates and dikes are notorious for being ineffective because of inattentive maintenance and contemporary flood stages higher than historic norms. Misplaced dikes and inoperative tide gates also impede freshwater outflow, creating impoundments which degrade salt marsh habitat and may worsen local flooding problems.
*Application*: Salt marsh restoration projects that remove dikes, berms, or levees, allowing floodwater and extreme high tides into salt marshes and freshwater drainage toward the ocean, will benefit flood control. In addition, projects that replace non-functioning (i.e. leaking or always open) standard tide gates with self-regulating tide gates, may also improve flood storage and protection, while improving salt marsh functions under non-flood conditions. Caution must be exercised in the manipulation of any flood control structure, however, as flood protection for low-lying developed areas must be maintained.

## Mosquito Control

Major government sponsored efforts have been undertaken over many years to control mosquitoes in salt marshes. Until recently, these projects have had a largely negative impact on the ecological function of salt marshes, while having little negative effect on targeted mosquito populations. The development of Open Marsh Water Management (OMWM) and its widespread acceptance as the state-of-the-art technique for mosquito control in tidal marshes, has resulted in many public benefits beyond the basic goal of

reduction of mosquito populations. This includes significant habitat and water quality improvements in salt marshes where OMWM has been applied. In addition, salt marsh restoration projects that are not part of a formal OMWM program, also contribute to mosquito control. In general, the contributing factors to mosquito control are the presence of salt pannes, adequate drainage, and sufficient tidal flushing. The rationale for each of these elements, and their application to salt marsh restoration is described below.

- Salt Pannes

*Rationale*: Salt pannes are habitat for both mosquito larvae and killifish. Killifish devour mosquito larvae, effectively limiting adult mosquito populations to less than a nuisance level.
*Application*: Salt marsh restoration projects that create or restore degraded salt pannes may enhance mosquito control. The extent of enhancement is related to the area of salt panne restored or created. Creation of salt pannes can, at times, conflict with other salt marsh restoration and protection goals and should only be implemented after careful study and review.

- Drainage

*Rationale*: In many cases, ponding of freshwater run-off within salt marshes by berms, dikes, clogged drainage systems, and other impediments, creates conditions favorable to mosquito reproduction.
*Application*: Projects that promote freshwater drainage from salt marshes by removing impediments to flow, or the strategic creation of ditches, may contribute to mosquito control. The magnitude of control is a function of the amount of ponded freshwater drained toward the estuary and/or the linear feet of ditches cleaned, repaired, or created. This technique can, at times, conflict with other salt marsh restoration and protection goals and should only be implemented after careful study and review.

- Tidal flushing

*Rationale*: Lack of tidal flushing can create areas of stagnant fresh or saltwater, which are conducive to mosquito breeding and also limit the introduction of predatory killifish to the marsh.
*Application*: Restoration projects that reintroduce tidal flow to restricted salt marshes and promote freshwater drainage may improve mosquito control. The level of improvement is related to the presence of nuisance levels of mosquitoes prior to the restoration and the area of marsh reintroduced to tidal flow.

## Fire Protection

Because of its dense growth form, abundance, and the persistence of dead leaves and stems, common reed, *Phragmites australis*, burns readily, especially in summer and fall and poses a significant fire threat. The dense cover of common reed also constitutes an "attractive nuisance", almost inviting mischievous behavior from those passersby armed with firecrackers, cigarettes, and other items. By eliminating stands of common reed, salt marsh restoration helps to diminish the threat of brush fires. The factors involved in

reducing the threat of fire are the density and size of common reed stands and their proximity to residential areas. The rationale for and application of these factors is self-evident from the current discussion.

## Recreation and Aesthetics

Salt marshes are widely held to be significant visual and aesthetic amenities of the coastal environment. They are appreciated as macro elements - a scenic landscape or view of a large area - and for the individual elements that comprise the marsh - the textures of salt marsh grasses, the open water, the long-legged birds that inhabit the marsh. Salt marshes also provide varied recreational opportunities, both passive and active, and a wide range of formal and informal educational experiences. In general, the attributes of salt marshes that are conducive to high-quality recreational, visual, and educational opportunities are physical and visual access and scenic diversity. The rationale for these factors and their implications for salt marsh restoration projects is discussed below.

- Access

*Rationale*: In order to appreciate and understand salt marshes people must be able to see them and directly access them. Views of marshes in urbanized areas are often obscured by tall, dense stands of common reed. Direct access to a marsh can be precluded by lack of parking, landowner restrictions, safety concerns, or unawareness of the presence of the marsh.
*Application*: Salt marsh restoration projects that are on public land are deemed to have high potential for enhanced public access, particularly when the jurisdictional agency's primary mission is open space protection, such as the MDC or a municipal parks department. The prospect of providing a designated parking area, visible access points, boardwalks, formal programming, and interpretative signage will further enhance access and appreciation. In addition, restoration projects that control stands of tall common reed, will increase visual appreciation for the marsh, along with addressing concerns about security and illegal dumping.

- Scenic Diversity

*Rationale:* Landscapes with a diversity of features are presumed to be more visually interesting than monotypic landscapes. A diverse salt marsh complex contains varying types of salt marsh habitats (i.e. low marsh dominated by tall and short form salt marsh cord-grass, high marsh dominated by salt hay grass, spike rush, and black grass), shrubby transition zones, fingers and islands of upland edges, mud flats, and areas of open water. In addition to providing visual diversity, these elements also provide a diversity of habitats which, in turn, attract diverse wildlife, particularly birds. This adds to the scenic elements and provides enhanced recreational opportunities.
*Application*: Restoration projects that enhance the diversity of habitat types to an overall salt marsh complex, such as creating salt pannes and tidal creeks, are judged to increase scenic diversity, and therefore, visual appreciation and recreational opportunities. Projects which control or eliminate tall monotypic stands of common reed, allowing views of the marsh, further enhance this element.

## *Project Cost Evaluation*

Restoration of salt marshes under any circumstances could and should be presumed to have positive ecological (and ultimately social) benefits. Given finite resources, however, the evaluation of potential wetland restoration sites often includes a basic cost vs. benefit analysis. Preliminary cost estimates for planning purposes are relatively straightforward. Costs to restore wetland areas can be approximated by adding up site acquisition costs (if applicable), costs directly attributable to restoration work (feasibility study, assessment of options, design, permitting, construction, and administration costs), and long-term monitoring and management or maintenance costs. At this time, and for the purpose of this evaluation, project costs are only roughly estimated as "low" (less than $10,000), "moderate" (from $10,000 to $100,000), and "high" (more than $100,000). Estimated project cost is included with each project description found in Appendix C. No assessment of the approximate restoration costs has yet been completed for the range of potential wetland restoration sites in the Rumney Marsh and Belle Isle Marsh.

## *Site Evaluation Results*

In 1998, the Rumney Marsh Salt Marsh Restoration Task Group compiled an initial inventory of potential restoration projects which totaled approximately 273 acres of potentially restorable salt marsh. This is about 24% of the existing salt marsh area of Rumney Marsh and Belle Isle Marsh and 10% of the entire ACEC acreage. Since 1993, 142 acres of this total salt marsh acreage have been restored within the ACEC at 14* sites. Additional area of potentially restorable salt marsh has also been identified and more is expected to be identified as a result of this planning effort and follow-up activities. The current acreage of potentially restorable salt marsh is estimated to be approximately 131 acres at 16 sites. Of this total, six projects comprising 87 acres are currently in the planning or design stages or are under construction. Of the total remaining 16 projects identified to date, five have been classified as priority projects because of their high potential for restoring significant ecological functions and values. These results are summarized in the tables below and in Appendix C.

*Table 3. Salt Marsh Restoration Project Summary for Rumney Marshes ACEC:*

| | | |
|---|---|---|
| Total Number of Identified Projects | 30 | 273 Acres |
| Projects Constructed | 14* | 142 Acres |
| Projects Planned, Designed, or Under Construction (as of 4/02) | 6 | 87 Acres |
| Other Projects Identified | 10 | 35 Acres |
| *Priority Projects* | *5* | *96 Acres* |

(*Note: For purposes of this analysis, CA/T mitigation projects were grouped together)

The purpose of the evaluation is to summarize the potential benefits of each individual project and consider them within the context of each subwatershed in the ACEC and the overall Saugus/Pines Rivers watershed. While a recommended long-term goal for this analysis is to eventually develop a quantified assessment of the cumulative benefits of salt marsh restoration in Rumney Marsh and Belle Isle Marsh, the evaluation presented here is not intended to be comprehensive or quantitative. What is presented is a

qualitative, descriptive overview of the potential benefits of each project. This information was initially assembled in 1998 by the Rumney Marsh Salt Marsh Restoration Task Group and further refined by MWRP in 2001.

Each potential salt marsh restoration project in Rumney Marsh and Belle Isle Marsh was evaluated based on the criteria and assumptions previously discussed. Those points can be summarized as the potential for each project to:

- reduce stands of *Phragmites* (projects evaluated yes or no, based on presence of significant stands of *Phragmites* within project area)*;*
- improve fish and wildlife habitat (projects evaluated as low, moderate, or high based on potential for restored area to provide significant fish and wildlife habitat benefits, as described above in *Evaluation Criteria, Salt Marsh Functions and Values)*;
- improve water quality (projects evaluated as low, moderate, or high based on potential for restored area to provide significant water quality benefits, as described above in *Evaluation Criteria, Salt Marsh Functions and Values)*;
- provide flood storage capacity and improve drainage (projects evaluated as low, moderate, or high based on potential for restored area to provide significant flood control benefits, as described above in *Evaluation Criteria, Salt Marsh Functions and Values)*;
- provide mosquito control (projects evaluated yes or no, based on mosquito control criteria as described above in *Evaluation Criteria, Salt Marsh Functions and Values*);
- reduce risk of brush fires (projects evaluated yes or no, based on presence of significant stands of *Phragmites* in project area and proximity to residential areas);
- increase recreational opportunities (projects evaluated as low, moderate, or high based on potential for restored area to provide significant recreational opportunities, as described above in *Evaluation Criteria, Salt Marsh Functions and Values);*
- improve scenic quality (projects evaluated as low, moderate, or high based on potential for restored area to provide scenic benefits, as described above in *Evaluation Criteria, Salt Marsh Functions and Values).*

Site evaluation results are summarized in the table below. Projects are not quantifiably ranked. Priority projects were identified based on their size and clearly recognizable ability to provide substantial ecological benefits and restore lost salt marsh functions. See Appendix C for a detailed description of all potential projects identified to date and a summary of all completed and on-going projects.

***Table 4: Salt Marsh Restoration Projects of the Rumney Marshes ACEC:***

| | | | Ecological Benefits | | | | Other Public Benefits | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Site Name (*=Projects in Design, Planning, or Under Construction)** | **City/Town** | **Project Size (Acres)** | **Phragmites** | **Fish & Wildlife Habitat** | **Water Quality** | **Flood Storage** | **Mosquito Control** | **Recreation** | **Scenic Quality** | **Fire Control** |
| ***Priority Projects*** | | | | | | | | | | |
| Oak Island Marsh & Tidegate* | Revere | 30 | Yes | High | High | High | Yes | Low | High | Yes |
| Townline Brook Floodplain* | Revere | 24 | No | High | High | High | Yes | High | High | No |
| Ballard St. Marsh Excavation* | Saugus | 20 | Yes | High | High | High | Yes | High | High | Yes |
| Ballard St. Marsh Tidegate* | Saugus | 12 | Yes | High | High | High | Yes | High | High | Yes |
| Seagrit Ave. Salt Marsh | Saugus | 10 | Yes | Mod | Mod | Mod | Yes | High | High | Yes |
| *Other Projects* | | | | | | | | | | |
| Sales Creek/Bennington St. | Boston | 6 | Yes | Low | Mod | Mod | Yes | Low | Mod | Yes |
| Belle Isle Fish Company* | Boston | 1 | No | Low | Mod | Low | No | High | Mod | No |
| Narrow Gauge Railway | Revere | 5 | Yes | Mod | Mod | Low | Yes | Low | Mod | Yes |
| Hastings Street Marsh | Revere | 4 | Yes | Mod | Mod | Low | Yes | Mod | High | Yes |
| Naples Road Marsh | Revere | 4 | Yes | Mod | Mod | Low | Yes | Low | Mod | Yes |
| Linden Brook/Rowe's Quarry* | Revere | 1 | Yes | Low | Mod | Low | Yes | Mod | Low | Yes |
| Old Saugus Race Track (track) | Saugus | 5 | Yes | Mod | Mod | Low | Yes | Mod | Mod | Yes |
| MDC Access Road Marsh | Saugus | 4 | Yes | Mod | Mod | Low | No | Mod | Mod | Yes |
| Lincoln Ave./Boston St. Br. | Saugus | 3 | Yes | Mod | Mod | Low | No | Mod | Mod | Yes |
| Daggert Landfill | Saugus | 1 | Yes | Low | Mod | Low | No | Low | Mod | Yes |
| MDC Access Road Culvert | Saugus | 1 | No | Low | Low | Low | No | Mod | Mod | Yes |
| *Projects Constructed* | | | | | | | | | | |
| Central County Ditch | Revere | 24 | Yes | High | High | High | Yes | Low | High | Yes |
| CA/T Mitigation Projects | Revere | 18 | Yes | High | Mod | Mod | Yes | High | High | Yes |
| Revere Beach Tidegates 1-4 | Revere | 12 | Yes | High | High | High | Yes | Low | High | Yes |
| Revere Beach Tidegates 5-6 | Revere | 12 | Yes | High | High | High | Yes | Low | High | Yes |
| Townline Brook Tidegates | Revere | 5 | Yes | High | High | High | Yes | High | High | No |
| Radio Tower Dike OMWM | Revere | 3 | Yes | Mod | Mod | Low | Yes | Mod | Mod | No |
| Caruso Enforcement | Revere | 2 | Yes | Mod | High | Low | Yes | Mod | Mod | Yes |
| Roughan's Point Mitigation | Revere | 2 | No | Mod | Low | Low | No | Mod | Mod | No |
| Old Saugus Race Track (OMWM) | Saugus | 30 | Yes | High | High | Low | Yes | High | High | No |
| Park Street Marsh | Saugus | 20 | Yes | High | Mod | Low | Yes | High | Mod | No |
| East Saugus OMWM | Saugus | 9 | Yes | Mod | Mod | Low | Yes | Low | Low | Yes |
| RESCO Landfill | Saugus | 3 | Yes | Low | Mod | Low | No | High | Mod | Yes |
| Ballard/Bristow St. Ditches | Saugus | 1 | Yes | High | High | Mod | Yes | Low | Mod | Yes |
| GE Landfill | Saugus | 1 | Yes | Low | Mod | Low | No | Low | Low | Yes |

# Action Plan

## *Proposed Restoration Goals*

In general, the prime restoration goal for the Rumney Marshes ACEC is to address local problems, as described above, by restoring as much salt marsh acreage as possible, given available resources and constraints. Specific restoration goals were developed during the community and agency review process for the draft plan. These goals are:

1. *Construct the five priority projects identified in this plan:*
   The five priority projects identified in this plan – Oak Island Salt Marsh, Townline Brook Floodplain, the two Ballard Street Projects, and Seagrit Avenue Salt Marsh – are in varying stages of planning or design. For example, the potential project at Seagrit Avenue is without a local sponsor and currently exists only as an element in this plan. At the other end of the spectrum, the Oak Island project is the only project of the five with adequate funding and construction is imminent. The other three projects are in preliminary design, though funding is incomplete and construction timelines appear distant at this time. (See *Appendix C: Salt Marsh Restoration Project Site Descriptions,* for full description of the priority projects).

   It is hoped that the publication of this plan will help focus public attention and resources on these projects. As described above, these five projects comprise 96 acres of potentially restorable salt marsh and implementation of any or all would provide the greatest environmental benefits to the ACEC and represent the most cost-effective use of limited restoration funding. MWRP will continue to work with existing project partners to actively support and promote these important projects.

2. *Work with local project sponsors to identify opportunities for further development of the eleven other projects profiled in this plan:*
   MWRP will be conducting active follow-up beyond the publication of this plan to help match potential project sponsors with the most important and timely projects. For each potential salt marsh restoration project described in this plan, a project sponsor is needed to take responsibility for the restoration work from inception through completion. While anyone may sponsor a salt marsh restoration project, sponsors are usually local and may include conservation commissions, land trusts, schools, businesses, other public agencies, and private landowners. Project sponsors need not be the landowner as long as landowner approval has been granted. Project sponsors may be eligible for funding and/or technical assistance through the GROWetlands (*Groups Restoring Our Wetlands*) Initiative coordinated by MWRP. MWRP and the ACEC Program will also work with project sponsors to secure other funding, review project plans, provide technical assistance during the permitting process, and provide other project support. Those interested in sponsoring projects should contact MWRP as soon as possible.

3. *Continue efforts to discover as yet unknown salt marsh restoration opportunities which could provide further ecological benefits to the ACEC:*
   Undoubtedly, there are additional salt marsh restoration opportunities within Rumney Marsh and Belle Isle Marsh that have not been identified or documented through this planning effort. For example, one project, the removal of a berm to restore tidal flow to about seven acres of salt marsh at the MDC's Belle Isle Marsh Reservation, has been consciously omitted because of public and agency resistance about certain aspects of the project. However, potential projects of this type should be revisited from time to time and reassessed as attitudes and political circumstances change. In addition, there are likely to be other opportunities to improve the ecological conditions of the ACEC, both within and outside of the ACEC boundary, that somehow did not receive the attention of the Rumney Marshes Salt Marsh Restoration Work Group. One such situation, at the Saugus Iron Works National Historic Site on the Saugus River, was identified during the review of the Draft Rumney Marshes Salt Marsh Restoration Plan. Though not included in the formal project descriptions here, this potential project is briefly discussed in Appendix G. MWRP and the ACEC Program actively solicit further project suggestions of this nature from potential project proponents.

