HAMPTON FALLS

New Hampshire

NATURAL RESOURCES INVENTORY

2025

Photo credit: Angela Stafford

NATURAL RESOURCES INVENTORY

TOWN OF HAMPTON FALLS

NEW HAMPSHIRE

August 2025

Prepared by:

FB Environmental Associates
Cocheco Mills #3
383 Central Avenue, Suite 267
Dover, NH 03820
www.fbenvironmental.com

Prepared for:
Town of Hampton Falls and
The Hampton Falls Conservation Commission
Hampton Falls Town Hall
1 Drinkwater Rd
Hampton Falls, NH 03844

This project was funded by a PREPA grant from the Piscataqua Region Estuaries Partnership (PREP), with support from the United States Environmental Protection Agency through the Infrastructure Investment and Jobs Act.

Seasons Unfolding

By Susan Burke

A winter storm covers the town with a blanket of snow
Coating the landscape with a brilliant white
Ushering in the season of reflection
The quiet beauty of the season is whispered
From the snow laden trees to the glistening ice covered falls

Slowly, the next season tip toes in, pushing flowers up through the snow
And then retreats… only to come back in
Roaring with a cacophony of sound and kaleidoscope of color
The season of rebirth is here
Trees and shrubs wear their dazzling spring flower coats
Peepers fill the ponds with a never ending symphony
Joined in sweet harmony by the robins, warblers and other feathered travelers.

The landscape starts to mature, turning verdant and lush
The woods and fields, streams and ponds all fill with life
The season of growth is here
Plants double overnight, loving the long days of sunlight
Enticing the hummingbirds and swallowtails to visit
Brilliant sunsets peak through the woods on warm evenings filled with bird song
The town breathes deep, relishing the gifts of the season

The nights cool while the days still brim with warmth
Vibrant colors start to spill across the foliage coating the trees with their autumn glory
The season of harvest is here
The town explodes in apples, pumpkins, tomatoes, and corn
A time for cider, hayrides, mazes and sunflowers that scale the heights
Scores of monarchs, grackles, geese and swallows visit on their fall journey
Just before a quiet starts to fall and the first frost hits
hiding the autumn flowers under crisp sheets of ice

A winter storm covers the town with a blanket of snow…

Seasons Unfolding by Susan Burke is one of the two selected entries from the 2025 Photo and Writing Contest held by the Hampton Falls Conservation Commission to engage the community in fostering connections with the town's natural resources.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS (APPENDIX A)

ABBREVIATIONS

CTC	Connect THE Coast
CWA	Clean Water Act
FBE	FB Environmental Associates
FEMA	Federal Emergency Management Agency
GBNERR	Great Bay National Estuarine Research Reserve
GIS	Geographic Information System
HFCC	Hampton Falls Conservation Commission
LID	Low Impact Design
NFIP	National Flood Insurance Program
NHDES	New Hampshire Department of Environmental Services
NH GRANIT	New Hampshire Geographically Referenced Analysis and Information Transfer
NHFGD	New Hampshire Fish and Game Department
NHWAP	New Hampshire Wildlife Action Plan
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source
NRCS	Natural Resources Conservation Service
NRI	Natural Resource Inventory
NSSP	National Shellfish Sanitation Program
PCBs	Polychlorinated Biphenyls
PCS	Potential Contamination Source
RCCD	Rockingham County Conservation District
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agencies
SELT	Southeast Land Trust
SHEA	Seabrook-Hampton Estuary Alliance
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea Level Rise
SPNHF	Society for the Protection of New Hampshire Forests
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WHPA	Wellhead Protection Area
WWTF	Wastewater Treatment Facility

EXECUTIVE SUMMARY

This natural resources inventory (NRI) report was prepared by FB Environmental (FBE) for the Town of Hampton Falls and the Hampton Falls Conservation Commission to provide a detailed description and analysis of the town's natural resources. This NRI was developed to be useful to all municipal departments as well as the public and serves as a resource for everyone and anyone interested in learning about the community and its natural resources. Results presented herein demonstrate that the Town of Hampton Falls contains abundant, diverse, and valuable natural resources that significantly contribute not only to the ecological richness and biodiversity of the town, but also the quality of life for the community. The natural resources inventory will serve as a tool to help guide future municipal planning and conservation efforts throughout the town.

