

Meadow Brook Wetlands Protection Project

A proposal to the

Maine Natural Resource Conservation Program

Submitted by



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September 2016

Meadow Brook Wetlands Protection MNRCP Project Proposal**Executive Summary:**

- **Project Title:** *Meadow Brook Wetlands Protection Project*
- **Project Sponsor:** *Steve Walker, Maine Coast Heritage Trust, 1 Bowdoin Mill Island, Suite 201, Topsham, ME 04086 (207)607-4588 swalker@mcht.org*
- **Project Location:** *Turkey Cove Road, Saint George, Maine*
- **Project Summary:** This project represents a milestone in local efforts to conserve the Meadow Brook watershed in Saint George. Efforts to date have extended from the headwaters near Tenants Harbor to the outlet at Otis Cove. Acquisition of this project will result in a cross-peninsula linkage of properties in the largest unfragmented habitat block in Saint George. Meadow Brook is included as part of the Lower Saint George River Focus Area of Statewide Ecological Significance. Conservation of the brook and associated wetlands has long been a priority of the Town of Saint George and the Tenants Harbor Water District given the value of the wetlands as a source of drinking water for the town, and the brook corridor's ecological and recreational values. This specific project (the McGrath parcel) will result in the fee protection of approximately 23 acres of estuarine, palustrine, and riverine wetland types as well as buffering upland forest. Specific resources to be permanently protected include mixed graminoid-forb saltmarsh, brackish tidal marsh, forested wetlands, and freshwater streams. This project directly addresses several of the MNRCP Priority Resource Types identified for the Central Interior and Mid-Coast Biophysical Region.
- **Compatible Property Uses:** Once protected, the property will be managed as a publicly accessible preserve. Any future recreational trails will be constructed in a manner that avoids impacts to protected resources while still allowing users to experience the natural diversity of the property.
- **Estimated Project Cost:**
 - Total Project Cost: \$176,300
 - MNRCP Fund Request: \$146,500

Table 1. Type of Conservation provided by the Meadow Brook Wetlands Protection Project:

Natural Resource Type		Restored acres	Enhanced acres	Preserved acres	Created acres	Total acres	SWH acres
Freshwater Resources	Freshwater wetland, emergent (PEM)		0	0	0	0	0
	Freshwater wetland, forested (PFO)		0	4.1	0	4.1	0
	Freshwater wetland, shrub-scrub (PSS)		0	0	0	0	0
	River, stream or brook*		0	2400lf	0	2400lf	
	Lake or pond (L1, L2, PUB, PUS, POW)**		0	0	0	0	0
	Vernal pools (number)		0	0	0	0	0
	Vernal pool critical terrestrial habitat		0	0	0	0	0
Coastal Resources	Coastal wetland, Marine subtidal (M1)					0	0
	Coastal wetland, Marine intertidal (M2)		0	0	0	0	0
	Coastal wetland, Estuarine subtidal (E1)		0	0	0	0	0
	Coastal wetland, Estuarine intertidal (E2)		0	6.4	0	6.4	6.4
Upland buffer (non-wetland or significant wildlife habitat acres)			0	11.65	0	11.65	0

Project Total		0	22.15	0	22.15	6.4
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1. Potential to Meet MNRCP Goals:

- **Current Conditions.** The McGrath parcel lies within the largest unfragmented forest block (1,500 acres) in the town of Saint George. To date, the town of Saint George, the Tenants Harbor Water District, and the Boy Scouts of America have acquired more than 200 acres within this block along the Meadow Brook corridor. MCHT is currently working with the owner of an 83-acre parcel at the southeastern end of the corridor. This string of protected lands immediately abut the subject property. The McGrath property is currently undeveloped. The majority of the site is forested with no evidence of recent timber harvests, or other disturbances. No significant occurrences of invasive plant species were noted on the property.

Dominant natural community types in the project area include: White Pine-Mixed Conifer Forest; Red Oak-Northern Hardwood-White Pine Forest; Spruce-Fir-Cinnamon Fern Forest; Brackish Marsh and Mixed Graminoid-Forb Saltmarsh. Cowardin wetland types in the project area include palustrine forested, riverine upper perennial, riverine lower perennial, estuarine intertidal emergent, and estuarine intertidal unconsolidated. The entirety of intertidal portions of the property are mapped as Significant Tidal Waterfowl and Wadingbird Habitat.

Wetlands in the project area have been located in the field using a Trimble GPS receiver. However, while providing an accurate depiction of wetland occurrences for the purpose of this grant application, this effort does not comply with formal delineation standards. It is likely that small pockets of wetlands have not been comprehensively mapped or depicted on the attached figures. Acreage calculations provided are therefore somewhat conservative, but reflective of the major wetland features of the property.

The existing condition of the property, and its context within a larger forested block (*refer to location map*) provide functional buffers to both stream systems and other wetlands on the parcel. Completion of the project will help to maintain cross peninsula habitat connectivity from the Lower Saint George River Focus Area of Statewide Ecological Significance to Tenants Harbor. Recent sea level rise modeling completed by the Maine Geological Survey demonstrates that the McGrath property intertidal area will increase to 14 acres under a 2-meter sea level rise (*refer to attached sea level rise scenario map*). This represents more than a doubling of the tidal wetlands on the site. The property is currently undeveloped and is located within a rural residential area zoned for 1-acre minimum lot sizes. The property is subject to resource protection restrictions under current Saint George shoreland zoning requirements. These restrictions would still allow for multiple residences on the project property if not protected. Recent subdivision activity on Turkey Cove Road demonstrate the level of threat to on-site resources as the demand for additional housing in Saint George continues.

