

Natural Resources Inventory

Bamford Preserve

St. George, Maine

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1. INTRODUCTION

This Natural Resources Inventory (NRI) describes the results of field surveys and review of background information for the Bamford Preserve (Preserve) in the Town of St. George, Maine. The purpose of this NRI is to provide information to Maine Coast Heritage Trust (MCHT) that is useful for planning and stewardship activities.

The 41-acre Bamford Preserve is located approximately 6 miles south of the villages of Thomaston and Rockland (see Figure 1). This mostly undeveloped property is a mosaic of variously-aged upland forests, and forested and open palustrine wetlands. The property features approximately 800 feet of frontage on Long Cove and is adjacent to approximately 5 additional acres of intertidal saltmarsh and mudflats.

This NRI describes the recent historic and present environmental conditions of the Bamford Preserve (Section 2), and presents recommendations for management (Section 3).

1.1 Acquisition History

The Bamford Preserve was acquired by MCHT as a result of a joint proposal between MCHT, Maine Department of Inland Fisheries and Wildlife, and the Georges River Landtrust, which was submitted to the Maine Natural Resources Conservation Program in 2014. The acquisition date was June 23, 2015. Prior to this, the land was owned by Robert Bamford of Campbell, California.

1.2 Stewardship Objectives and Considerations

The mission of MCHT is to conserve and steward Maine's coastal lands and islands for their renowned scenic beauty, ecological value, outdoor recreational opportunities, and contribution to community well-being.

Potential specific management objectives for the Bamford Preserve are to:

1. Support vital ecological or conservation functions and values.
2. Maintain healthy ecological communities and enhance the value of habitats and suitability for a diverse assemblage of wildlife species.
3. Secure and maintain a wild and undeveloped shoreline.
4. Maintain the forests in a natural condition and allow them to succeed to old age.
5. Encourage wise public use and manage it to minimize impact to critical natural resources.
6. Link the Bamford Preserve as part of a larger multi-agency conservation and recreation effort in the midcoast region.
7. Increase and manage accessibility of the Preserve for public use.

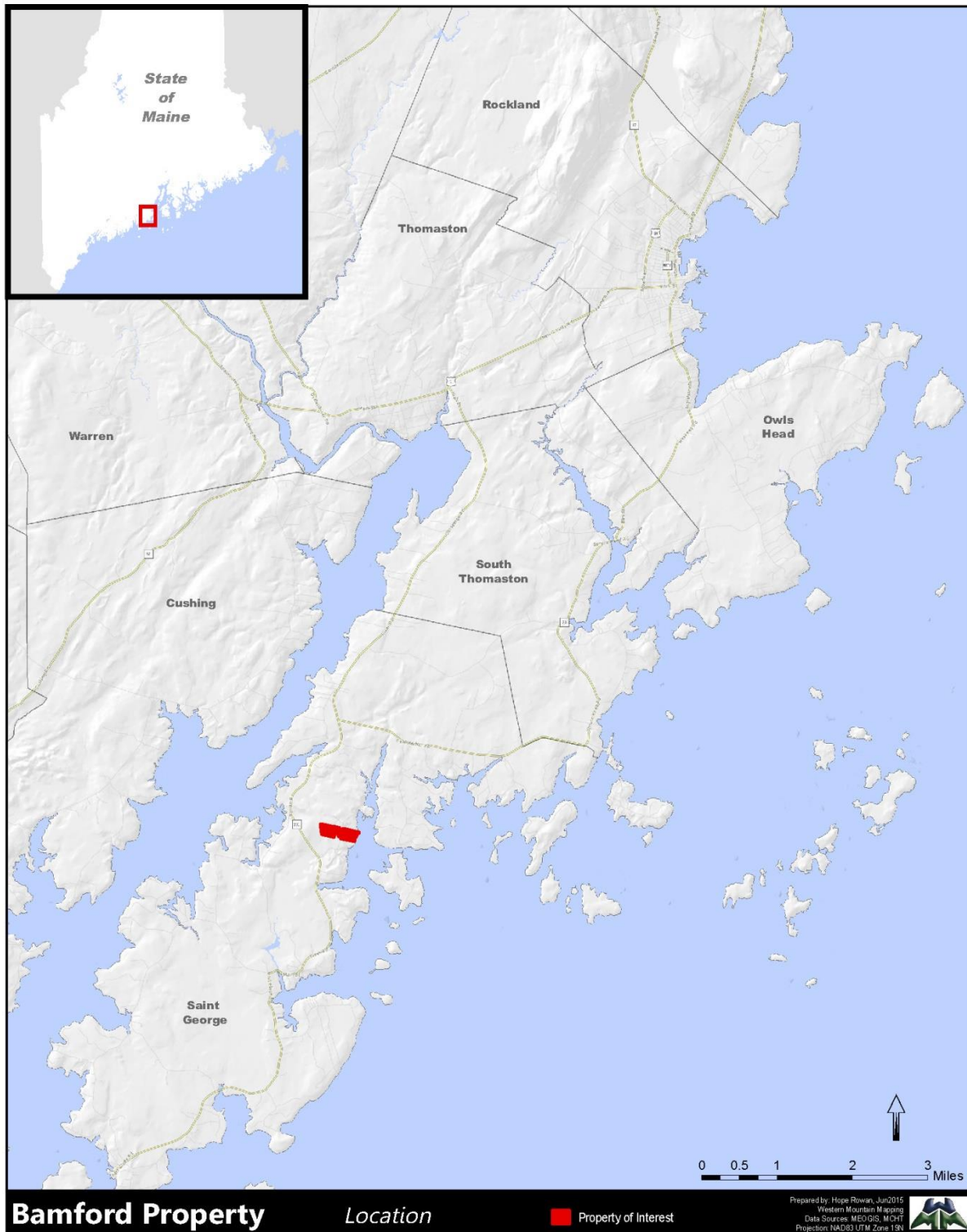


Figure 1. General location of Bamford Preserve.

1.3 Boundaries

The boundaries for the property were obtained from MCHT and transferred into a Garmin GPS unit for accurate field location. Figure 2 depicts the Preserve boundaries as provided by MCHT and evaluated for this project, overlain onto 2013 imagery. The Preserve is separated by a public road, Long Cove Road, into east and west parcels and they are referred to as such in this report.

1.4 Methods for the NRI

Tasks completed for the NRI included: 1) Landscape Analysis, including collection and synthesis of background information; 2) Natural Resource Field Inventory; and 3) Development of Management Recommendations.

Landscape Analysis – Extensive information was collected and reviewed to assist with the NRI, and to provide a general understanding of the ecology of the property and to determine the locations of potentially significant habitats and natural communities. Sources included the following:

Maps and Published Information

- USGS 7.5' topographic maps, recent and historical (1910, 1941, 1945, 2014)
- Recent and historic black and white and color aerial photos (1942, 2013)
- Bedrock, surficial, and soils maps
- National Wetland Inventory maps
- Beginning With Habitat maps
- Soil Survey for Knox and Lincoln Counties, Maine
- Maine Department of Inland Fisheries and Wildlife (MDIFW) Significant Wildlife Habitat Maps
- Long Cove Wetlands Protection Project – Phase I. A proposal to the Maine Natural Resource Conservation Program (MCHT September 2014)

Consultations and Miscellaneous Other Information

- Consultation with Maine Historic Preservation Commission
- Maine Natural Areas Program consultation and data of rare plant and animal species and exemplary natural communities on the property and in the vicinity
- Deeds, historic photographs, and accounts from landowners
- Books located at the Tenants Harbor Library and files at the Thomaston Historical Society
- General internet search and review
- Anecdotes and accounts of current and past land use of the property; adjacent landowners and townspeople

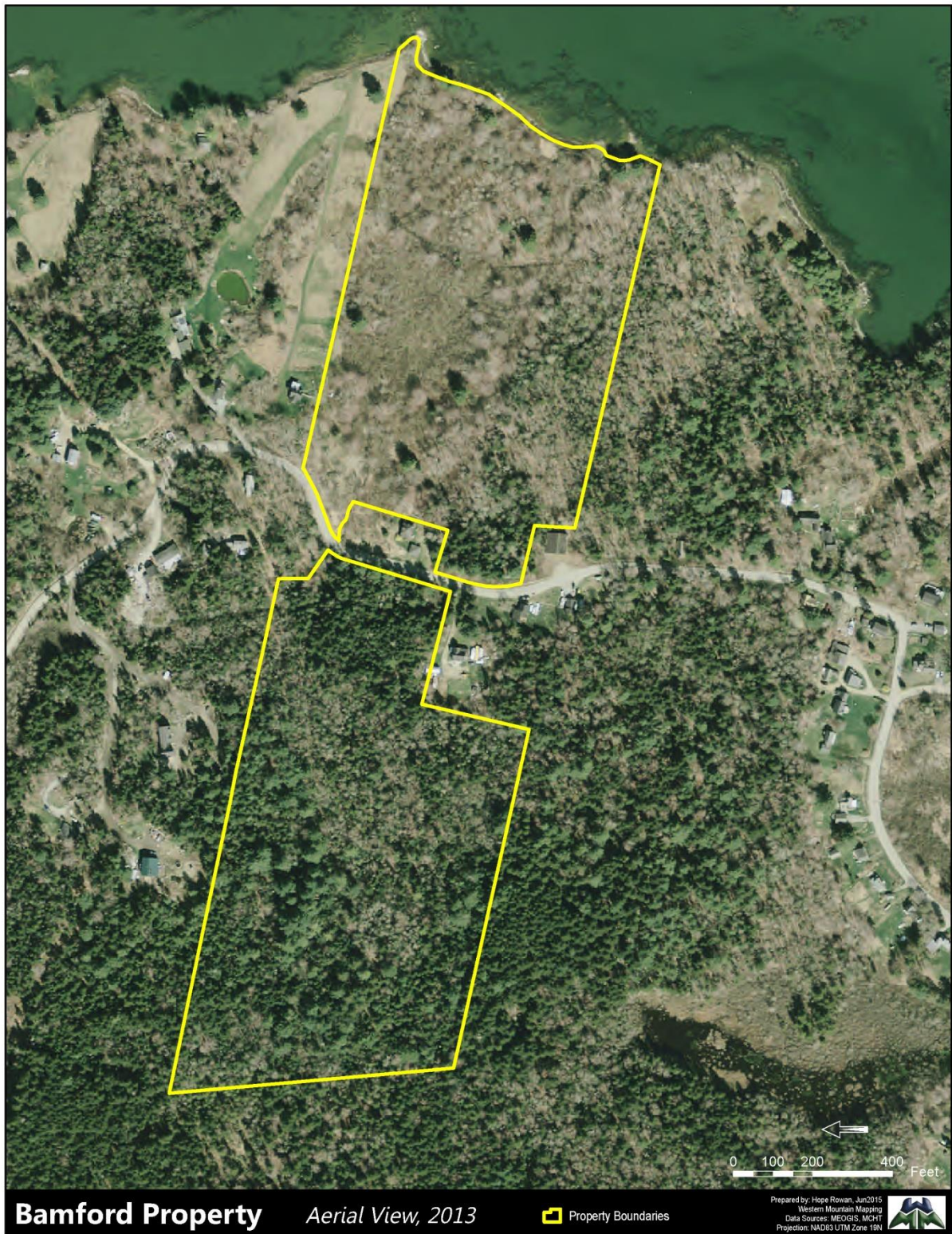


Figure 2. Boundaries of Bamford Preserve in St. George, Maine.

Natural Resource Field Inventory – Visits to the site were performed to gather site-specific and current information on wildlife, plants and plant communities, land use patterns, and miscellaneous other features. Specifically, information from field visits was used to:

- Compile a baseline list of observed wildlife species;
- Compile a baseline list of plant species;
- Identify and delineate plant communities;
- Identify and record locations of invasive plants and other restoration needs; and,
- Identify and record locations of trails, historical features (e.g., stone walls, old cars), and other features.

Approximately six field visits were conducted between May and September 2016. The area was visited twice during May and June to document breeding birds and to record spring flowering plants. The majority of the plant community mapping was completed during August.

All plant communities were identified, classified, and characterized using Maine Natural Areas Program protocol. Six north-south traversing transects were systematically established across the parcel, and 10 plots (approximately one plot per 3.5 acres) were located using GPS and recorded on a base map. Figure 3 identifies the location of sampling plots. At each plot, natural communities were classified using Gawler and Cutko's (2010) *Natural Landscapes of Maine* classification manual. In addition, observations of tree regeneration, tree health, weather-induced conditions, wildlife sign, and habitat features were recorded at each plot. Photographs were taken at each plot. Reverting pasture was considered to be a non-natural community and was designated as Shrub and Brush Rangeland, per the *Land use and land cover classification system for use with remote sensor data* (Anderson et al. 1976).

Plant species observed at plots and along continuous transects between plots were documented and compiled into a comprehensive species list (Appendix 2). Areas not covered by transects were explored for exemplary and/or sensitive natural features, rare plant element occurrences, and to more fully document and locate natural community boundaries. Transects were walked between grid plots, and extensive meandering was completed between transects to ensure thorough coverage.

Other features that were examined closely in the field include trails, access points, stone walls, and exposed shorelines. The features were evaluated for condition, current or potential degradation, and potential for public use.

Development of Management Recommendations - Information gathered from the landscape analysis and field investigation was used to identify potential opportunities for management and public use. The area was assessed for characteristics such as need and opportunity for restoration and enhancement, conversion to more appropriate land uses, recreation potential, and public access.