4. *Continue to work with project proponents and participants to monitor all Rumney Marsh and Belle Isle Marsh restoration projects and quantify the benefits and effects of salt marsh restoration in the ACEC.*
   Monitoring is a critical component of any salt marsh restoration process. Monitoring to demonstrate restoration of functions and characteristics should focus on simple measures used as indicators for each of several functions. The goal of the monitoring program is to provide sufficient data to direct additional post-restoration corrections, if necessary, and to demonstrate that the project has met its success criteria. These success criteria are established and judged relative to nearby undisturbed salt marshes of the same type (reference sites). Success criteria based on the evaluation of specific parameters at the reference sites must be quantified so that the evaluation of restoration success is based on a continuing comparison of the monitoring data to the success criteria.

   In simplest terms, monitoring allows for a determination of the success of the restoration project by comparing simple data collected from the project site and nearby reference sites. An important, but often overlooked use of regularly collected monitoring data is to identify the opportunity for additional post-project modifications which will more rapidly or more effectively lead to a determination of project success. These requirements should not be overly costly and should provide meaningful information to assess the benefits of these projects and to help guide future improvements in wetland restoration.

   MWRP, the ACEC Program, and other state and federal agencies will continue to work with project sponsors, local schools, citizen volunteers, and other groups to ensure that Rumney Marsh and Belle Isle Marsh salt marsh restoration projects are

monitored in accordance with scientifically-accepted, standardized guidelines and protocols.

## *Other Restoration Goals*

While this plan focuses primarily on restoring degraded salt marsh within the Rumney Marshes ACEC, it is evident that the environmental integrity of the entire ACEC rests upon adequate resource protection and public education as well as restoration efforts. Although a detailed implementation plan for protection strategies is beyond the scope of this report, several actions are highlighted here to provide a framework for collaborative efforts among environmental advocacy organizations, public officials, property owners, environmental permitting agencies, and others, which are needed to ensure long-term protection of existing salt marsh resources within Rumney Marsh and Belle Isle Marsh. Therefore, in addition to the basic goals focused on project construction and monitoring, MWRP and the ACEC Program recommend the following ancillary goals be incorporated into restoration projects and salt marsh protection efforts within the ACEC:

- *Use projects to educate the community regarding wetlands and wetland restoration:* Salt marsh restoration projects provide excellent opportunities to educate local citizens on the importance of wetlands and the significant benefits that can be realized by restoration and enhancement of ecological functions. MWRP will continue to provide active education and outreach support, in collaboration with project sponsors and participants, for ACEC restoration projects. This will include items such as signage and descriptive brochures, formal and informal site walks, informational programs, and canoe trips.

- *Involve local volunteers whenever possible:*
  Many of the activities that comprise a salt marsh restoration project are conducive to volunteer involvement. Volunteers of all ages can be employed for restoration site clean-ups, pre- and post-construction monitoring, and a wide range of outreach activities. Already, both Rumney Marsh and Belle Marsh have benefited from numerous volunteer and student programs, including those sponsored by the Saugus River Watershed Council, Revere High School, and the respective Friends groups. Project sponsors are encouraged to include volunteer opportunities in all salt marsh restoration projects. MWRP is available to support and promote volunteer restoration efforts.

- *Increase public access to the ACEC:*
  Existing public access points such as canoe launches, boardwalks, and nature observatories help to increase public awareness of the natural resources and wildlife found in Rumney Marsh.

  The Metropolitan District Commission currently owns and manages over 500 acres within the ACEC. A wide range of natural history and educational programs are currently provided on an ongoing basis by the MDC at Belle Isle Marsh Reservation which is open to the public for walking on trails, bird watching and enjoying expansive views of the marsh. The MDC also co-sponsors volunteer cleanup projects, canoe trips, birding trips, and other natural history programs with the Saugus River

Watershed Council in the northern portions of the ACEC. Both the MDC and the Saugus River Watershed Council have coordinated youth education programs and projects to introduce area school children to the natural beauty and environmental issues associated with Rumney Marsh.

Expanding recreational opportunities, education programs, and physical access points will help promote long-term environmental stewardship of the Rumney Marshes ACEC. Additional public access points such as canoe launches, boardwalks, or fishing sites should be pursued in an environmentally sound manner to increase public knowledge and use of Rumney Marsh without compromising environmental integrity.

- *Prevent illegal dumping:*
  Illegal dumping has been identified as a major environmental problem within the Rumney Marshes ACEC. Unfortunately, household, commercial, and industrial waste are often dumped in secluded portions of the marsh causing problems for wildlife habitat, water quality, public safety, and aesthetics. Collaborative efforts by environmental advocacy organizations, and local, state, and federal environmental permitting agencies are needed to clean up degraded sites and implement measures to prevent continued illegal dumping in the watershed. (The Saugus River Watershed Council has launched a campaign against illegal dumping and is working with property owners, and public agencies to prevent future dumping through signage, fees, barriers, community service projects, and other measures.

- *Protect existing salt marsh from encroaching development:*
  The Rumney Marshes ACEC continues to experience significant pressures for new development that can replace or degrade salt marsh resources. Protecting existing salt marsh resources from encroaching development is fundamental to maintaining the overall health of the ecosystem. Addressing this issue will require public officials, environmental permitting agencies, advocacy organizations, and others to work together to ensure appropriate implementation of the Wetlands Protection Act, the Rivers Act, and local wetlands by-laws. Ongoing efforts by the MDC to acquire and protect more land within the ACEC are positive steps toward this effort.

- *Protect existing salt marsh from new and existing sources of pollution:*
  Because the Rumney Marshes ACEC is located within a highly urbanized region, pollution from stormwater runoff, point sources, atmospheric deposition, and other sources has a negative impact on wildlife and habitat. Collaborative efforts are needed to ensure that efforts to protect and restore salt marsh areas within the ACEC are not counteracted by existing or by the introduction of new sources of pollution.

# APPENDICES

# *Appendix A: History and Resource Inventory Summary for Rumney Marshes ACEC*

## **Regional History** (adapted from Pastore 1995)

At the end of the last ice age, about 10,000 years ago, the stage was set for the development of the coastal marshes of the northeast, including Rumney Marsh. Melting, glacial ice raised the level of the ocean submerging coastal areas. This glacial melt water also washed sediments toward the coast. Sand traveling down rivers and creeks was pushed along the coast by wind, waves, and currents, creating a barrier beach at what is now Revere Beach. Once the beach was established, it acted as a buffer between the ocean and the area behind it. Now sheltered from the full force of the sea, mud flats became established. At some point marsh grass seeds, possibly transported by birds from warmer southern marshes, sprouted at the water's edge where the tides covered the ground less than half the time. Eventually these thick cordgrasses spread. Sediment and debris floating in with the tides became trapped by the marsh grasses building up the marsh. For hundreds of years, successive layers of dead plant material and sediments formed into a peat. Scientific dating of this material estimate that marshes of the Northeast became established about 3000-4000 years ago.

The level of the marsh increased in height until it reached above the level of the average high tide. The cordgrasses which needed wetter conditions, were now replaced with salt marsh hay. Other plants such as sea lavender and marsh elder also thrived in this higher, dryer environment.

As the climate became warmer, many species of animals took advantage of the sheltered conditions at Rumney Marsh. Shellfish and fish found their way into the marsh. Insects and other invertebrates found a home, while the migratory patterns of birds and spawning fish became established. Finally mammals, including humans, benefited from the ample food supply.

Between 6000-8000 years ago, Native Americans began their seasonal settlement of the area. (There are numerous Native American sites in the region, [Bell 1998] ). They were attracted to the marshes by the rich shellfish beds, enormous waterfowl populations, and the spring spawning runs up the Saugus and Pines Rivers by anadramous fish such as alewife, rainbow smelt and Atlantic salmon.

With the coming of the English colonists in the 1600's, Native Americans found themselves sharing these seemingly limitless natural riches of the area. In 1629 William Wood observed:

> "Northward up the river (Saugus) goes great store of Alewives. I have seen ten thousand taken in two houres by two men...There likewise came store of Basse, which the Indian and English catch with hooke and line, some fifty and threescore at a tide".

Along with fishing, settlers harvested salt marsh hay to feed livestock. These salt marsh grasses provided a good substitute for upland pastures which were scarce in the heavily forested New England. Today remains of the wooded staddles - structures used to store the hay above the marsh - still dot Rumney Marsh. Despite these uses, human impact on the marsh was still relatively insignificant.

## BIOLOGICAL RESOURCES

*BIRDS AND WILDLIFE*

Given its close proximity to Boston, one of the largest and most densely developed metropolitan areas in the US, Rumney Marsh and Belle Isle Marsh are uniquely significant habitats for a wide variety of wildlife. Throughout the ACEC, there is good distribution and interspersion of subtidal, irregularly exposed, and regularly flooded habitats. The large aerial extent of these, and other, distinct habitat types provides a highly valuable and regionally important coastal wetland system for resident and migratory wildlife.

An extraordinary variety of birds use the area, and at least five species are state listed as endangered, threatened, or of special concern. For example, local birders have documented at least 107 species in Belle Isle Marsh alone (Zendeh, pers. comm.) Additionally, Friends of Belle Isle Marsh and Concerned Coastal Sportsmen's Association maintain lists of bird species that either breed in the area or feed and rest during their annual migrations. Among the species known to breed in the area are black duck, mallard, glossy ibis, great egret, meadowlark, spotted sandpiper, willet, greater and lesser yellowleg, sharp-tailed sparrow, American kestrel, common tern, killdeer, and red-tailed hawk. A partial listing of migrants and winter visitors includes shorteared 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.

Among the mammal species indigenous to the area are raccoon, muskrat, meadow vole, skunk, red fox, and harbor seal. 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 fresh water areas (IEP, 1987).

*FINFISH*

Like all estuarine systems, Rumney Marsh and Belle Isle Marsh are critical resource areas for both resident and transient fish species. Year-round resident fish species in the salt pannes and creeks of Rumney Marsh and Belle Isle Marsh include mummichogs (*Fundulus heteroclitus*), killifish (*Fundulus* spp.), three-spined sticklebacks (*Gasterosteus aculeatus*), and four-spined sticklebacks (*Apeltes quadracus*) (Gard 1984). These species play a crucial role in the food web and nutrient dynamics of the salt marsh systems. As both prey species for larger fish and birds and consumers of detritus, vegetation, macrofauna, and meiofauna, they represent an important link in the maintenance of trophic structure relationships. The presence of these species is widely regarded as an indicator of salt marsh health.

Transient species inhabit the marsh area seasonally and/or at certain stages in their life cycle, while spending the rest of the time in deep water habitats. Marshes provide areas for spawning, nursery grounds for juveniles, foraging areas, and protection from predators. Highest utilization of the estuary occurs during spring and fall migrations, but is highly variable for each species depending on water temperature, salinity, and other physical parameters. Nonresident fish species have historically been the most important economic resource in the estuary.

The Saugus and Pines Rivers have supported subsistence level fisheries since the area was first inhabited by native Americans. Anadromous species, including Atlantic salmon, sea run trout, and striped bass, were the preferred species of the indigenous human population. The English colonists in the 17th century exploited the fishery resources for both subsistence and commercial purposes. Heavy fishing pressure and habitat degradation especially from poor water quality led to the depletion of formerly plentiful anadromous species. Salmon, shad, and bass were extirpated by the turn of the century.

By the 1950s, fishing in Rumney Marsh was mostly limited to recreational purposes. Lynn Harbor eventually developed into one of the largest sport fishing areas on the North Shore. Studies by the Massachusetts Division of Marine Fisheries reviewed the status of the area's fisheries and the condition of the estuarine habitat and identified the Saugus-Pines River estuary is an important area for mackerel, cod, striped bass, haddock, pollock, bluefish and winter flounder (DMF 1972).

In recent years, overall groundfish-based sportfishing activity has declined in this region. This is especially true for the party/charter boat and skiff rental businesses. However, regional conservation efforts throughout the North Atlantic have drastically improved the striped bass fishery (Chase 1994).

*SHELLFISH AND OTHER INVERTEBRATES*

Soft-shell clam (*Mya arenaria*) and blue mussel (*Mytilus edulis*) are the most common shellfish found within Rumney Marsh and Belle Isle Marsh (IEP 1987). The Saugus/Pines River complex has extensive soft-shell clam beds in the intertidal areas.

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recreational access at Belle Isle Marsh Reservation and the promise of future access and use in the Rumney Marshes area. Hiking, nature study, boating and fishing are all important recreational activities enjoyed here by area residents.

There are a number of scenic sites and views of the salt marshes and estuary available from several locations. At the Rumney Marshes, the MDC has also acquired much of the unprotected salt marshes and continues to acquire the remaining acres of unprotected salt marsh whenever feasible.

## *Appendix B: Rumney Marshes ACEC Designation Document*

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

Following an extensive formal review required by the regulations of the Executive Office of Environmental Affairs (301 CMR 12.00) including nomination review, research, meetings, and evaluation of all public comments, I, the Secretary of Environmental Affairs, hereby designate portions of the Cities of Boston, Lynn, and Revere, and the Towns of Saugus and Winthrop, as described below, as an Area of Critical Environmental Concern (ACEC). I take this action pursuant to the authority granted me under Massachusetts General Law c. 21A, s. 2(7).

I also hereby find that the coastal wetland resource areas included in the Rumney Marshes ACEC, the title taken from the name used during the colonial era to identify the marshes and lowlands of this region, are significant to flood control, the prevention of storm damage, the protection of land containing shellfish, and fisheries; the prevention of pollution, the protection of wildlife habitat, the protection of public and private water supplies; public interests defined in the Wetlands Protection Act (MGL c. 131, s. 40; 310 CMR 10.00).

I. Boundary of the Rumney Marshes ACEC

Upon review of the boundaries as recommended in the nomination letter and subsequent recommendations made in testimony received, the designated boundary encloses two principal wetland systems, the Saugus and Pines River Estuary, and Belle Isle Marsh. The landward boundary, in large part, is the 100 year flood elevation as delineated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps and Floodway Maps. However, in certain specific locations described herein, the landward boundary may change to the edge of wetland, as defined in the Wetlands Protection Act (MGL c. 131 s.40), or artificial boundaries.

Specifically, the boundary of the Saugus and Pines Estuary is defined as follows: The area includes the Saugus and Pines Rivers and wetland resource areas falling within and adjacent to this estuarine system. Beginning at the northerly shore of the Saugus River, at a point where the westerly edge of the railroad right-of-way intersects the 100 year flood elevation, the boundary follows the thread of the shoreline at the 100 year flood elevation. The boundary continues at this elevation through the Lynn and East Saugus waterfronts, southwesterly to Franklin Park in Revere, then southeasterly to a point in Revere where North Shore Road intersects this elevation. The boundary then follows the westerly (marshward) side of North Shore Road until it reaches Mills Avenue, which the boundary follows until it reaches the

railroad right-of-way. The boundary follows the westerly side of this right-of-way, across the Saugus River, to the point from whence it started.

The boundary of the Belle Isle Marsh portion of the ACEC is defined as follows: The area includes the Belle Isle Creek, the marshes of this system, and the tributary streams. Beginning at the northerly end of Bennington Street in Revere at a point of intersection between the easterly (marshward) edge of the street and the 100 year flood elevation, the boundary follows Bennington Street in a southerly direction to where it crosses Belle Isle Creek. The boundary then becomes coincident with the jurisdictional boundary of the Wetlands Protection Act (i.e. typically 100 feet beyond the edge of the wetland resource area). The ACEC boundary follows along the creek in a northwesterly direction to Sales Creek, which is also subject to this designation. In general, all lands and waters falling under the jurisdiction of MGL C. 131, s. 40 in the Belle Isle Creek and Sales Creek areas falls within this designation. On the southerly side of Belle Isle Creek at Bennington Street, the boundary continues along the easterly edge of the street until a point at the intersection with Leverett Street. From this point, the boundary becomes the "edge of wetland", as defined in the Wetlands Protection Act and regulations promulgated thereunder, and follows the thread of the wetland edge to East Boston and around the MBTA Rail Yard to a point, at the southerly side of the yard, where the edge of wetland roughly intersects with the 100 year flood elevation. From this area, the boundary follows this elevation to a point of intersection with Winthrop Parkway. The boundary follows the westerly edge of the Winthop Parkway to Crystal Street in Revere, which it follows until a point of intersection with 100 year flood elevation. From this point, the boundary continues at this elevation to the point from whence it started.

II. Boundary Exclusions and Exemptions from Designation:

There are three separate areas that fall within the described boundaries which are to be excluded. The first is the "footprint" of the proposed Belle Isle Creek dredging project. Given that this project is currently only in the preliminary planning stages and there is no indication, at this time, precisely which areas will be dredged, the ultimate exclusion will be based on the plans for the project as approved by the Office of Coastal Zone Management through their Federal Consistency review. This exclusion is granted with the provision that the Department of Environmental Management, through its Division of Waterways, will direct the planning of this project in a manner consistent with the ACEC designation.

The second and third exclusions are for the dredging of the Saugus

and Pines Rivers. Like the Belle Isle dredging exclusion, the final configuration of the exclusion will be based on the project plans as approved by the Office of Coastal Zone Management through their Federal Consistency review.