- **Level of Threat.** The project area parcel is developable under town zoning. Significant upland areas occur outside of the resource protection overlay zone, and have adequate soil conditions for subsurface disposal systems. The property is currently being marketed by a local realtor (True Hall Realty) for residential development purposes. There have been multiple subdivisions completed recently that have reduced the size of the Meadow Brook undeveloped forest block. Development of the property would occur along the southern edge and would likely require a stream crossing to reach easterly building areas. If purchased for development purposes, forest management and limited clearing to enhance views could occur within the resource protection overlay down to the edge of the marsh. Any development scenario would increase impervious cover and reduce natural forest cover within the watershed of the on-site perennial stream, and Meadow Brook associated wetlands. The narrow fingers of upper Otis Cove (immediately downstream of the project area) are restricted by the Maine Department of Marine Resources for shellfish harvesting due to non-point source pollution. Lower portions of Otis Cove remain open

and unrestricted. Additional development along Meadow Brook (the main tributary to Otis Cove) could result in further water quality impacts and could enlarge the area restricted for shellfish harvesting.

- Proposed Future Conditions. If successfully conserved, this property will be managed for ecological functions and low-impact recreation. No additional forestry is proposed, unless highly selective treatments are identified as the best approach to improving stand age and ecological value. The goal of any future management would be to restore mature/late successional stands throughout the site. This forest age class is limited throughout the mid-coast and is likely to best enhance local ecological functions and water quality. Primary freshwater functions provided by the McGrath parcel include: Groundwater Discharge (*numerous seeps feed streams that outlet to intertidal wetland communities*), Wildlife Habitat (*connectivity, interior forest condition, diversity of natural communities, etc.*), and Floodflow Alteration (*floodplain forest and broad emergent wetlands along Meadow Brook provide significant storage and slow release capacity during storm events*). Project area coastal wetlands provide fish and shellfish habitat as evidenced by multiple minnow species utilizing on-site tidal creeks and salt pannes. Additionally, the intertidal wetlands provide Shoreline/Sediment Stabilization functions, and contribute to the Visual Quality/Aesthetics of Turkey Cove Road given their natural and unfragmented condition. Completion of this project will secure these functions and values. Additionally, providing the opportunity for on-site forests to mature and sea-level to rise unobstructed will enhance and maintain these functions and values over-time.
- Proposed Compatible Uses. If MCHT is successful in protecting this property, we will manage it as a publicly accessible preserve. Siting and development of user amenities would follow a management planning process that would include consultation with MNRCP staff. Future trails would be designed to avoid and minimize impacts to protected resources. Trails envisioned would be for pedestrian use only and typically do not require vegetation cutting other than branch, small tree, and shrub removal. Forest management is not proposed. If however, a storm event, or invasive species outbreak results in forest disturbance that would require additional cutting to maintain ecological functions we would respond appropriately and consult with MNRCP to ensure that any temporary disturbance to aquatic resources is minimized.
- Restoration Work Plan. We are not proposing wetland restoration work on this property.
- Conservation Easements. We are not proposing a conservation easement on the subject property.

2. Landscape Context:

- Beginning with Habitat Focus Areas. The Meadow Brook Wetlands Protection Project lies within the Lower Saint George River Focus Area of Statewide Ecological Significance (Beginning with Habitat Focus Area). The Town of Saint George has designated Meadow Brook as a Special Place based on the conservation interests of town residents as expressed in the comprehensive plan.
- Other Conserved Lands. Protection of the subject parcel completes the western link from Turkey Cove Road eastward to the Meadow Brook headwaters which are currently owned by the Town of Saint George, the Tenants Harbor Water District, and Boy Scouts of America. In total, more than 6,700 feet of Meadow Brook will be conserved if this project is successful, and a total of 225 acres will be protected. MCHT, the Georges River Land Trust, and the Saint George Conservation Commission will continue to work with landowners within the Meadow Brook forest block to expand protected acreage of this important wetland system. We are actively working with an owner of 83-acres along the southeastern portion of the watershed, and hope to close by the end of the year.

Meadow Brook Wetlands Protection Project September 2016

- **Other Resource Priorities.** The McGrath property includes the majority of the tidal marsh habitat associated with Meadow Brook. This marsh and associated intertidal mudflats of Otis Cove are mapped by the Maine Department of Inland Fisheries and Wildlife as Significant Tidal Waterfowl and Wading Bird Habitat.

- **Important Species.**

Special Concern & Species of Greatest Conservation Need: The following Maine bird Species of Greatest Conservation Need and Special Concern bird species are known to occur regularly on the property based on sightings data. It is likely that species of other taxa, including listed bat species, are also present. Comprehensive plant and animal surveys have not been completed to date. MCHT will conduct a formal natural resource inventory if successful in completing this project.