This NRI is not and should not be viewed as a conservation plan of action. Rather, it is an encyclopedia of information based on the best currently available data, with a measure of interpretation and preliminary recommendations about what is important to conserve from an ecological perspective. The NRI is a baseline characterization and thus marks the beginning of an ongoing process of updates and refinements.

As part of the NRI process, FBE compiled and created relevant Geographic Information System (GIS) shapefiles which provide a means to visualize and further analyze Hampton Falls' natural resources information. These updated shapefiles and metadata have been shared with the town.

Eighteen maps were created to illustrate Hampton Falls' natural resources and character. These maps depict the town's watersheds and surface water resources, geology and groundwater resources and potential pollutant sources, floodplains and sea level rise inundation areas, flood mitigation areas, salt marsh migration projections, water quality impairments and use restrictions, forest resources, prime wildlife habitat and priority areas for conservation, forest soils, soil limitations, prime farmlands, scenic resources, conservation lands and habitats, areas of unfragmented land, and high value resource areas.

The Town of Hampton Falls has experienced steady population growth and development since the 1950s. There are currently over 1,418 acres of conserved land within the town and this number is continuously growing. Much of this conserved land consists of salt marshes and Appalachian oak-pine forests. Conserving these habitats helps preserve important ecosystems and ecosystem functions such as stormwater and flood control and the filtering of pollutants and increases recreation areas and scenic vistas.

Hampton Falls has 12 named streams (Taylor River, Hampton Falls River, Grapevine Run, Browns River, Winkley Brook, Kenney Brook, Clay Brook, Ash Brook, Mill Creek, Hampton River, Old River, and Drakes River) totaling 19 miles of waterways, and almost 40 miles of unnamed streams. Many of these begin as freshwater headwater streams or tributaries that become brackish as they approach harbors or the Atlantic Ocean. There are also 102 acres of ponds and reservoirs in Hampton Falls. The largest, the Taylor River Reservoir, spans 24 acres on the northeastern boundary of Hampton Falls, with the rest of the reservoir occurring within the Town of Hampton. The Dodge Ponds, in the south near the Hampton Flats of the Hampton-Seabrook salt marsh, cover 21 acres. The major wetland systems in Hampton Falls are associated with the tides of Hampton Harbor, or surround major streams. With an estimated 1,035 acres of freshwater wetlands and 1,087 acres of saltwater wetlands in Hampton Falls, the salt marshes serve a crucial role as an interface between Hampton Harbor and upland ecosystems. Beyond their ecological significance, Hampton Falls' wetlands and floodplains provide flood storage and stabilization in addition to supporting the vital functions of pollutant attenuation and wildlife habitat. These areas will help lessen the impacts of sea level rise, increasing storm intensity, and the overall effects of climate change.

Drinking water in Hampton Falls is supplied entirely by groundwater resources, mostly through the use of on-site domestic water wells. A small portion of this water is drawn from a stratified drift aquifer that covers 195 acres of the town. Eleven public water supply wells support local businesses and are located within state-designated wellhead protection areas covering 28% of the town. These areas help safeguard water quality, and future planning includes potential development of a municipal water system along Route 1.

In 2020, the New Hampshire Fish and Game Department (NHFGD) conducted a habitat condition analysis to identify areas of highest habitat and ecologically intact areas, which are identified in this NRI as "Prioritized Habitat Blocks". The four contiguous prioritized habitat blocks identified are: Hampton Flats, Upper Taylor River, Taylor River and The Cove (east of NH Route 88), and Taylor River and The Cove (west of NH Route 88, which is a portion of the Great Brook/Exeter River confluence habitat block). Additionally, FBE conducted a co-occurrence analysis by compiling a variety of data layers and completed a detailed analysis to identify areas with high natural resource values - a high density of natural resources. Sixteen types of resources were included in the analysis and resulted in identifying six areas of high natural resource co-occurrence values. In most cases, these six areas overlap the four identified by the Prioritized Habitat Blocks. Combined, these areas will be referred to as "Priority Conservation Areas."

The Priority Conservation Areas encompass much of the town's mapped wetlands and streams and areas mapped as part of NHFGD's 2020 Wildlife Action Plan which identified them as valuable habitat, in addition to larger areas of unfragmented land, some of which are already protected. In total, the NHFGD Prioritized Habitat Blocks cover approximately 3,081 acres or 38% of Hampton Falls, and the high natural resource co-occurrence areas (values of 8 or greater) span approximately 632 acres or 8% of the town.