The rationale for the exclusion of the Saugus River dredging project is based on the intent of the Executive Office of Environmental Affairs to continue in its active support of commercial fishing and related activities in the Saugus River. The dredging of this channel, and associated limited anchorage areas, will enhance navigational access to the river. With this enhanced access comes the potential for greater competition between the commercial and recreational boating interests. The principal resource being competed for is space; space for dockage, for moorings, and for appropriate shoreside services. Nearly all of this space is created or enhanced through new dredging, which is prohibited under the ACEC designation. In recognition of this improvement dredging prohibition and the potential adverse effect it may have on the commercial fishing industry in the Saugus River, a secretarial waiver, pursuant to 301 CMR 12.15, of this prohibition will be considered in instances where the proposed project: 1) provides the broadest possible public benefit; 2) is consistent with the goals of the EOEA in supporting the commercial fishing industry in the Saugus River; 3) is otherwise consistent with the rigorous standards of the ACEC designation; and 4) is fully consistent with the MCZM Program Policies. It should be understood that this waiver will not be granted lightly, and that projects receiving a waiver will very closely scrutinized as they pass through the regulatory process.

The reason for the Pines River dredging being excluded from the designation is directly tied to the exclusion of the dredging of the Saugus. The Pines River is predominantly a recreational boating area, and taken within the context of the Saugus/Pines system, it is the more appropriate location to allow the development of new or expanded recreational boating facilities. To this end, a secretarial waiver will be considered for projects related to recreational boating and related shoreside services. The same conditions listed above, particularly Nos. 1,3, and 4, will be the framework used to determine whether the granting of a waiver is appropriate. However, significantly more emphasis will be placed on the "public benefits" aspects of the project requesting a waiver.

The intent of these exclusions and discretionary waivers is provide some additional level of protection to the resource areas within the ACEC. If, at some time in the future, the local municipalities were to develop an appropriate regional harbor management plan for the Saugus and Pines Rivers, this management plan would then provide the basis for waiver

decisions. The communities responsible for these two harbor areas should contact the MCZM Harbor Planning Coordinator to find out more about ongoing technical support and funding programs for this type of planning.

Two specific projects, and a few small activities accessory to other large public works projects falling outside the boundary, are to be exempted from the designation. These projects are being "exempted" from the designation rather than "excluded" from the boundary because the have a scope of activities which cannot be properly defined by a standard geographic exclusion, are projects with potentially broad public benefits, and are or have already been closely scrutinized by the environmental regulatory agencies.

The Saugus River Flood Damage Reduction Project is the first project to be exempted from the designation. Like the excluded projects discussed above, this project will be exempted as it is approved by the Office of Coastal Zone Management through its Federal Consistency review. I feel that the ongoing interagency review process, directed by the Corps of Engineers, will allow the project to be closely scrutinized as to its environmental impacts and provide for appropriate mitigation. This process will meet or exceed the intent of the designation with regard to the proposed project.

The second project to be exempted from the designation is the Sales and Green Creeks Flood Control Projects. This project is being directed by the DEM, Division of Waterways and has recently received a Secretarial Certificate for the Final Environmental Impact Report (FEIR). Given the close scrutiny the the project has already received through the MEPA process, and the broad public benefit resulting from the project, I feel that the project has met the intent of the designation and should be allowed to proceed under the preexisting environmental standards. Like the Corps of Engineers, the DEM should realize that these exemptions carry with them the responsibility of assuring that the projects are planned and carried out in the most environmentally sensitive manner possible. We will be closely watching the progress of both of these projects to assure these responsibilities are met.

Two smaller exemptions are activities related to projects which fall outside the boundary of the ACEC. There is a tide gate to be improved and maintained in Sales Creek as a part of the Roughan's Point Flood Reduction Project. To facilitate the overall project, this activity is exempt from the designation. The second exemption is the removal of sand from the so-called "I-95 Embankment". While the removal of this material may not present a problem even under the designation, in the interest of clarity and facilitation of an important beach nourishment project, this activity

is also exempt. It is presumed that this excavation will be consistent with the existing Secretarial Certificate for the project. In general, I am, and have been, very concerned with the ultimate fate of this fill. To restate my position, our ultimate goal is to remove the fill and restore the marsh. Any activity which does not further this goal will be deemed inconsistent with the designation.

The area included in the designation has been significantly reduced from that which was proposed by the nominating committee. This reduction in geographic scope was not made lightly, nor without due consideration for the potential importance of these areas with regard to resource protection. While we have concluded that these areas are inappropriate for designation, it should be recognized that all activities in the vicinity of an urban marshland such as this have the potential for adverse environmental impacts, especially the degradation of water quality or wildlife habitat values. It is incumbent on those who propose to build in these adjacent areas to consider carefully the potential adverse impacts that may be associated with their projects. It is equally important that the surrounding communities closely scrutinize their zoning and land use controls adjacent to these valuable resources to assure that these local controls enhance the protections afforded by the designation. Finally, all EOEA agencies should be reminded, as a result of this designation, of their responsibility to reflect the environmental sensitivity of this area in their decisions.

III. Designation of the Resources of the Rumney Marshes ACEC

In my letter of acceptance of the nomination of the Saugus and Pines Rivers and Belle Isle Marsh as an ACEC, I indicated that our evaluation indicated that it easily met the minimum threshold for consideration. The nomination letter clearly lists the quantity and quality of the resources present.

The presence of these resources, and their relatively undisturbed nature within such a developed area, clearly indicate their value to the region and the state.

IV. Procedures Leading to ACEC Designation

On 15 March, 1988, a letter of nomination, signed by ten citizens of the Commonwealth and pursuant to 301 CMR 12.00, was received by my office. The nomination was formally accepted by letter on 1 April, 1988, and the review process was begun.

Notice of the acceptance of the nomination and of an informational meeting and a public hearing was published in the Boston Globe and in the Massachusetts Environmental Monitor on 12 May, 1988. Numerous informational articles appeared in the local and regional newspapers.

A meeting for town officials was held on 24 May, 1988, and an informational meeting for the general public followed on 26 May, 1988. The public hearing was held on 23 June, 1988, and the public comment period was held open until 8 August, 1988. Written and oral testimony was received from 39 individuals and organizations at the public hearing and 64 comment letters were received before the close of the comment period. The comment letters and public hearing testimony is on file at the MCZM office.

V. Discussion of Criteria for Designation Specified 301 CMR 12.06

In the review process leading to the decision on a nominated area, the Secretary must consider the factors specified in Section 12.06 of the EOEA regulations. As stated in these regulations, the factors need not be weighed equally, nor must all of these factors be present for an area to be designated. While the more factors an area contains, the more likely its designation, the strong presence of even a single factor may be sufficient for designation.

Based on the information in the nomination letter, presented at the public hearing, and through written comments, and on the research of my staff, I find the following factors relevant to the designated ACEC:

Threats to Public Health through Inappropriate Use

Saltmarshes play an important role in the prevention of flood damage by providing vital flood storage capacity. This capacity is lost when marshlands are filled. It has been documented, through research of the Corps of Engineers, that the saltmarshes of the Saugus and Pines River Estuary have experienced filling of saltmarshes at a rate of approximately 6 acres per year. Just considering the loss of flood storage capacity of the system, ignoring for the moment the other vital roles saltmarshes play in coastal ecosystems, this magnitude of presumably illegal fill has significant implications with regard public health, safety, and welfare.

Productivity

The Saugus and Pines Estuary, situated landward of the barrier beach of Revere, contains one of the most extensive salt marsh systems in the greater Boston metropolitan area. Including Belle Isle Marsh, the areas contain approximately 1000 acres of saltmarsh, tidal flats, and shallow

subtidal channels. The U.S. Fish and Wildlife Service characterizes the designated area as "one of the most biologically significant estuaries in Massachusetts north of Boston". Further quoting from the USFWS comment letter:

> "Nearly 70 percent of all commercial fish and shellfish resources are dependent on estuaries for spawning and nursery grounds. Winter flounder, alewife, smelt, blueback herring, and American eel are a few of the more common finfish that occur within the nominated estuarine ecosystems...Intertidal habitats...support a wide variety of invertebrate resources. These include soft shelled and razor clams, mussels, snails, marine worms, and other invertebrates that are integral components of the marine food chain. Although many of the shellfish beds are too contaminated for human consumption, they represent an important food source for wildlife, attracting large numbers of wintering waterfowl to the area annually".

The list of bird species, migratory or indigenous, is extraordinary. The Massachusetts Natural Heritage and Endangered Species Program has commented that the area contains at least 5 species listed by the Division of Fisheries and Wildlife as Endangered, Threatened, or a Species of Special Concern. Despite its proximity to the intense development of the area, there is little doubt of the productivity of the designated area.

Uniqueness of the Area

Given its close proximity to a major metropolitan center with a population in excess of one million, this relatively undisturbed estuary and marsh complex is indeed unique. Much like the Back River ACEC and the Weir River ACEC to the south, this relatively large tract of marshland habitat, situated in an area subject to intense development pressure, provides the resource base necessary to maintain the diversity and productivity of an ecosystem which must, despite stringent regulation, accommodate the cumulative impacts arising from this development. While there may be smaller parcels of marshland which dot the urban landscape, the inventory of larger marshes capable of supporting these vital resources is dwindling and must be preserved.

Imminence of Threat to Resources

Despite laws and regulations to the contrary, construction on the fringes of marshes and waterways can result in incremental filling over time. As mentioned above, this is especially true in the Saugus and Pines River Estuary. The intensity of development, especially adjacent to the

designated areas, is ever increasing. Given the existing intensity of development in the area, the chronic and cumulative impacts associated with this proposed development activity may exceed the system's capacity to accommodate its effects.

It is hoped that this designation will serve to focus attention on the value and sensitivity of the area and will provide a guide for future development proposals.

James S. Hoyte
Secretary of Environmental Affairs

August 22, 1988
Date

## *Appendix C: Salt Marsh Restoration Project Descriptions*

1. Townline Brook
2. Linden Brook
3. Central County Ditch SRT
3. Central County Ditch Mars
4. Hastings Street Marsh
5. Park Street Marsh
6. Dewey Daggert Landfill
7. RESCO Landfill
8. Naples Road Marsh
9. Caruso Mitigation Site
10. MDC Access Road
11. Bayou Street Marsh
12. CA/T MITIGATION
13. CA/T MITIGATION
14. CA/T MITIGATION
15. ROUGHANS POINT
16. OLD SAUGUS RACETRACK
17. OLD SAUGUS RACETRACK
18. WALTERS DITCH
19. BALLARD STREET MARSH
20. BOSTON ST BRIDGE
21. GE LANDFILL
22. OAK ISLAND TIDEGATE
23. REVERE BEACH TIDEGATES 5-6
24. REVERE BEACH TIDEGATES 1-4
25. ROUTE 1A MARSH TIDEGATE
26. EAST SAUGUS OMWM
27. SEGRIT AVE MARSH
28. Ballard St. Tide Gate
29. Oak Isl. Marsh Excavation
30. Narrow Gauge RR ROW
31. MDC Access Rd. Marsh
32. No Man's Land
33. Belle Isle Fish Co.
34. Radio Tower Dike OMWM
35. Sales Creek Culvert
36. Rt. 107 Drainage Swale
37. B&M RR Bridge
38. Townline Brook Floodplain

# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

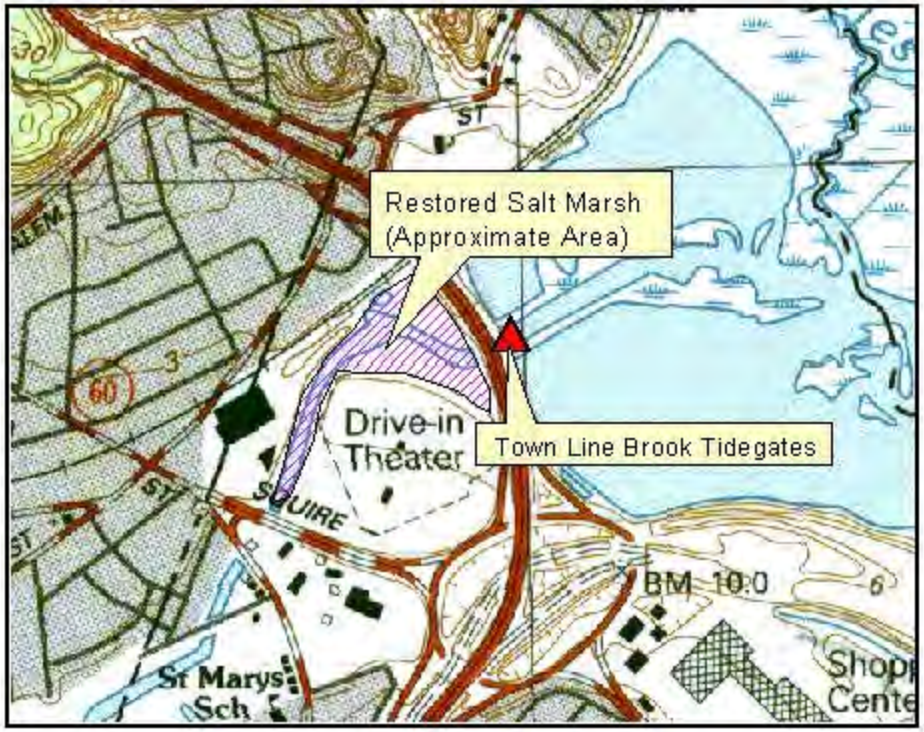
**Project Name** Town Line Brook Tidegates **City/Town** Revere/Malden **Status** Constructed

**Site Location** Located where Lynn Streeet and Washington Street merge and prior to Route One, at end of Spring Street. Tide gates located north of ACEC boundary at Route One, adjacent to "Seaplane basin". Brook is west of Route One along Revere/Malden/Everett town line.

**Land Owner** MDC **Area of Restorable Wetland** 5 acres **Estimated Cost** > $100,000

**Site Description**

Town Line Brook and Linden Brook, which drains into Town Line Brook, are tributaries of the Pines River. Six flapper type tidegates and ten sets of stop log structures originally constructed in 1957 by the MDC have leaked substantially for a least 20 years restoring some portions of the previously drained salt marshes upstream of the tide gates. In 2001, the Massachusetts Highway Department (MHD) funded the replacement of the leaking tide gates with eight new ones, including three self-regulating tide gates, and the repair of stop logs. This project will improve conditions to about 5 acres of degraded salt marsh adjacent to the Showcase Cinemas parking lot, while also improving flood protection. Additional improvements along Town Line Brook may also be gained by pursuing other salt marsh restoration opportunities further upstream (see project description, Town Line Brook Floodplain).




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Linden Brook (Rowe's quarry section) **City/Town** Revere **Status** Planning/Design

**Site Location** Open channel and wetlands located near "Rowes Quarry", south of Lynn Street, adjacent to Sea Plane Basin..

**Land Owner** Rowes Quarry **Area of Restorable Wetland** 1 acre **Estimated Cost** $10,000 - $100,000

**Site Description**

Linden Brook is a small stream that drains approximately 90 acres in the Rowes Quarry vicinity, just east of Route One. From the quarry, the brook passes under Lincoln Street, and flows though a sparsely vegetated vacant area and a degraded, tidally restricted cat-tail/common reed marsh before joining Town Line Brook near the Sea Plane Basin. There is an old wooden tide gate at the railroad crossing. In 1957, MDC re-routed the flow regime for the Town Line Brook flood control project.

Because of existing stormwater drainage, plans for future development (filling and redevelopment of the quarry), and the extensive excavation which would be required, this area is probably not a strong candidate for salt marsh restoration. However, as part of a larger redevelopment project, the degraded cat-tail/common reed marsh should be restored. This would likely entail control of the invasive plant species, establishment of some open freshwater or brackish habitat, and creation of a fringing wetland area. This would greatly enhance stormwater control from the adjacent Route One and improve water quality within the Seaplane Basin area of Rumney Marsh. Preliminary studies to implement a wetland restoration project here are underway. This site has significant potential for public access through the addition of a canoe launch, boardwalk, and interpretive signage. These improvements, along with wetland restoration work, could be included as mitigation associated with the potential Rowe's Quarry development.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

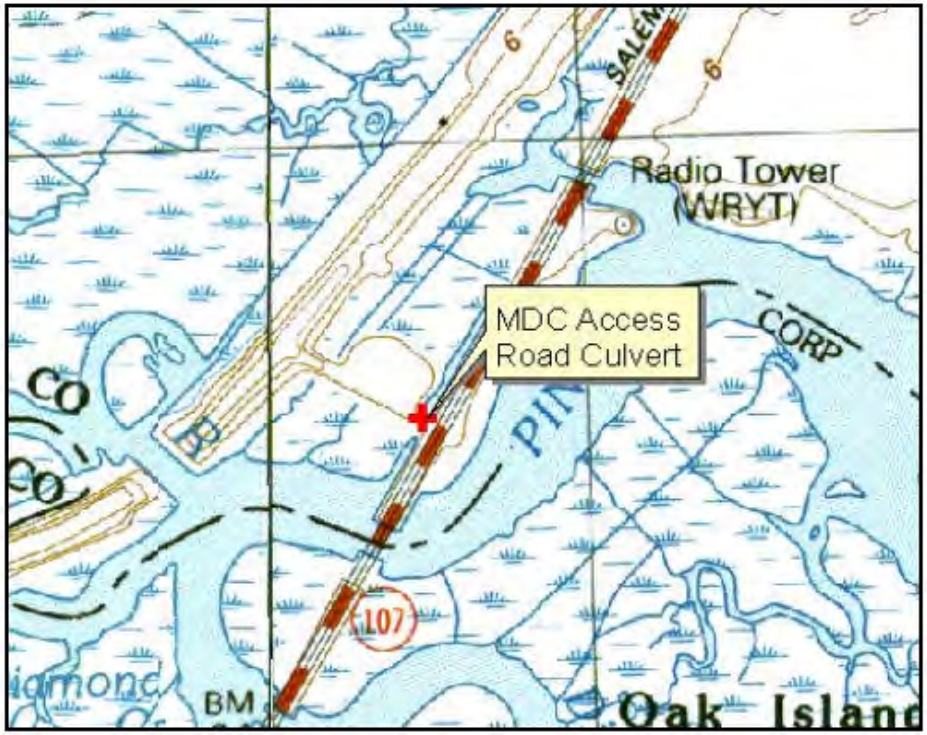
**Project Name** MDC Access Road Culvert **City/Town** Saugus **Status** Potential

