

Spear Farm Estuary Preserve

Management Plan



A management strategy for all seasons.

DRAFTED AND COMPLIED BY:

Yarmouth Parks & Lands Committee

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**Respectfully submitted to the Yarmouth Town Council
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Spear Farm Estuary Preserve Management Plan

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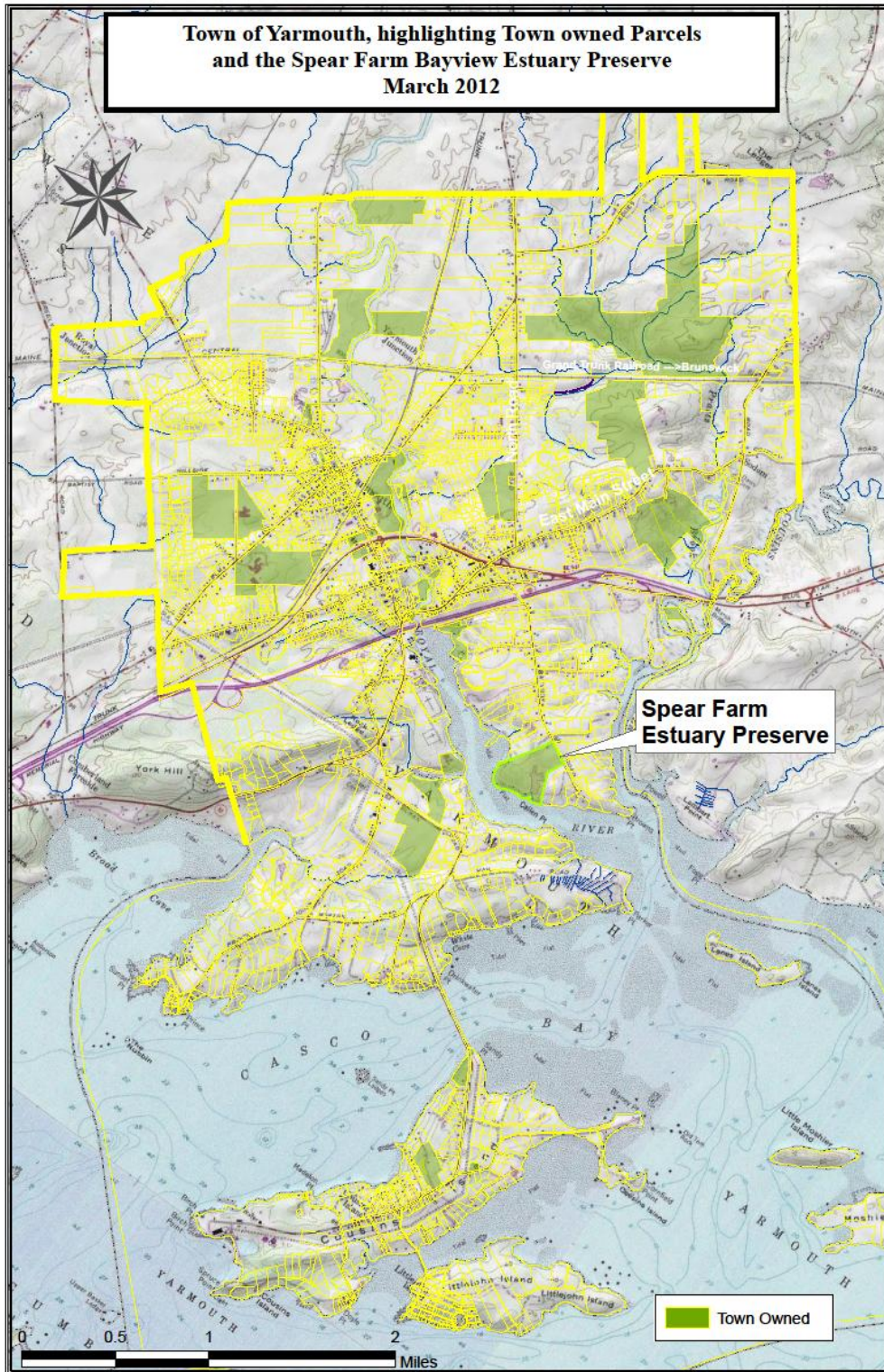
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1. Executive Summary

The 55.5-acre Spear Farm Estuary Preserve is located south of Bayview Street, approximately one mile east of Route 88, and terminates along the banks of Royal River. In the late 1800's through the mid 1900's, the property was primarily used for agricultural purposes and was left idle until its purchase. The property was purchased in three phases with a combination of federal, state, local and private funding and is subject to management provisions set forth by two distinct conservation easements. While largely forested, the Preserve has a 1-acre field near the parking lot adjacent to Bayview Street. Other distinct features include a 3.5 acre freshwater pond impounded by a low earthen dike, an apple orchard located on the Southeast bank of the freshwater pond, and nearly 14 acres of high and low salt marsh meadows flanking the Royal River. A parking lot for up to six vehicles is separated from the small field by a barn, which is used for equipment storage. A network of nearly two miles of walking trails provides a majority of the public recreational opportunities afforded by the Preserve. Primary users of the property include walkers, hikers and bird watchers. There are several picnicking and vista spots giving users the opportunity to view a great deal of wildlife within the forest, field, salt marsh, river shore, and pond habitats.