The greatest threats to the natural resources and ecology of the Town of Hampton Falls include habitat loss, invasive species, and the impacts of climate change and sea level rise modifying the landscape in the southeastern parts of the town. Incorporating considerations of the threats faced by natural resources into town planning and decision-making processes will aid Hampton Falls in devising strategies to protect these resources, strengthen the community's resiliency, and enhance existing protection and management efforts. It's important to note, however, that preservation of entire Priority Conservation Areas is not feasible. Many of the mapped areas are privately-owned lands that contribute, through taxes, to the economic stability of the town. Rather, a balanced approach to conservation and development which incorporates a suite of land use planning and conservation tools is recommended, as careful attention to growth in Hampton Falls will help to ensure sound stewardship of the town's natural resources.

1. INTRODUCTION

1.1 NATURAL RESOURCES INVENTORY DEFINED

A natural resources inventory (NRI) is a document that identifies and describes important naturally occurring resources within a given locality via written descriptions of resources, maps, and associated documentation of mapped data. A comprehensive NRI provides the basis for land conservation planning and facilitates the incorporation of natural resources information into local land-use planning and zoning. An NRI can be useful to (Stone, 2001):

- Document current conditions so that changes over time can be assessed
- Educate local officials and the public regarding a community's natural resources
- Identify and protect important fish and wildlife habitat
- Develop or update the Natural Resources section of a town's Master Plan
- Develop amendments to existing zoning ordinances
- Develop a Conservation Plan
- Initiate and support land protection efforts
- Provide a basis for land use planning efforts
- Preliminarily evaluate effects of proposed land use and zoning changes
- Screen development proposals

An NRI is a tool to help achieve some of the goals listed below. While an NRI is useful in the planning process, it is generally not suitable for site-specific issues. An NRI may be used as a screening tool by identifying areas where site-specific assessments may be required (Stone, 2001).

As new and revised information emerges, NRIs may need periodic updating and refining, but the initial NRI provides a baseline for observing changes over time (Stone, 2001).

1.2 RATIONALE

To protect local natural resources, they must first be located and identified. Until an NRI is conducted, and the information is compiled, a given community will not have a clear picture of all the resources present, where resources are located, and which are significant to them, and why.

Land use decisions made at the local level have a large role to play in the fate of natural resources at the local scale. Communities frequently need to make decisions affecting natural resources, but very often don't have adequate information about those resources available to back those decisions. By identifying and describing natural resources in a local setting, an NRI provides communities with a strong foundation for more informed decision-making. It also encourages participation in identifying and protecting natural resources important to the community and provides information that will support careful land use planning, voluntary land conservation, and improved natural resource protection measures.

By compiling geospatial information and creating maps and their associated data tables and descriptions, an NRI helps a community visualize its natural resources geographically, enabling a better understanding and appreciation of the community's natural resources in combination with the human infrastructure and community resources they rely on (Stone, 2001).

1.3 GOALS OF THE HAMPTON FALLS NATURAL RESOURCES INVENTORY

- ✓ Build relevant reports, plans, and studies regarding natural resources in Hampton Falls into the NRI
- ✓ Map and describe significant natural resources in the Town of Hampton Falls
- ✓ Identify the threats and pressures natural resources are facing
- ✓ Educate the public and local officials regarding Hampton Falls' natural resources and potential threats
- ✓ Promote the conservation, protection, and responsible management of the natural resources of the town
- ✓ Protect the town's water quality, surface waters, wetlands, and groundwater resources
- ✓ Identify areas of ecological value and habitat corridors that cross town boundaries
- ✓ Protect the natural ability of the landscape to withstand flooding and other changes due to climate change
- ✓ Maintain recreational opportunities through protection, appropriate management, and interconnection of conserved areas