Table 2: Bird Species of Greatest Conservation Need (based on draft July 2015 list), and Maine Special Concern Species (based on March 2011 list)

Species	Project Area Habitat	SGCN Priority	Type of Use	State Status
<u>Kites, Eagles & Hawks</u>				
Broad-winged Hawk	Forests	3	Breeding	
Northern Harrier	Intertidal Marsh	3	Migrant	Special Concern
<u>Sandpipers</u>				
Least Sandpiper	Intertidal Marsh	3	Migrant	
Semi-palmated Sandpiper	Intertidal Marsh	2	Migrant	Special Concern
Short-billed Dowitcher	Intertidal Marsh	3	Migrant	
Black-bellied Plover	Intertidal Marsh	2	Migrant	
Lesser Yellowlegs	Intertidal Marsh	1		Special Concern
Greater Yellowlegs	Intertidal Marsh	2	Migrant	
<u>Kingfishers</u>				
Belted Kingfisher	Intertidal Marsh, Pannes/Channel	3	Summer	
<u>Cuckoo</u>				
Black-billed Cuckoo	Forest	3	Breeding	
<u>Rails</u>				
Sora	Emergent Wetlands	3	Migrant	
<u>Perching Birds</u>				
Nelson's Sparrow	Intertidal Marsh	2	Migrant	Special Concern
Canada Warbler	Forest	2	Migrant	Special Concern
Veery	Forest	2	Breeding	Special Concern
Swainson's Thrush	Forest	3	Migrant	
Sedge Wren	Emergent Wetlands	1	Migrant	Endangered
Olive-sided Flycatcher	Forest	2	Migrant	Special Concern
Eastern Wood-Pewee	Forest	2	Breeding	Special Concern
Yellow-bellied Flycatcher	Forest	3	Migrant	
Least Flycatcher	Forest	3	Migrant	Special Concern
Purple Finch	Forest	3	Breeding	Special Concern
Barn Swallow	Open Wetlands	2	Migrant	Special Concern
Wood Thrush	Forest	1	Breeding	Special Concern
Lincoln's Sparrow	Edge	3	Migrant	
Black-and-white Warbler	Forest	2	Breeding	Special Concern
Tennessee Warbler	Forest	2	Migrant	Special Concern
Cliff Swallow	Open Wetlands	3	Migrant	
Rose-breasted Grosbeak	Forest	3	Breeding	
Scarlet Tanager	Forest	3	Breeding	
Ruby-crowned Kinglet	Forest	2	Breeding	
Northern Parula	Forest	3	Breeding	

Species	Project Area Habitat	SGCN Priority	Type of Use	State Status
Black-throated Blue Warbler	Forest	3	Migrant	
Bay-breasted Warbler	Forest	3	Migrant	
Blackburnian Warbler	Forest	3	Migrant	
Chestnut-sided Warbler	Forest	2	Migrant	Special Concern
Yellow Warbler	Forest Edge	3	Breeding	Special Concern
American Redstart	Forest	2	Breeding	Special Concern
Blackpoll Warbler	Forest	3	Migrant	
Cape May Warbler	Forest	3	Migrant	
Black-throated Green Warbler	Forest	3	Breeding	
Northern Rough-winged Swallow	Open Wetlands	3	Migrant	Special Concern
Tree Swallow	Open Wetlands	2	Breeding	Special Concern
Eastern Kingbird	Open Wetlands	2	Migrant	Special Concern
White-throated Sparrow	Forest Edge	3	Migrant	Special Concern
Herons				
Great Blue Heron	Intertidal Wetlands	2	Resident	Special Concern
American Bittern	Emergent Wetlands	3	Migrant	
Snowy Egret	Intertidal Wetlands	3	Migrant	
Woodpeckers				
Northern Flicker	Forest	3	Migrant	

Fisheries: Sea-run rainbow smelt are known to utilize Meadow Brook. American eels are also present. Several minnow species were observed in the brook, but not identified to date.

3. Project Readiness

- Project Timeline. MCHT completed property appraisals in August 2015. If this grant is successful we will begin title work, hazardous waste screen, and other due diligence tasks. We anticipate closing within 6 months of MNRCP award notification.
- Landowner Willingness. Diane Hall (Realtor with True Hall Real Estate) is aware that MCHT is applying for funding to complete land acquisition. MCHT has drafted and submitted an Option Agreement to the landowner. We are currently negotiating final price.
- Access. The property has 730 feet of frontage on Turkey Cove Road.
- Permits. No state, federal, or local permits will be required for the completion of this project.

4. Project Sponsor Capacity

Sponsor Experience. Maine Coast Heritage Trust is a state-wide, non-profit conservation land trust that has been partnering with private landowners to protect coastal lands in Maine for public use, wildlife habitat and scenic enjoyment since 1970. As of September 2016, MCHT holds 285 conservation easements and owns and manages 172 properties across the state. MCHT has protected over 144,000 acres including 315 entire coastal islands and 90 freshwater islands. MCHT has an active 21-member Board of Directors, a 32-member Advisory Council and a growing professional staff of 45.

Participating Partners. The Town of Saint George Conservation Commission has been actively involved in the development of this project. Georges River Land Trust is aware of the project and likely to contribute staff time to help plan future management.