Management of the preserve includes traditional tasks such as trail maintenance, mowing, maintaining scenic vistas, and erosion control but unique to this property is maintenance associated with the earthen dike separating the fresh-water pond from the tidal marsh. Water levels are directly correlated to the functionality of the dike and its associated water-level control overflow pipe. Biodiversity is currently at risk in the preserve because of the increasing prevalence of several invasive plant species. The most of which is the oriental bittersweet located in the western upland adjacent to the salt marsh. Future management goals for the preserve include monitoring and reporting required by the conservation easements; assessing, maintaining, and improving trails; monitoring invasive species and implementing mitigation strategies; and identifying volunteer projects, events, and work days.

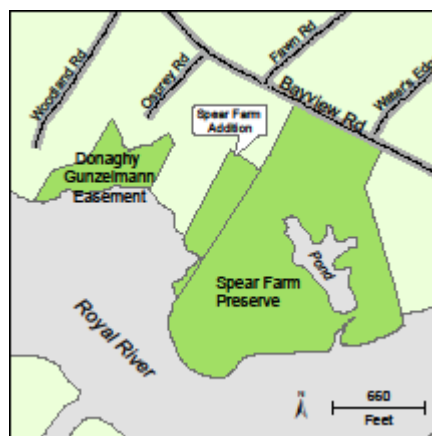
1. a. Location map



1.b. Aerial image of SFEP



1.c. December 2011 addition to SFEP from neighbor Robert Cattell



2. Description and History

2.a. Description

Spear Farm Estuary Preserve (SFEP) is an approximately 55 acre parcel located near the end of the Bayview Street Peninsula between the road and the tidal portion of the Royal River. The Preserve was acquired in three phases between September 2004 and December 2011. The 141 square mile Royal River watershed culminates in the tidal portion of the River that flows by this Preserve. Originally known as the Bayview Estuary Preserve, the name was changed to the Spear Farm Estuary Preserve in honor of the Spear family, from whom the Phase 2 parcel was acquired (LMF, 13 acres, 12/20/2005). Access to the Preserve is from Bayview Street where a gravel driveway leads to the parking area. The driveway is located approximately one mile from the intersection of Route 88 (Spring Street) with Bayview Street.

2.b. Land Use History

The productivity of the Royal River with its annual fish runs and access to interior Maine, likely made this area a prime location for the first tribes to settle this area. Conflicts between Native Americans and the first European settlers were documented through the 1600s and early 1700s, which delayed the development of the upper and lower villages of today's Yarmouth. The current site of the Preserve is thought to have been included in what was the second home of William Royall, which at the time was referred to as Wolf Point.

In the late 1800's and early 1900's the general area was farmed, primarily for hay. A 1924 land sale of the Preserve involved farming tools, cattle, and other personal property as part of the transaction. An oral history from long time neighbor Robert Cattell recalls cattle being pastured in the fields near the road in the past 25 years. The large groves of multi-stem pine and widespread presence of invasive plants attests to the land being harvested for timber, and pastured until the early 1950's. The oldest timber on the Preserve is found on the western upland adjacent to the salt marsh. On the bluff overlooking the salt marsh is a stand of red oak that is more than 150 years old, and just to the south between the perimeter trail and the salt marsh is a large stand of mature black cherry.

The carpet of myrtle at the back of the field near Bayview Street indicates the probability of a historic (European) home site. An archeological investigation of this area has not been performed and is not imminent. The historic and cultural resources within the Preserve have not been thoroughly explored, although the Preserve's connection to the Royal River suggests a story to be discovered. However, care should be taken to avoid disrupting any historical resource should trail re-alignment be proposed in this part of the Preserve.

2.c. Parcel Acquisitions

The Preserve consists of three contiguous parcels acquired by the Town of Yarmouth at different times.