1.4 GENERAL METHODOLOGY

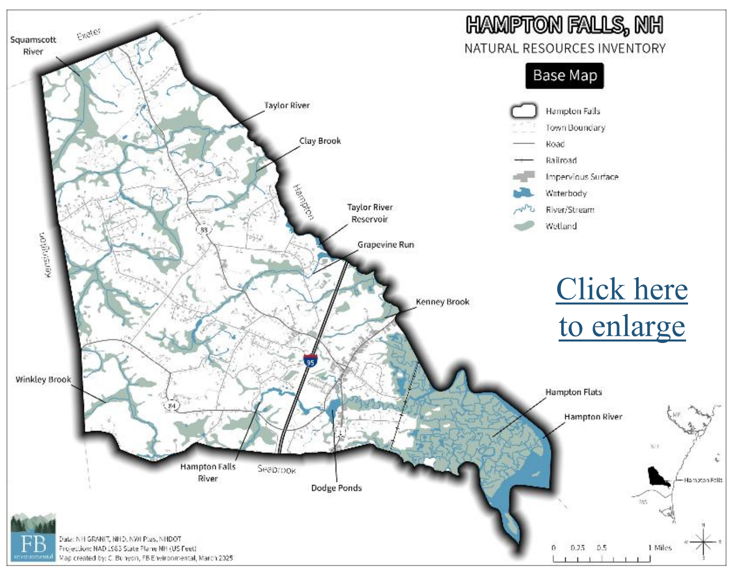
This town-wide natural resources inventory is based on the methodology outlined in Natural Resources Inventories – A Guide for New Hampshire Communities and Conservation Groups by the University of New Hampshire Cooperative Extension (Stone, 2001). The following sections of this document describe the types of natural resources and potential threats to the different natural resources found in the Town of Hampton Falls. Geographic Information System (GIS)-based data and maps related to each resource are presented in Appendix A. For each category of natural resource (e.g., water and geologic resources, wildlife and habitats) included in this document, a description of the resource category and its extent in the town is provided, as well as any known or potential threats to that resource. Discussion of the important natural resources that should be prioritized for long-term protection and recommendations for improving conservation and protection measures for the identified resources are also provided.

1.5 DISCLAIMER AND DATA LIMITATIONS

Much of the data utilized in this NRI is comprised of stock data sets obtained from the state GIS clearinghouse, NH GRANIT. Many of these data layers were created from remotely sensed data (e.g., aerial photography, digital orthophotos, satellite images) and large landscape-level mapping projects. As a result, the data layers are intended to be viewed at certain scales (generally 1:24,000/1:25,000) and have specific accuracy levels. NH GRANIT maintains a continuing program to identify and correct errors in these data but makes no claims as to the validity or reliability, or to any implied uses of, these datasets. As a result, **the data presented herein should be used for planning purposes only.** If greater data precision is required, this inventory should be supplemented with field surveys or other on-the-ground methods of data collection.

There may also be minor data discrepancies throughout this document due to the variety of source materials and mapping standards used. The reader is encouraged to refer to the original referenced sources if specific data inconsistencies need to be resolved. Geographic Information System (GIS) data presented in the maps within Appendix A represents the best currently available data and information at the time of data collection (2025). The Hampton Falls Conservation Commission and Seabrook-Hamptons Estuary Alliance (SHEA) provided the Conservation Parcel data, which was more up to date than the NH GRANIT data layer.

1.6 PROJECT AREA



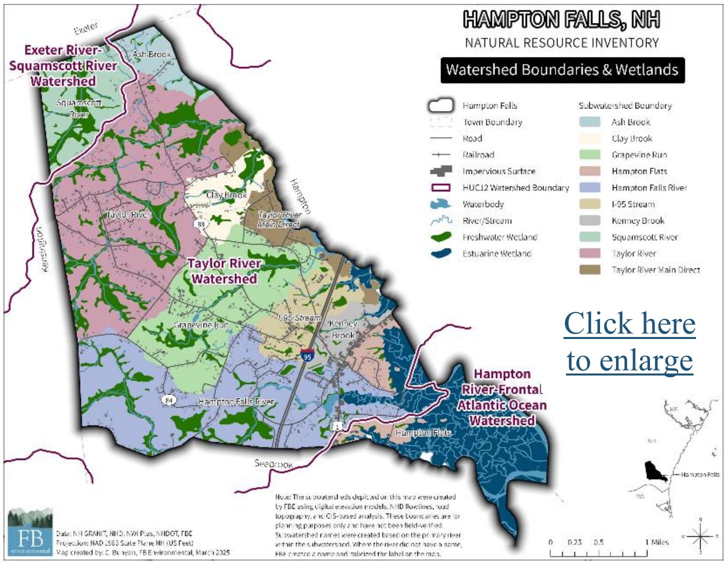
Hampton Falls is situated within New Hampshire's Seacoast Region near the intersection of Interstate 95 and NH Route 101. Hampton Falls is bordered by Hampton from the northeast, Exeter from the northwest, Kensington from the west, and Seabrook from the south. Encompassing 8,078 acres (approximately 12.5 square miles) in Rockingham County, Hampton Falls contains roughly 1,097 acres of estuarine and salt marsh habitat, several farms, and large, unfragmented blocks of forested land (Appendix A, Map 1). According to 2022 census data, the population of Hampton Falls reached 2,411, an increase of 175 individuals or 8% over the 2010 population of 2,236, but is relatively low compared to other nearby seacoast towns. Hampton Falls' charming and historic community attracts visitors with its natural beauty, open landscapes, and rural character. The town offers many recreational opportunities such as trail walking, bird watching, fishing, and cycling. Outdoor enthusiasts enjoy exploring the area's scenic trails, visiting local farms, and participating in community events that celebrate Hampton Falls' unique blend of history and natural beauty.