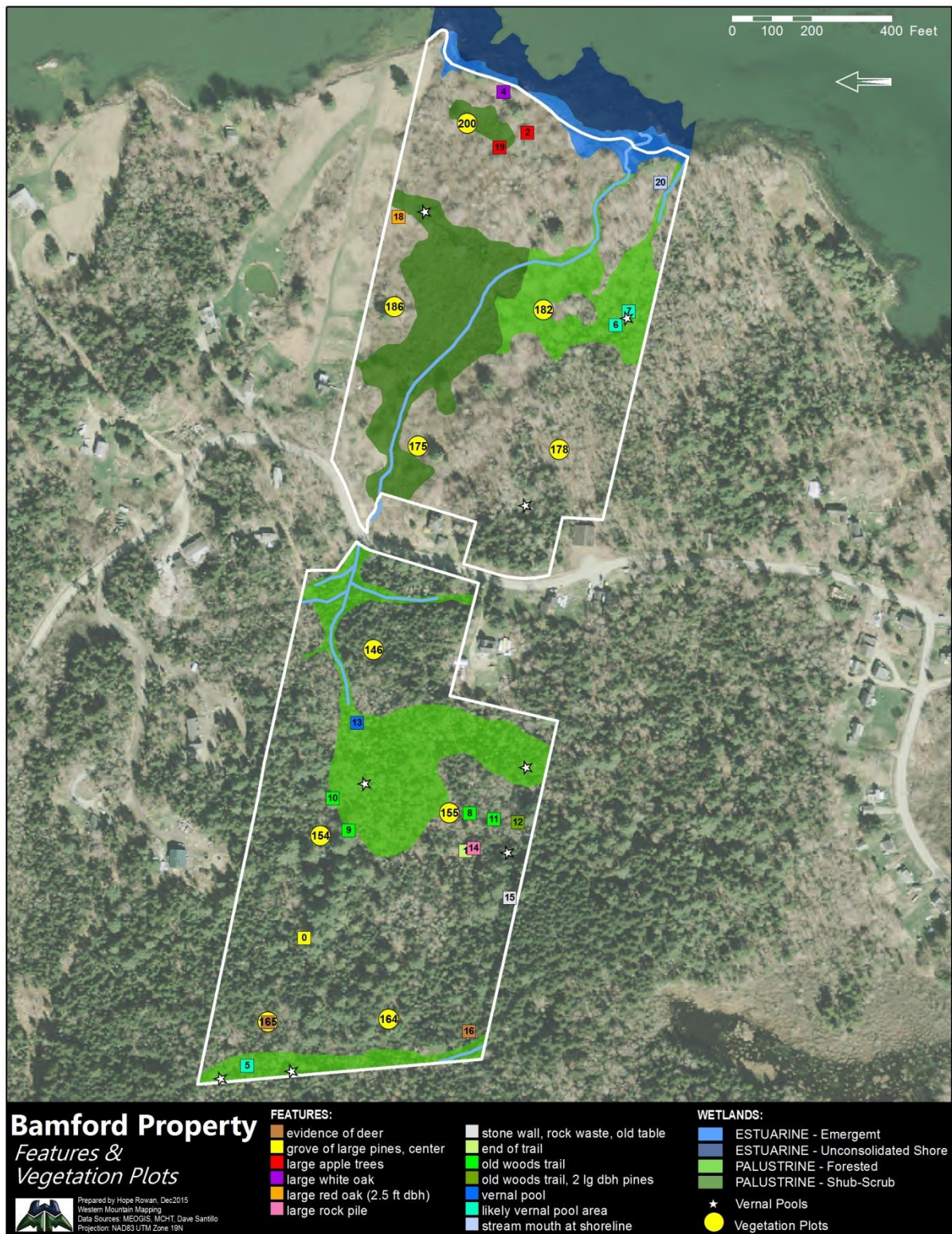


Figure 3. Location of vegetation sampling plots and features recorded during 2015 field surveys for Bamford Preserve NRI.

2. EXISTING CONDITIONS

2.1 Land Use

2.1.1 Prehistoric and Historic

The history of the region of Maine that encompasses the Town of St. George and the St. George peninsula is a long one that has left its mark on the Bamford Preserve. The coast of Maine has a relatively long settlement history first by Native Americans and then by Europeans. No known prehistoric or significant historic resources were reported at the Preserve by the Maine Historic Preservation Commission (Art Spiess, Personal Communication). The documentation of historic resources, however, often is a byproduct of modern development. Accordingly, the lack of known prehistoric or historic resources on the property is very likely the result of no one having performed archaeological investigations.

Prehistoric Context

The topography and land features of the site suggest that the region of St. George that includes the Bamford Preserve could have a moderate to high sensitivity for prehistoric cultural resources. The eastern edge of the property is bordered by tidal flats on Long Cove which, as to this day, would have provided an excellent location for shellfishing and hunting. The flat land adjacent to this shoreline would have provided a good location for camping or seasonal settlement. A map located at the Tenants Harbor library displays a trail across the peninsula just south of the Preserve with the label “Indian Trail” (Figure 4). This trail connected what was then called Mill Cove (now called Seavey Cove) on Long Cove with the St. George River near modern-day Watts Cove.

The landscape characteristics of the site make it possible that it could have been used by Native Americans at any point during any of the three major prehistoric cultural periods, including Paleoindian, Archaic, and Ceramic. Evidence of use by Native Americans is common in shell middens found along the coast in estuary and island environments, and are also common in interior sections along waterways, ponds, and lakes (MacPherson et al. 1997). Given the physical setting of the Bamford Preserve, it is likely that shell middens used by Indians are located somewhere along the shoreline on or near the Preserve, although none were observed during fieldwork.

The Contact Period was a period of tremendous and rapid change for Maine’s Native Americans. Ethnohistoric accounts of Abenaki groups in Maine suggest fairly substantial late pre-contact indigenous population numbers and loose political confederations centered on prestigious or charismatic individuals (Snow 1980). Subsequent additions of European materials to Native material culture were followed by expansions and strains in pre-existing intertribal trade networks, warfare, and social structure.

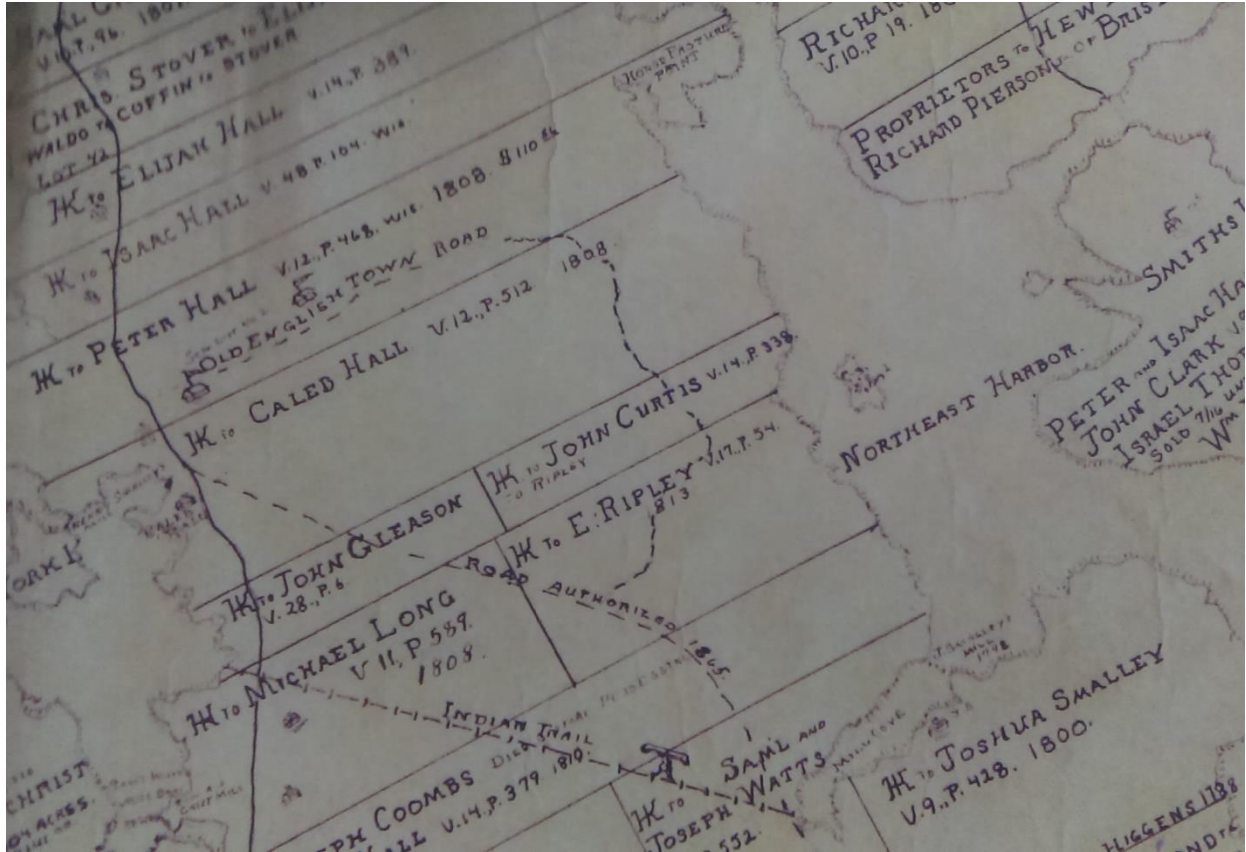


Figure 4. Excerpt from old map showing parcels, roads, and trails as they existed in the area of the Bamford Preserve in the 1800s. Source: Thomaston Historical Society

The Early Contact Period has been considered to start arbitrarily at 1500 A.D., with European voyages to Newfoundland and the Gulf of St. Lawrence. The period arbitrarily ends in 1676 corresponding with the outbreak of King Phillip's War, the abandonment of trading posts and towns, and intensified movement by Native American refugee groups and other drastic changes in Native American ethnic groupings and lifestyles. The long prehistoric occupation of Maine came to an end with the arrival of the European traders, fishermen, and settlers.

Most researchers believe that the specific group of Indians that inhabited the St. George peninsula was either the Abenakis or the Tarratines, and specifically the subgroup Warenocks (Smalley 1976). One of the most profound and lasting results of early visits by Europeans to the coast was European-introduced disease. Not surprisingly, an epidemic in 1616 wiped out a large portion of the Native American population of the project area, and the Indians were essentially gone by the time of English colonization (Smalley 1976).

Historic Context of South Thomaston and Vicinity

The St. George peninsula has a long history of European influence, with a record of one of the first contacts in New England in 1605. Evidence suggests that George Weymouth explored Monhegan Island and sailed up the St. George River. Monhegan was initially named “St. George” Island in honor of Weymouth (Eaton 1865). Reportedly, there was a trading post established in the vicinity of Thomaston as early as 1620 (Smalley 1976).

The first “sale” of the area containing the project area came in 1630 when the area was part of a Grant to John Beauchamp and Thomas Leverett of England (Eaton 1865, Smalley 1976). It was referred to as the Muscungus Grant, which encompassed an area between the Penobscot and Medomak rivers. By 1635, there were reports of two families on the St. George peninsula, and by 1717 there was a fort on the peninsula. By 1733, the first serious settlements were made and the first of the lime-burning kilns was documented (Eaton 1865).

Old documents and maps reviewed in the Tenants Harbor Library and the Thomaston Historical Society reveal that Long Cove Road has existed since the early to mid-1800s when it was called the Old Engishtown Road. Figure 4 shows the road and indicates that the area containing the Bamford Preserve was owned by Caleb Hall as of 1808.

Humans radically altered the peninsula in the 1800’s. The Town of St. George was incorporated in 1803. The period of 1830 to 1890 was the peak era of building of sailing ships. As a result, very few trees were left standing beyond the borders of village boundaries. Pictures from the 1870’s reveal a St. George peninsula that is devoid of trees (Figure 5).

The mid 1800’s also was the period of great granite quarrying in Maine (Neeson 1974) and granite was mined and refined throughout the Thomaston and St. George areas. A geological map from 1905 reveals that the higher portions of the Bamford Preserve were categorized as glacial till and bare rock, which made it highly suitable for granite mining. The Preserve is located in the central section of Long Cove Road, and historical accounts reveal that large quarries were located on both ends of the road. There is strong evidence that small scale mining of granite was done on the Preserve itself as large piles of waste cut granite exist just east of the southern road frontage of the east parcel, and along the southern boundary of the central portion of the west parcel. The mining done on the Preserve almost certainly fell under the category of individual landowner “motions.” Motions were small granite quarrying sites that were outlying to actual quarry facilities, which could belong to anyone. Owners typically were workers at the official quarries, who worked their own sites whenever work was slow at the “factory.”

No records were found describing possible structures within the reserve itself based on historical topographic survey maps, soil survey photography and old photographs, as well as thorough inspection of the site during field surveys. Houses and structures along Long Cove itself have existed for well over 100 years. The 1910 USGS Topographic Map shows a house located just west of Long Cove Road in the location of one of the current houses.



Figure 5. Picture from 1870 taken from Thomaston, looking across at a treeless South Thomaston.
Source: Thomaston Historical Society

It is likely that the specific area containing the Preserve was almost entirely cleared of trees by some point in the 1800s, as was most of the St. George peninsula. The west parcel possessed rugged topography, shallow soils, and wetlands that made the land unsuitable for anything but woodland, and was likely permitted to revert to forestland. This west parcel largely was forest and shrub land in aerial photographs from the 1940s (Figure 6). Open paths are visible in the eastern portion of the west parcel that could suggest at least part of it was being used for unimproved pasture at that time, but overall the western part of the preserve was well on its way to reverting to forest at that time. The presence of some larger canopied trees in the 1940 photo, combined with the size of trees currently in this area, suggests that the forest is up to about 120 years old, with younger trees closer to Long Cove Road.

In contrast, the east parcel is flatter and has deeper soils, and historically was at least somewhat suitable for agriculture of some type. It therefore remained unforested after being cleared in the 1800s. The area appears primarily as herbaceous open land on photographs from 1940 (Figure 6), when it potentially may have been used for pasture. It then appears mostly as brush-land on USGS Soil Survey photographs from 1978. Based on these photographs and the size of trees present on the area, it likely has been abandoned for 50 to 75 years. Some trees are visible on the 1940 photograph in the southwest portion of the east parcel, in the area currently vegetated by Oak–Northern Hardwoods–White Pine Forest. Based on the photographs and the size of trees, this forest is approximately 100 years in age.



Figure 6. Historical aerial photograph of Bamford Preserve from 1940. Source: Natural Resources Conservation Service, Knox and Lincoln Counties, Rockland, Maine.

2.1.2 Current Land Use

The current land use of the Bamford parcel is a direct reflection of the land use implemented by European settlers since the 1800's, and the age since abandonment. No part of the Preserve can be considered to be in an undisturbed state. The land in the Preserve itself, however, is essentially undeveloped and is vegetated with a mosaic of second growth forest, reverting forest, and shrub and forested wetlands. Full descriptions and area of these communities are presented in Section 2.3.