**Site Location** MDC access road off Rt 107. Across from Atlantic Lobster Co. Gate at front of road.

**Land Owner** MDC **Area of Restorable Wetland** < 500 sf **Estimated Cost** $10,000 - $100,000

**Site Description**

The MDC access road is about 300 meters long, extending from Route 107, just north of the Pines River bridge, west to the I-95 embankment. A segment of the roadway is paved and a chain-link fence controls access from Route 107 onto the embankment. Placement of the fill restricted tidal flow of two small, unnamed creeks adjacent to Route 107 and the embankment. According to permit plans, a 12-inch culvert was installed under the road at the Route 107 end of the access road, however it is now buried and cannot be located. A larger culvert was installed on the I-95 embankment side. Despite this, the placement of the access road fill has severely restricted tidal flow from the Pines River, resulting in the establishment of common reed on the north side of the embankment. Salt marsh restoration here involves replacing the buried 12-inch culvert with new, larger ones (two 48-inch concrete pipes were suggested in consultation with Mass. Highway for a mitigation plan for the Route 107 bridge replacement projects), along with limited excavation of fill and clean-up of the marsh area north of the access road (see project description, MDC Access Road Salt Marsh. This project would directly benefit the impacted marsh adjacent to the access road while also improving tidal flow and habitat connectivity throughout the entire section of marsh north of the Pines River and west of Route 107. This site is currently used on an informal basis by the MDC and others to launch canoe trips. The site is accessible through prior arrangement with the MDC. A model airplane club is permitted access past the fence to the end of the road. Future improvements could enhance the public's ability to use this central access point to Rumney Marsh.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

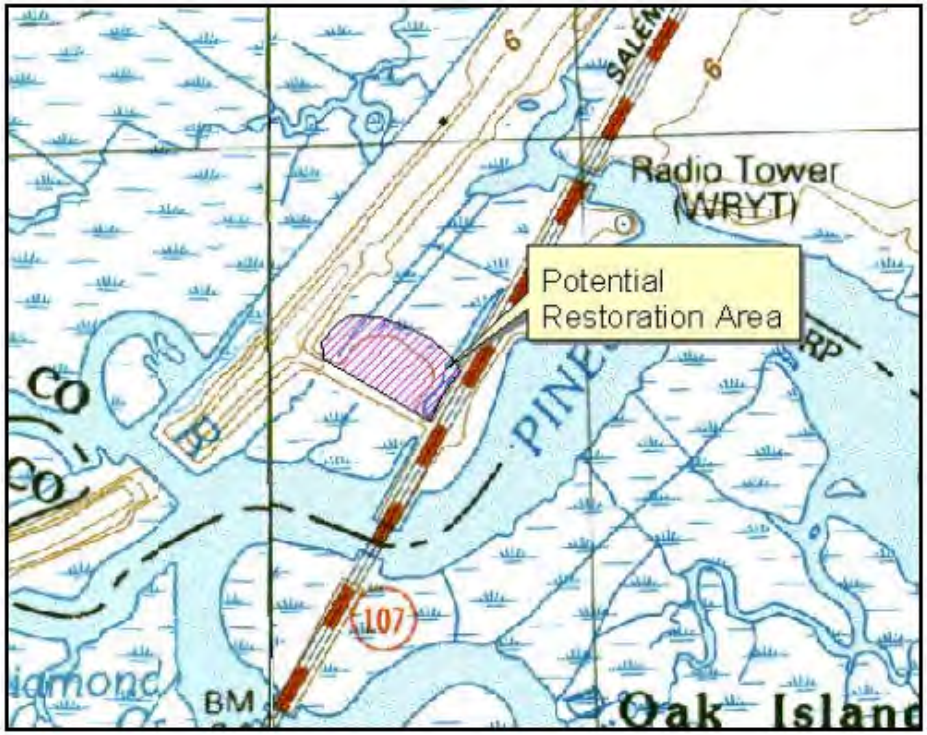
**Project Name** MDC Access Road Salt Marsh **City/Town** Saugus **Status** Potential

**Site Location** Adjacent to and north of MDC access road off Rt 107 (see MDC Access Road Culvert). Across from Atlantic Lobster Co.

**Land Owner** MDC **Area of Restorable Wetland** 4 acres **Estimated Cost** $10,000 - $100,000

**Site Description**

This project is located just north of the MDC access road. About two acres of fill was placed here without a federal permit. In combination with the culvert replacement project described previously (see project description, MDC Access Road Culvert), approximately four acres of salt marsh could be restored by excavating fill. This could be accomplished as part of an OMWM project.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Hastings Street Salt Marsh **City/Town** Revere **Status** Potential

**Site Location** The marsh is north of Hastings Street, at Jacob Memorial Park, a Revere city park.

**Land Owner** Revere **Area of Restorable Wetland** 4 acres **Estimated Cost** $10,000 - $100,000

**Site Description**

The Hastings Street Marsh restoration area is approximately four acres and is comprised of a filled and degraded edge of salt marsh and an adjacent upland area. The problems with the marsh are partially attributed to illegal filling with street sweepings, construction debris, and other material. Common reed has invaded the area and is growing along the edge on fill and piles of wrack and debris. Wetland restoration of the site would involve removal of a portion of fill, clean-up of surface debris, and creation of an excavated panne and perimeter ditch system to ensure sufficient tidal flooding at a level and frequency to inhibit growth of common reed. The City of Revere owns the land, which was donated as Jacobs Memorial Park. Restoration of the salt marsh, and the abutting upland area, would facilitate development of the area into a passive nature-park with excellent potential for both formal and informal environmental education opportunities for local schools and neighborhood residents. Completion of the restoration project would also provide high-quality aquatic, wetland, and upland wildlife and fish habitat.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Caruso Enforcement Restoration **City/Town** Revere **Status** Constructed

**Site Location** Behind Northgate Mall, adjacent to I-95 embankment.

**Land Owner** Caruso **Area of Restorable Wetland** 2 acres **Estimated Cost** > $100,000

**Site Description**

This project is located adjacent to the Caruso company, behind Northgate Plaza. The work resulted from an enforcement action and involved the removal of illegally placed fill over approximately two acres. To ensure the successful establishment of inter-tidal habitat, the site was excavated to an elevation lower than what previously existed. In addition to excavation, limited salt marsh plantings were used to establish vegetation. Though the wetland restoration portion of this project is complete, further coastal habitat enhancements could be gained by cleaning up the adjacent upland buffer zone and planting native coastal plants.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

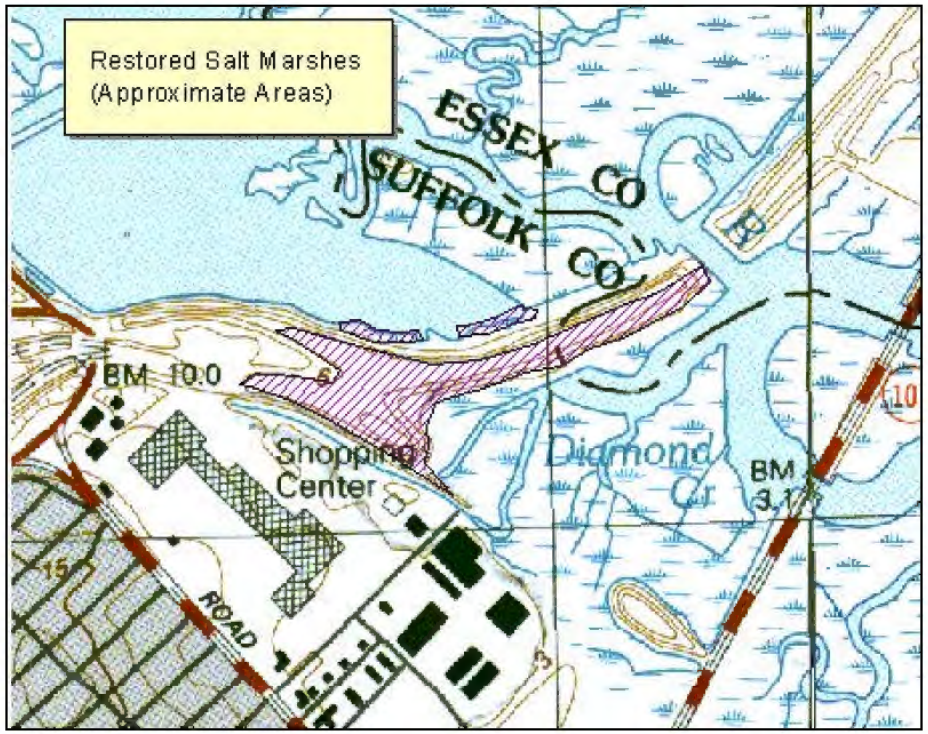
**Project Name** MHD Central Artery Mitigation **City/Town** Revere **Status** Constructed

**Site Location** Behind Northgate Shopping Center and adjacent to the I-95 embankment.

**Land Owner** MHD **Area of Restorable Wetland** 18 acres **Estimated Cost** > $100,000

**Site Description**

This project involved the restoration of approximately 18.3 acres of inter-tidal habitat and served as mitigation for unavoidable wetland impacts from the Central Artery/Tunnel project in Boston. The project is comprised of three discrete areas -- one large area adjacent to the Caruso site behind Northgate Plaza, and two smaller lobes, approximately one acre each, on either side of the embankment. The work involved substantial excavation of large volumes of fill material along with some OMWM work to create salt pannes and creeks. Salt marsh plantings were used on a limited basis to stabilize the marsh substrate in areas vulnerable to erosion. The remaining area was left to revegetate naturally. Visual monitoring observations through the 2001 growing season show that natural revegetation is occurring steadily and the project has achieved its intended goals.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

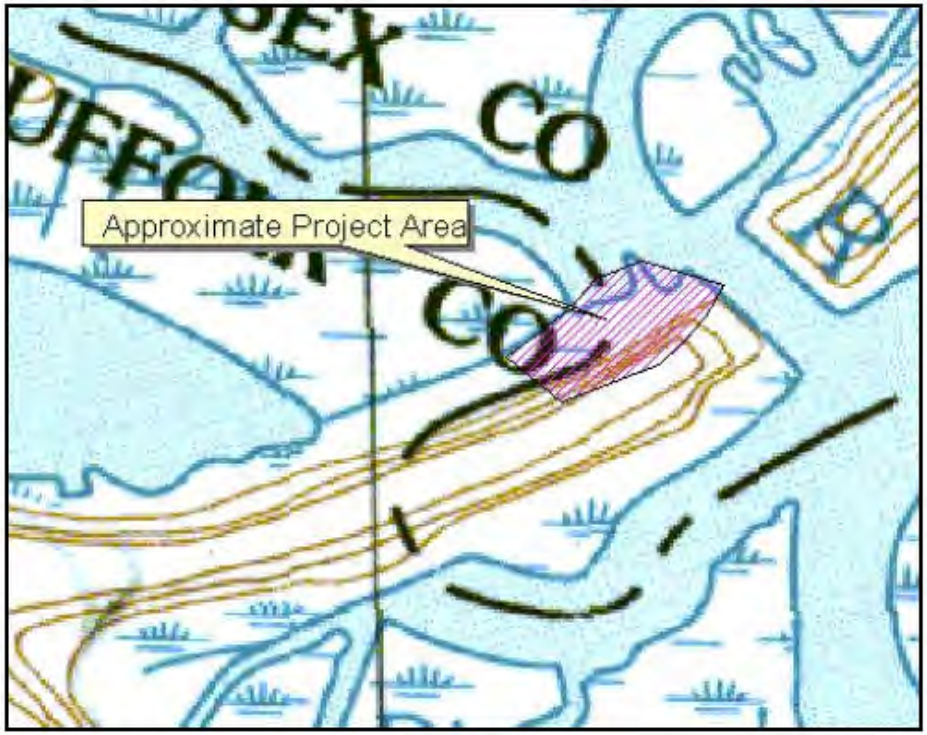
**Project Name** Roughan's Point Mitigation **City/Town** Revere **Status** Constructed

**Site Location** I-95 embankment at Pines River crossing on Peninsula at Revere side.

**Land Owner** MDC **Area of Restorable Wetland** 2 acres **Estimated Cost** > $100,000

**Site Description**

This filled area was restored as mitigation for a flood protection project by the Army Corps and DEM. The project involved the removal of two acres of fill to restore intertidal habitat suitable for soft shell clams. Limited salt marsh plantings (Spartina alterniflora) were used along two sides of the excavation and the area was seeded with clams. Monitoring for clam and vegetation establishment is on-going by the Army Corps and Division of Marine Fisheries.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Old Saugus Race Track - OMWM

**City/Town** Saugus

**Status** Constructed

**Site Location** This site is located in open marsh. Foot access is possible from the Park Street Extension or Aldrich Avenue, off Lincoln Avenue.

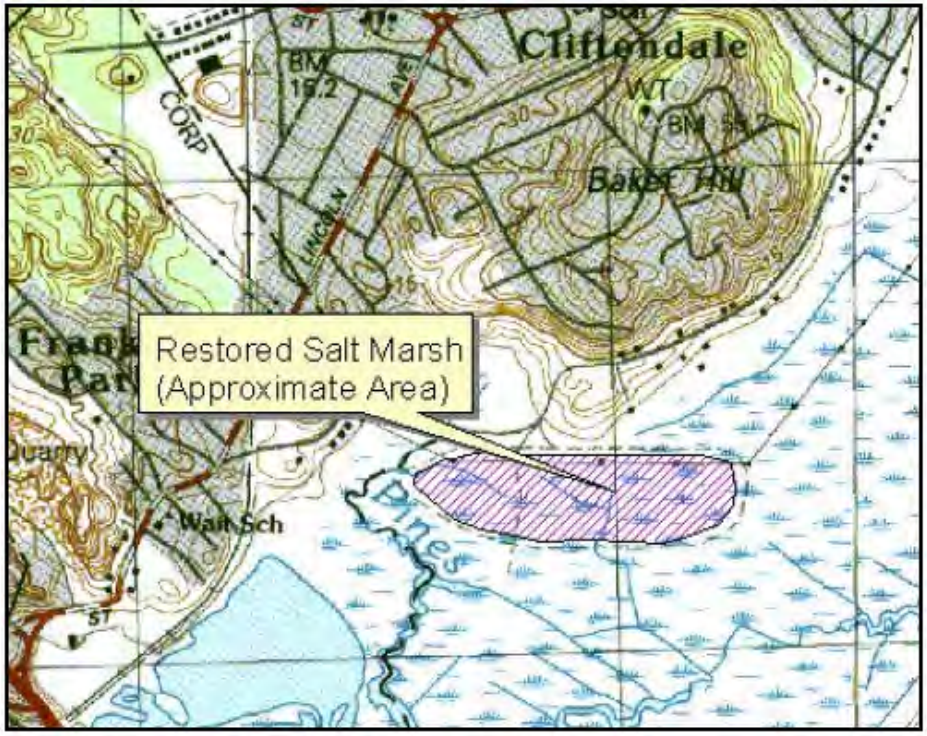
**Land Owner** MDC

**Area of Restorable Wetland** 30 acres

**Estimated Cost** $10,000 - $100,000

**Site Description**

This site is a formerly ditched and filled wetland, which used to be the infield area of a horse and car race track (see Appendix, Rumney Marsh History). OMWM was conducted here in 1993 and through 1996. The project was funded by the USFWS Partners for Wildlife Program.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Old Saugus Race Track - Uplands

**City/Town** Saugus

**Status** Potential

**Site Location** This site is located in open marsh. Drive to the end of Aldworth Ave. You must walk out to the site using a gravel path.