- i. September 2004; the Town of Yarmouth acquires the original 35-acre parcel from The Trust for Public
- ii. Land purchased with a combination of local funds (the last of the Towns Open Space Bond funds), state and federal funding and a strong show of local private fundraising.
- iii. In December 2005, an additional 13 acres were acquired through a project that incorporated funding from the Land for Maine's Future (LMF) Program with the Town of Yarmouth's majority contribution coming from a citizen's initiative to fund the acquisition.
- iv. In December 2011, 2.87 acres of abutting salt marsh and shoreline to the north of Phase 1 was gifted to the Town of Yarmouth by longtime neighbor, Robert Cattell. This transaction was the product of a 3-lot subdivision of the Cattell Property, resulting in 1 additional, un-built residential lot, the lot containing the existing home, and the 2.8 acre gift to the town.

2.d. Deed or Conservation Easement Restrictions

Phase 1 and Phase 2 acquisitions are each subjected to separate conservation easements, both held by the Royal River Conservation Trust (f/k/a Friends of the Royal River). These conservation easements are a tool, used to preserve the natural character of these parcels while allowing availability for low impact public recreation. In both cases the stated purpose of the easements is as follows:

This Conservation Easement is intended to protect the natural, scenic and undeveloped character of the Protected Property, to assure its availability as a public preserve for low impact public outdoor recreation, and to promote the conservation of its scenic open fields and its woodland and their associated wildlife habitat values, and the water quality of the Royal River. It is intended to balance the community need for open land available for public outdoor recreation, nature observation and study, with restrictions that will ensure that the experience of the public on the Protected Property will be one, increasingly rare, of relatively unstructured quiet contemplation and reverence for the natural world.

In addition to conveying development rights and subdivision rights, each Conservation Easement allows for perpetual limited public access and provides the Town specific rights to enhance low impact outdoor recreation and conservation of the Preserve. The phase 3 parcel should be subjected to the above conservation easements.

2.e. Stakeholders

- i. Neighbors and property owners who worked to protect this property, and who benefit from its existence.
- ii. Town of Yarmouth - The Town of Yarmouth is the owner of the underlying fee of the real property (Phase I, Phase II and Phase III).
- iii. Land for Maine's Future (LMF) – the LMF Program distributed LMF Bond monies to cover a portion of the purchase for Phase II. As a standard condition to financial participation, LMF attached a set of terms and conditions of partnership called the Project Agreement.
 - Maine Department of Conservation (DOC) - the DOC is the Designated State Agency (DSA) as defined in the LMF Project agreement, and monitors and enforces the Project Agreement.
 - Royal River Conservation Trust (RRCT) – f/k/a Friends of the Royal River. The land trust was granted the Conservation Easements (CE) for Phase I and Phase II. RRCT should also be granted a CE for the Phase III property, and any subsequent Phases.
 - Trust for Public Land (TPL) - TPL's interest in the conservation values associated with its ownership of Phase I was defined in the language of the CE and the rights and obligations transferred, as applicable, to the Town of Yarmouth and RRCT.
 - National Oceanic & Atmospheric Administration (NOAA) - NOAA's interest in the conservation values associated with its ownership of Phase I was defined in the language of the CE and the rights and obligations transferred, as applicable, to the Town of Yarmouth and RRCT.

3. Resource Inventory

3.a. Natural Resources

i. Geology & Soils

The bedrock underlying the Spear Farm Estuary Preserve is metamorphic schist belonging to the Richmond Corner Formation. For the most part, deep deposits of glacial marine silts and clays cover bedrock, and therefore there is little bedrock influence on the soils found on the Preserve. Marine and glacial outwash sediments constitute the parent materials out of which the Preserve's soils developed. The fine marine silts and clays create poorly drained soils, while the coarser sediments deposited by glacial run-off gave rise to better-drained soils.

The soils on much of the Preserve consist of Elmwood (EmB) soils that form thin layers of loam over deeper marine clay deposits. These soils underlie the wooded areas located to the east and west of the freshwater pond and marsh. The steep wooded bluff on the west side of the Preserve that provides views of the tidal marsh is composed of deep, excessively drained Windsor (WmD) soils formed from sandy glacial outwash. Suffield (SuD2) soils composed of marine sediments are found north of the pond and freshwater marsh. Unfortunately portions of the trail network are located there. Permeability in both the Elmwood and Suffield soils can be very slow in the clay substratum. This can create adverse slippery conditions on trails with steep gradients. The low and high salt marsh is growing on deep organic salt marsh peat from as little as 2 to over 6 feet deep. These organic fibrous soils have developed in response to sea level rise over the past 14,000 years, with help from the accumulation of silt and clay from the Royal River.