- **Long-term Stewardship.** The stewardship arm of MCHT is responsible for continuing the conservation efforts that are begun when a property is acquired or an easement negotiated. The following stewardship philosophy was developed by the Board's Stewardship Policy Committee and adopted by the Board in 1999 and further revised in 2006:

“Stewardship is the on-going, long term commitment of time and resources to the conservation of land. Its implementation is essential to MCHT's ability to protect land in the future. MCHT will strive to practice exemplary stewardship of its lands, always protecting ecological values and when appropriate and feasible, providing compatible human uses. Important components of our stewardship will include encouraging a local land ethic, community involvement, and a focus on the quality of each visitor's experience at our preserves.”

Once the property is acquired, MCHT land protection and stewardship staff will, in collaboration with representatives from MNRCP and the Town of Saint George, reach out to local stakeholders to discuss management options for the property. With this input together with results of a detailed natural resource inventory of the properties, MCHT will draft a management plan consistent with conservation purposes identified in the MNRCP Project Agreement.

The first year stewardship costs associated with this project are estimated at \$8,450.00 which includes the completion of a natural resource inventory and management plan, installation of signage, a simple trail into the property, and boundary marking. Annual costs in perpetuity are estimated at \$2,300/year. This estimate includes regular maintenance and monitoring, and staff travel time. MCHT will need to contribute approximately \$50,500 to its long-term stewardship endowment fund in order pay this cost annually based on a 4.5% fund yield.

- **Monitoring.** The Meadow Brook Wetlands Protection Project does not involve wetland restoration, enhancement, or creation. As a result no monitoring plan has been included with this application. MCHT is committed to monitoring and controlling invasive species on each of its properties. We monitor each property annually and draft reports of findings. This cost has been included in the project stewardship budget.

5. Cost Effectiveness

See attached budget

6. Other Benefits

Aside from direct benefits to Meadow Brook wetland resources, this project will address community needs with real recreational, educational, and economic value.

Consistency with the Saint George Comprehensive Plan: The 2013 Saint George Comprehensive Plan highlights the importance of Meadow Brook as one of only 4 significant streams in town. Protection of the brook from non-point source pollution resulting from development is a key action identified in the plan. Completion of this project will address the following goals of the Saint George comprehensive plan:

- Protect the quality and manage the use of St. George's water resources, including lakes, aquifers, rivers and streams;
- Protect St. George's natural resources including wetlands, wildlife and fisheries habitat, shorelands, scenic vistas, and unique natural areas;

Meadow Brook Wetlands Protection Project September 2016

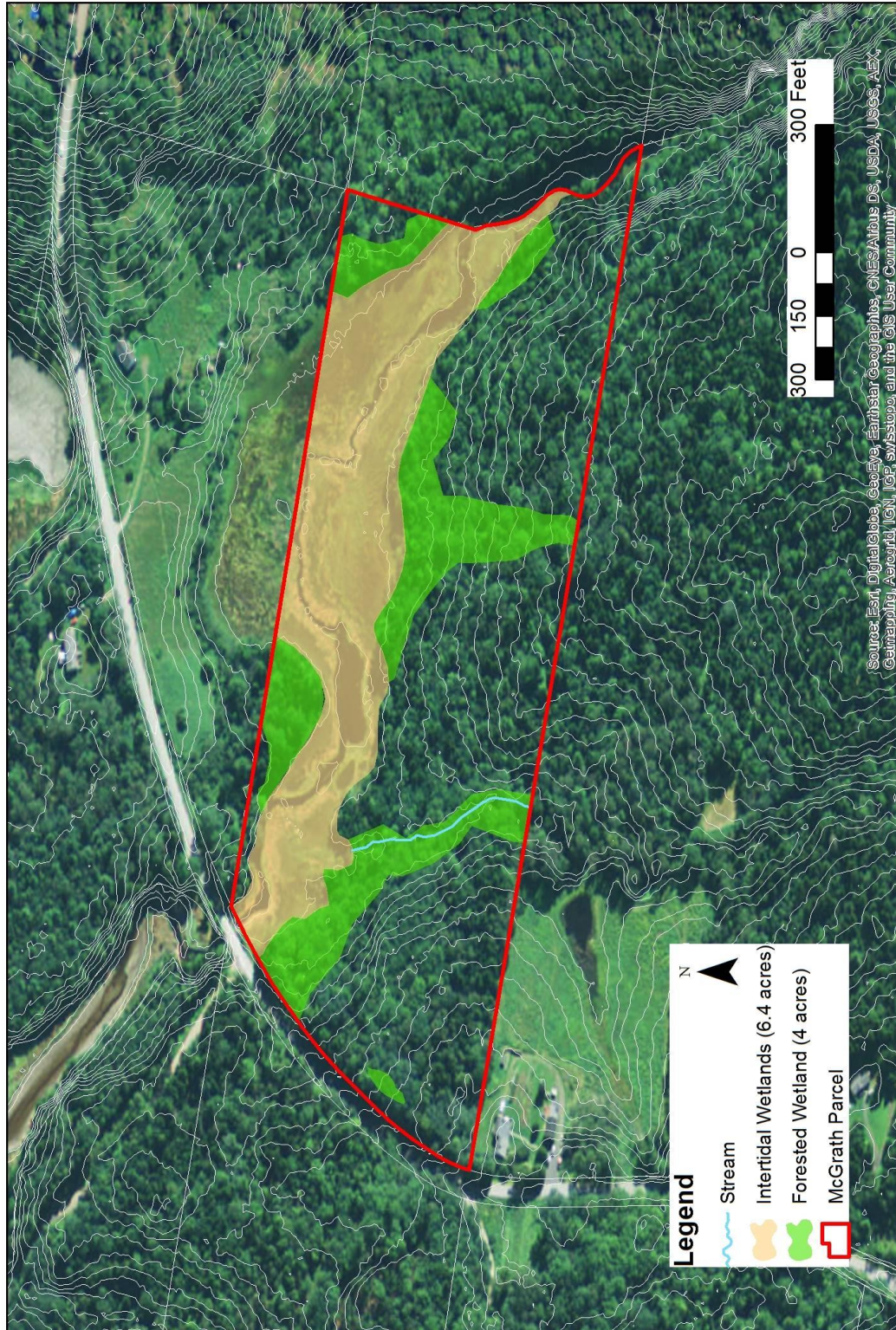
- Safeguard St. George's forestry, open space, and agricultural resources from development, which affect those resources; and
- Work with individuals and private conservation organizations for the purchase of conservation easements and for the acquisition of land to preserve valuable open space areas.