**Land Owner** MDC

**Area of Restorable Wetland** 5 acres

**Estimated Cost** $10,000 - $100,000

**Site Description**

This site is the former race track itself. The area appears to be subsiding and pioneer salt marsh plants, such as Salicornia, are beginning to colonize the area. Additional salt marsh restoration work may be warranted, contingent on the MDC's plans for improved access to the area.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

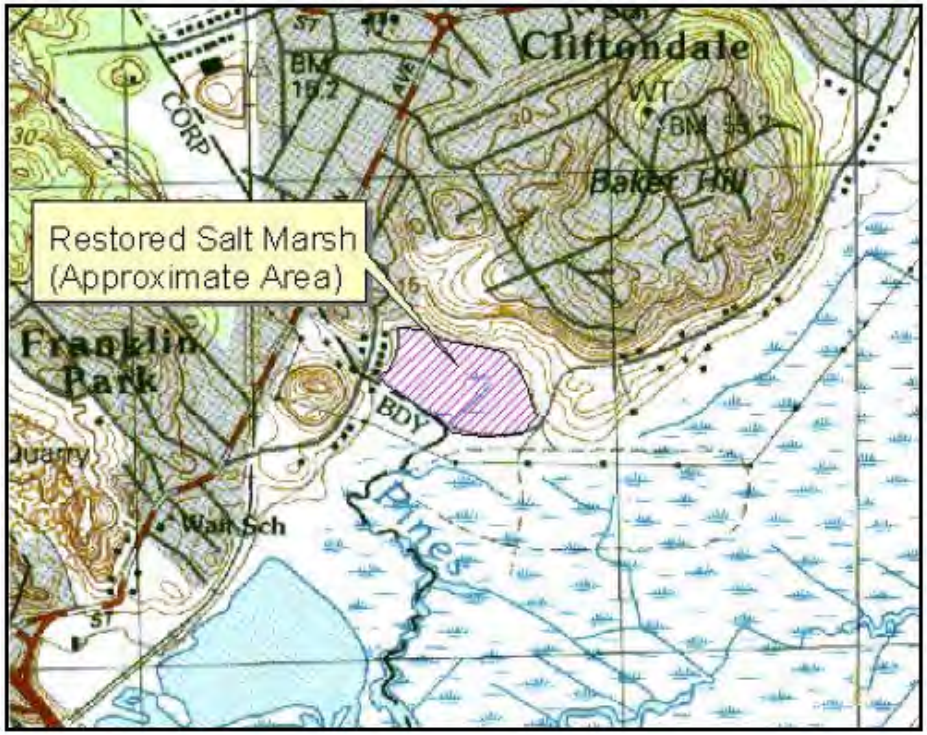
**Project Name** Park Street Salt Marsh **City/Town** Saugus **Status** Constructed

**Site Location** Park Street off Lincoln Ave on Revere/Saugus border.

**Land Owner** MDC **Area of Restorable Wetland** 20 acres **Estimated Cost** $10,000 - $100,000

**Site Description**

The Park Street Salt Marsh area is located along the western boundary of the ACEC in East Saugus, adjacent to the Old Saugus Race Track. After the track was abandoned in the 1930s, the site became a dumping ground for debris, rubble, cars, and other refuse. Numerous piles of fill material were deposited from an unknown source sometime in the early 1970s. Under MDC ownership, the site was secured from further dumping and cleanup operations were begun. With a grant from the US Fish and Wildlife Foundation, the ash was excavated and the marsh restored by the Northeast Mass. Mosquito Control and Wetlands Management District. Work remaining at Park Street Marsh involves the removal of two excavated fill piles and enhancement of adjacent uplands.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Ballard Street Marsh, Tidegate Replacement

**City/Town** Saugus

**Status** Planning/Design

**Site Location** Eastern Avenue. Between Ballard and Bristow street along 107.

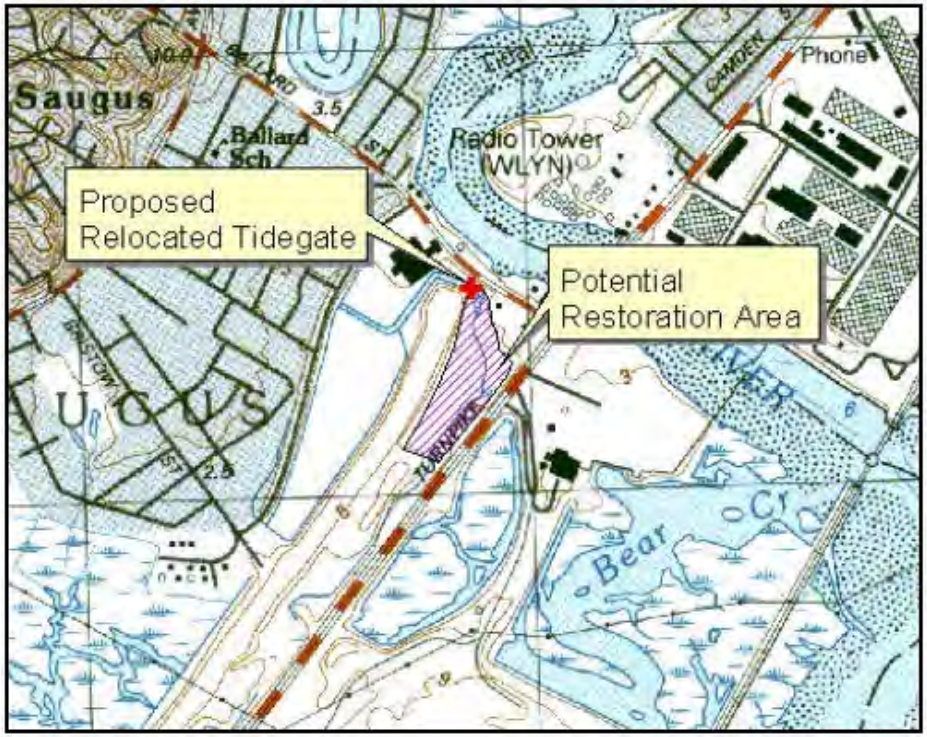
**Land Owner** MDC, Town of Saugus

**Area of Restorable Wetland** 12 acres

**Estimated Cost** > $100,000

**Site Description**

This project involves the replacement and relocation of a poorly functioning tidegate with a Waterman-Nekton self-regulating tide gate. The existing gate is located at the discharge of an unnamed creek at the Saugus River adjacent to Vitalie Park (Lobsterman's Landing). The old flapper tidegate fell off its hinge in 1990 and was replaced by a steel plate suspended by chains attached to the concrete headwall at the outlet. The jury-rigged arrangement does not provide sufficient flood protection for the Bristow St./Eastern Ave. neighborhood due to leakage. The leakage, however, is not sufficient to fully support the former salt marshes upstream of the tidegate and control common reed that has taken over the salt marsh. A study prepared by the NRCS for MWRP and the Town of Saugus recommends replacement of the faulty gate with a self-regulating tidegate within the tidal creek and relocated at the northern end of the I-95 embankment. This will allow controlled tidal flow upgradient of the tidegate to protect the Eastern Avenue neighborhood from flooding. Replacement and relocation of the Ballard Street tidegate could enhance tidal flushing to approximately twelve acres of salt marsh and two acres of tidal creeks in the area bordered by Route 107, Ballard Street, the I-95 embankment, and the Bristow Street extension right-of-way. However, this is contingent on excavation of additonal flood storage areas west of the I-95 embankment (see next project, Ballard Street Marsh Excavation) and the removal of the temporary steel plate used as an emergency tidegate at the Saugus River outlet. This will reduce coverage of common reed, increase the density and vigor of native salt marsh vegetation, and enhance fish habitat by improving the connection from the Saugus River and the smaller creek system in this marsh. Because of the relatively large area of potentially restorable salt marsh and signnifcant improvements in flood storage, water quality, and other ecological benefits, both this project and the Ballard Street Marsh Excavation are the highest priorty projects within Rumney Marsh.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

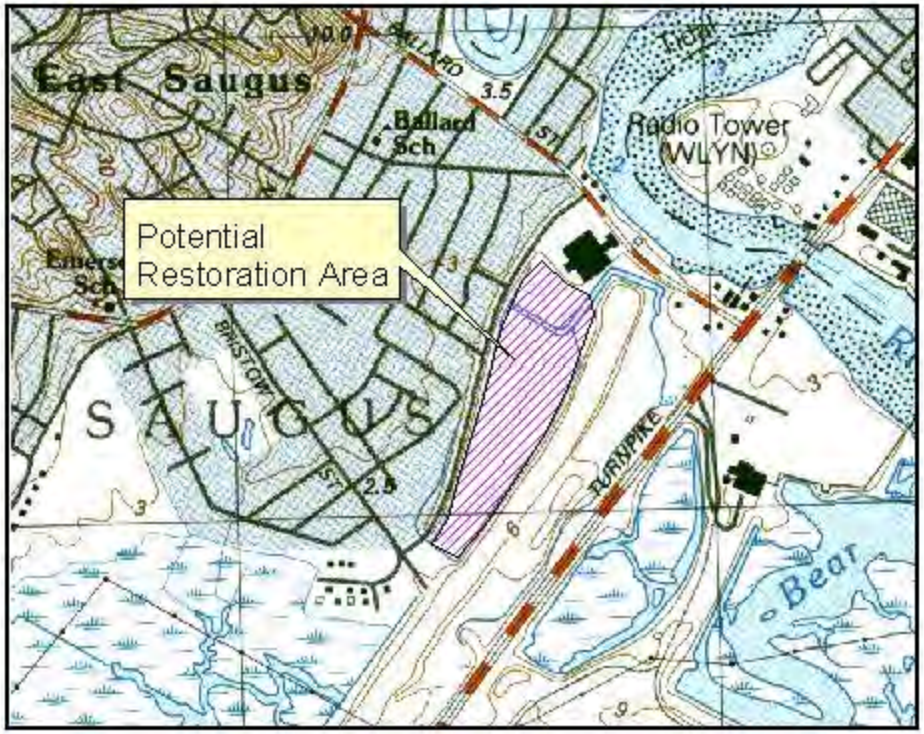
**Project Name** Ballard Street Marsh Excavation **City/Town** Saugus **Status** Planning/Design

**Site Location** Between Ballard and Bristow street along 107

**Land Owner** MDC, Town of Saugus **Area of Restorable Wetland** 20 acres **Estimated Cost** > $100,000

**Site Description**

The Ballard Street Salt Marsh restoration project involves the excavation of approximately 20 acres of area dominated by common reed to a depth suitable to accommodate increased flood storage and provide for reestablishment of salt marsh vegetation and tidal creeks. The project is linked to the Ballard Street Tidegate Replacement Project, described above. Approximately 82,000 cubic yards of fill must be removed from the area to achieve the required elevations and flood storage (NRCS 1999). This excavation, in concert with controlled tidal flow from the tide gate replacement, will restore about 20 additional acres of salt marsh in the area between the I-95 embankment and Eastern Ave. Use of a self-regulating tide gate will provide enhanced flood control for the Bristow St./Eastern Ave. neighborhood, while allowing sufficient tidal flow to sustain a salt marsh. The restored marsh will provide 20 acres of new fish habitat, in close proximity to the Saugus River, reduce a significant stand of common reed, and help treat stormwater run-off from the residential area to the west. Most of the site is owned and/or managed by the MDC and plans for enhanced public access and programming are under development. MWRP, NRCS, MDC, EPA, and the town of Saugus are currently working to develop preliminary designs for this project. Because of the relatively large area of potentially restorable salt marsh and signnifcant improvements in flood storage, water quality, and other ecological benefits, both this project and the Ballard Street Tidegate Replacement are the highest priorty projects within Rumney Marsh.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Ballard Street Salt Marsh Ditch Maintenance

**City/Town** Saugus

**Status** Constructed

**Site Location** Between Ballard and Bristow street along the I-95 embankment.

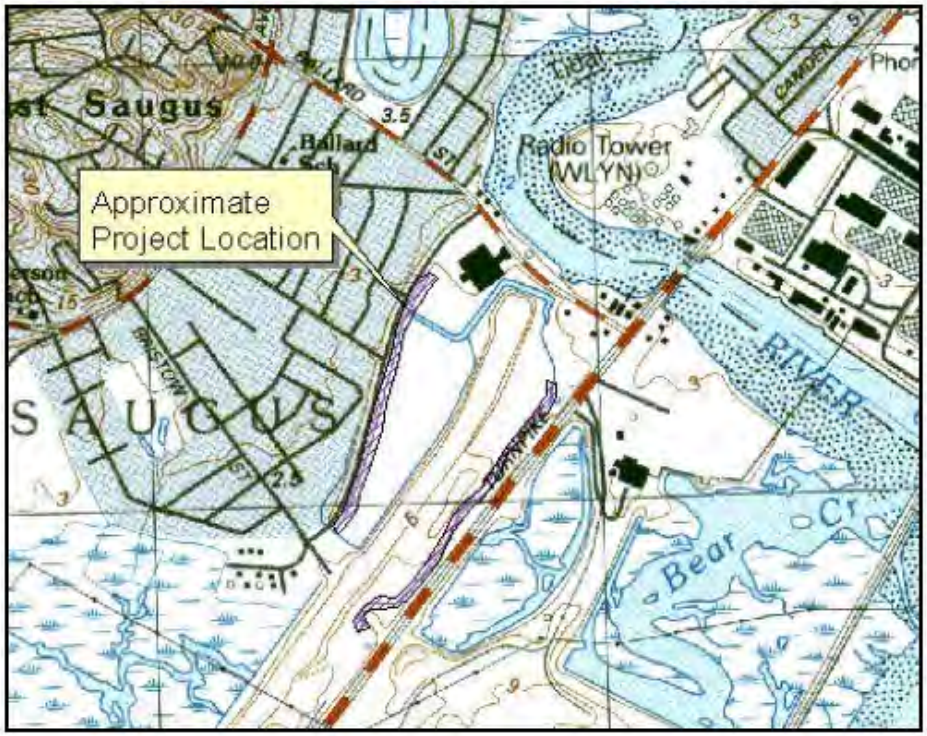
**Land Owner** Town of Saugus

**Area of Restorable Wetland** 2100 linear feet

**Estimated Cost** $10,000 - $100,000

**Site Description**

This project involved routine maintenance of ditches running adjacent to the I-95 embankment. The ditch maintenance restored tidal flushing and helped prevent the further spread of Phragmites in approximately one arce of marsh and restored flow, flushing, and habitat in 2,100 linear feet of salt marsh creeks.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

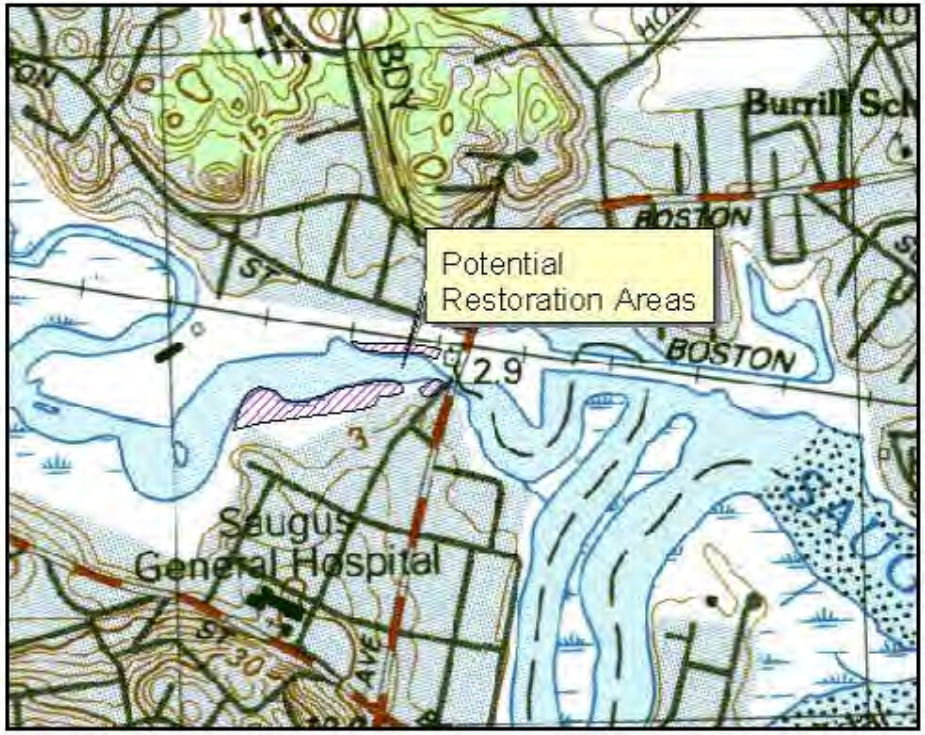
**Project Name** Lincoln Ave/Boston St Bridge **City/Town** Saugus **Status** Potential

**Site Location** Saugus River at Lincoln Ave. and Boston St.

**Land Owner** MHD **Area of Restorable Wetland** 3 acres **Estimated Cost** > $100,000

**Site Description**

The Lincoln Ave/Boston St Bridge was built in 1927. The opening of the bridge is undersized and causes a tidal restriction upstream. The lack of tidal flushing above the bridge has enabled Phragmites to become established, displacing native salt marsh vegetation. Mass. Highway is currently working on plans for a new bridge. Any new design should include a substantially larger opening to allow normal tidal flow upstream. This will potentially restore approximately three acres of salt marsh and limit the spread of Phragmites. The MDC has recently completed environmental remediation on the Rumney Marsh side of the bridge in Lynn, which included removal of over 22,000 gallons of #6 oil underground at the site. Now that the site meets environmental standards for a public park, minor improvments such as plantings, a gravel path, benches, and signage will be added to increase public access th this "gateway" to the Rumney Marsh ACEC. This area and the MDC-owned riverfront parcel on the other side of Boston Street in Saugus continue to provide significant potential for future public access improvements such as a canoe launch and educational programming.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** RESCO Landfill **City/Town** Saugus **Status** Constructed

**Site Location** Located on RESCO property off of Route 107

**Land Owner** RESCO **Area of Restorable Wetland** 3 acres **Estimated Cost** > $100,000

**Site Description**

RESCO is a 200 acre landfill constructed on former salt marsh. As a component of a closure and park conversion project, a large portion of the landfill is being transformed into publicly accessible open space, with significant areas of restored grassland and shrub habitat. This includes approximately three acres of fringing salt marsh along the south and east sides of the landfill, adjacent to Bear Creek. This work is 75% complete and will be finished in 2002. There may be potential for additional salt marsh restoration in several small areas totalling about 0.5 acres if a collapsed culvert by the East Branch of the Pines River bridge along Route 107 is replaced by Mass Highway or others. The public accessibility and overall attractiveness of this site makes it especially suitable for environmental education and passive recreation.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