ii. Hydrology and Topography

The high point of the Preserve is the frontage on Bayview Street at nearly 70 feet. A low ridge/ravine complex typical of this glacially influenced part of the coastline drains the upper portions of the Preserve and presents the pedestrian/soil stability challenges noted in this report. A series of low bluffs along the fringing salt marshes and coves beside the tidal portion of the Royal River estuary defines the transition from coastal wetlands to upland. Several small drainages descend from just below Bayview Street to the freshwater pond. Within the eastern portion of the Preserve several seasonal streams collect storm water and fill the pond. The pond is impounded by an earthen dam with an outlet structure, which provides drainage and overflow into the Royal River salt marshes. The U.S. Fish and Wildlife Service constructed this pond feature in 1965 as a project to improve wading bird and waterfowl habitat, which it has done well based upon observation of amphibians, reptiles and birds through the seasons. The Yarmouth Parks & Lands Committee places a high value on the diversity of habitats within such a small area. A unanimous Committee decision was made to repair the dam rather than restore the habitat to tidal salt marsh, and early in 2012 repairs were made to the dam structure in order to regain the intended surface elevation for maximum habitat value.

iii. Vegetation

Two-thirds of the Preserve is forested uplands. Pockets of forested and non-forested wetlands habitat exist around the pond with seasonal streams charging the pond. Upland non-forested habitats include a 1 acre field by the parking area, the first phase of an apple orchard planted just south of the pond and a 75 foot square picnic area near the northwest side of the pond. The forest stands range from mature hardwood (red oak, black cherry, and sugar, red and Norway maples) along the edges of the bluffs, to thickets of multi-stem white pine grown up in what are likely regenerated, cleared agricultural fields. Other dominant species include a number of understory and shrubby invasive plant species such as smooth buckthorn, Morrow's honeysuckle, Japanese barberry, and Asiatic bittersweet vines. The latter continue to damage high-value trees of the forest in the lower half of the property. There is a small remnant of open field near the parking area dominated by barnyard grasses (timothy, redtop, and foxtail) as well as several species of goldenrod, tall white aster, and common

cinquefoil. On a rise in the far eastern corner of the Preserve there is an open area where a small apple orchard was planted in the summer of 2011. In addition to the newly planted apple trees, several vintage homestead apple trees are growing on the upper portion of the Preserve with the potential for pruning to encourage fruit production.

The lowest portions of the Preserve slope into freshwater wetlands below the dam, associated with the impounded artificial pond, and a broad band of salt marsh that runs for more than one-half mile along the Royal River. The freshwater pond and associated wetlands cover approximately 5 acres. The pond is fringed with meadowsweet, winterberry, alder, and in the wetter areas, pickerelweed, cattails, cinnamon fern, and native swamp loosestrife. Forested wetlands are dominated by red maple, white ash, interrupted fern, lady fern and wood fern.

The salt marsh contains a mix of salt marsh hay, black rush, and lower salt marsh grasses such as three-square rush and salt marsh cord grass. This area is riddled with salt pannes, productive bare patches of inundated deep organic mud. As sea-level continues to rise, and likely much faster in the coming century, these salt marsh areas are likely to convert to open water and tidal mud flats and smaller and smaller bands of marsh will be left fringing the edge of the steeper sloped adjacent forest.

iv. Habitat/Wildlife

The Preserve provides a diversity of wildlife habitats thanks to the presence of fields, forest, freshwater pond and marsh, salt marsh and estuarine ecosystems. However, due to the size of the parcel and surrounding development, most species here are those common to moderate-sized woodlots in southern Maine. Those species are white tailed deer, gray and red squirrels, white-footed mice, red fox, turkey, thrushes and songbirds. The large oaks and scattered beech provide abundant nuts, while black cherry, buckthorn, and apple provide seasonal fruits. The freshwater wetlands and salt marshes give this property some of its most significant habitat both locally and regionally. The proximity of the freshwater pond to such extensive salt marshes along the Royal River makes this area significant for wading bird and waterfowl habitat. Notable species observed here include black-crowned night herons, great blue herons, snowy egrets, and mallards, ring-bill, wood ducks and black ducks, bald eagle and osprey. Several species of turtles are also residents of the pond.

3.b. Cultural resources: (intentionally omitted at this writing).