Appendix A

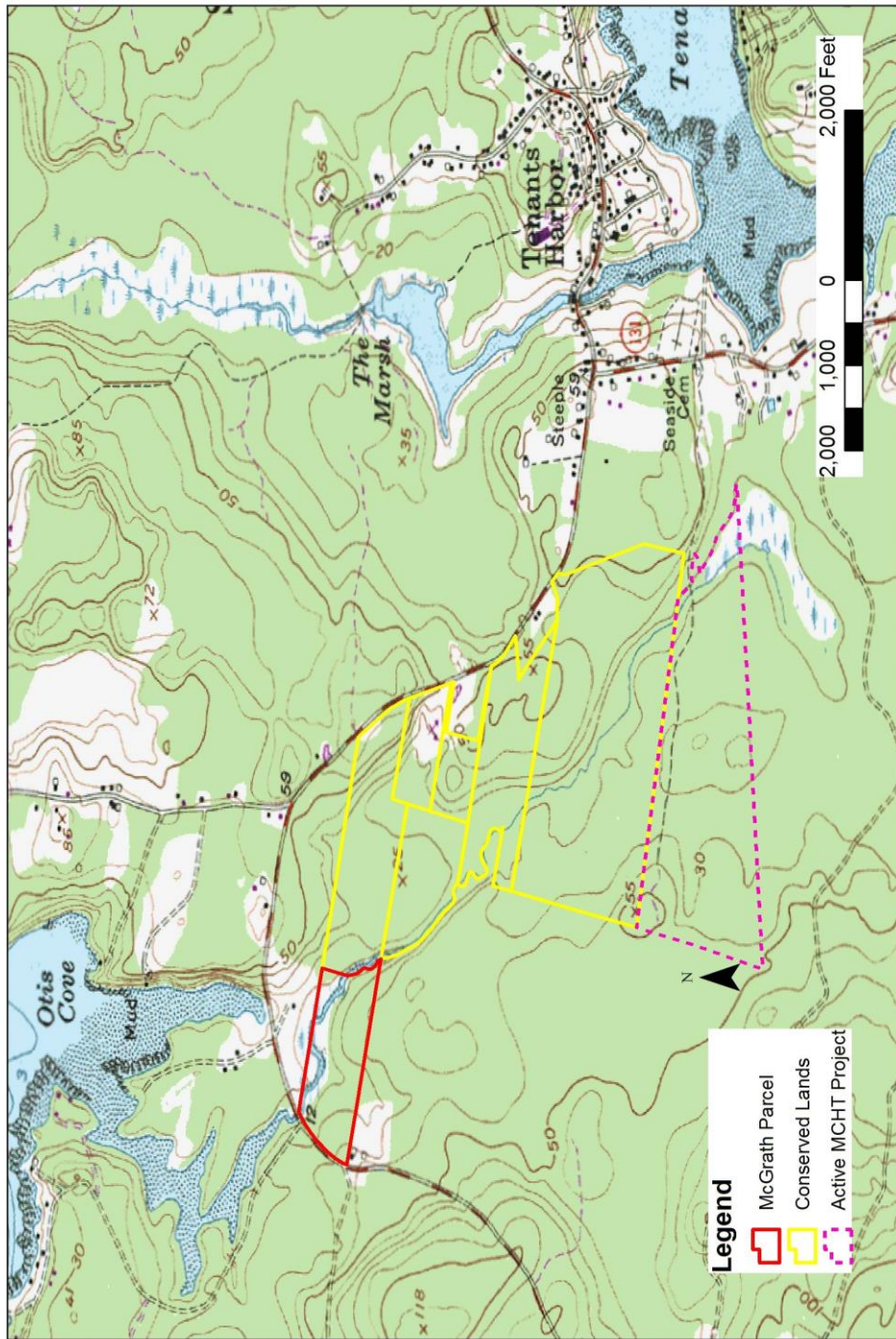
Meadow Brook Wetlands Protection Project Budget	Total Project Costs	Proposed use of MNRCP Funds
Acquisition and Associated Costs		
Value of fee lands to be purchased	\$114,000	\$114,000
Value of conservation easements to be purchased	n/a	n/a
Subtotal of land and/or conservation easement value	\$114,000	\$114,000
Appraisal costs	\$1,300	
Title, legal and closing costs	\$1,500	
Land survey	\$3,500	\$3,500
Environmental hazard survey	\$ 500	
Baseline documentation (<i>easement only</i>)	n/a	
Natural resource survey	\$2,500	\$2,500
Subtotal of associated costs	\$ 9,300	\$ 6,000
Long-Term Management & Stewardship Costs		
Long-term management planning	\$2,500	\$ 1,250
Long-term management/stewardship costs	\$50,500	\$ 25,250
Invasive Species Control Planning	n/a	
Invasive Species Control equipment and supplies	n/a	
Invasive Species Control personnel, contractors, other	n/a	
Subtotal long-term management & stewardship costs	\$ 53,000	\$26,500
Restoration, Enhancement, or Creation Costs		
Personnel	n/a	
Site Work	n/a	
Contractual	n/a	
Equipment	n/a	
Supplies	n/a	
Other	n/a	
Monitoring costs for restoration, enhancement, creation only	n/a	
Subtotal restoration, enhancement, creation costs	n/a	
Total Project Cost:	\$ 176,300	\$146,500
Total Maine Natural Resource Conservation Program Request:	\$146,500	
Other Funding Sources and Amounts: MCHT will provide the additional \$29,800 to complete this project.		