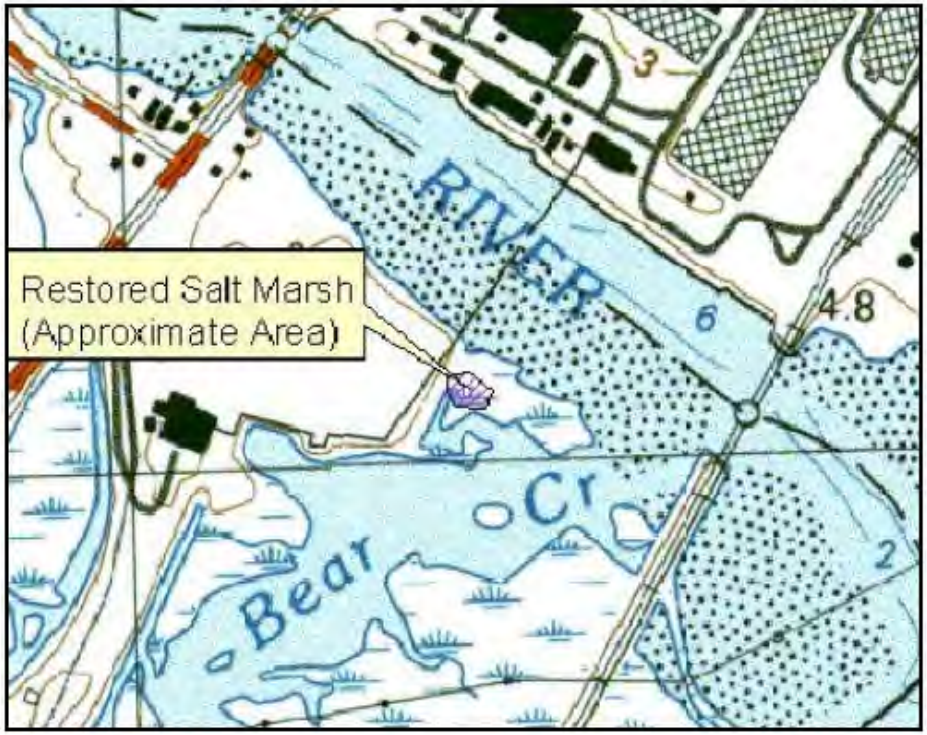
**Project Name** GE Landfill **City/Town** Saugus **Status** Constructed

**Site Location** Between RESCO and the Saugus River, off Rt. 107.

**Land Owner** General Electric Co. **Area of Restorable Wetland** < 0.5 acres **Estimated Cost** > $100,000

**Site Description**

Like RESCO, the GE landfill was constructed on salt marsh. Together, these two landfills represent the largest piece of marsh lost in Rumney Marsh. A small salt marsh restoration project was completed here in 1998 as mitigation for wetland impacts from the landfill closure process.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Central County Ditch **City/Town** Revere **Status** Constructed

**Site Location** Site is located behind warehouse complex. South of Revere Street and East of 60.

**Land Owner** Syratech Corporation **Area of Restorable Wetland** 24 acres **Estimated Cost** $10,000 - $100,000

**Site Description**

The Central County Ditch extends for approximately one half mile, from the southeast corner of Rumney Marsh to a 24 acre salt marsh located behind the former Towle Manufacturing Co. warehouse off Route 60. The ditch replaces filled portions Diamond Creek and drains a large section of northeast Revere. A tidegate was used at the downstream end of the ditch to alleviate upstream flooding. Initially, this tidal restriction cut-off almost all salt water flow to the upstream marsh, leading to the proliferation of Phragmites and reducing the habitat quality in the marsh. However, the tidegate was damaged during a storm in October 1996, allowing full tidal flow back into the marsh. While this had a beneficial affect on the marsh by reducing the density of Phragmites, it also caused serious flooding problems to the surrounding residential and commercial neighborhood. In 1997, the Town of Revere, working in concert with the EPA and the Army Corps of Engineers, and with the cooperation of the warehouse property owner, solved the problem by installing a Waterman-Nekton Self-Regulating Tidegate. This tidegate is designed to allow a controlled amount of salt water to pass, then closes when the water has reached a predetermined elevation. The tidal elevation at which the gate closes is set by adjusting a float mechanism. The marsh is flooded at a frequency and to a depth sufficient to maintain healthy salt marsh vegetation. At the same time, the surrounding neighborhood is protected from damaging high tides and storm surges. There is potential for additional habitat enhancement by cleaning up the bank adjacent to roadway and parking areas and eliminating illegal dumping.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Oak Island, Route 1A Tide Gate **City/Town** Revere **Status** Planning/Design

**Site Location** Between St. George Condominiums and Route 1A and between Route 1A and Railroad. Revere St. and Oak Island Rd.

**Land Owner** City of Revere, private **Area of Restorable Wetland** 20 acres **Estimated Cost** > $100,000

**Site Description**

This project is located in an area of marsh just south of the Oak Island neighborhood and east of the B&M railroad tracks. The marsh has been impacted by the construction of the railroad tracks, Route 1A, and other alterations to tidal flow. In addition, the marsh itself has been extensively filled. A standard tidegate historically had been used under the railroad tracks, blocking the majority of tidal flow of Diamond Creek to the marsh. Restoration elements of this project include the installation of a self-regulating tidegate and a new culvert under the railroad bed to ensure adequate tidal flow, while also protecting residential areas upstream from flooding. Excavation of the marsh surface will be undertaken by the Northeast Mass. Mosquito Control and Wetlands Management District as on OMWM project, is required to establish the elevations needed for development of a salt marsh and will also provide additional flood storage. The City of Revere, with funding from FEMA, HUD, USFWS, and EPA, will complete installation of the new culvert and self-regulating tidegate during 2002.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Revere Beach Back Shore Ponding Area (Tidegates 1-4)

**City/Town** Revere

**Status** Constructed

**Site Location** Off Route 1A accross from Dimare Seafoods.

**Land Owner**

**Area of Restorable Wetland** 12 acres

**Estimated Cost** > $100,000

**Site Description**

The Revere Beach Back Shore Ponding Areas are a series of salt marshes strung along Route 1A from Oak Island Road to about a quarter mile past Mills Ave., between Revere Beach Boulevard and Route 1A. They are crucial areas for storing stormwater from tidal surges and alleviating local flooding. This site is separated from tidegates 5 and 6 by the historic narrow gauge railway right-of-way, now used as a sewer easement. At this site four standard, flapper-type tide gates connecting the marsh to the Pines River were replaced by Mass. Highway with self-regulating tide gates in 2000. In 2001, the Northeast Mass. Mosquito Control and Wetlands Management District conducted an OMWM project and ditch maintenance here to further improve the remaining salt marsh.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Revere Beach Back Shore Ponding Area (Tidegates 5-6)

**City/Town** Revere

**Status** Constructed

**Site Location** Along Route 1A, Pipe #6 next to Beach Animal Hospital and Kennels

**Land Owner**

**Area of Restorable Wetland** 12 acres

**Estimated Cost** > $100,000

**Site Description**

In 2000, Mass Highway replaced two missing tidegates affecting this Phragmites dominated marsh with Waterman/Nekton self-regulating tidegates. Mass Highway replaced a section of collapsed pipe on culvert six next to the animal hospital in 2001. The Northeast Mass Mosquito Control and Wetlands Management District did ditch maintenance reconnecting culvert five and six.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

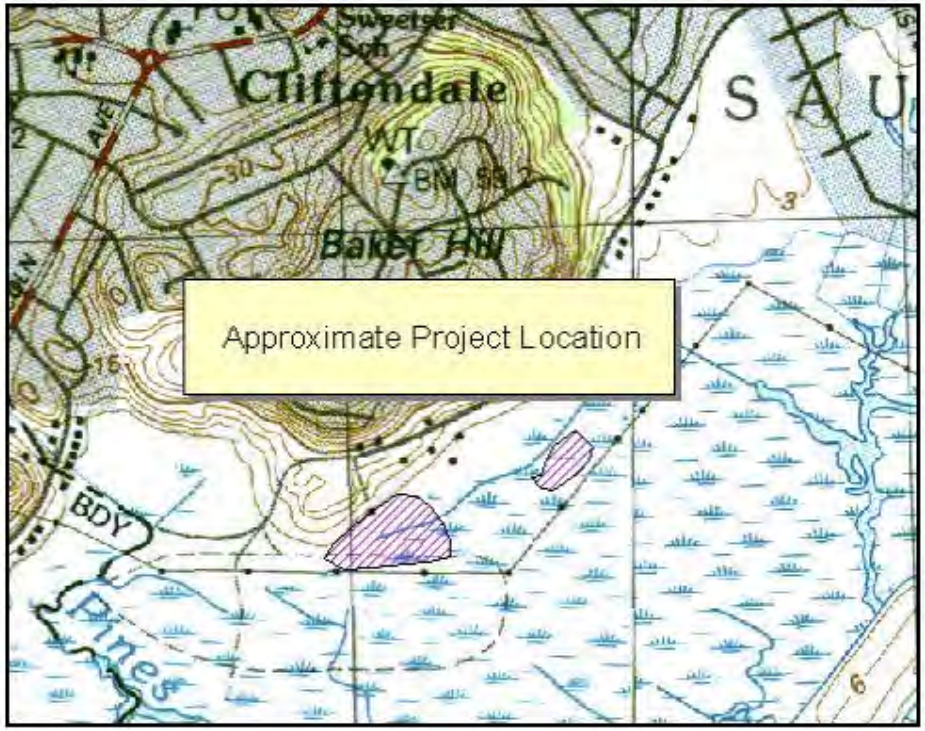
**Project Name** East Saugus OMWM **City/Town** Saugus **Status** Constructed

**Site Location** Adjacent to abandoned Saugus race track area.

**Land Owner** MDC **Area of Restorable Wetland** 9 acres **Estimated Cost** < $10,000

**Site Description**

This previously ditched salt marsh was improved by an OMWM project implemented by the the Northeast Mass. Mosquito Control and Wetlands Management District.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

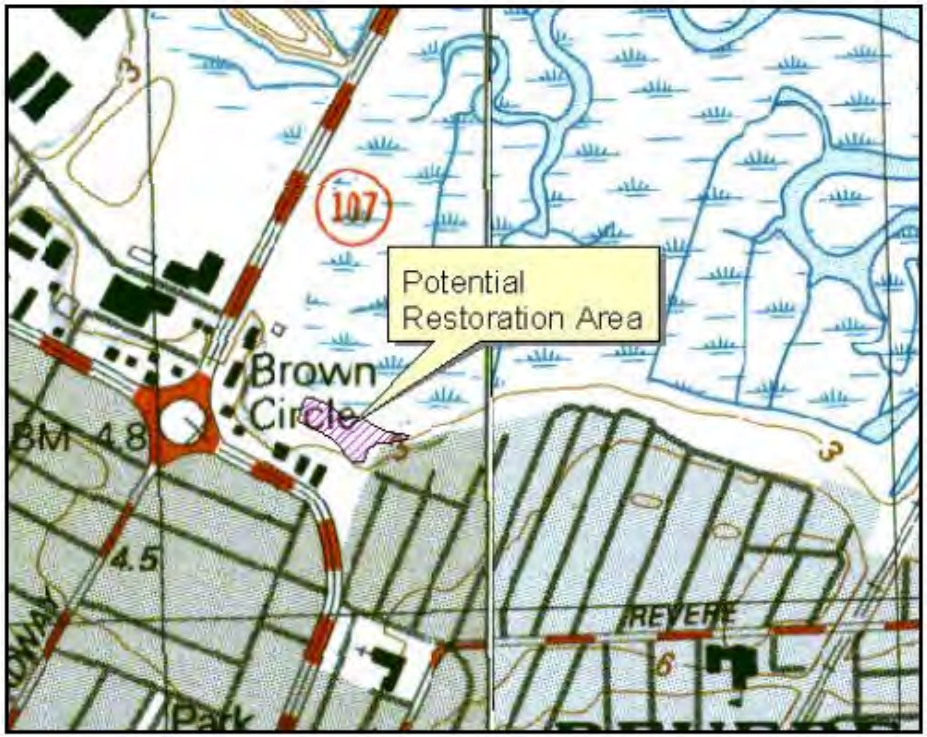
**Project Name** Naples Road Marsh **City/Town** Revere **Status** Potential

**Site Location** Behind Quick Oil Change on Naples Road; adjacent to rotary where Route 107 meets Route 60

**Land Owner** Private landowner **Area of Restorable Wetland** 4 acres **Estimated Cost** $10,000 - $100,000

**Site Description**

The Naples Road Marsh site consists of portions of several privately-owned parcels near 415 American Legion Parkway. The parcels are commercially developed. The restoration area is the bank of the marsh and adjacent filled marsh. One parcel remains undeveloped and is proposed for construction of a car wash. The potential restoration area consists of 300 to 400 linear feet of bank behind a series of commercial and light industrial buildings. The area has been seriously degraded by chronic dumping and filling occurring over many years. Tidal flushing has been restricted and common reed has colonized the area, displacing native salt marsh vegetation and degrading wildlife and fish habitat. Common reed also creates a localized fire hazard, contributes to the breeding of mosquitoes, and restricts views of the marsh. Restoration of the area would involve clean-up of large amounts of debris and rubble. Some removal of fill would be required to restore salt marsh vegetation and inhibit the growth of common reed. The upland bank area should also be planted with native coastal vegetation to further improve the habitat. Though this land is privately-owned, there has been some expression of interest in donating land to the city by the landowner(s). Volunteer clean-ups conducted in past years demonstrate community and city interest in the site.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Narrow Guage Railway **City/Town** Revere **Status** Potential

**Site Location** Behind Rent-a-Toll and Beach Animal Hospital, off Route 1A.

**Land Owner** **Area of Restorable Wetland** 5 acres **Estimated Cost** < $10,000

**Site Description**

This project is located in a semi-triangular tract between the Boston & Maine tracks and Route 1A and just south of the Pines River. The Narrow Gauge Railway used to ferry passengers over sections of Rumney Marsh to Revere Beach. Though the railway has been inactive for many decades, portions of its filled right-of-way still remain throughout Rumney Marsh and Belle Isle Marsh. At this particular location, fill from the right-of-way restricts tidal flushing from the nearby Pines River. In addition, to the right-of-way itself, additional filling and illegal dumping has taken place for many years. The Northeast Mass. Mosquito Control and Wetlands Management District plans an OMWM project here.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

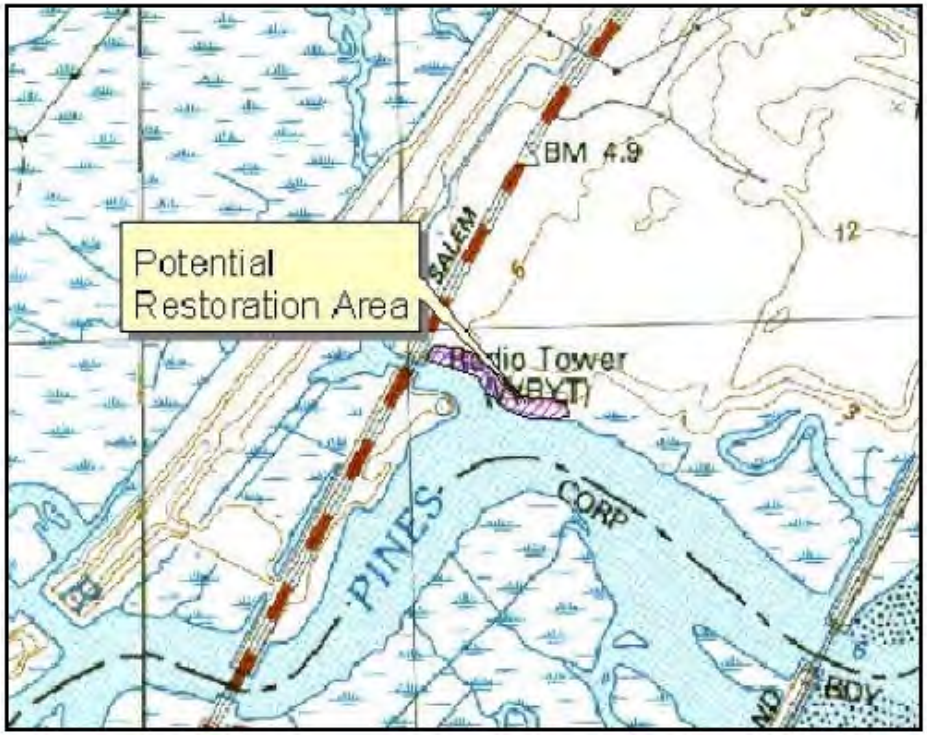
**Project Name** Dewey Dagget Landfill **City/Town** Revere **Status** Potential

**Site Location** North of the Pines River, between Route 107 and the RESCO landfill.

**Land Owner** Private **Area of Restorable Wetland** 1 acre **Estimated Cost** $10,000 - $100,000

**Site Description**

This site is located just north of the Pines River, between Route 107 and the RESCO landfill. The landfill is about three acres in size and sits on the northern bank of the Pines River. The landfill is inactive and is owned by an out-of-state real estate trust. The site was listed as a Chapter 21E site in 1989 under the provisions of the Massachusetts Contingency Plan. In 1995, a Phragmites fire was smothered with 70,000 cubic yards of sand by an EPA emergency CERCLA action. There is currently no remediation plan in place, though the Dewey Daggert landfill has been cited as a major contributor of non-point source pollution into the Saugus/Pines River estuary. The site presents two opportunities for small-scale restoration projects. In its current condition, the southern edge of the landfill is eroding, potentially allowing sediment and leachate into the Pines River. As an element of a comprehensive site remediation plan, small areas of fringing marsh along the southern edge of the landfill could be restored to help stabilize this area. A portion of the landfill shoreline may require rip rap stabilization. Closure and clean-up of the landfill and stabilization of the banks will be a significant step toward improving water quality in the Pines River. Remediation and restoration of the Dewey Daggert landfill also has the potential to link to other salt marsh restoration projects within the Rumney Marsh. Final closure and remediation of the landfill may require capping of the entire site with at least three feet of clean fill. The landfill could be a designated disposal area for clean excavate generated by other salt marsh restoration projects. This will promote other Rumney Marsh restoration projects, while also addressing the need to close and cap the landfill in a cost effective manner. Once the landfill's capacity is reached, the site could be converted to a public park, further enhancing the public benefit of the project. Given the current unclear ownership status and long history of the site, aggressive state action would be required to bring this vision to reality.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