The Preserve encompasses forest that is contiguous with only moderately fragmented forestland that extends up and down the central portion of the St. George peninsula in a block that is over 400 acres. Forested land also extends to the west towards more inland areas of the midcoast region of Maine.

The project area is located in a rural area of St. George, approximately 6 miles south of the villages of Thomaston and Rockland. The population of the three towns is relatively stable, and there currently is no major development pressure encroaching upon the Preserve. The population in the Town of St. George was 2,592 in 2012, which was virtually unchanged from an earlier census. The population of the general area, encompassing Thomaston and Rockland, peaked in the mid-1800s during the peak mining

and ship building era, but continues to experience a gradual downward trend. Current residences in proximity to the Bamford Preserve are located along Long Cove Road. Development is encroaching a bit from the north, with houses adjacent to both the west and east parcels.

Most of the existing features documented during field surveys provide evidence of historic human use, as shown in Figure 3 on page 9. These include the previously mentioned mining areas and a stone wall along the south boundary of the west parcel. A remnant of an old woods road exists in the west parcel; otherwise no well-established trails exist on the parcel.

2.2 Topography, Geology, and Soils

2.2.1 Topography

Elevation on the parcel ranges from sea level up to about 75 feet above sea level at the high point in the north central portion of the west parcel. Figure 7 depicts the boundaries of the Preserve on the 2014 U.S.G.S. topographic map. Topography is relatively level over much of the Preserve, with the exception of the west and north quadrant of the west parcel, which is somewhat rugged and undulating, a sample of which is shown by the 2-ft contour intervals of the south parcel that are depicted in Figure 8.

The aspect of the Preserve primarily is to the east, and it generally drains east to the ocean in Long Cove via an intermittent stream that is largely contained within the Preserve.

2.2.2 Geology

The bedrock composition of the Bamford Preserve is mostly igneous rocks of Devonian age with exposed mined granite piles. Figure 9 illustrates surficial and bedrock geology of the preserve. Muscovite is the accessory mineral of the underlying bedrock.

The granite is part of regional thrust sheets that were set in place during the Devonian Period about 400 million years ago when a microcontinent called Avalon collided with North America (Maine Geological Society 2002). This was also known as the Acadian orogeny, which created the topography of the region as well as this site, and also is responsible for the folds and faults evident in the rocks throughout Maine's coast.

The surficial geologic map of the area indicates glacial till, a stony heterogeneous sediment, loose to very compact, poorly sorted, stratified mixture of sand, silt, and gravel-sized rock debris released from melting glaciers.

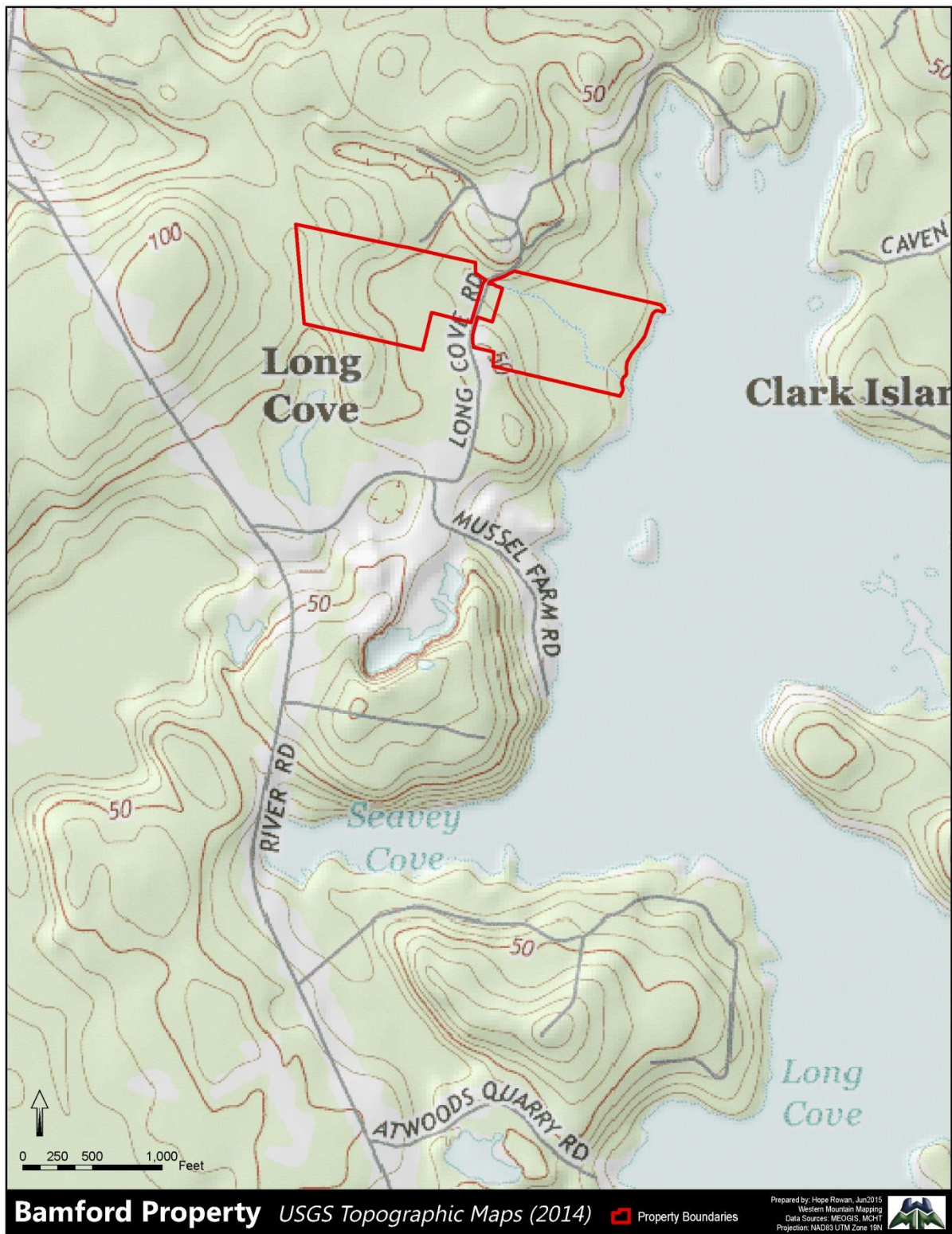


Figure 7. U.S.G.S. Topographic map of area containing Bamford Preserve in St. George, Maine.



Figure 8. Two-foot topographic contour intervals on Bamford Preserve.



Figure 9. Surficial and bedrock geology of the Bamford Preserve.

2.2.3 Soils

There are three soil complexes and series found on the Preserve. Figure 10 shows their distribution within the boundaries of Preserve, as mapped by U.S.G.S. Soil Conservation Service (Hedstrom 1983), and Table 1 summarizes characteristics.

Lyman–Rock Outcrop–Turnbridge Complex – The most common soil type on the Bamford Preserve is Lyman-Rock Outcrop-Turnbridge complex (LrC), on 8 to 15% slopes. Over 41% (14.78 acres) of the Preserve is underlain by these soils, which are prevalent in the southern section of the east parcel, and in the central western portion of the southern parcel. The vegetation type covering most of this soil is Red Oak–Northern Hardwood–White Pine. Invasive plants are uncommon in this soil type, indicative of the low level of disturbance over the last 50 years or so.

This complex occurs on strongly sloping and rolling terrain in an intricate pattern that makes it impractical to map them separately. Within this complex, Lyman soil is shallow over bedrock and somewhat excessively drained. Turnbridge soil is moderately deep and well drained. Rock outcrop typically consists of exposed gneiss, mica schist, phyllite, rhyolite or granite bedrock. Erosion is a moderate hazard for this soil complex. Based on its position in the landscape, the soils in this complex on the Bamford Preserve fit the description of Turnbridge soil.

Within the area mapped as LrC are wetlands in the eastern boundary area of this soils' occurrence. The LrC mapping unit includes several hydric soils, and the soils in these areas fit the description of the Swanville silt loam series.

This soil type is very poorly suited for cropland and community development, primarily because of their shallow depth, stony surface, slope, and draughtiness. It is suited primarily for woodland (although subject to high tree mortality due to wind-throw hazard and draughtiness), pasture, and lowbush blueberries.

Swanville Silt Loam – The second most common soil type on the Preserve is Swanville silt loam (Sw), which underlays approximately 37%, or 13.3 acres of the land. This soil underlays most of the wetland on the Preserve, particularly on the east parcel but also extending into the northeast corner of the west parcel. All five of the Community types on Bamford are found on this soil type, although most of it is Alder Thicket and Shrub and Brush Rangeland on the east parcel. Much of the land cover occurring on Sw soils has been gradually reverting from historical use as pasture, and thus has been subject to disturbance. Accordingly, this soil type contains the highest concentrations of invasive plants, compared with other soil types. Multiflora rose is the most common invasive plant in this soil type, but Tartarian honeysuckle, balsam hemlock, reed-canary grass, Canada thistle, and purple loosestrife all are present.

This complex occurs on nearly level (0 to 3% slopes) and poorly drained low-lying areas on marine and lacustrine plains near the coast. Depth to bedrock generally is over 60 inches. Surface runoff is low or medium in this complex, and the available water capacity is high. Permeability of water is slow or medium, and there is a seasonably high water table. Erosion is only a slight hazard.

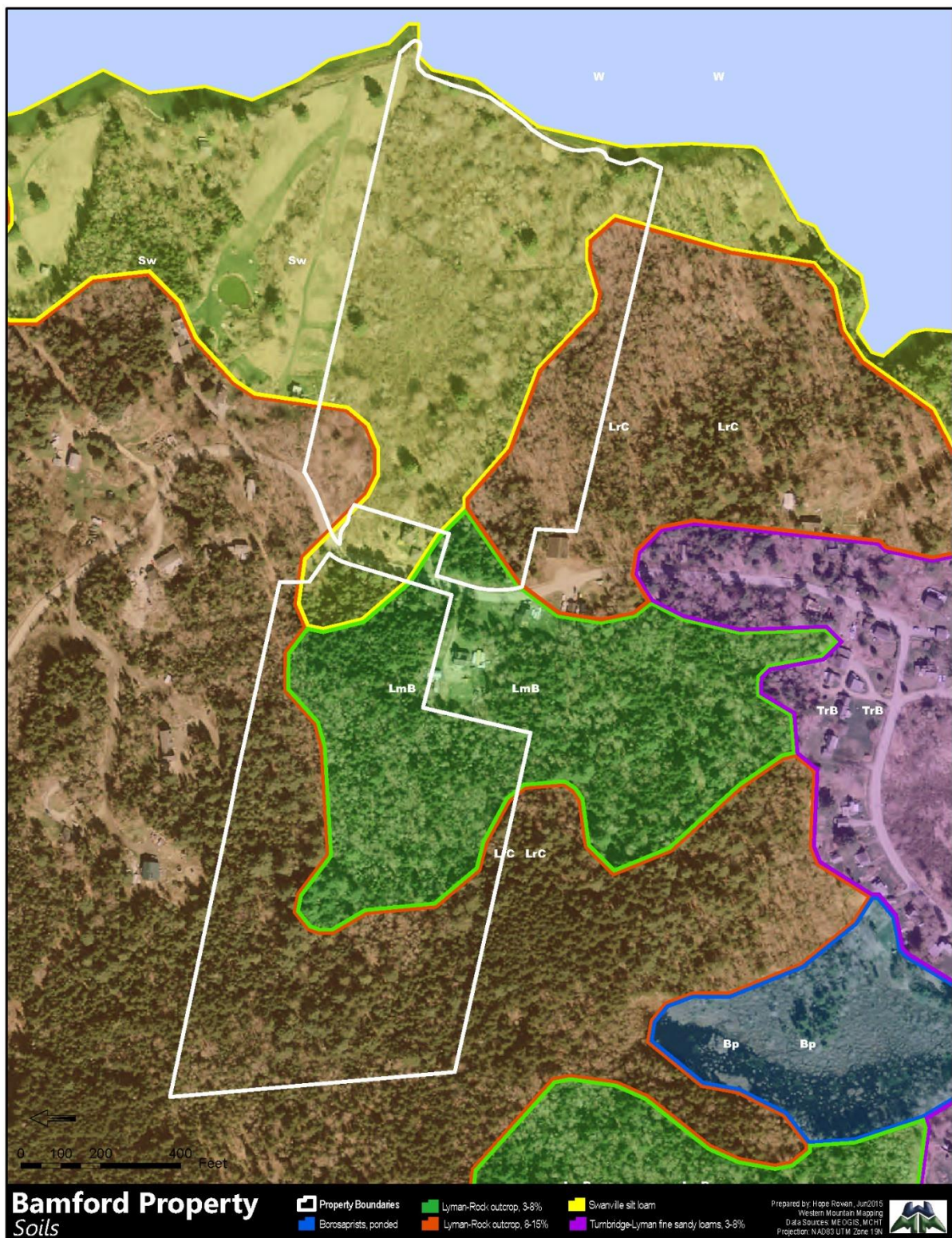


Figure 10. Map of soils on the Weskeag Preserve.

Table 1. Soils of the Bamford Preserve.

Map Code	Area (ac)	Soil Name	General Description	Management Considerations
LrC	14.8	Lyman-Rock outcrop-Turnbridge complex, 8 to 15% slopes	Strongly sloping and rolling soils in glaciated, upland areas and on low coastal ridges. Typically 40% Lyman, 20% rock outcrop, 20% Turnbridge, and 20% other soils.	Suitable for woodland, lowbush blueberries, and some pasture.
LmB	7.7	Lyman-Brayton Variant-Rock Outcrop complex, 0 to 8 % slopes	Nearly level and undulating soils in low lying areas of glaciated uplands, and low coastal areas. Typically 40% Lyman, 25% Brayton Variant, 15% Rock outcrop, and 20% other.	Woodland.
Sw	13.3	Swanville silt loam	Nearly level, deep, in low-lying areas on marine and lacustrine plains near the coast.	Woodland
Source: Knox and Lincoln County Soil Survey (Hedstrom 1983).				