Appendix B

Maps of Project Area

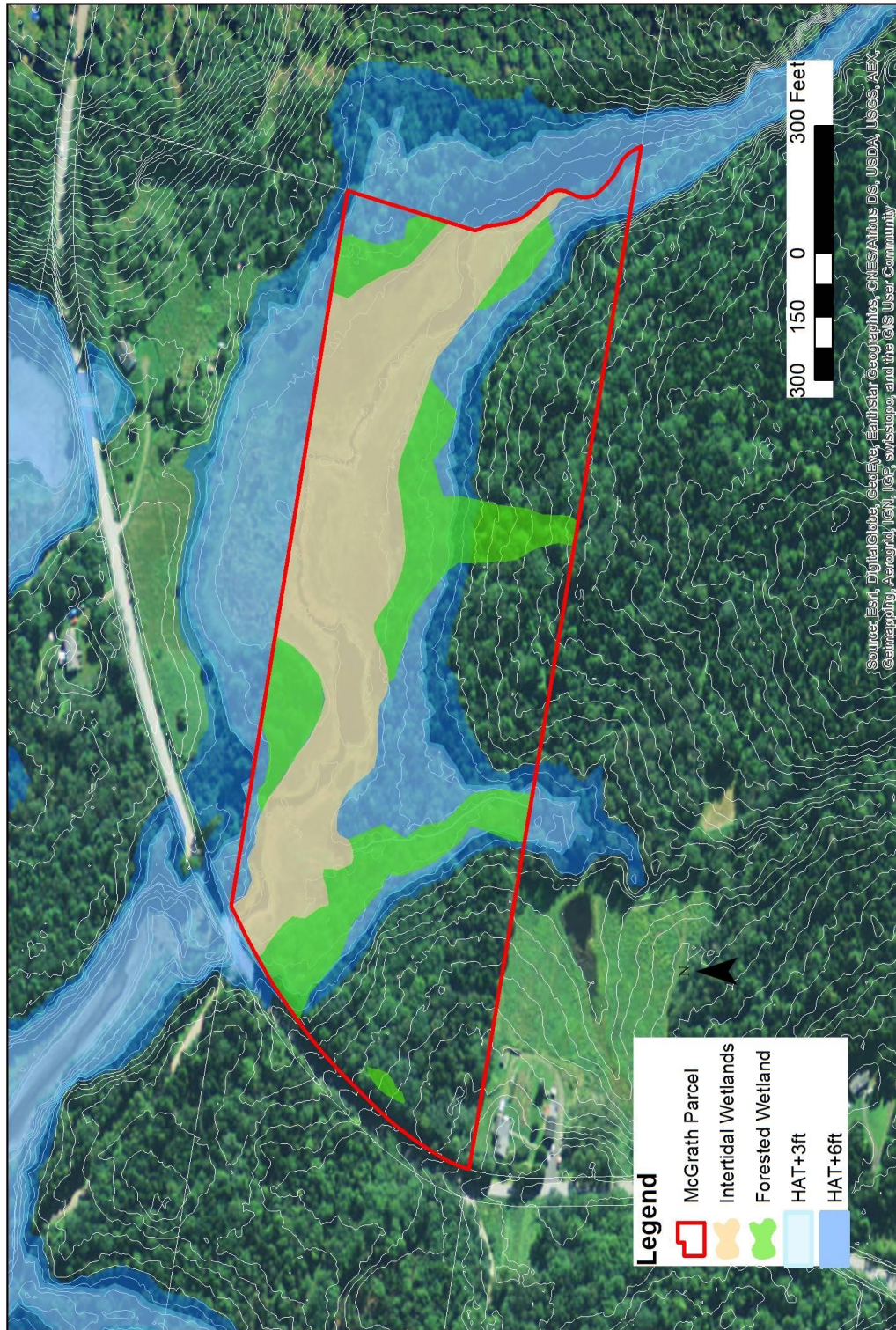


Meadow Brook Wetlands Protection Project
Wetland Type Map



Meadow Brook Wetlands Protection Project
Location Map Showing Adjacent Conserved Lands