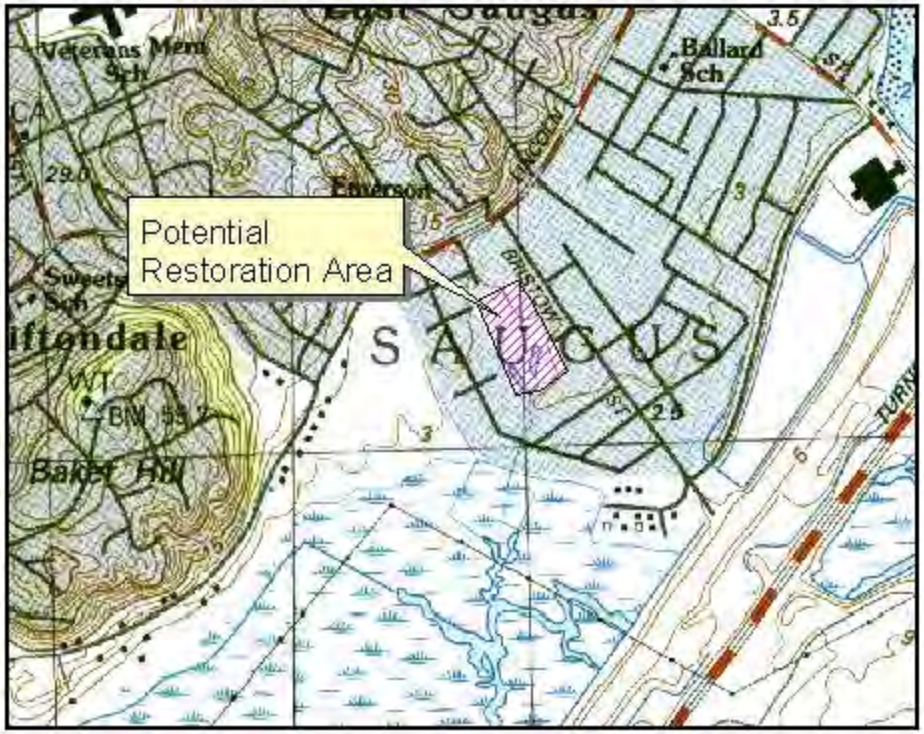
**Project Name** Seagrit Avenue Marsh **City/Town** Saugus **Status** Potential

**Site Location** Located between Bristow Street and Bentley Street.

**Land Owner** **Area of Restorable Wetland** 10 acres **Estimated Cost** > $100,000

**Site Description**

The Seagrit Avenue neighborhood is a relatively new residential development in East Saugus. Extensive filling occurred in the 1950s and 60s to create buildable land, resulting today in chronic neighborhood flooding problems and seriously degraded salt marsh habitat. Historically, freshwater runoff from the surrounding upland area flowed from the Bristow-Seagrit area south into the Pines River. This is still the case, however both freshwater and tidal flows are restricted due to filling and associated alterations of historic drainage patterns. The Seagrit Avenue marsh today is an isolated impoundment. A tide gate has been installed to control tidal flooding, but this has not been effective in controlling storm water flooding and has also caused further impacts to the marsh's ecological value and function by blocking salt water flow. Lack of tidal flushing has caused common reed to colonize the area, restricting views of the marsh and creating a local fire hazard. Because of the dense residential character of the neighborhood, uncontrolled re-introduction of historic tidal flushing patterns is not a realistic restoration option. Any salt marsh restoration projects in this area must seriously consider local flooding problems. The best opportunity for pursuing a restoration project will also address flooding issues, thereby solving several problems at one time. One potential restoration option would involve excavation of the existing common reed stands and re-introduction of controlled tidal flushing by installing a self-regulating tide gate. This would create some open water habitat, with some fringing marsh areas, that will allow for increased flood storage capacity as well as restoration of salt marsh habitat.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

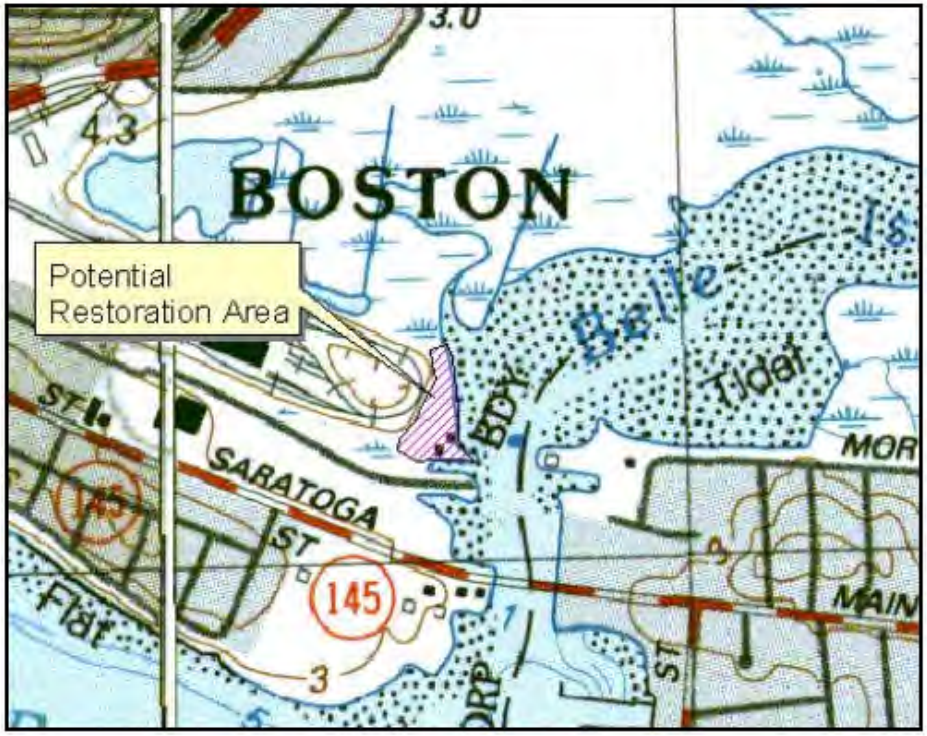
**Project Name** Belle Isle Fish Co. **City/Town** Boston **Status** Planning/Design

**Site Location** Off Saratoga Street, behind OSCO drug store just west of the Saratoga Street Bridge.

**Land Owner** City of Boston **Area of Restorable Wetland** 1.5 acres **Estimated Cost** > $100,000

**Site 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.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Radio Tower Dike/OMWM Area

**City/Town** Revere

**Status** Constructed

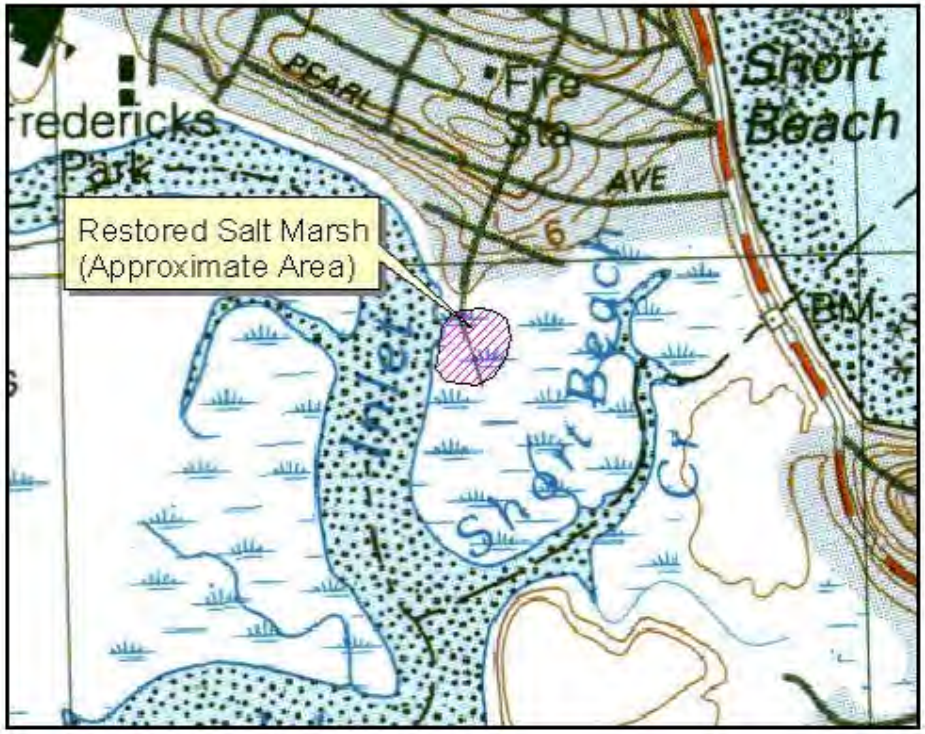
**Site Location** East of Belle Isle Inet, near Short Beach Creek.

**Land Owner**

**Area of Restorable Wetland** 5 acres

**Estimated Cost** < $10,000

**Site Description**
This diked salt marsh was the site of a five acre OMWM project completed by the Northeast Mass. Mosquito Control and Wetlands Management District in 1993.




# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

**Project Name** Sales Creek/Bennington Street **City/Town** Boston **Status** Potential

**Site Location** Insection of Sales Creek and Benninton St.

**Land Owner** Mixed private **Area of Restorable Wetland** 6 acres **Estimated Cost** $10,000-$100,000

**Site Description**

A standard flapper type tidegate 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 tidegate at Bennington Street, to include a Self-Regulating Tidegate to introduce controlled tidal flow to Sales Creek to help control Phragmites and improve it's ecology, habitat values, and flushing characteristics.


# Rumney Marshes ACEC Salt Marsh Restoration Plan -- Project Profiles

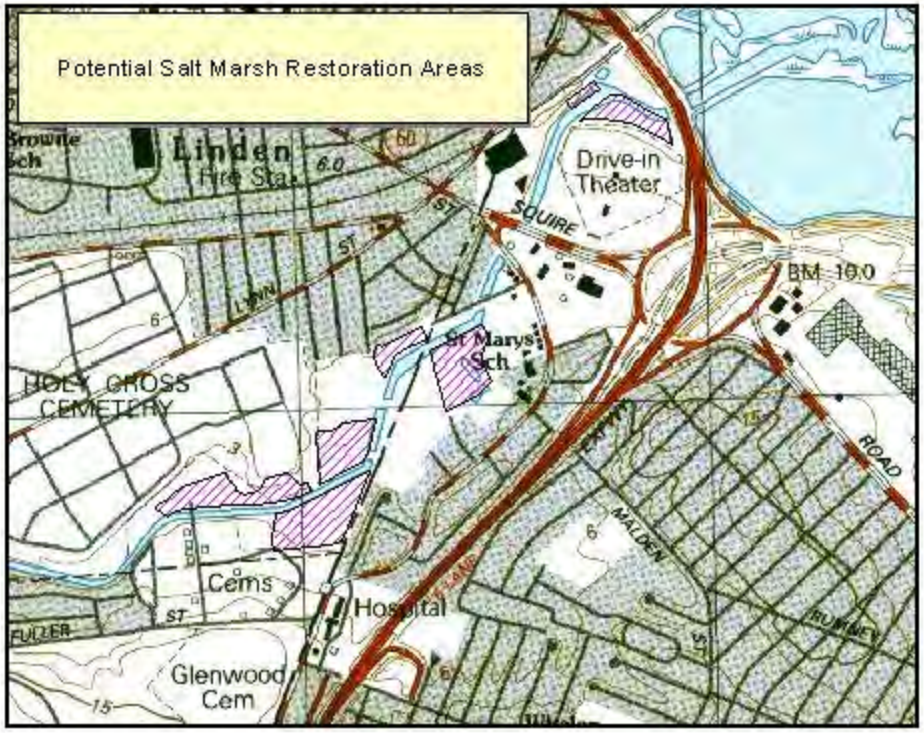
**Project Name** Town Line Brook Floodplain **City/Town** Malden **Status** Planning/Design

**Site Location** Town Line Brook and adjacent wetlands upstream (west) of Squire Road and south of Holy Cross Cemetery.

**Land Owner** Mixed Public/Private **Area of Restorable Wetland** 24 acres **Estimated Cost** > $100,000

**Site Description**

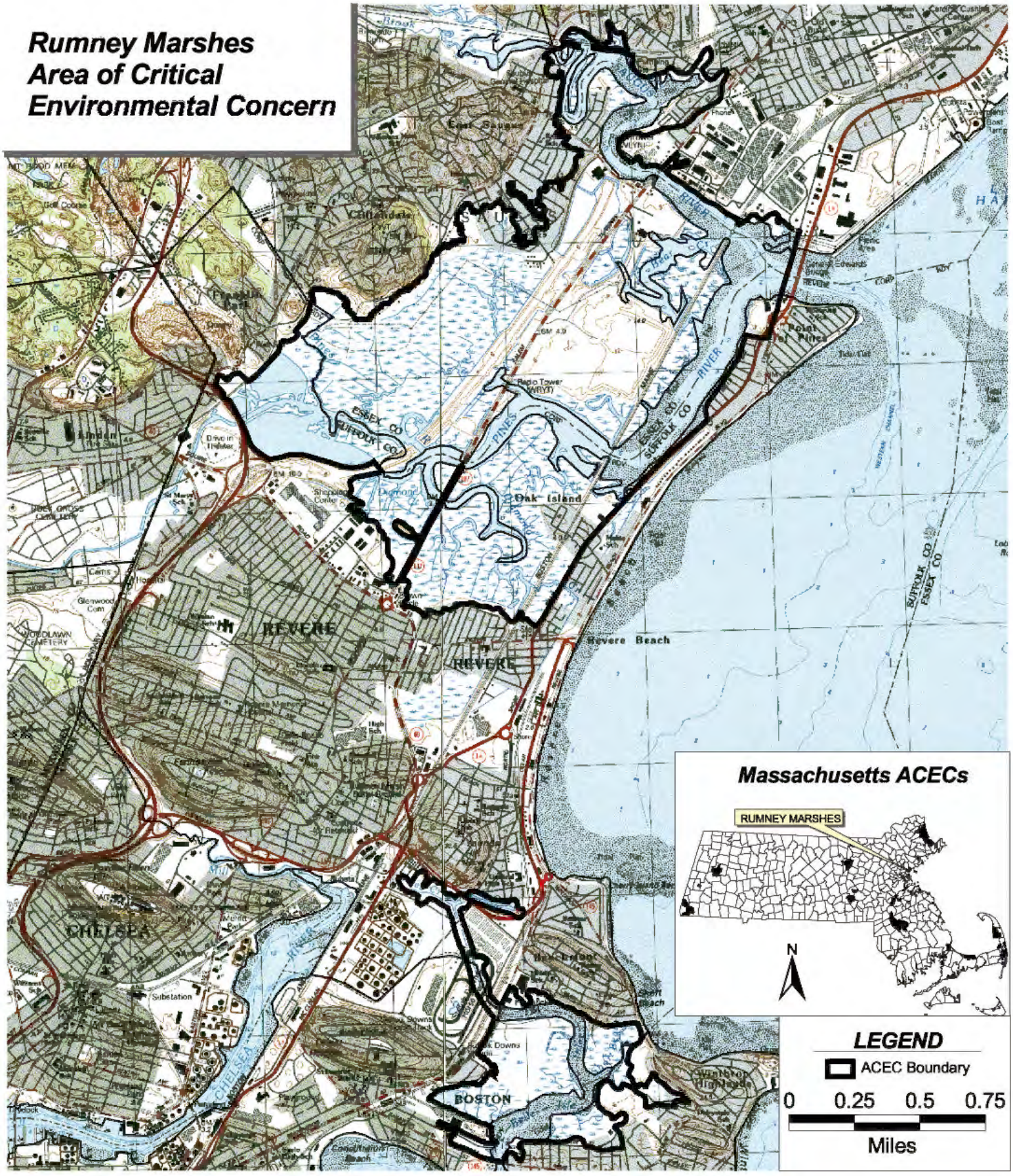
Town Line Brook has been severely degraded by channelization, hard armoring of its banks, filling in of its floodplain, excessive stormwater inputs, and other urban impacts. Though tidal flow does reach this section of the brook, and is now enhanced by the new tidegates at Route One (see project description, Town Line Brook Tidegates), tidal water rarely reaches the adjacent wetlands due to entrenchment of the stream channel and increased elevation of the floodplain caused by filling. Preliminary studies conducted by a private consulting firm, funded by the Mass. Environmental Trust and the Mass. Watershed Initiative, have identified 24 acres of potentially restorable salt marsh along Town Line Brook in Revere and Malden. Such an undertaking would likely involve naturalization of the stream channel and its banks and restoration of filled and degraded salt marsh areas. Pending the availability of non-federal matching funds, the US Army Corps of Engineers will perform the more detailed studies and engineering analyses required to implement this restoration project as part of the Coastal Mass. Ecosystem Restoration Study. In any circumstances, the need for enhanced flood storage and protection of adjacent residential areas will be balanced with any ecosystem restoration goals. Given the relatively large area of potentially restorable salt marsh and the significant ecological and flood protection benefits that could be gained, this project is a high priority within the Rumney Marsh ecosystem.




## *Appendix D: Maps*

- Current USGS
- Historic USGS
- Salt Marsh Restoration Project Locations
- ACEC Hydrography
- ACEC Open Space Protection
- Historic vs. Current Extent of Wetlands

NOTE: These maps are for planning and illustrative purposes only. They represent the best available digital statewide data for a given theme. They are not to be used for legal boundary definition or regulatory interpretation. See the 1988 ACEC designation document for the legal ACEC boundary description. Except where noted, map data courtesy of Mass. GIS.