2. WATER AND GEOLOGIC RESOURCES

Water resources including both surface waters and groundwater resources are some of a community's most valuable assets. Most drinking water sources – whether public or private – depend on subsurface water in sand and gravel aquifers or bedrock. Wetlands, both estuarine and freshwater, provide habitat for a diverse array of wildlife, provide flood storage and resilience, and protect both water quantity and water quality. Surface waters and their floodplains also offer flood attenuation, wildlife habitat, and recreation, and are key scenic resources. These aspects of Hampton Falls' water resources are discussed in detail below.

2.1 MAJOR WATERSHEDS

Precipitation hitting the land surface will either seep below the soil as groundwater or flow downhill as runoff, until it reaches a water body. This journey is part of the larger context of a watershed, which is a unit of the land surface formed by topographic divides directing water toward a given water body. Rain falling on one side of the divide drains into one water body, while rain falling on the other side of the divide drains to a different water body, and each water body has its own watershed. Watersheds can be identified and mapped by tracing a line along the highest elevations, often along high points and ridgelines. Activities, impacts, or changes on the landscape within a given watershed are passed downstream by the water flowing through or across the watershed that reaches the receiving waterbody.



The majority of Hampton Falls lies within the Taylor River watershed, identified by the US Geological Survey (USGS) as Hydrologic Unit Code (HUC) 10600031003. A small portion in the northwestern area of Hampton Falls is part of the Exeter River – Squamscott River watershed (HUC ID: 10600030805), and the southeastern tip of the town is part of the Hampton River – Frontal Atlantic Ocean watershed (HUC ID 010600031005). Within these drainages, FBE delineated the following 10 sub-watersheds using ArcGIS analyses: Taylor River, Hampton River, Grapevine Run, Squamscott River, Hampton Flats, Taylor River Main Direct, Clay Brook, Ash Brook, I-95 Stream, and Kenney Brook (Appendix A, Map 2). A list of established management plans for some of Hampton Falls' waterways can be found in Table 1.

Table 1. Established management plans for waterways in Hampton Falls.

Report	Organization	Date	Link
Hampton-Seabrook Estuary Management Plan	Seabrook-Hampton Estuary Alliance	2023	Report
Exeter-Squamscott River Watershed Management Plan - Update	Exeter-Squamscott River Local Advisory Committee	2022	Report
NH's Coastal Watershed Conservation Plan	The Nature Conservancy	2021	Report
Hampton-Seabrook Estuary Restoration Compendium	University of New Hampshire	2009	Report

2.2 SURFACE WATERS AND WETLANDS

2.2.1 PONDS AND STREAMS

Ponds and streams are key elements of aquatic ecosystems that provide valuable habitat for fish, wildlife, and plants, as well as important recreational opportunities including swimming, boating, and fishing. These values depend on good water quality, which can be threatened by certain human activities in the surrounding watershed. Ponds are sensitive to the nutrients they receive from waters that drain their watersheds. Nutrients are needed for natural growth, but excessive nutrients, especially phosphorus, can encourage excessive growth of algae and cyanobacteria in ponds, a process known as eutrophication.

Hampton Falls contains 102 acres of waterbodies classified as "Lake/Pond" or "Reservoir" comprising approximately 1.3% of the town's total area. The largest of these is the Taylor River Reservoir, which serves as the boundary between Hampton Falls and Hampton west of Interstate 95. The reservoir spans almost 53 acres, with just under half (24 acres) lying within Hampton Falls. The second largest waterbody, the Dodge Ponds, collectively covers 21 acres in the southern portion of the town—from the west side of US Route 1 to just west of the I-95—and is located along the Hampton Falls River.