Maine Coast Heritage Trust
A Statewide Land Conservation Organization



Meadow Brook Wetlands Protection Project
Highest Annual Tide Plus 3 & 6 Foot Scenarios

Appendix C

Photographs of Project Area



Photo 1 Typical Spruce-Fir Cinnamon Fern Forested Wetland Community in Eastern Portion of Project Area



Photo 2 Perennial Stream Channel in the Central Portion of the Project Area (July 17, 2015)



Photo 3 Brackish Tidal Marsh associated with Meadow Brook in Eastern Portion of the Project Area (July 17, 2015)



Photo 4 Meadow Brook and Associated Tidal Wetlands Facing East (July 17, 2015)



Photo 5 Mixed Saltmarsh Community and Meadow Brook Facing West Toward Road (July 17, 2015)



Photo 6 Salt Pannes in Project Area Turkey Cove Road in Background (July 17, 2015)



Photo 7 Red Maple Swamp within Meadow Brook Floodplain (July 17, 2015)



Photo 8 Stone Bridge Structure at Turkey Cove Road (from Maine Stream Habitat Viewer)

Appendix D

MNAP Property Summary

**Meadow Brook
St. George****Site Visit Summary
Maine Natural Areas Program, 2016**

MNAP Ecologist Kristen Puryear and Field Assistant Rachel Wood walked the Meadow Brook Wetlands Protection Project on August 10th, 2016. The primary focus of the survey was to 1) conduct a functions and values assessment of the wetlands on the property, 2) identify any potential restoration or enhancement opportunities associated with the parcel, and 3) conduct a rapid-assessment natural resource and rare plant survey of the property.

**Site Overview**

The Meadow Brook Wetlands Protection Project is an approximately 22-acre parcel that extends from Turkey Cove road, eastward along Meadow Brook to where the stream narrows significantly (and transitions to brackish conditions) and south through forested upland and wetland. The parcel is located within the Lower St. George River State Wildlife Action Plan Focus Area, abuts town conservation land to the east, and is part of a 1400 acre undeveloped block.

The Maine Department of Inland Fisheries and Wildlife has mapped Tidal Waterfowl and Wading Bird Habitat on the marsh, and the Maine Natural Areas Program has mapped Spartina Saltmarsh along Meadow Brook, part of a larger system draining into Otis Cove and the St. George River (Table 1). Wetland and aquatic features on the property include forested, estuarine intertidal, and subtidal wetlands, as well as ephemeral and tidal streams.

Table 1: Rare natural communities documented within the Meadow Brook Wetlands Protection Project, St. George, Maine.

Common Name	Scientific Name	State Status	EO Rank	S-Rank	G-Rank
Spartina Saltmarsh	N/A	N/A	C-Fair	S3	G5

Uplands

Time spent on the property was directed towards the wetlands and tidal portions of the project, therefore the uplands were not surveyed.

Forested Wetlands

Most of the parcel is forested wetland, composed of poorly drained soils and a gradual slope down towards the tidal marsh. The canopy is dominated by conifers (red spruce and balsam fir) with red maple and paper birch less common. The ground is hummocky, covered in mosses,

and the understory is light to moderate in terms of herbaceous cover, typical of a **Spruce-Fir Cinnamon Fern Forest**.

An ephemeral stream drains north through the project area and enters the salt marsh, where it eventually meanders in to Meadow Brook near the western end of the parcel. For most of its length the stream is 2-3' wide, flanked by forested wetland and has a deeply incised channel with mossy banks until it enters the marsh at a brief transition area of Brackish Tidal Marsh. The forested wetland along this portion of the parcel is more deciduous, with red maple, big-toothed aspen, and spruce with abundant cinnamon fern (*Osmunda cinnamomea*), New York fern (*Thelypteris novaboracensis*), Canada mayflower (*Maianthemum canadense*), and a carpet of mosses.



Table 2: Functions and values of the forested wetlands on the Meadow Brook Wetlands Protection Project, St. George.

Ecological Functions / Values	Rationale*
Groundwater Recharge/Discharge	Groundwater discharged into wetland
Floodflow Alteration	<i>High Value:</i> Wetland can retain water for long periods, absorb water from heavy rain events, overland flow. Ephemeral stream that may be flashy in spring.
Fish and Shellfish Habitat	Drains to tidal stream
Sediment/Toxicant Retention	<i>High Value:</i> Basins and dense vegetation capable of trapping sediment
Nutrient Removal	Slow moving water, vegetation, hold potential for trapping sediment, removing and/or converting nutrients.
Production Export	Wildlife food sources present in wetland, conversion to higher trophic levels
Sediment/Shoreline Stabilization	Dense vegetation and roots stabilize banks in "flashy" ephemeral drainage
Wildlife Habitat	Connected to other wetland types and uplands; part of an undeveloped block.
Recreation	Potential for hunting (if permitted), wildlife observation; easily accessible from road
Educational/Scientific Value	Opportunities for lessons in wetland ecology
Uniqueness/Heritage	N/A
Visual Quality/Aesthetics	Contrasts with surrounding land use, plants turns bright colors in fall.
Endangered Species Habitat	None identified
MNAP Natural Community Type	Spruce Fir Cinnamon Fern Forest