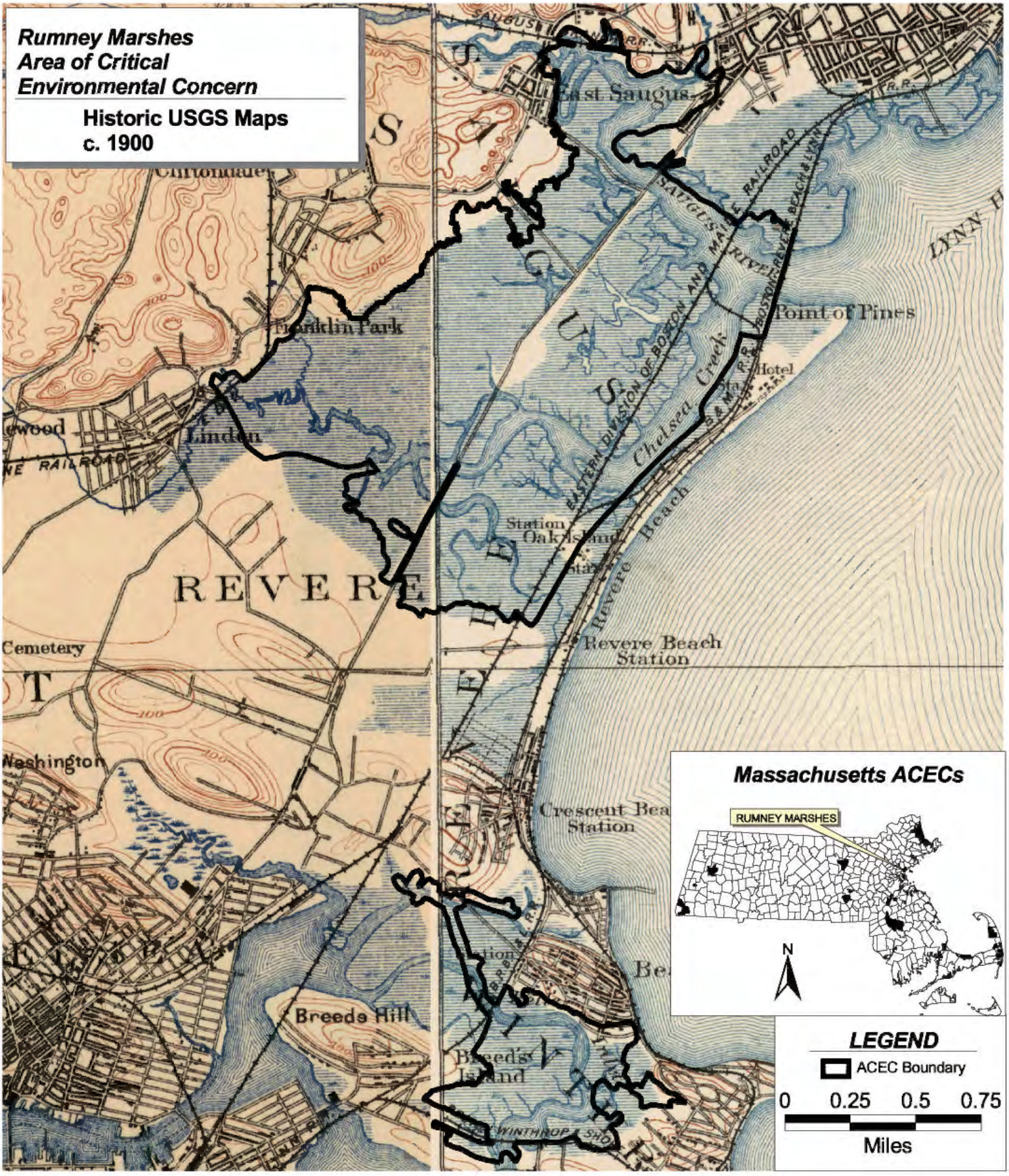



# Rumney Marshes ACEC Salt Marsh Restoration Plan

Executive Office of Environmental Affairs

DEM, ACEC Program Wetland Restoration Program

Map Date: June 2001




# Rumney Marshes ACEC Salt Marsh Restoration Plan

Executive Office of Environmental Affairs

DEM, ACEC Program Wetland Restoration Program

Map Date: June 2001

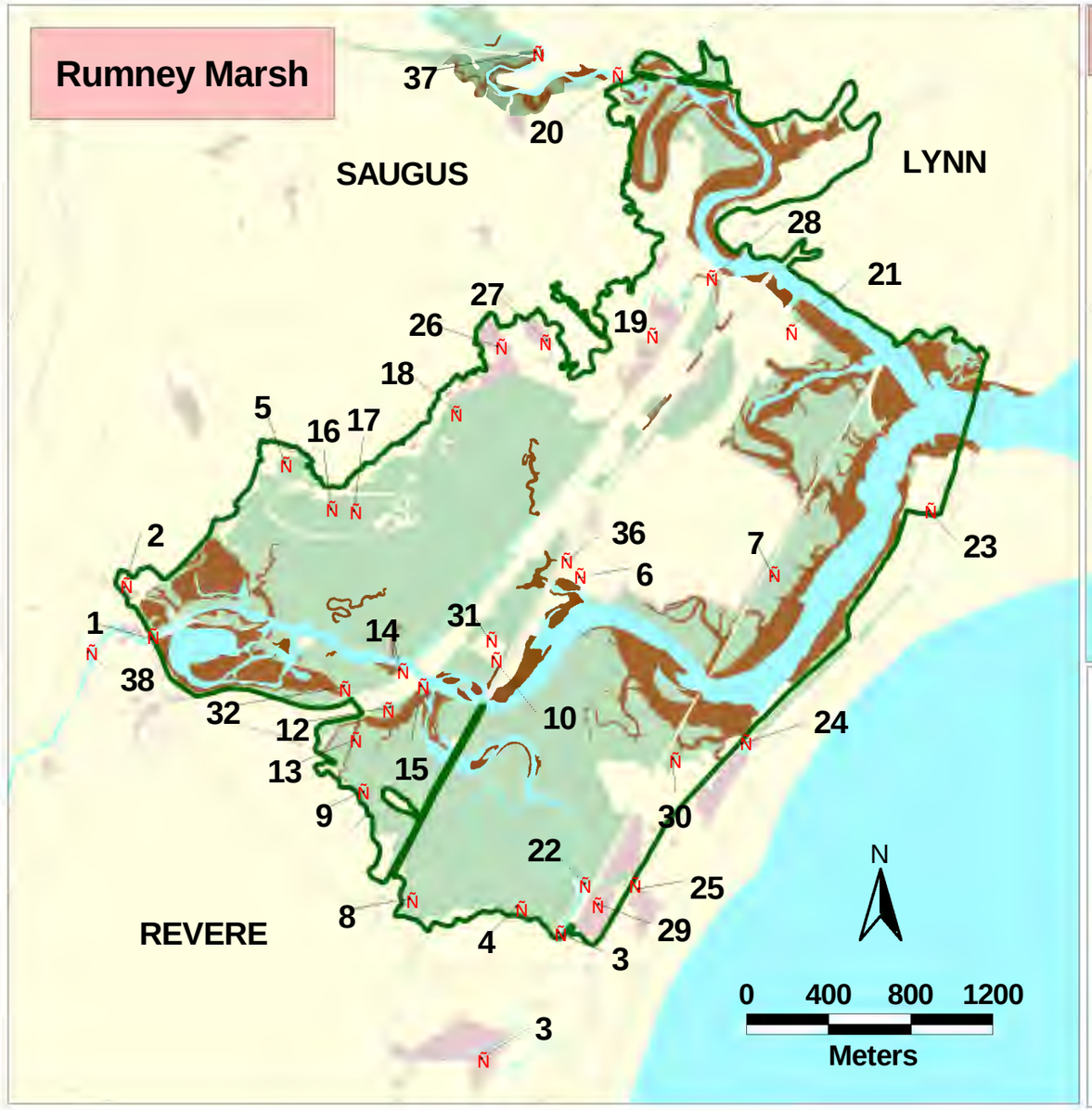
# *Salt Marsh Restoration Projects in the Rumney Marshes ACEC*

*Rumney Marshes ACEC Salt Marsh Restoration Plan*

**Executive Office of Environmental Affairs**

**Wetlands Restoration Program** **DEM, ACEC Program**

**Map Date: May 2002**





## LEGEND

**Wetlands**

- SALT MARSH
- SHALLOW MARSH MEADOW
- TIDAL FLAT
- OPEN WATER
- ACEC Boundary
- Major Roads

## Projects

| | |
|---|---|
| 1 | Townline Brook |
| 2 | Linden Brook |
| 3 | Central County Ditch SRT |
| 3 | Central County Ditch Marsh |
| 4 | Hastings Street Marsh |
| 5 | Park Street Marsh |
| 6 | Dewey Daggert Landfill |
| 7 | RESCO Landfill |
| 8 | Naples Road Marsh |
| 9 | Caruso Mitigation Site |
| 10 | MDC Access Road |
| 12 | CA/T MITIGATION |
| 13 | CA/T MITIGATION |
| 14 | CA/T MITIGATION |
| 15 | ROUGHANS POINT |
| 16 | OLD SAUGUS RACETRACK |
| 17 | OLD SAUGUS RACETRACK |
| 18 | WALTER'S DITCH |
| 19 | BALLARD STREET MARSH |
| 20 | BOSTON ST BRIDGE |
| 21 | GE LANDFILL |
| 22 | OAK ISLAND TIDEGATE |
| 23 | REVERE BEACH TIDEGATES 5-6 |
| 24 | REVERE BEACH TIDEGATES 1-4 |
| 25 | ROUTE 1A MARSH TIDEGATE |
| 26 | EAST SAUGUS OMWM |
| 27 | SEAGRIT AVE MARSH |
| 28 | Balllard St. Tide Gate |
| 29 | Oak Isl. Marsh Excavation |
| 30 | Narrow Gauge RR ROW |
| 31 | MDC Access Rd. Marsh |
| 32 | No Man's Land |
| 33 | Belle Isle Fish Co. |
| 34 | Radio Tower Dike OMWM |
| 35 | Sales Creek Culvert |
| 37 | B&M RR Bridge |
| 38 | Townline Brook Floodplain |

# *Rumney Marshes ACEC, Hydrography*


## LEGEND

- 100 Year Floodplain (FIRM, Zone A)
- Streams and Ditches

Wetlands

- SALT MARSH
- SHALLOW MARSH MEADOW
- TIDAL FLAT
- OPEN WATER

Major Roads

*Rumney Marshes ACEC Salt Marsh Restoration Plan*

**Executive Office of Environmental Affairs**

**Wetlands Restoration Program** **DEM, ACEC Program**

**May 2002**

# *Rumney Marshes ACEC, Open Space Protection*


## *LEGEND*

**Open Space Ownership**

- CHAPTER 61A (AGRICULTURE)
- CHAPTER 61B (RECREATION)
- DEM
- INHOLDING
- MDC
- MUNICIPAL
- PRIVATE NON-PROFIT
- PRIVATE, NOT CHAPTER 61
- UNKNOWN
- ACEC Boundary

*Rumney Marshes ACEC Salt Marsh Restoration Plan*

**Executive Office of Environmental Affairs**

**Wetlands Restoration Program** **DEM, ACEC Program**

**May 2002**

# *Rumney Marshes ACEC, Existing vs. Historic Wetlands*


## LEGEND

- HISTORIC WETLANDS, c. 1895
- EXISTING WETLANDS
- TIDAL FLAT
- OPEN WATER
- ACEC Boundary
- Major Roads

*Rumney Marshes ACEC Salt Marsh Restoration Plan*

**Executive Office of Environmental Affairs**

**Wetlands Restoration Program** **DEM, ACEC Program**

**May 2002**

## *Appendix E: Rumney Marshes ACEC SMRP Notification List*

**Rumney Marshes ACEC Salt Marsh Restoration Task Group** (* repeated below)

Executive Office of Environmental Affairs, Wetlands Restoration Program
EOEA Watershed Initiative, North Coastal Basin Team
Mass. Bays Program
Mass. Department of Environmental Management, ACEC Program
Mass. Department of Environmental Protection
Mass. Division of Marine Fisheries
MassHighway
Metropolitan Area Planning Commission
Metropolitan District Commission
Northeast Massachusetts Mosquito Control and Wetland Management District
Revere Conservation Commission
Saugus Conservation Commission
Saugus River Watershed Council
US Army Corps of Engineers
US Environmental Protection Agency
US Fish and Wildlife Service
National Marine Fisheries Service

**Municipal Officials**

Conservation Commissions*, Mayors, Town Managers, Selectmen, Aldermen, Boards of Health, Departments of Public Works, and Planning Boards in the cities and towns of Boston, Lynn, Revere, Saugus, and Winthrop.

**Statewide Environmental Groups**

Massachusetts Association of Conservation Commissions
Massachusetts Audubon Society
Massachusetts Society of Municipal Conservation Professionals
Massachusetts Watershed Coalition
Massachusetts Association of Conservation Districts
Nature Conservancy/Massachusetts Field Office

**Local Environmental and Other Groups**

Bike to the Sea
Boston Natural Areas Fund
Concerned Coastal Sportsmen Association
Friends of Belle Isle Marsh
Friends of Rumney Marsh
Mass. Audubon: North Shore
ROCA/Youth Star

Route 107 Flyers

Saugus River Watershed Council*
Save the Harbor/Save the Bay

**Regional Planning Agencies**
Metropolitan Area Planning Council

**Conservation Districts**
Essex County Conservation District
Suffolk County Conservation District

**State Agencies and Programs**
Executive Office of Environmental Affairs
- Wetland Restoration Program*
- North Coastal Watershed Basin Team*

Department of Environmental Protection
- Office of Watershed Management
- Division of Wetlands & Waterways, Boston Headquarters
- Division of Wetlands & Waterways, Northeast Regional Office

Department of Environmental Management – ACEC Program*
Department of Fisheries, Wildlife, and Environmental Law Enforcement
- Division of Fisheries and Wildlife
- Division of Marine Fisheries*
- Natural Heritage and Endangered Species Program
- Riverways Program

Massachusetts Bays Program*
Massachusetts Coastal Zone Management*
Massachusetts Highway Department*
Metropolitan District Commission*
Northeast Massachusetts Mosquito Control & Wetland Management District*

**Federal Agencies**
US Environmental Protection Agency – Region One, Massachusetts Field Office*
US Army Corps of Engineers, New England Division, Regulatory*
US Fish and Wildlife Service*
US Department of Agriculture – Natural Resource Conservation Service
National Oceanographic & Atmospheric Administration – National Marine Fisheries Service*

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## *APPENDIX G: Public Comment Letters and Responses*

The Draft Rumney Marshes ACEC Salt Marsh Restoration Plan was publicly released in June 2001. In addition to comments discussed during a public meeting held in Saugus and comments received on an on-going basis from the Rumney Marshes Inter-Agency Task Group, the following written comments were received by MWRP and the ACEC program during the review period:

June 26, 2001 *Letter from Concerned Coastal Sportmen's Association*
*Summary of Comments:* The CCSA's letter describes their interest in maintaining access to Rumney Marsh for the purposes of fishing, fowling, and navigation. They suggest that the plan address ways in which coastal access is guaranteed.
*Response:* No salt marsh restoration project described in this plan precludes or inhibits coastal access. In fact, salt marsh restoration enhances coastal resources and the interests described by CCSA. Furthermore, access to coastal resources is regulated by the Commonwealth's Waterways regulatory program.

June 28, 2001 *Letter from Michael J. Serino, Selectman, Town of Saugus*
*Summary of Comments*: Mr. Serino states that 1) ACEC marshes should remain as passive recreation areas; 2) the I-95 embankment remain in place to ensure flood protection for East Saugus; 3) the ACEC needs better maintenance, and 4) a funding plan should be developed for implementation of the restoration plan.
*Response:* 1) The final plan does not suggest uses other than passive recreation for the ACEC; 2) the final plan does not recommend removal of the I-95 embankment; 3) maintenance needs of the ACEC are beyond the scope of the final plan; 4) MWRP and the ACEC Program will continue to work with other agencies and project sponsors to identify funding sources for individual projects as needed.

July 11, 2001 *Letter from Charles Burnham and Robert Cameron, Essex Historical Society and Shipbuilding Museum/Saugus Iron Works*
*Summary of Comments:* Citing their involvement with the Saugus Iron Works National Historic Site, the comments address a broad suite of environmental problems along the upper limits of tidal influence on the Saugus River. A partial list of these issues includes, historic filling of salt marsh and tidal creeks, freshwater run-off into the marsh, occurrence of *Phragmites* within marsh-upland transition zones, loss of historically occurring fish runs, and impediments to navigation. The draft plan is further criticized for lacking a broad view of the environmental problems along the Saugus River.
*Response*: As a plan specifically focused on salt marsh restoration opportunities within the ACEC, many of the issues raised are beyond the scope of this plan. However, a stated goal of the plan is to identify other potential restoration projects which may improve ecological conditions within the ACEC, such as the sites suggested here. Though these sites are not documented in this plan, MWRP and the ACEC Program are available and willing to meet with project sponsors interested in pursuing individual salt marsh restoration projects.

July 17, 2001 *Letter from Laurie Webster*
*Summary of Comments:* This letter urges serious consideration be given to replacing the Bennington Street tidegate in East Boston with a self-regulating tidegate and the daylighting of buried portions of Sales Creek.
*Response:* The Bennington Street Tidegate/Sales Creek project is documented in this plan. Potential local project sponsors are urged to contact MWRP for assistance in project planning and development.

July 17, 2001 *Email received from Gail Miller, Friends of Belle Isle Marsh*
*Summary of Comments*: This message acknowledges the long history of the FBIM in the development of the final plan and strongly advocates for the restoration of Sales Creek and the replacement of the Bennington Street Tidegate with a self-regulating tidegate. In addition, a general lack of emphasis on Belle Isle Marsh is noted.
*Response:* See response above re: Bennington Street Tidegate/Sales Creek. With regard to Belle Isle Marsh in general, MWRP is particularly interested in working with the MDC, FBIM, and other project supporters to identify and pursue other salt marsh restoration opportunities with the Belle Isle Marsh Reservation, such as the berm removal project designed by the Army Corps of Engineers in 1991.

In addition to the individuals and organizations listed above, the Saugus River Watershed Association provided extensive comments on the draft plan. Their comments have been incorporated into the narrative of the final plan.