3.c. Recreational Resources

i. Public Access

The SFEP, as with most Yarmouth Parks, is open from dawn to dusk, although nighttime use can be granted with special permission from the Community Services Director or Town Manager. The Preserve currently provides a host of outdoor recreational opportunities. These opportunities include hiking, dog walking and skiing/snowshoeing. The Preserve is currently one of few Town-owned properties with pedestrian access to the tidal marshes of the Royal River. Currently there is no defined or encouraged hand-carry boat access or stopover boating facility along the shoreline of the Preserve. This potential use will continue to be discouraged to protect the fragile surface of the salt marsh. The Parks & Land Committee should be consulted and relied on to provide informed guidance and analysis of any initiatives proposing to increase access to or from the water, or for the construction of blinds for wildlife observation.

ii. Trails

There is a high density (approximately 2 miles) of trails in the roughly 35 upland acres of the Preserve. This high trail volume offers visitors several options for looping strolls and distinct experiences across the entire Preserve. However, an examination of the existing trail network should be made to evaluate whether trails are located in the preferred location for optimum visitor experience and environmental sustainability. Full consideration should be taken before any new trails are established or moved. Limitations include steep slopes and silty soils with frequent seepage areas that are prone to rutting and subsequent erosion. Existing and proposed trails should be evaluated at least annually for surface condition and routing optimization. Any trail system changes should consider the primary resources of the Preserve, highlighting opportunities for low impact recreation, hiking, birding, photography, picnicking, skating, snowshoeing and skiing under the appropriate conditions, and for enjoyment of scenic views of or from the Preserve, wildlife observation, and allowing for personal solace.

iii. Scenic Vistas

Scenic vistas have been identified as a significant resource for conservation purposes on both a watershed and Town-wide scale. In the Royal River Region Conservation Plan (2005), “scenic areas” was one of seven conservation targets identified within the watershed. Views of the Lower Landing and Casco Bay from the Spear Farm Estuary Preserve were identified as having particular scenic significance within the watershed in the 1988 Public Access Recreation Plan. The 2010 Yarmouth Comprehensive Plan re-affirmed the protection of scenic views as a Town policy. As a strategy to address this policy, the Plan pointed to the implementation of the recommendations in the Royal River Corridor Study (2008, “RRCS”). The general recommendations for the river corridor are relevant for the SFEP. Among the recommendations to consider for scenic vistas was:

“Open view corridors along the river in appropriate locations in keeping with current Shoreland Zone standards, while minimizing wildlife impacts and erosion.”

The scenic views from SFEP are certainly a valued resource that warrants protection, and management actions for the Preserve should place a high priority on this.

iv. Amenities and Structures

iv-1 Parking Area

The existing gravel parking area easily accommodates 5-6 cars, without designated spaces. It is uncommon for there to be any overflow with this amount of space available. Many people who visit the Preserve do so by walking directly to it from their homes. This is a valuable community resource, which is enjoyed throughout the day by many visitors from near and far. The Conservation Easements restrict the size of this parking area to 1800 square feet without prior consultation with the holder (RRCT). If demand increases the existing parking lot could hold more parked cars without increasing its size by designating spaces. There is currently no dedicated parking available for the disabled. Should dedicated parking spaces be established, or if any of the trails from the lot are made ADA compliant, at least one parking space should be designated for handicapped access.

A number of large boulders have been located to block vehicular access from the parking area through the open field near the entrance and the heads of the recreational trails. Unauthorized vehicles are not allowed on the trails.

iv-2 Structures

Storage Barn - The current location of the existing barn adjacent to the parking lot stands as a sentry to the Preserve. Presently it functions as satellite storage for seasonally unused equipment of the Yarmouth Public Works Department. On occasion the Yarmouth Land Steward and Parks and Recreation Department will utilize the barn for staging workdays and community service events. However, the facility is not secure and leaving hand tools or construction materials on site for extended times is not advised.

With some structural remedy and cosmetic improvement, at a minimum the façade could be vastly improved. As a potential long range replacement-planning project the barn could be relocated to the east side of the parking lot and rebuilt. While continuing to function in a storage capacity for YPW or Preserve specific projects, space could also be made available for education.

Informational Kiosk - There is an informational kiosk in the open field, about 75 ft from the parking area. Open Space Guides are available here as well as a Preserve map.

Bird Watching Blind - In 2009, as part of an Eagle Scout project, a 10' x 12' bird watching blind was constructed. This is located in the small field on the edge of the salt marsh to the south of the pond. It could give better service in another location.

Interpretive and Trail Signage - Five interpretive signs placed throughout the Preserve provide narrative about some of the Preserve's natural features. Further interpretative signs could be developed as part of a program to enhance the educational potential of the Preserve. Experiential learning opportunities for local school groups and community service groups are a use that could help promote future stewardship of this and other natural areas. Educational opportunities could include "green lab" space, sustainable trail construction, geo-caching/orienteering and team building exercises, any or all of which could become a featured use of the Preserve. The interpretive signs will need to be maintained, and trail signage needs to be developed.

Bike Rack - A bike rack with space for 4 bicycles is located at the edge of the parking lot.

Toilets - at present there are no sanitary facilities available at the Preserve.