*Principle functions and values are indicated as "High Value"

Estuarine Intertidal Wetlands (Spartina Saltmarsh)

The saltmarsh along Meadow Brook is typical of a *Spartina* Saltmarsh, dominated by saltmarsh hay (*Spartina patens*), with patches of black rush (*Juncus gerardii*). Smooth cordgrass (*Spartina alterniflora*) occurs in areas with more frequent tidal flooding, along the river and tidal pools. Other herbaceous species within the open marsh include sea lavender (*Limonium carolinianum*), seaside goldenrod (*Solidago sempervirens*), and seaside plantain (*Plantago maritima*). Green crabs were found present in the wrack line.



The upper tidal fringes close to the forested edge show transition to brackish conditions with species such as prairie cordgrass (*Spartina pectinata*), saltmarsh tuber rush (*Bolboschoenus maritimus*), silverweed (*Argentina anserina*), and three-square bulrush (*Schoenoplectus pungens*). Just at the eastern property boundary the tidal marsh begins to shift to more brackish vegetation along the stream channel, and plants such as seaside buttercup (*Ranunculus cymbalaria*) and widgeongrass (*Ruppia maritima*) persist in the muddy banks. Atlantic mudwort (*Limosella australis*), a rare plant in Maine's tidal waters, may be located here however a complete specimen could not be found to verify identification.

Sea level rise simulation modeling shows that the entire length of the wetland and upland border along the Meadow Brook marsh (on this parcel) has the potential to support marsh migration under 1m of sea level rise (see attached map). The shorelines and adjacent lowlands are calculated together to have the potential to support approximately 4.21 acres of future tidal wetland under a 1m sea level rise scenario (MNAP/MGS data). The undeveloped and unfragmented condition of the wetlands and uplands adjacent to this area of potential marsh migration further support future tidal marsh resilience by maintaining coastal habitats, providing connectivity between tidal and non-tidal habitats, filtering sediment and nutrients to maintain water quality, stabilizing soil, and furthermore protecting land from storm surge or seasonal/storm-related flooding through wave attenuation and floodwater storage capacity.

Table 3: Functions and values of the estuarine intertidal wetlands on the Meadow Brook Wetlands Protection Project, St. George.

Ecological Functions / Values	Rationale*
Groundwater Recharge/Discharge	Groundwater likely discharged into wetland
Floodflow Alteration	<i>High value:</i> Wetland can retain water for long periods, absorb water from heavy rain events, storm surge, or overland flow.
Fish and Shellfish Habitat	Contributes to adjacent fish and shellfish habitat in tidal river
Sediment/Toxicant Retention	<i>High value:</i> Basins and dense vegetation capable of trapping sediment
Nutrient Removal	<i>High value:</i> Slow moving water, vegetation, hold potential for trapping sediment, removing and/or converting nutrients.

Production Export	<i>High Value:</i> Wildlife food sources present in wetland, conversion to higher trophic levels
Sediment/Shoreline Stabilization	<i>High value:</i> Dense vegetation, peat, and root systems stabilize shore along stream
Wildlife Habitat	<i>High value:</i> Connected to other wetland types and uplands; part of undeveloped block; part of TWWH.
Recreation	Opportunities for wildlife observation, hunting (if permitted); easy to access
Educational/Scientific Value	Opportunities for lessons in wetland ecology, tidal marsh system; easy to access on foot
Uniqueness/Heritage	Spartina Saltmarsh (rare natural community type); possible rare plant
Visual Quality/Aesthetics	Contrasts with surrounding land use, plants turns bright colors in fall.
Endangered Species Habitat	None identified
MNAP Natural Community Type	Spartina Saltmarsh, Brackish Tidal Marsh

*Principle functions and values are indicated as “High Value”

Restoration and Enhancement Opportunities

The tidal crossing on Turkey Cove Rd. is a stone block structure spanning about 4-5' for Meadow Brook. It is currently restricting tidal flow, which can be seen in the scour pool on the “upstream” side, pooling water, and slow drain time. Meadow Brook channel has pooled water in several locations (some of these 2' deep), which evidently never fully drain as they are full of widgeongrass (*Ruppia maritima*) – a plant generally seen in pools or below tide level. The channel is fairly wide and sections of peat have calved off. At the time of the survey water was still draining out of the stream, when it should have been transitioning to an incoming tide [2 hours before high tide in Tenant's Harbor, water was still draining out of Meadow Brook]. Turkey Cove Road is a town road.



The Maine Stream Habitat Viewer data show that this crossing is not a barrier for aquatic organisms, however the survey protocol does not fully evaluate a crossing for its potential to be a restriction to tidal flow, or to evaluate its future potential (or lack-thereof) under various

Meadow Brook Wetlands Protection Project September 2016

scenarios of sea level rise (Royte, personal communication). Additional survey work would be needed to evaluate current and future tidal restriction present at this crossing and/or to design an improved structure.