Within the area mapped as Sw are Alder Thicket wetlands in the east parcel. The Sw mapping unit includes several very wet soil types, including the very poorly drained Biddeford and poorly drained Scantic hydric soils.

This soil type is suited primarily for woodland. It is poorly suited for development or farming, and grazing has to be controlled to avoid compaction when soils are wet.

Lyman-Brayton Variant-Rock Outcrop Complex, 0 to 8% Slopes – The third most common soil type on the Preserve is Lyman-Brayton Variant-Rock Outcrop Complex (LmB), which underlays approximately 21.6%, or 7.7 acres of the land in the preserve. This soil occurs covers much of the west parcel, in the more south and easterly section. This area has been forested for at least 100 years, and it is vegetated by Mixed Conifer Forest and Spruce–Fir–Cinnamon Fern Forest. Indicative of the low level of recent disturbance, invasive plants are uncommon throughout this soil type.

This complex occurs on relatively level and undulating (0 to 8% slopes) areas of glaciated uplands and low lying coastal areas. Lyman soils are shallow, with a depth of bedrock of about 16 inches, and somewhat excessively drained. Brayton Variant is moderately deep, with bedrock about 32 inches deep, and somewhat poorly drained or poorly drained. Surface runoff is slow to medium in this complex, and erosion is a light hazard. The available water capacity is low in Lyman soils and moderate in the Brayton Variant. Permeability of water is moderately rapid in Lyman, and moderate to moderately rapid in the Brayton Variant. There is a seasonably high water table in Brayton Variant between the surface and 1.5 feet which restricts the depth of the root zone.

Within the area mapped as LmB are Spruce–Fir–Cinnamon Fern Forest wetlands in the west parcel. The LmB mapping unit includes several very wet soil types, including the very poorly drained Biddeford and Searsport soils, and poorly drained Scantic and Swanville hydric soils.

This soil type is not suited for farming and community development primarily because of their shallow depth, stones on the surface, and seasonal high water table. It is suited primarily for woodland.

2.3 Vegetation and Natural Communities

A total of six vegetation community types were identified at the 41-acre Bamford Preserve, including three upland and two wetland community types. Figure 11 displays these community types. A list of plant species documented on the Preserve is included as Appendix A. Appendix B contains the GPS coordinates of the 10 vegetation plots, along with the GPS Coordinates of features documented during field surveys.

White Pine–Mixed Conifer Forest – White Pine–Mixed Conifer Forest is the most extensive community type on the Bamford Preserve. It covers just over 14 acres, or about 34%, of the Preserve and it is predominant in the west parcel. This forest encompasses land that has mostly been forested for about 100 to 130 years, based on the size of the trees and the fact that these areas were largely forested on 1942 aerial photographs. Inclusions of younger forest exist in areas that were indicated as younger forest closer to Long Cove Road.

This community type is one of the more homogenous habitats on the Preserve. It is a relatively even-aged forest community with low to moderate vertical and horizontal structural diversity of vegetation, and relatively minor variations in associations of dominant species within the overall classification. The dominant tree species are red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), white pine (*Pinus strobus*), and red oak (*Quercus rubra*). Other species of trees in this community include red maple, tamarack (*Larix laricina*), paper birch (*Betula papyrifera*), and trembling aspen (*Populus tremuloides*). White pine is a notable species in this community because many of the pines form a supracanopy above that of the other trees in the community.

Canopy cover in this natural community averages 70%, with a range of 55 to 80%. Average height of canopy trees is about 55 feet, and average diameter at breast height (dbh) of trees is about 10 inches. The pines in this community extend 10 to 25 feet above the average canopy and are up to 30 inches in dbh.

The structural diversity of understory and shrub cover is slightly more variable, but relatively low given the relatively closed canopy. Average shrub cover is about 10%, and it consists mostly of regenerating balsam fir, red spruce, and white pine.

Further indicative of the relatively closed canopy of this community, herbaceous cover averages just 15%. Dominant species of forbs include sarsaparilla (*Aralia nudicaulis*), hay-scented fern (*Dennstaedtia punctiloba*), bracken fern (*Pteridium aquilinum*), bunchberry *Cornus canadensis*, Canada mayflower

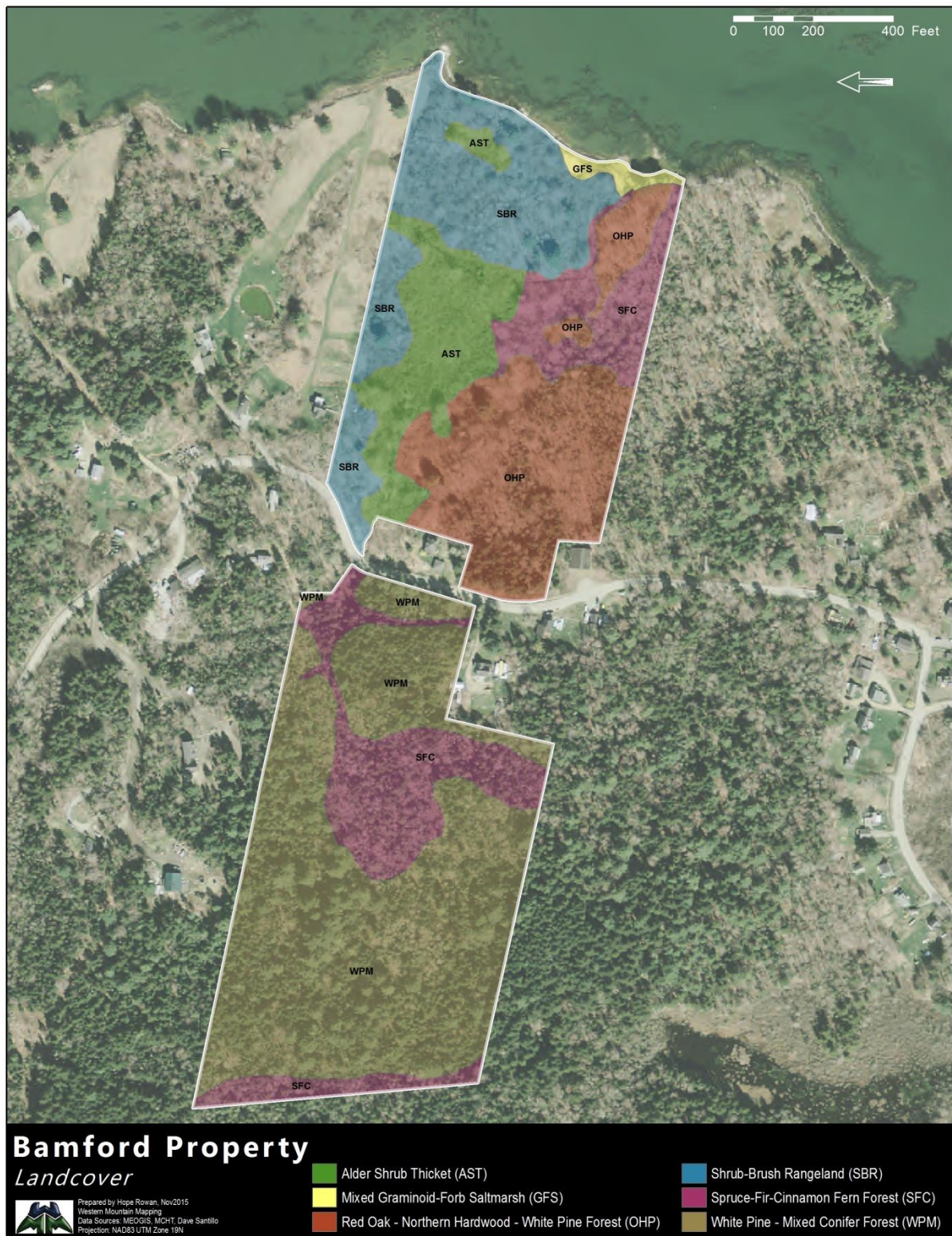


Figure 11. Map of plant communities on Bamford Preserve.

(*Maianthemum canadense*), and starflower (*Trientalis borealis*). Invasive plants were uncommon in this community.

This community, in combination with the diverse range of community types both in and adjacent to the Preserve, contributes important habitat diversity to the area. A portion of this community, in the western portion of the west parcel is habitat that is suitable for winter cover for white-tailed deer. Representative species of birds observed in this community on the Preserve include the pine warbler, red-breasted nuthatch, and black-throated green warbler.

The state rank of this natural community is S4.

Shrub and Brush Rangeland – Shrub and Brush Rangeland covers almost 10 acres, or about 24%, of the Preserve. This “non-natural” community encompasses types that are referred to as “abandoned field,” “old pasture,” “successional farmland,” and “reverting forest.” The area appears as primarily herbaceous open land on photographs from 1940, when it potentially may have been used for pasture. It appears as brushland on USGS Soil Survey photographs from 1978. Based on these photographs and the size of trees present on the area, it likely has been abandoned for 50 to 75 years.

Shrub and Brush Rangeland occurs in the north eastern section of the eastern parcel.

This community type possesses a high degree of vertical and horizontal structural diversity of vegetation, and very high level of interspersed varying species associations within the overall community classification. Some areas have characteristics of open woodlands dominated by red oak (*Quercus rubra*) and white pine (*Pinus strobus*), and some are well stocked with old apple trees choked by herbaceous and shrubby plants, including many invasive plants. Other areas are more typical of successional woodland forest, dominated by densely-stocked pole-sized trembling aspen (*Populus tremuloides*), red maple (*Acer rubrum*), and gray birch (*Betula populifolia*).

Overstory canopy cover ranges from 0% to 25%, but averages about 20%. Average height of canopy trees, when present, is about 30 feet, and average diameter at breast height (dbh) of trees is about 6 inches.

Many apple trees are scattered throughout this community, and they appear to be productive and in peak “wild form” with minimal overtopping by taller trees. Trees that are in the early stages of taking over portions of this community include red maple, white pine, and red oak.

Understory and shrub cover has high vertical and horizontal diversity in this community. Average shrub cover is about 50%, and it ranges from 30 to 75. Dominant species are juneberry (*Amelanchier laevis*), pin cherry (*Prunus pennsylvanica*), steplebush (*Spiraea tomentosa*), blackberry (*Rubus allegheniensis*), and dewberry (*Rubus flagellaris*).

Indicative of the open nature of this community, herbaceous cover averages about 40%, and ranges from 20 to 80%. Dominant species of forbs include several species of goldenrod (rough-stemmed - *Solidago rugosa*, Canada - *S. canadensis*, and tall - *S. gigantea*), and aster (flat-topped - *Doellingeria umbellata*), calico – *Symphoricarum lateriflorus*), and sensitive fern (*Onoclea sensibilis*).

Invasive plants are more common in this community than any of the other communities on the Preserve. Multiflora rose (*Rosa multiflora*) is most common, but other species include Himalayan balsam (*Impatiens glandulifera*), purple loosestrife (*Lythrum salicaria*), Tartarian honeysuckle (*Lonicera tartarica*), and reed canarygrass (*Phalaris arundinaceae*).

This transitional community, in combination with the diverse range of community types both in and adjacent to the Preserve, contributes important habitat diversity to the area. It also provides travel cover and browse for white-tailed deer. This community is extremely dense and difficult to hike in; it would require aggressive brush-hogging to clear any trails. The dense undergrowth includes a large number of berry producing species of shrubs, and extensive use by white-tailed deer and numerous birds was noted. It supports a diverse assemblage of bird species that utilize shrubs, including American redstarts and red-eyed vireos.

Oak–Northern Hardwood–White Pine Forest – Oak–Northern Hardwood–White Pine Forest covers approximately about 13.2 acres, or 32%, of the Preserve. This community is found in the southwestern section of the east parcel. The area appears mostly shrubby with scattered trees in aerial photographs from 1940 (Figure 6), and as forested in 1978 imagery. The age of this forest is approximately 80 to 100 years old, based on interpretation of historical aerial photographs and size of trees in this forest.

This community type is relatively homogenous with low to moderate vertical and horizontal structural diversity of vegetation, and relatively minor variations in associations of dominant species within the overall classification. The dominant tree species is red oak. Other common species of trees in this community include red maple, white pine, and paper birch.

Canopy cover averages about 70%, with a range of 60 to 85%. Average height of canopy trees is about 50 feet, and average dbh of trees is about 12 inches.

Understory and shrub cover is a bit more variable, in terms of structural diversity. The densest cover occurs along where this community type borders the more open Alder thicket and Shrub and Brush Rangeland community types, whereas percent cover tends to be lowest in the interior of this community. Average overall shrub cover in this community is about 20%, and it ranges from 5 to 35%. Dominant species of trees in the understory are sapling-sized balsam fir, red oak, red spruce, and white pine. Shrubs are not abundant, but include maple-leaved viburnum (*Viburnum acerifolium*), winterberry holly (*Ilex verticillata*), and raspberry.

Herbaceous cover ranges from a low of about 10% to a high of 55%; it averages about 25%. Dominant species of forbs include big-leaved aster (*Eurybia macrophyllus*), hay-scented fern, rough-stemmed goldenrod, and Canada mayflower (*Maianthemum canadense*).

Invasive plants in this community type are located in the northern part of its occurrence on the Preserve, in the vicinity of the Alder thicket behind the residences along Long Cove Road. Himalayan balsam is quite common in this area.

This community, in combination with the diverse range of community types both in and adjacent to the Preserve, contributes important habitat diversity to the area. It supports a diverse assemblage of woodland bird species, including scarlet tanagers, hermit thrushes, great-crowned flycatchers, and red-eyed vireos. It also provides travel cover and browse for white-tailed deer. In addition, this community provides an aesthetically pleasing hiking experience among the large hardwood trees and relatively open understory.

The state rank of this community is S4.

Alder Thicket – Alder Thicket covers about 3.4 acres, or about 8.3%, of the Preserve. This community is located in the central portion of the east parcel. This community appeared to be open and dominated by herbaceous vegetation on 1940 photographs, and shrubby on 1978 photographs. It may be possible that the wetness of soils in this area contributed to the abandonment of this parcel. The 40 to 60 year time window since abandonment is not significant and Alder thicket is likely not the climax plant community. Portions of this community likely are successional towards Spruce–Fir–Cinnamon fern wetlands (i.e., palustrine forested).