4. Park and Land Use

4.a. Current use

The Preserve is currently used for low impact recreational and educational purposes, serves as a significant remnant of wildlife habitat, and also provides runoff control and water quality protection for the Royal River and the Bay, all as outlined in Section 3, Resource Inventory.

4.b. Allowable use

The allowable uses are as set forth in and tempered by the statement of purpose of the two conservation easements (see Section 2.d. above). Determining allowable uses requires a careful balancing of the declared values.

4.c. Restricted use

The following general uses are prohibited:

- Residential, commercial, industrial, quarrying or mining activities;
 - Dividing the land, except to remedy boundary disputes;
 - Disposal or burial of waste;
 - Development of high-impact recreational facilities such as recreational courts, playing fields, tennis courts, playgrounds, swimming pools, racetracks, and performance stages;
 - Building of structures, except as specified;
 - Surface alterations, except as specified;
 - Vegetation management, except as specified;
 - Limitations of Public Use, except as specified;
- The easement holder (RRCT) can allow certain additional activities such as surface alteration and vegetation management at its discretion, to the extent specified in the easements.

4.d. Conflicting use

Although there continues to be a perceived need and desire in Yarmouth and many coastal communities for public access to water bodies for recreational boating and associated on-shore parking, the Preserve is not a preferred site for active recreational water-oriented activities. Challenges include the distance from the parking area to the shore; the lack of infrastructure such as docks or ramps suitable for tidal fluctuations (and the regulatory challenges associated with their implementation); and limited parking. In addition, there would be a direct conflict with the natural resource and habitat values. Breeding, nesting, feeding and resting places for wading shorebirds and other waterfowl, as well as a breeding place and food source for finned and non-finned fishes are represented by the fragile Intertidal Zone, and all work against a low-impact water access point development. This Plan makes no provision for future river access for active water-oriented recreational purposes.

The Preserve is heavily used as a dog exercise area. Users are responsible for removing pet waste from the Preserve and avoiding conflict with other users of the park. Continued attention to and monitoring of this situation will help to minimize potentially conflicting uses. Additionally, unrestrained dogs can stress wildlife unnecessarily, and this should be avoided.

4.e. Potential and/or recommended highest use

The current uses of the Preserve, providing high-value wildlife habitat, low-impact recreational use, scenic vistas, opportunities for education and the *“increasingly rare...relatively unstructured quiet contemplation and reverence for the natural world”* are all noble and attainable goals for this Preserve. Expanded nature and environmental education programs could increase use of the Preserve, but no material change from current use is recommended.

5. Management

5.a. Guiding summary of management goals and strategies

The following resources/values of the Preserve are deemed the most significant and require the greatest degree of protection and preservation:

- Estuarine resources of the lower Royal River—salt marsh, mud flats and accompanying wildlife habitat;
- Opportunities for low-impact recreation in a natural setting;
- Scenic views of the lower Royal River from the Preserve; and
- Preservation of the fresh water pond as an important habitat for migrating waterfowl and resident wildlife.

Key management issues for this property include trail maintenance (bog bridging over wet land crossings, annual mowing of the fields and more frequent trail mowing), invasive plant species management, fruit tree orchard maintenance and regular inspections and maintenance of the dam on the freshwater pond and other structures.

All management activities should comply with state, federal, and local regulations as well as with the specific terms of the conservation easements.

Regular Management Activities - the Committee should:

- Develop a checklist of predictably required management activities.
- Before undertaking any new projects at the Preserve consider to what degree their upkeep will add to this list.
- Annual perimeter walks should be conducted, in order to identify any incursions, or any undesirable conditions or adverse developments, with written reports (these can be copies of the easement monitoring reports required by the Conservation Easements) going into the Preserve’s permanent file.
- Annual trail inspections should be conducted using appropriate trail assessment tools.
- Annual inspections of the earthen dike and water outlet structure for potential leaks or inadequate spillage of water that could threaten the structural integrity of the dike, potentially risking massive failure of the dam and draining of the important freshwater pond habitat.
- Consult with and coordinate management activities with the Town Tree Warden, as appropriate, with particular reference to vegetation management.
- Develop and maintain relationships with recognized organizations concerned with the health of Casco Bay, as well as the River, so this property can be used for educating the public, ensuring children get exposed to the outdoors and as a potential long-term study site.

- With proper planning and education, this site could potentially support a tie-up facility that would be available at high tide and allow access to the shore without materially damaging any sensitive intertidal soil or vegetation.
- The recently planted apple orchard should be cared for in a manner that allows for its future use as a resource for community apple harvesting, in consultation with the Town Tree Warden.
- Management of the vegetation native flora and fauna.

i. Vegetation

Protecting the Marsh - The tidal marsh grows on deep salt marsh peats of accumulated organic matter that has historically accreted as sea level rises. The salt marsh substrate is very poorly drained and regularly inundated by high tides and the vegetation on top is very sensitive to foot traffic. There are also implications for habitat values, since various species rest, feed and nest there. Intrusions into this Intertidal Zone should be avoided without a raised boardwalk. Enforcement of the 'no-wake' policy of the Town Harbor Master in this section of the Royal River will support protection of the fragile shoreline.

Mowing Open Areas – There should be semi-annual (spring and fall) mowing of the open, grassy areas on the Preserve, to maintain the open nature of these areas. Open areas on the Preserve should be mowed or otherwise kept clear to reduce opportunities for contact with ticks.

Mowing Trails - Trails on the Preserve should be mowed or otherwise kept clear more frequently to enable uninhibited foot travel and to reduce opportunities for contact with ticks. The brush hog being used accomplishes these objectives, but it is also doing significant damage to tree roots on the trails in certain locations. Consideration should be given to managing vegetation on sensitive portions of the trails using less disruptive techniques (such as with a string trimmer or hand tools).

Invasive Species Control - Invasive plant species represent the single greatest management issue at this Preserve. There are a number of invasive plant species at the Preserve, which have shown various levels of success. The list of invasive plants includes oriental bittersweet, Morrow's honeysuckle, glossy buckthorn, Norway maple), Japanese barberry, multiflora rose, and Phragmites. These invasive plants disrupt the ecological integrity of the communities in which they are found by displacing native plant and animal species and altering the ecological processes in the associated communities. In addition to disrupting ecological integrity, some invasives are growing to the point where they are detracting from the scenic vistas of the river from Preserve trails, as well as (in the case of bittersweet) threatening the viability and health of host trees and encroaching on trails. Entire stands of trees are at risk. While complete eradication of invasive plant species at the site is not likely an achievable short-term goal. Containment of the worst infestation would be a reasonable goal. Strategies could include identification and manual removal of plants in timber stands that are not completely overwhelmed. The use of chemicals to manage this threat should always be considered as an effective strategy. Responsible, licensed and informed pesticide application contractors should always be chosen for this management technique, for the health and safety of the environment and the person performing the application. The development of a practical, long-term invasive plant and forest management strategy is a critical component of management planning for this Preserve.

Any soil disturbance presents an opportunity for a durable and prevalent invasive species seed bank to propagate their crop. Any construction activity or wind thrown trees should be managed as preventive maintenance in the battle against the success of these invaders.

An annual invasive plant management plan should be formulated, with a year-end self graded report card, which can serve as preparation for the next annual plan.

Asiatic bittersweet poses the greatest risk and greatest challenge to the forested stand. Bittersweet is the primary invasive threat. Other invasive plant species including Morrow's honeysuckle, multiflora rose, Japanese barberry, glossy buckthorn, Norway maple, black swallow-wort and phragmites are also present. Wooded buffers should be maintained along the river, drainage features and pond. Efforts should be made to encourage natural forest regeneration native to this area in the under-story. Removing invasive species in a manner that does not destabilize the riverbank and adding native plantings will lead to encourage a sustainable and successional forest.

ii. Trails and Recreation

Trails – None of the soils, as identified by the Cumberland County Soils Map, are well suited to trail construction or use. The existing recreational trails in the Preserve are located on soils that are identified as “loamy sand” to “silt loam”. All trails on these soils can expect quick compaction to expose and damage tree roots and lead to slippery or muddy surfaces. All trails should be surfaced with organic woody material or gravel/stone dust, depending on the existing slope characteristics. Re-routing trails to avoid unfavorable trail conditions should be recognized as a futile effort and instead effort should constantly be taken to harden and protect trails in a preferred location for optimum visitor experience while avoiding any areas that would see a reduced ecological benefit from an improved trail and the anticipated human and dog use. A careful examination of the existing trail network should be made to determine whether the abandonment of one or more trail segments might be advisable. Any proposal for trail system changes should consider how specific trails support opportunities for low impact recreation, and/or enhancing enjoyment of scenic views. Any trail changes should be reflected in an updated map of the current trail system. Adding “destinations” or sitting areas periodically along the trail to encourage greater recreational use would be a use that fits well within the Conservation intent for this property. Sitting areas should be sited for shade, views, and their potential for wildlife observation/photography and/or meditation.

Trail Map Revisions - Trail network changes should be made thoughtfully, and any trail network changes should be reflected in an updated map. These up-to-date maps should be made available on-line, at the Parks & Lands website.