Indicative of the relatively short time since abandonment, this community type has relatively high vertical and horizontal structural diversity of vegetation. The dominant tree species are red maple, pin cherry (*Prunus pennsylvanicum*), and trembling aspen. Speckled alder (*Alnus incana*) exists as a dense understory species. The overstory trees average 30 feet in height and have a percent cover of about 20% (range 0 to 40). The dbh of these trees is about 6 inches. The percent cover of shrubs averages 50%, most of which is speckled alder. Other species include steplebush and black raspberry.

Herbaceous cover is similarly high, averaging about 55% and ranging from 20 to 80%. The most common species are rough-stemmed goldenrod, sensitive fern, cinnamon fern, Himalayan balsam, and grass-leaved goldenrod.

Species in this community type include several invasive plants. Himalayan balsam is quite common, especially in proximity to the residences along Long Cove Road, but also along the northern border of the east parcel. Multiflora rose also is common.

This community, in combination with the diverse range of community types both in and adjacent to the Preserve, contributes important habitat diversity to the area. It supports a diverse assemblage of bird species that utilize shrubby habitat, including the alder flycatcher, American redstart, and common yellowthroat. It also provides dense cover and browse for white-tailed deer. This community has low potential for public use, and location of a trail through it would require repeated brush cutting and potentially the addition of some type of ground support, such as cribbing, in the wettest areas.

The state rank of this community is S5.

Spruce–Fir Cinnamon Fern Forest – Spruce–Fir–Cinnamon Fern Forest (S-F-C Forest) covers approximately 6.4 acres, or almost 16%, of the Preserve. This wetland community occurs in both the east and west parcels in low-lying areas that are associated with drainages. This community serves as

headwater seepage wetlands in the upper reaches of intermittent streams, and encompasses a number of vernal pools.

This community type has moderate vertical and horizontal structural diversity of vegetation, and relatively minor variations in associations of dominant species within the overall classification. The dominant tree species is black spruce. Other species of trees in this community include balsam fir and red maple.

Canopy cover averages 60%, with a range of 45 to 70%. Average height of canopy trees is about 50 feet, and average dbh of trees is about 10 inches.

Understory and shrub cover is variable, in terms of structural diversity. Average shrub cover is about 10%. Dominant species of trees in the understory are sapling-sized black spruce and balsam fir. Common shrubs include winterberry holly, swamp dewberry (*Rubus hispidus*), and wild raisin (*Viburnum nudum*).

Herbaceous cover averages about 15%, and ranges from 5 to 25%. Common species include cinnamon fern, sensitive fern, jack-in-the-pulpit (*Arisaema triphyllum*), flat-topped aster (*Doellingeria umbellata*), and northern bugleweed (*Lycopus uniflorus*).

Invasive plants are uncommon in this community.

This community, in combination with the diverse range of community types both in and adjacent to the Preserve, contributes important habitat diversity to the area. The prevalence of coniferous tree cover in this community, in proximity to shrub, pasture, and deciduous forestland, indicates the potential for use as winter cover for white-tailed deer. Representative species of birds observed in this habitat on the Preserve include the pine warbler, red-breasted nuthatch, and black-throated green warbler. The S-F-C Forest found along the western boundary of the west parcel also appears to provide wintering habitat for white tailed deer.

The state rank of this natural community is S4.

Mixed Graminoid–Forb Saltmarsh – Mixed Graminoid–Forb Saltmarsh covers about 4 acres, or about 10%, of the Preserve. This community is located along the extreme eastern boundary of the east parcel, and it borders Long Cove. It is adjacent to open water and intertidal mudflat, as well as terrestrial communities that include Red Oak–Northern Hardwood–White Pine Forest and Shrub Rangeland.

This community type possesses a moderate degree of horizontal habitat diversity. It essentially is a narrow fringe marsh along the shoreline of Long Cove, with few habitat features like pannes and pools.

Herbaceous cover averages about 60%, and ranges from 35 to 85% on a very localized level. Dominant species include *Spartina alterniflora*, *Spartina patens*, and black grass (*Juncus gerardii*). Other species include *Distichlis spicata* and sea lavender (*Limonium carolinianum*). Other habitat features include wrack and bare sandy gravel and mud.

Species in this community type include several invasive plants, primarily along the border with terrestrial forested communities. Multiflora rose is the most common.

This community, in combination with the diverse range of community types both in and adjacent to the Preserve, contributes important habitat diversity to the area. It provides an important salt marsh buffer along the shoreline, and is contiguous with the extensive intertidal saltmarsh and mudflat system within the upper part of Long Cove.

This habitat supports a diverse assemblage of priority bird species, including numerous waterfowl and shorebirds. The juxtaposition of vegetation and open water provides excellent habitat for numerous species of waterfowl and wading birds. Numerous other bird species, including several rare species, likely use this habitat type during migration, as discussed in Sections 2.4 and 2.5. Saltmarsh pools and channels also are important nursery and refuge areas for saltwater fish species. This community has low potential for public use, but provides an aesthetically pleasing green buffer.

The state rank of this community is S4.

Other Habitat

- **Salt Marsh and Tidal Mudflats** - Although not documented in this NRI because they are located outside of project boundaries, there are additional tidal saltmarsh and mudflats adjacent to boundary of the east parcel of the Preserve. The saltmarsh is a relatively narrow fringe (10 to 20 ft) marsh containing *Spartina alterniflora* and *S. patens*, *Juncus gerardii*, and sea lavender (*Limonium carolinianum*). Wrack was locally abundant on the marsh vegetation. Mudflat appears to extend from 50 to 150 feet from shore at low tide. The Preserve is located in the upper portion of Long Cove, and is protected from exposure surf from the open ocean by Clark Island.

2.4 Invasive Species of Plants

The Bamford Preserve is only moderately impacted by invasive plants. Figure 12 illustrates that invasive plants primarily are found on the east parcel of the Preserve. The area most impacted by invasives is the northern boundary of this parcel, between the adjacent open field and the brush land and Alder Thicket on the Preserve, and along the shoreline of the eastern boundary of the Preserve. Another concentration exists, also in the east parcel, behind residences along Long Cove Road.

There were 19 locations of invasive plants documented during fieldwork. These locations generally described areas of concentrations as opposed to individual plant occurrence.

Occurrences of invasive plants were recorded in the center of the occurrence, and notes were taken regarding the dimensions and abundance. Table 2 provides detailed information for each occurrence, including the location, species, extent and/or abundance, and “severity” of the occurrence, which is addressed further in the Management Recommendations.

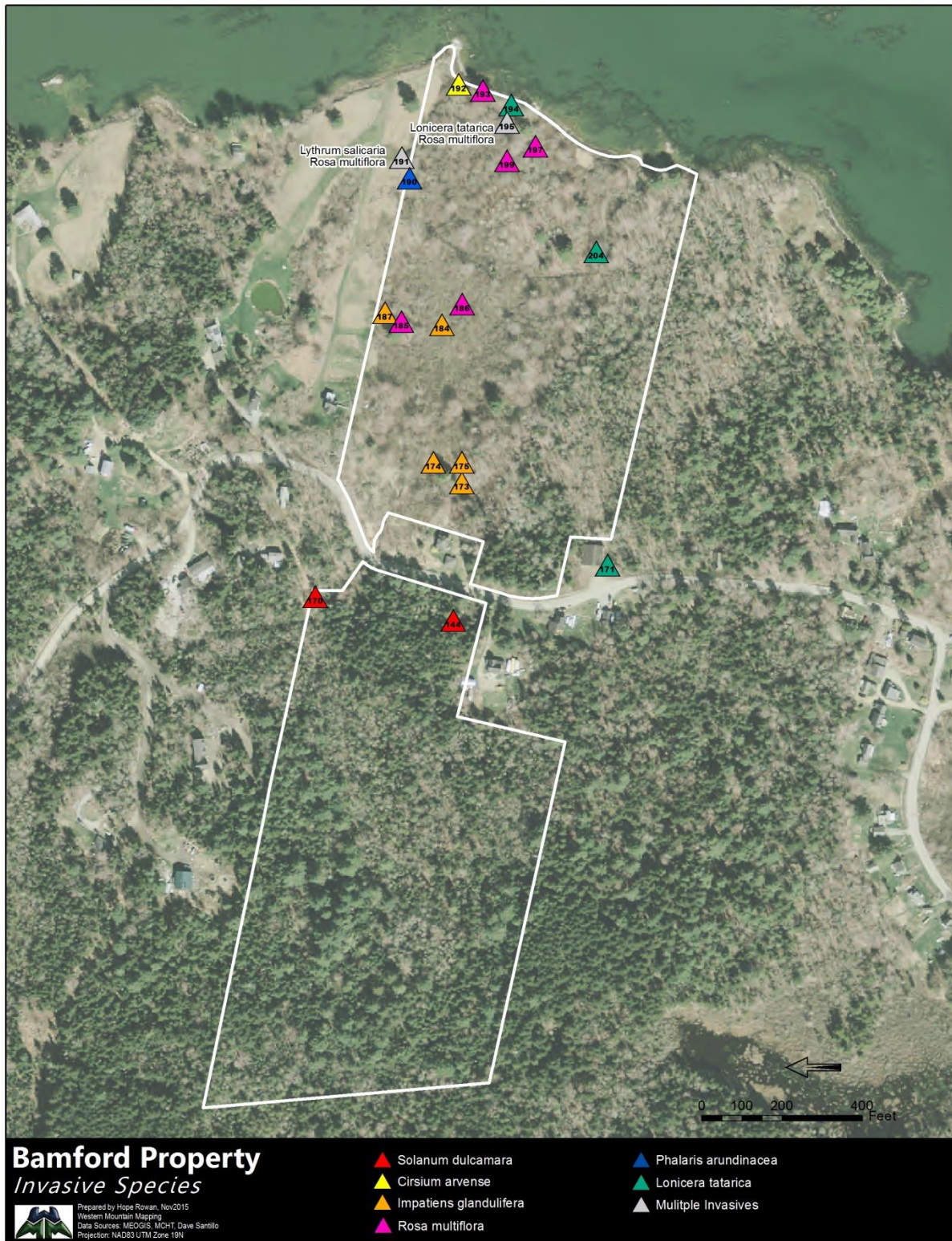


Figure 12. Locations of invasive plants on Bamford Preserve

Table 2. Locations, species, and occurrence details for invasive plants located during 2015 NRI at Bamford Preserve.

Point #	GPS Coordinates.						Species	Occurrence	Pic #	Severity
	D	M	S	D	M	S				
144	43	59	38.6	69	11	56.4	Bittersweet Nightshade	10 by 10 ft area		1
170	43	59	41.8	69	11	55.6	Bittersweet Nightshade	Several individuals		1
171	43	59	35.6	69	11	54.5	Tartarian Honeysuckle	3 bushes. Probably outside of boundary along parking area.		1
173	43	59	38.0	69	11	51.7	Himalayan Balsam	100 ft diameter		3
174	43	59	39.1	69	11	51.0	Himalayan Balsam	Mod. dense in general area.		2
175	43	59	39.3	69	11	51.0	Himalayan Balsam	Widespread throughout general area	1812	3
184	43	59	38.9	69	11	46.3	Himalayan Balsam	3 stems. Picked		1
185	43	59	39.9	69	11	46.2	Multiflora Rose	2 bushes		1
186	43	59	39.9	69	11	46.2	Multiflora Rose	Loosely scattered in gen. area.	1817	2
187	43	59	40.3	69	11	45.9	Himalayan Balsam	20 by 10 ft area		2
190	43	59	39.7	69	11	41.3	Reed canary grass	30 ft diam		1
191	43	59	39.9	69	11	40.6	Purple loosestrife and Mult. rose	50 linear ft	1818	2
192	43	59	38.5	69	11	38.1	Canada thistle	10 plants		1
193	43	59	37.9	69	11	38.3	Multiflora rose	10 by 10 ft area		1
194	43	59	37.2	69	11	38.8	Tartarian Honeysuckle	Loosely scattered in general area.		1
195	43	59	37.3	69	11	39.4	Multiflora Rose and Tartarian Honeysuckle	Mod. dense in general area.		2
197	43	59	36.6	69	11	40.2	Multiflora Rose	Loosely scattered in general area.		1
199	43	59	37.3	69	11	40.7	Multiflora Rose	Loosely scattered in gen. area.		1
204	43	59	35.1	69	11	43.8	Tartarian Honeysuckle	Scat. loosely in general area.		1

The most abundant invasive plants are multiflora rose and Himalayan Balsam. Somewhat less abundant but still very common is Tartarian honeysuckle. Present in low frequencies were bittersweet nightshade, purple loosestrife, Canada thistle, and reed canarygrass.

Himalayan Balsam – Himalayan Balsam (HB) was recorded at five locations in the Preserve, all of which represent areas of concentration, as opposed to individual plants. The concentrations tended to be restricted to the noted diameters of the occurrence as opposed to representing a broad occurrence over a wide area. It is found in the east parcel and it is most common immediately behind residences of Long Cove Road. Elsewhere HB occurs as a component of shrub and herbaceous vegetation along the edges of the field along the northern border of the east parcel.

Multiflora Rose – Multiflora rose (MR) was recorded at six locations in the Bamford Preserve, most of which represent centers of broad occurrences in general areas. Generally, MR can be described as a widely present species within the Brush Rangeland and Alder thicket communities. Although some dense monotypic thickets are present, MR typically is found in association with other invasive plants, various species of raspberry, and Virginia rose (*Rosa virginiana*). It seemed to be particularly abundant within a 50 to 100-ft corridor adjacent to the shoreline, and in proximity to apple trees.

Tartarian Honeysuckle – Tartarian honeysuckle (TH) was recorded at four locations on the Preserve. None of the occurrences were significant.

Reed Canary Grass – Reed Canary Grass (RCG) was recorded at one location along the northern boundary of the east parcel. It was characteristically dense and monotypic within the single 30-ft diameter occurrence.

Bittersweet Nightshade – Bittersweet nightshade was recorded at two locations in the Preserve, both on the west parcel. Neither location was severe in terms of outcompeting native vegetation.