Trail Maintenance - In general, trails in the Preserve are in good shape and provide reasonably comfortable walking conditions during dry to slightly wet conditions. Any period of saturating precipitation increases the opportunity for severe damage, rutting and erosion to occur on any surface, which has not been improved or surfaced. Exposed tree roots present another concern for the health of the tree. Mowing of trail vegetation has exacerbated this concern, periodically disrupting tree roots by damaging, cutting, or dislodging them from soil.

iii. Habitat

Freshwater Pond/Marsh—Water Level Drop - In May 2011, an overflow pipe serving as the outlet drain from the freshwater pond functionally failed, effectively decreasing the pond depth by nearly 2 feet. This culvert and standpipe structure was replaced on January 5, 2012. A full pond is a critical component to this unique habitat's function. During the discussion of how to best approach this repair three solutions were considered; Repair the impoundment in kind, remove the impoundment structure (effectively restoring the natural tidal condition of the impounded wetland) or let the forces of nature proceed along their non-human influenced track. Any further repairs to this feature should follow similar troubleshooting analysis.

Sea Level Rise from Climate Change - Current climate change models suggest that sea level could rise 1-3 feet or more by the end of the 21st century. The coastal habitats most affected by sea level rise will be estuarine salt marsh and mudflat communities. These habitats are significant natural resources at SFEP. Signs of sea-level change are visible through the transition of high-salt marsh plants to those usually only found in low salt marsh. In addition to sea-level rise, impacts from more frequent intense rain and snow events could cause more severe and prolonged flooding from the Royal River and sedimentation from impacts further up the watershed.

Water Quality - Non-point source pollution from the Preserve is presumably minimal, which passively supports the water quality of the Royal River. The most likely source of any pollution from the Preserve would be erosion from disturbances from use and management activities on the Preserve. Taking care to minimize contributions to non-point source pollution during planning for any and all management activities is essential. This consideration is built into the conservation easement documents for the Preserve and should be reflected in any action plan.

Tidal Wetlands - The soils of the tidal marsh (formed of unconsolidated mineral and organic sediments) are very poorly drained and regularly flooded by high tides. They are distinctly not amenable to heavy foot traffic. Therefore, intrusions into the Intertidal Zone should be avoided unless a boardwalk system is developed. Boardwalks over salt-marsh habitats have impacts on wildlife and require regular maintenance. Currently the installation of a boardwalk is not recommended. Enforcement of the 'no-wake' policy of the Town Harbor Master should be vigorously supported. Rising sea levels will only heighten this concern.

iv. **Scenic Vistas**

A short-term goal could be to reduce invasives that interfere with scenic vistas overlooking the river. This would be an appropriate way to open view corridors to the river within the Preserve. Selected 'pruning up' to the extent permitted by shoreland zoning could be considered in selected spots, bearing in mind habitat values. No structures should be erected which would tend to obstruct scenic vistas.

6. Implementations and Recommendations

- Continue to utilize the Easement monitoring report(s) required by LMF and/or RRCT to identify issues and threats as they arise from year to year. Incorporate actions to address these as appropriate into annual management planning.
- Conduct a yearly trail assessment using the MECCA tool.
- The phase 3 parcel should be subjected by deed of easement to the terms of both of the conservation easements.
- Prepare and maintain a photographic record of the extent of invasive species infestation and document and map the methods used and results from various control efforts, updated at least annually, to provide a historical basis for assessing effectiveness of control efforts.
- Designate/Recruit a Preserve Steward. Parks & Lands Committee member Lars Lindgren has volunteered for this Preserve.
- Identify specific projects and organize work parties, taking advantage of volunteer labor, such as “friends” of the Preserve, Scouts, Yarmouth High School service volunteers, civic organizations, etc, as appropriate and needed.
- Replacement signs could include CR Code technology to allow for access to more detailed information & provide a location on a digital property map.

Be alert to possible future acquisitions and/or additions to the Preserve, noting any conclusions or observations as part of the annual management report. These could be for varying purposes:

- Promoting new or additional goals or values – none identified at this time.
- Enhancing existing values – an example is the recent pathway addition at the northeast corner of the Preserve, which enabled the completion of a loop trail. Nothing further is presently contemplated.
- Promoting connections to other Town Properties – a pedestrian connection from the Preserve upstream to the Town Landing would be desirable, and some links of that may be attainable in the short-term. The Bicycle and Pedestrian Sub-Committee has been asked to ascertain the current facts, and outline the requirements to pursue this goal.
- Incorporate relevant recommendations from the Greenprint Yarmouth plan (when it is completed) to address connectivity of SFEP with other Town open spaces and green infrastructure as part of the Royal River corridor.