Canada Thistle – Canada thistle was recorded at a single location along the shoreline on the east parcel. Approximately 10 plants were found within a roughly 50 ft area.

Purple Loosestrife – A single location of purple loosestrife was recorded on the east parcel along the northern border with the adjacent field. Stems were removed during fieldwork.

2.4 Significant Species and Habitats

2.4.1 Significant Species

No state or federal-listed endangered or threatened species of plant or animal was documented on the Bamford Preserve during fieldwork, or reported by Maine Natural Areas Program.

A bald eagle (*Haliaeetus leucocephalis*) was seen flying along the shoreline of Long Cove approximately one-quarter mile south of the Preserve. The undeveloped shoreline of the Preserve provides suitable roosting habitat for eagles.

The Bamford Preserve provides a diversity of forested and shrub habitats. These areas, in conjunction with adjacent open fields located off the Preserve is highly suitable for northern long eared bats (*Myotis septentrionalis*), a candidate for federal listing.

The saltmarsh and mud flats adjacent to the undeveloped eastern boundary of the Preserve are excellent habitats for shorebirds and waterfowl. Many of the species that likely utilize this habitat are listed as Priority Species within Bird Conservation Region (BCR) 14 of the North American Bird Conservation Initiative (NABCI).

The saltmarsh and mudflat habitat of the eastern fringe of the Preserve provides habitat that is suitable for a number of shorebirds on this list including:

- Highest Priority Species - semi-palmated sandpiper;
- High Priority Species - American golden plover, black-bellied plover, red knot, short-billed dowitcher, whimbrel;
- Moderate Priority Species – Hudsonian Godwit, killdeer, least sandpiper, semi-palmated plover, willet.

Waterfowl on this list that are very likely to use this habitat include:

- Highest Priority Species - American blackduck, common eider;
- High Priority Species – Canada Goose;
- Moderate Priority – common goldeneye, greater scaup, long-tailed duck.

2.4.2 Significant Habitats

This section summarizes habitats on the Bamford Preserve that have both “official” designation and unofficial value as significant habitats. The Maine Natural Resources Protection Act (MNRPA) defines significant habitat types as the following areas to the extent that they have been mapped by the Maine Department of Inland Fisheries and Wildlife (MDIFW) or are within any other protected natural resource: habitat, as defined by the MDIFW, for species appearing on the official state or federal list of endangered or threatened animal species; high and moderate value deer wintering areas and travel corridors as defined by the MDIFW; seabird nesting islands as defined by the MDIFW; and critical spawning and nursery areas for Atlantic salmon as defined by the Department of Marine Resources.

These areas include:

1. Significant vernal pool habitat;
2. High and moderate value waterfowl and wading bird habitat, including nesting and feeding areas; and,
3. Shorebird nesting, feeding and staging areas.

Vernal Pools – The habitat surveys for this NRI were performed in mid spring and summer after the generally accepted survey window for vernal pools. However, sufficient evidence of seasonal hydrology and vegetation patterns were present to make a professional assessment of presence/absence. The

flat, low-lying topography and poor drainage of the Preserve provide excellent potential for vernal pools.

Vernal pool habitat is present in the Spruce–Fir–Cinnamon Fern Forest wetlands on both east and west parcels. A total of six vernal pool features were recorded during fieldwork, however the points recorded as vernal pool habitat generally document a general location as opposed to an entire feature. Most of the vernal pools have intricate boundaries and are fairly extensive.

Much of the vernal pool habitat exists as the upper reaches of intermittent drainages where they exist as headwater seepage wetlands. The habitat is excellent forested vernal pool habitat with a high shoreline index quotient, moderate amounts of water column woody debris in the water column, and high overhanging cover. Other potential areas are located in the dense Alder Thicket of the east parcel.

Winter Deer Yard – The wetland and upland coniferous forest along the western boundary of the west parcel exhibits strong evidence of winter deer use, and is situated on southwest and west-facing slopes. There is an area of about 2.7 acres on the Preserve that appears to be in core wintering area, encompassing the bottomland Spruce–Fir–Cinnamon Fern Forest and the upland White Pine–Mixed Conifer forest on the west-facing slope. The actual area of intact suitable habitat, however, extends off the preserve therefore the overall extent of suitable habitat is unknown. Based on aerial imagery and topographic contours, it likely is of a size sufficient to qualify for official designation as a deer yard.

Evidence of use by wintering deer included heavy browsing on preferred browse species of trees and shrubs and high concentrations of scat. The canopy of this forest is dominated by conifers and has over 75% cover, and is therefore highly suitable winter habitat for providing thermal cover and decreased snow depths. Winter use by deer is further supported by the proximity of high browse habitats on the east parcel and general low human disturbance of the Preserve. The specific identified wintering area is over 1,100 feet from the nearest road.

Waterfowl and Wadingbird Habitat - The saltmarsh habitat and mudflat located within and adjacent to the eastern boundary of the Bamford Preserve is within the upper reaches of Long Cove and is part of an extensive marsh and mudflat system. The entire upper Long Cove system has been designated as Significant Tidal Waterfowl and Wading bird habitat by the Maine Beginning With Habitat Program.

Wetlands Capable of Buffering Sea Level Rise – The wetlands of the east parcel have exceptional potential to mitigate sea-level rise on a local level. The elevation of a large portion of the east parcel is less than or equal to 5 feet above sea level. The entire shoreline is relatively flat, which also will help to mitigate encroachment of tidal influences on the uplands in the Preserve.

Habitat Diversity – Although not a discrete significant habitat or location, the diversity of plant communities on the Bamford Preserve provides an inherent high quality value of habitat diversity, with moderately high degrees of habitat interspersation and juxtaposition. No community type is strongly dominant on the Preserve. This habitat diversity directly translates to relatively high wildlife diversity.

2.5 Wildlife Species

Thirty-seven (37) species of birds and six species of mammals were recorded during fieldwork completed for this NRI. Table 3 identifies the species and the habitats in which they were recorded. Fieldwork was completed outside of the major migratory periods and was concentrated in terrestrial portions of the Preserve. Accordingly, the actual list of birds that utilize the Bamford Preserve is significantly greater. This diversity of birds reflects the diversity of habitat types on the Preserve.

Eight of the bird species observed during fieldwork are species identified as priority species in BCR 14 of the NABCI:

- High Priority Species – American redstart, chestnut-sided warbler, veery;
- Moderate Priority Species – black-throated green warbler, northern flicker, northern parula, ovenbird, ruffed grouse.

Five of the bird species also are designated as Species of Concern by the State of Maine. These species include great-crested flycatcher, black and white warbler, yellow warbler, eastern towhee, and scarlet tanager.

Table 3. Bird and mammal species observed during 2015 NRI Fieldwork at Bamford Preserve.

TAX. GROUP/Species	Habitat Types
BIRDS	
Upland Game Birds	
Ruffed Grouse	Mixed forest
Pigeons & Doves	
Mourning Dove	Coniferous forest
Woodpeckers	
Downy Woodpecker	Mixed forest
Northern Flicker	Mixed forest
Tyrant Flycatchers	
Alder Flycatcher	Alder thicket
Least Flycatcher	Mixed forest
Great-crested Flycatcher	Mixed forest
Vireos	
Red-throated Vireo	Mixed forest, Alder thicket, Brush rangeland
Jays, Crows	
Blue Jay	Mixed forest, Coniferous forest
American Crow	Mixed Forest, Coniferous forest
Chickadees, Nuthatches	
Black-capped Chickadee	All Forest
Tufted Titmouse	All Forest
White-breasted Nuthatch	All Forest
Red-breasted Nuthatch	Coniferous forest
Wrens	
Winter Wren	Coniferous forest
Kinglets & Gnatcatchers	
Golden-crowned Kinglet	Mixed forest
Thrushes & Mimids	
American Robin	Mixed forest
Hermit Thrush	Mixed forest
Veery	Mixed forest
Wood Warblers	
Common Yellowthroat	Brush rangeland
Chestnut-sided Warbler	Mixed forest, Alder thicket
Black-throated Green Warbler	Mixed forest
Pine Warbler	Coniferous forest
Black and White Warbler	Mixed Forest
Yellow Warbler	Brush rangeland
Magnolia Warbler	Coniferous forest
Yellow-rumped Warbler	Coniferous forest
Parula Warbler	Mixed Forest
American Redstart	Alder thicket
Blackburnian Warbler	Coniferous forest
Ovenbird	Mixed forest
Tanagers & Cardinals	
Scarlet Tanager	Mixed forest
Cardinal	Coniferous forest
Emberizine Sparrows/Allies	
Chipping Sparrow	Mixed forest

Table 3 continued	
TAX. GROUP/Species	Habitat Types
Song Sparrow	Brush rangeland
Northern Junco	Coniferous forest
Finches	
American Goldfinch	All
Purple finch	Coniferous forest
MAMMALS	
Porcupine	Mixed forest
Raccoon	Alder thicket
White-tailed Deer	All
Red Squirrel	All forest types
Gray Squirrel	Mixed forest
Eastern Chipmunk	All

3.0 MANAGEMENT RECOMMENDATIONS

The Bamford Preserve offers a number of management opportunities and needs that would enhance the value of the habitats on the Preserve, and assist MCHT meet its objectives relating to conservation, stewardship, and public use. The opportunities and needs were identified based on the results of collection of background information, and of field surveys performed for this NRI, which were reported in Section 2 of this report. They fall generally into the categories of habitat management and infrastructure/people management. Figure 13 illustrates the location of the recommendations on the Preserve.

3.1 Control Invasive Plants

The Bamford Preserve consists of vegetation communities that essentially are a result of varying amounts of human disturbance over the last 200 years. Continued disturbance will inevitably result from recreation activities associated with stewardship by MCHT. Even without additional disturbance, there is strong potential for invasive plants to become even more pervasive, in particular on the east parcel. Table 2 provides details about the extent of documented locations of invasive plants, and Figure 12 illustrates locations. Table 2 includes a qualitative assessment of severity of the occurrence translated to priority for treatment rated on a scale of 1 to 3. A priority of 3 indicates a significant and likely expanding occurrence, and a high priority for treatment.

Complete eradication of invasive plants on the Bamford Preserve is an unrealistic goal. However, a focused invasive plant control program should be implemented to halt the expansion of invasive plants, and reduce their abundance in the most affected areas.

The general areas where invasive plant control should be prioritized are on the east parcel, along the shoreline and along the north boundary with the neighboring field. The shoreline is impacted heavily by multiflora rose. The field edge is affected by a variety of invasive plants, including multiflora rose, Himalayan balsam, and several other species. A third area of control is located behind residences along Long Cove Road, primarily to control Himalayan balsam.

Effective control will likely require both chemical control with herbicides and manual control through cutting and pulling of individual plants. Mechanical control is not a viable option because of the difficulty in maneuvering vehicles across the rugged and forested terrain.

3.2 Develop a Plant Community Management Plan

A Plant Community Management Plan should be developed that emphasizes management on a focused level that is appropriate for each stand or plant community. This plan should accommodate and facilitate other management goals.

The west parcel consists of intact forested land that includes habitat identified as potential deer wintering area. Management of this stand should emphasize no harvesting of trees to maintain the quality and character of mature upland and wetland coniferous forest.

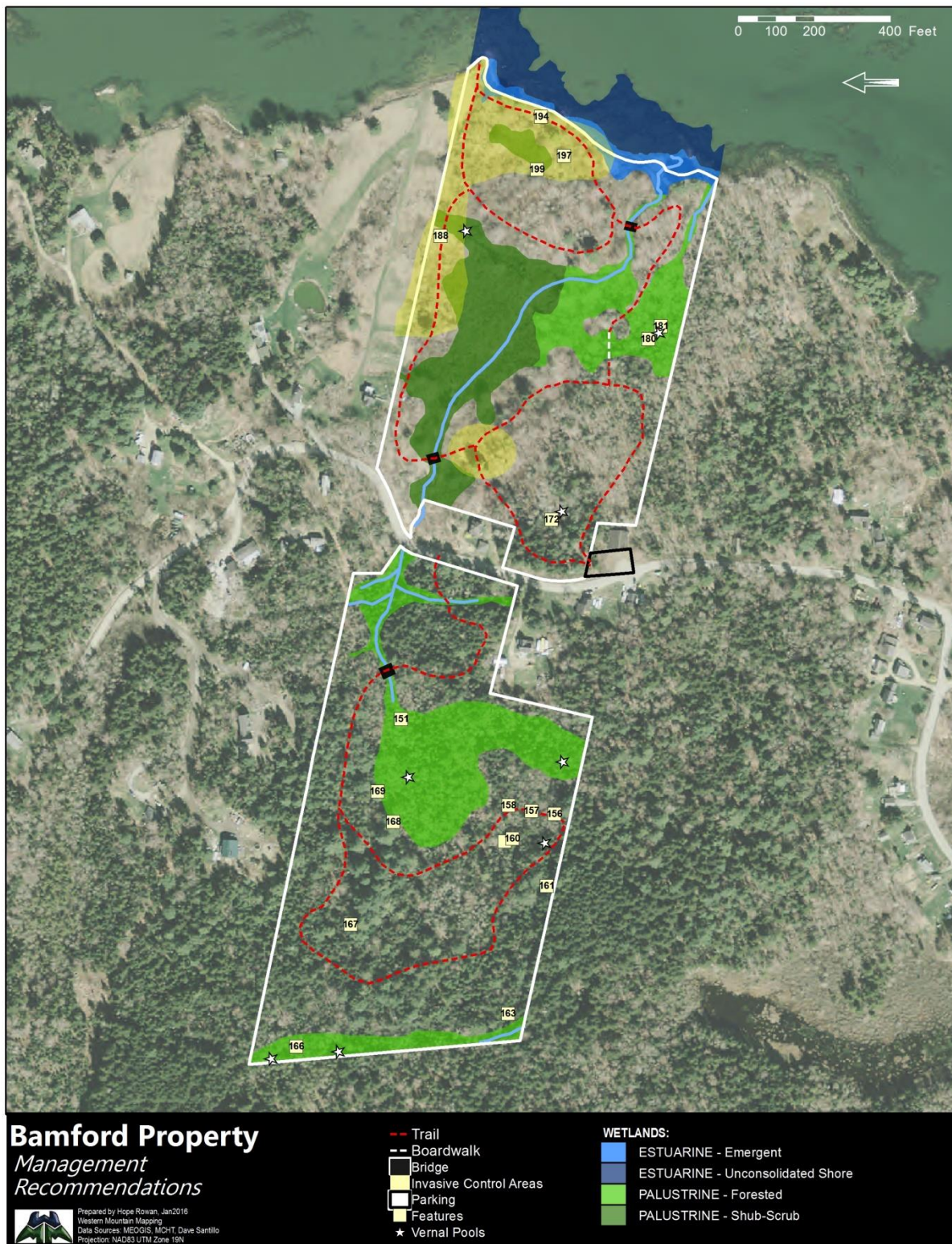


Figure 13. Map of Management Recommendations for Weskeag Preserve.

The east parcel is a mosaic of upland and wetland plant communities that range in age from 80 to 100-year old Oak–Pine forest in the southwestern portion of the parcel to successional communities that have been abandoned within the last 50 years or so, including Alder thicket wetlands. It is likely that the Alder thicket wetlands eventually will succeed to Spruce–Fir–Cinnamon Fern wetland. Other than what is needed to establish and maintain trails or to control invasive plants, no tree harvest or other vegetation manipulation should be performed in wetlands.

Some amount of cutting might be desirable in the Shrub Rangeland for several reasons. First, there are a large number of apple trees scattered through this community that contribute a desirable wildlife habitat component. Many of these trees are overtopped by successional trees such as trembling aspen, and are crowded by invasive species of shrubs from below. Release of these trees by removing competing vegetation would enhance the vigor of these trees and increase value as wildlife habitat. Secondly, there is potential to use the shoreline area of Bamford for a trail and day use, as discussed in Section 3.3. It may be desirable to restore several areas near the shoreline to an herbaceous meadow plant community surrounding apple trees. Care should be taken to avoid cutting vegetation on the shoreline itself to prevent erosion.

3.3 Maintain Integrity of Shoreline Buffer While Accommodating Recreational Use

A significant value of the Bamford Preserve is the approximately 800 feet of undeveloped shoreline along Long Cove. Preservation of this shoreline is a worthy top priority of management. The appearance of a visually appealing “green” shoreline as viewed from the water should be maintained.

The shoreline of Bamford provides a good opportunity for moderate levels of use for recreation for several reasons. The habitat along the shoreline, while undeveloped, largely consists of vegetation that is early successional and which is moderately impacted by invasive plants. Long Cove itself does provide habitat for waterfowl and wading birds, but it also is relatively accessible and cannot be considered as a significant “refuge” situation for avian use. Finally, recreational use of the shoreline is unlikely to be heavy given the small size of the Bamford Preserve and limited parking. Trails are discussed more in Section 3.4.

“Strategic” alteration of vegetation directly on or immediately adjacent to the shoreline should be limited to that required to control invasive plants or to provide for recreational trail or access to the water in focused locations.

3.4 Create a Network of Walking Trails

Appropriate siting and design of trails is critical to creating a positive recreational experience for users, while at the same time minimizing impacts to the natural setting and wildlife that use the habitats. No hiking trails exist on the Preserve, although there is an old woods road in one portion of the west parcel.

There is potential to create a trail network on the Preserve that crosses diverse habitat types and interesting land forms on the preserve, but which also avoids sensitive habitats, steep erodible slopes and stream banks, and critical wildlife use areas. The trail should avoid the habitat that is potentially used for wintering deer, and residences along Long Cove Road, and minimize disturbance to wetlands.

By avoiding steep slopes, the trail should be suitable not only for walking, but also for cross-country skiing.

A recommended route for a recommended network of trails was identified using the above criteria that totals over 8,000 feet in length (about 1.5 miles). Figure 13 shows the location of the recommended network of trails.

The recommended trail network maximizes use of upland forest and woodland, and minimizes amount of clearing that would be required. The route maximizes the diversity of habitats encountered, which will allow birders to encounter the maximum number of bird species. The trail system would require construction of two bridges to cross intermittent streams and wetlands in the east parcel, and two to cross intermittent streams in the west parcel. The recommended trail also would cross interesting features including the historical granite motions and the area of large pines on the west parcel.

The trail route would include a significant distance of contact with the shoreline, which would be an excellent attraction for this Preserve. The shoreline is suitable for a hiking trail for several reasons. First, the saltmarsh habitat is a relatively narrow fringe of only moderately value habitat for waterbirds. The shoreline is already subject to disturbance as there is a fair amount of boat traffic in the waterway. The soil substrate above the shoreline is relatively well drained, although it may be susceptible to erosion and therefore armoring it with gravel or wood chips is recommended to prevent erosion. Finally, there are several minor rock ledges along the shoreline that offer wonderful sitting areas looking out over the water, as well as stable substrate that would limit potential for loss of vegetation and resulting erosion that can potentially occur when humans access unarmored shoreline.

The trail system will cross elevational gradients, including side slopes, on the west parcel and therefore all sections should be designed to allow proper drainage and prevent erosion. Use of broad-based dips, water bars, and if necessary, small culverts, will facilitate transport of water across and off of the trail and prevent damaging sheet and rill erosion in descending sections of the trail.

3.5 Create Central Parking and Signage

One of the objectives of land stewardship by MCHT is to encourage public use, therefore parking should be accommodated to help facilitate that goal at Bamford. The Preserve is a relatively accessible preserve because it is bisected by a public road. This road frontage will allow for a centrally located access point, and little risk of alternative access points, given that there are no roads near the interior portions of the Preserve.

Off-street parking currently is available on the east side of Long Cove Road in the southern portion of the Preserve. This location is excellent in that it possesses a solid gravel base and it is sufficient to hold at least five vehicles. Given the relatively small size of the Weskeag Preserve, this amount of parking should be adequate for a desirable level of recreational use.

3.6 Hunting Access

Perpetuating hunting opportunity and access to huntable land is a critical goal for resource management organizations. There is evidence that the Preserve is fairly heavily hunted by locals, and a

conversation with a neighbor reinforced that belief. At least five hunting tree stands are located on the east parcel. The mosaic of habitats, dense thickets, and old apple trees provide excellent deer habitat.

The perceived “public ownership” by MCHT may increase hunting pressure. The relatively small size of the Preserve and the limited parking should, however, help to limit the extent of additional hunting pressure to a reasonable degree.

It may be beneficial from the standpoint of partnering with locals to continue to allow hunting on the preserve, but not promote that feature widely. Neighbors seem quite willing to assist with maintenance activities and perpetuating hunting access for them would likely cement this relationship. Given the seasonality of hunting, there would be minimal conflict with non-consumptive wildlife oriented recreational use of the Weskeag Preserve.

3.7 Monitoring

Several of the management recommendations would benefit from periodic monitoring to determine success and identify the need for corrective actions and maximize positive return on initial improvement investments. Annual visits by MCHT stewards and/or ongoing observations from local residents should adequately fulfill monitoring requirements. Table 4 summarizes monitoring suggestions and identifies possible criteria for success.

Table 4. Monitoring requirements and parameters for determining success of management recommendations.

Recommendation	Monitoring Requirements	Success Parameters
Invasive Plant Control	Annual qualitative visual assessments performed from trails.	Reduction in extent as identified in Table 2.
Develop a Plant Community Management Plan	Annual inspection to document success of management prescriptions, and document unauthorized cutting, disease, or other perturbation.	Achievement of management goals. Lack of disturbance.
Maintain Integrity of Shoreline Buffer	Annual inspection from trail.	No unauthorized cutting of vegetation or new trails.
Hiking trails	Annual inspection of trail system.	No erosion. No unplanned trails.
Parking	Annual inspection of the parking area along Long Cove Road.	No parking outside of designated areas. No evidence of tire ruts or erosion.
Hunting	Annual inspection of signage.	No conflicts.

Implementation of the recommendations contained in this report will further increase the accessibility of the Preserve, as well as increase the scope of education and interpretation programs that can be provided.

Each of the management recommendations made specifically for the Bamford Preserve are made in response to conservation and land management needs that are in no way unique to this preserve. Invasive plants, for example, are a significant problem throughout the ecosystems of coastal Maine. Poor trail design is a common flaw in conservation areas. Loss of forested wetlands is an ongoing challenge for conservation. Management of open plant communities in an innovative way that requires low maintenance and incorporates volunteer participation would have broad application. Each of these management and stewardship recommendations has implications and utility for outreach programs.

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APPENDICES

Appendix 1. GPS locations of Vegetation Plots and Features recorded at Bamford Preserve during fieldwork for Natural Resources Inventory, 2015.

Appendix 1. GPS locations of Vegetation Plots (v) and Features (f) recorded at Bamford Preserve during fieldwork for Natural Resources Inventory, 2015.

GPS Pt #	Code	GPS Coordinates			GPS Coordinates			Description	Pic #
		Deg N	Min	Sec	Deg W	Min	Sec		
146	v	43	59	40.4	69	11	58	Veg plot	1799
151	f	43	59	40.8	69	12	0.5	Vernal pool	1801
154	v	43	59	41.7	69	12	4.4	Veg plot	1802
155	v	43	59	38.5	69	12	3.6	Veg plot	1803
156	f	43	59	36.8	69	12	3.9	Old woods trail, and two large dbh pines	1804
157	f	43	59	37.4	69	12	3.8	Old woods trail	
158	f	43	59	38.0	69	12	3.6	Old woods trail	
159	f	43	59	38.1	69	12	4.9	End of trail	
160	f	43	59	37.9	69	12	4.8	Old stone pile - evidence of quarry	1805
161	f	43	59	37.0	69	12	6.5	Large stone wall, rock waste pile, old table	1806
163	f	43	59	38.0	69	12	11.1	Evidence of deer use on SW facing slope	
164	v	43	59	40.0	69	12	10.7	Veg plot	1808
165	v	43	59	43.0	69	12	10.8	Veg plot	1809
166	f	43	59	43.5	69	12	12.3	Vernal pool	1810
167	f	43	59	42.1	69	12	7.9	Center of grove of large pines	
168	f	43	59	41.0	69	12	4.2	Old woods trail	1811
169	f	43	59	41.4	69	12	3.1	Old woods trail	
172	f	43	59	36.9	69	11	53.3	Large rock pile	1812
175	v	43	59	39.3	69	11	51	Veg plot	1812
178	v	43	59	35.8	69	11	51.1	Veg plot	1813
180	f	43	59	34.4	69	11	46.8	Likely vernal pool area	1814
181	f	43	59	34.1	69	11	46.4	Likely vernal pool area	
182	v	43	59	36.2	69	11	46.3	Veg plot	1815
186	v	43	59	39.9	69	11	46.2	Veg plot	1817
188	f	43	59	39.8	69	11	43.1	Large specimen tree Red Oak, 2.5 ft dbh	
194	f	43	59	37.2	69	11	38.8	Large white oak	
197	f	43	59	36.6	69	11	40.2	Many apple trees	
199	f	43	59	37.3	69	11	40.7	Large apple tree	
200	v	433	59	38.1	69	11	39.9	Veg plot	1821

Appendix 2. List of plant species at Bamford Preserve, by community type, identified during 2015 field surveys for NRI.

Appendix 2. List of plant species at Bamford Preserve, by community type, identified during 2015 field surveys for NRI. Key to Abundance Code: D=Dominant, C=Common, U=Uncommon.

STRUCTURAL CLASS/Scientific Name	Common Name	Species Occurrence by Community Type					
		W. Pine-Mixed Conifer Forest	R. Oak-N.HW- W. Pine Forest	Shrub & Brush Rangeland	Alder Thicket	Spruce – Fir Cin Fern For.	Mixed Gram. – Forb Sltmarsh
TREES							
<i>Abies balsamea</i>	Balsam fir	C	C	U	U	D	
<i>Acer rubrum</i>	Red maple	U	C	C	C	C	
<i>Acer saccharum</i>	Sugar maple		U				
<i>Betula allegheniensis</i>	Yellow birch	U	U			U	
<i>Betula papyrifera</i>	Paper birch	C	U	C	U	U	
<i>Betula populifolia</i>	Grey birch	C		C	U	C	
<i>Carpinus caroliniana</i>	Muscle-wood	U	U	U			
<i>Fraxinus nigra</i>	Black ash	U				U	
<i>Larix laricina</i>	Tamarack	U		U	U	U	
<i>Malus sylvestris</i>	Apple			C	U		
<i>Picea mariana</i>	Black spruce				U	C	
<i>Picea rubens</i>	Red spruce	D	C	C		U	
<i>Pinus strobus</i>	White pine	D	C	D	U	U	
<i>Populus grandidentata</i>	Big-toothed aspen	U		C		U	
<i>Populus tremuloides</i>	Quaking aspen			C	U		
<i>Prunus pennsylvanica</i>	Pin cherry			C	U		
<i>Prunus virginianus</i>	Choke cherry		U				
<i>Quercus rubra</i>	Red oak	U	D	C	U	U	
<i>Salix petiolaris</i>	Meadow willow			U	U		
<i>Salix bebbiana</i>	Bebb's willow			U			
<i>Tsuga canadensis</i>	Eastern Hemlock	U	U				
SHRUBS/WOODY VINES							
<i>Alnus incana</i>	Speckled alder	U	U	U	D	U	
<i>Amelanchier laevis</i>	Shadbush	U	C	U			
<i>Comptonia peregrina</i>	Sweet fern	U		C			
<i>Cornus canadensis</i>	Bunch-berry	C	C		U	U	
<i>Cornus sericea</i>	Red osier dogwood			U	U		
<i>Crataegus spp.</i>	Hawthorn		C	C	U		
<i>Gaultheria hispidula</i>	Wintergreen	C		C	U	U	
<i>Gaylussacia baccata</i>	Huckleberry			U			
<i>Ilex verticillata</i>	Winterberry holly	U	U	U		U	
<i>Juniperus communis</i>	Juniper						
<i>Kalmia angustifolia</i>	Sheep laurel	U		U			
<i>Linnaea borealis</i>	Twin-flower	U	U	U			

STRUCTURAL CLASS/Scientific Name	Common Name	Species Occurrence by Community Type					
		W. Pine-Mixed Conifer Forest	R. Oak-N.HW- W. Pine Forest	Shrub & Brush Rangeland	Alder Thicket	Spruce – Fir Cin Fern For.	Mixed Gram. – Forb Sltmarsh
<i>Lonicera tartarica</i> *	Tartarian honeysuckle	U	U	D	U	U	
<i>Myrica gale</i>	Bayberry			U			
<i>Rhus hirta</i>	Staghorn sumac						
<i>Rosa rugosa</i> *	Rugosa rose	U	U	D	U		
<i>Rosa virginiana</i>	Virginia rose			C	U		
<i>Rubus allegheniensis</i>	Blackberry	U		D			
<i>Rubus hispidus</i>	Swamp dewberry	U		C	U		
<i>Rubus idaeus</i>	Red raspberry	U		C	C		
<i>Rubus pubescens</i>	Dwarf raspberry			C			
<i>Rubus semisetosus</i>	Northeastern blackberry			C			
<i>Sambucus candensis</i>	Elderberry			C	U		
<i>Spiraea alba</i>	Meadowsweet			C	U		
<i>Spiraea tomentosa</i>	Steeplebush			C	U		
<i>Vaccinium angustifolium</i>	Lowbush blueberry			C			
<i>Vaccinium corymbosum</i>	Highbush blueberry	U	U	U			
<i>Viburnum acerifolium</i>	Maple-leaved viburnum		C	U			
<i>Viburnum dentatum</i>	Arrowwood		U	C	U		
<i>Viburnum lantanoides</i>	Hobblebush		U				
<i>Viburnum lentago</i>	Nannyberry	U	U	U	U		
HERBS							
<i>Achillea millefolium</i> *	Yarrow			U			
<i>Ambrosia artemesiifolia</i>	Ragweed			U			
<i>Artemesia vulgaris</i>	Mugwort			U			
<i>Anaphalis margaritacea</i>	Pearly everlasting	U		U			
<i>Aranaria lateriflora</i>	Lateral flowered sandwort			U			
<i>Aralia hispida</i>	Bristly sarsaparilla		C	U			
<i>Aralia nudicaulis</i>	Sarsaparilla	U	C	U	U		
<i>Arisaema triphyllum</i>	Jack in the pulpit		U				
<i>Aster puniceus</i>	P. stemmed aster	U	C	U			
<i>Atriplex prostrata</i>	Orach						
<i>Bidens frondosa</i>	Devils beggar-ticks				U		
<i>Barbarea vulgaris</i> *	Rocket			U			
<i>Boehmeria cylindrica</i>	False nettle			U			
<i>Centarea nigra</i>	Black knapweed			U			
<i>Cerastium fontanum</i> *	Mouse-ear chickweed			U			
<i>Chamaerion angustifolium</i>	Fireweed	U		U			

STRUCTURAL CLASS/Scientific Name	Common Name	Species Occurrence by Community Type					
		W. Pine-Mixed Conifer Forest	R. Oak-N.HW- W. Pine Forest	Shrub & Brush Rangeland	Alder Thicket	Spruce – Fir Cin Fern For.	Mixed Gram. – Forb Sltmarsh
<i>Circaea quadrisulcata</i>	Enchanters nightshade		U	U			
<i>Circuta bulbifera</i>	Water hemlock			U			
<i>Cirsium arvense</i> *	Canada thistle			U			
<i>Clintonia borealis</i>	Blue bead lily	U	U				
<i>Coptis trifolia</i>	goldthread	U	U	U			
<i>Cypripedium acaule</i>	Pink Lady's Slipper	U	U				
<i>Daucus carota</i>	Wild carrot						
<i>Doellingeria umbellatus</i>	Flat-topped aster			C	U		
<i>Epilobium ciliatum</i>	N. willow herb			U	U		
<i>Erigeron annuus</i>	E. daisy fleabane			U			
<i>Eupatorium maculatum</i>	Spotted joe-pyeweed			U	U		
<i>Eupatorium perfoliatum</i>	Boneset			U	U		
<i>Eurybia macrophyllus</i>	Large leaved aster		C	U	U		
<i>Eurybia radula</i>	Rough aster		U	U			
<i>Euthamia graminifolia</i>	Grass-leaved goldenrod			U			
<i>Frageria virginiana</i>	Wild strawberry			U	U		
<i>Galium mollugo</i> *	Bedstraw			U			
<i>Hieracium canadense</i>	Can. hawkweed						
<i>Hypericum canadense</i>	Can. St. Johnswort			U			
<i>Impatiens capensis</i>	Jewelweed	U	U		U		
<i>Impatiens glandulifera</i> *	Himalayan balsam			C	U	U	
<i>Iris versicolor</i>	Blue flag				U		
<i>Lactuca canadensis</i>	Yellow lettuce			U	U		
<i>Leontodon autumnale</i> *	Fall dandelion			U			
<i>Leucanthemum vulgare</i>	Oxeye daisy			U			
<i>Limonium carolinianum</i>	Sea Lavender						U
<i>Linnaea borealis</i>	Twin-flower	U	U	U			
<i>Lobelia inflata</i>	Indian tobacco	U	C	U			
<i>Lycopus uniflorus</i>	Northern bugleweed	U		U	U		
<i>Lysimachia terrestris</i>	Swamp candles		U				
<i>Maianthemum canadense</i>	Canada mayflower	U	C	U	U	U	
<i>Mentha canadensis</i>	Common mint			U			
<i>Mitchella repens</i>	Partridgeberry	U	C	U		U	
<i>Monotropa uniflora</i>	Indian pipe	U	U	U			
<i>Oclemena acuminatus</i>	Whorled aster	U	C	U	U	U	
<i>Oenothera parviflora</i>	N. evening primrose			U			
<i>Oxalis stricta</i>	Yellow wood sorrel		U	U			
<i>Persicaria arifolia</i>	Halberd-leaved tearthumb						

STRUCTURAL CLASS/Scientific Name	Common Name	Species Occurrence by Community Type					
		W. Pine-Mixed Conifer Forest	R. Oak-N.HW- W. Pine Forest	Shrub & Brush Rangeland	Alder Thicket	Spruce – Fir Cin Fern For.	Mixed Gram. – Forb Sltmarsh
<i>Persicaria sagittata</i>	Arrow-leaved tearthumb			U			
<i>Phytolacca americana</i>	Pokeweed		U				
<i>Podophyllum peltatum</i>	Mayapple		U	U			
<i>Potentilla simplex</i>	Five-finger			U			
<i>Prenanthes trifoliolata</i>	Gall of the earth		U				
<i>Prunella vulgaris</i>	Self-heal		U	U			
<i>Ranunculis acris*</i>	Tall buttercup			U			
<i>Rumex crispus</i>	Curled dock			U			
<i>Senecio vulgaris*</i>	Common groundsel			U			
<i>Silene vulgaris*</i>	Bladder campion			U			
<i>Solidago canadensis</i>	Canada goldenrod	U	U	C	U	U	
<i>Solidago gigantea</i>	Tall goldenrod			C			
<i>Solidago juncea</i>	Early goldenrod			U			
<i>Solidago nemoralis</i>	Gray goldenrod			U			
<i>Solidago puberula</i>	Purple-stemmed goldenrod		U	U			
<i>Solidago rugosa</i>	Rough-stemmed goldenrod			C		U	
<i>Solidago uliginosa</i>	Bog goldenrod	U		U		U	
<i>Stellaria media*</i>	Common chickweed			U			
<i>Streptopus lanceolatus</i>	Twisted stalk		U	U			
<i>Solanum dulcamara*</i>	Purple nightshade		U	U	U		
<i>Symphotrichum lanceolatus</i>	White paniced aster	U	C	C	U	U	
<i>Symphotrichum lateriflorus</i>	Calico aster	U	C	C	U		
<i>Symphotrichum novi-belgii</i>	New York aster		U	U			
<i>Symphotrichum undulatum</i>	Wavy leaved aster		C	U	U		
<i>Symplocarpus foetidus</i>	Skunk cabbage		U	U	U		
<i>Taraxacum officinale*</i>	Dandelion			U			
<i>Thalictrum polygamum</i>	Tall meadow rue			U			
<i>Trifolium arvense</i>	Rabbit-foot clover			U			
<i>Trientalis borealis</i>	Starflower	U	C	U			
<i>Trifolium pratense</i>	Red clover			U			
<i>Tussilago farfara*</i>	Coltsfoot		U				
<i>Potentilla simplex</i>	Five-finger			U			
<i>Prenanthes trifoliolata</i>	Gall of the earth		U				
<i>Prunella vulgaris</i>	Self-heal		U	U			

STRUCTURAL CLASS/Scientific Name	Common Name	Species Occurrence by Community Type					
		W. Pine-Mixed Conifer Forest	R. Oak-N.HW- W. Pine Forest	Shrub & Brush Rangeland	Alder Thicket	Spruce – Fir Cin Fern For.	Mixed Gram. – Forb Sltmarsh
<i>Ranunculis acris</i> *	Tall buttercup			U			
<i>Rumex crispus</i>	Curled dock			U			
<i>Verbascum thapsus</i>	Common mullein			U			
<i>Veronica officianalis</i>	Common speedwell			U			
<i>Viola lanceolata</i>	Lance leaved violet		U	U			
<i>Carex debilis</i>	White-edged sedge		U	U			
<i>Carex disperma</i>	2-seeded sedge					U	
<i>Carex intumescens</i>	Swollen sedge			U		U	
<i>Carex scoparia</i>	Broom sedge			U	U		
<i>Carex trisperma</i>	3 seeded sedge					U	
<i>Carex vulpinoidea</i>	Fox sedge			U	U		
<i>Dactylis glomerata</i> *	Orchard grass			U			
<i>Dichanthilium boreale</i>	N. panic grass			U			
<i>Elocharis obtusa</i>	Blunt spike rush			U			
<i>Eleocharis tenuis</i>	Spike rush			U			
<i>Glyceria striata</i>	Manna grass			U			
<i>Juncus bufonius</i>	Toad rush			U			
<i>Juncus effusus</i>	Soft rush				U		
<i>Juncus gerardii</i>	Black grass						C
<i>Juncus tenuis</i>	Path rush			U			
<i>Phalaris arundinacea</i> *	Reed canary grass			U	U		
<i>Phleum pretense</i> *	Common timothy			U	U		
<i>Poa compressa</i>	Canada blue grass			U	U		
<i>Poa palustris</i>	Fowl meadow grass			U			
<i>Scirpus cyperinus</i>	Common wool grass				U		
<i>Scirpus microcarpus</i>	Barber pole bulrush				U		
<i>Spartina alterniflora</i>	Smooth cordgrass						C
<i>Spartina patens</i>	Saltmeadow cordgrass						C
FERNS AND CLUBMOSSES							
<i>Dennstaedtia punctiloba</i>	Hay-scented fern	U	C	U			
<i>Dryopteris spinulosa</i>	Spinulose wood-fern	U	U	U			
<i>Equisetum arvense</i>	Field horsetail			U			
<i>Equisetum sylvaticum</i>	Woodland horsetail	U					
<i>Gymnocarpium dryopteris</i>	Oak fern	U	U	U			
<i>Onoclea sensibilis</i>	Sensitive fern	U	U	U	U	C	
<i>Osmunda cinnamomea</i>	Cinnamon fern	C	U	U	U	C	
<i>Pteridium aquilinum</i>	Bracken fem	C		U			

		Species Occurrence by Community Type					
STRUCTURAL CLASS/Scientific Name	Common Name	W. Pine-Mixed Conifer Forest	R. Oak-N.HW- W. Pine Forest	Shrub & Brush Rangeland	Alder Thicket	Spruce – Fir Cin Fern For.	Mixed Gram. – Forb Sltmarsh
<i>Thelypteris novaboracensis</i>	New York fern		U	U			
<i>Huperzia lucidula</i>	Shining clubmoss		U	U			
BRYOPHYTES							
<i>Cladina sp.</i>	Reindeer lichen	U		U		U	
<i>Leucobrium glaucum</i>	Cushion moss	C		U		U	
<i>Sphagnum spp,</i>	Peat mosses	C	U	C		U	
<i>Usnea hirta</i>	Old man's beard	U		U		U	
<i>Xanthoria sp.</i>	Rock lichen						

Appendix 3. Record of photographs taken during 2015 fieldwork for NRI of Bamford Preserve.

Appendix 3. Record of photographs taken for 2015 Bamford Preserve NRI. Unless otherwise noted, direction of photograph was north.

Pic #	GPS		Description	GPS Coordinates					
	Pt #	Code		Deg N	M	S	Deg W	M	S
1799	146	v	Veg plot	43	59	40.4	69	11	58.0
1800	147	f	Intermittent Stream	43	59	41.4	69	11	58.3
1801	151	f	Vernal pool	43	59	40.8	69	12	0.5
1802	154	v	Veg plot	43	59	41.7	69	12	4.4
1803	155	v	Veg plot	43	59	38.5	69	12	3.6
1804	156	f	Old woods trail, and two large pines	43	59	36.8	69	12	3.9
1805	160	f	Old stone pile - evidence of quarry	43	59	37.9	69	12	4.8
1806	161	f	Large stone wall, rock waste pile	43	59	37.0	69	12	6.5
1807	162	f	Small stream	43	59	38.0	69	12	11.9
1808	164	v	Veg plot	43	59	40.0	69	12	10.7
1809	165	v	Veg plot	43	59	43.0	69	12	10.8
1810	166	f	Vernal pool	43	59	43.5	69	12	12.3
1811	168	f	Old woods trail	43	59	41.0	69	12	4.2
1812	175	v	Veg plot	43	59	39.3	69	11	51.0
1813	178	v	Veg plot	43	59	35.8	69	11	51.1
1814	180	f	Likely vernal pool area	43	59	34.4	69	11	46.8
1815	182	v	Veg plot	43	59	36.2	69	11	46.3
1816	183	f	Small stream in PSS wetland	43	59	37.6	69	11	46.3
1817	186	v	Veg plot	43	59	39.9	69	11	46.2
1818	197	f	Many apple trees	43	59	36.6	69	11	40.2
1819			Shoreline						
1820			Shoreline						
1821	200	v	Veg plot	433	59	38.1	69	11	39.9