Hampton Falls is also home to 58 miles of mapped streams, both freshwater and tidal. The majority of streams in Hampton Falls drain to Hampton Harbor. Some small streams are not included in the above estimate because they are not mapped. Intermittent streams, which carry water for only a portion of the year, are often too small to be captured in regional mapping studies. Mapped or not, streams and their adjacent riparian corridors are important habitat and travel corridors for the town's terrestrial and aquatic wildlife. In addition, many bird species are attracted to water and the food sources that are located nearby. There are twelve named watercourses in Hampton Falls (Table 2) and numerous miles of additional unnamed streams in the town.

The State of New Hampshire uses a stream order system to classify rivers and streams. Stream order is a method for classifying the relative location of a stream reach within the larger river system. Streams that have no branches are designated as first-order streams. When two first order streams come together, they form a larger, second-order stream. When two second-order streams come together, they form a larger, third-order stream, and so on (See illustration below, Figure 1).

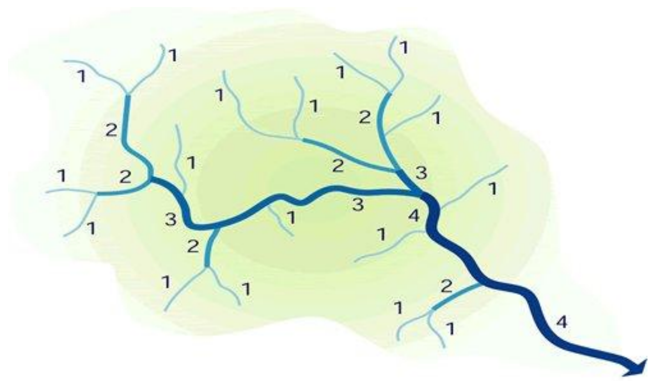


Figure 1. Illustration of the stream order system used in New Hampshire (USEPA, n.d.)

Fourth order and higher streams are protected under the NH Shoreland Water Quality Protection Act. Headwater Streams (first-order streams) that have a watershed area of less than one square mile are considered "primary" headwater streams. The health of larger streams, rivers, and other surface waters downstream in a watershed, depends in part upon an ecologically healthy and functioning primary headwater stream network. Headwater streams are particularly important for maintaining water quality due to the sheer number of square miles that drain into them in most watershed drainage systems, and their ability to attenuate contamination if they are conserved. In Hampton Falls, headwater streams account for 64% of total mapped stream miles (see Appendix A Map 1 and Table 2).

Table 2. Order and length of named watercourses in Hampton Falls, NH. Watercourses marked with an * indicate primary streams with watershed areas less than one square mile.

Watercourse Name	Stream Order	Length in Hampton Falls (miles)
Taylor River	3–4	7.2
Hampton Falls River	1, 3	4.6
Grapevine Run	2, 4	2.0
Browns River	2	1.8
Winkley Brook	2	1.3
Kenney Brook	1	0.9
Clay Brook	2, 4	0.7
Ash Brook	2	0.3
Mill Creek	2	0.2
Hampton River	4	0.1
Old River	2	<0.01
Drakes River	3	<0.01
Unnamed Streams *(some)	1–3	40.0

If adequately conserved, primary headwater streams protect the quality and value of larger streams, rivers, lakes, and estuaries. The benefits provided by primary headwater streams include reduction of sediment delivery downstream, reduction in nutrient loading (nitrogen and phosphorus), flood storage and control, and aquatic habitat. Primary headwater streams and their adjacent vegetation provide areas for wildlife habitat and add protection for fish and other animals living in the primary headwater streams and the larger streams into which they feed (Ohio EPA, 2015).

Disruption of the hydrologic and biological processes in primary headwater streams has cumulative impacts on the health of the entire river system. Properly functioning primary headwater streams can help sustain base flow (the amount of stream flow which is maintained between precipitation or snow melt events) downstream in times of drought. They are also critical determinants of overall river system health (Ohio EPA, 2015). Maintaining good water quality in headwater streams is essential for watershed health.

2.2.2 FRESHWATER AND TIDAL WETLANDS

Wetlands are an integral part of Hampton Falls' natural resources. They remove excess nutrients and sediment from water, slow the flow of and store floodwaters, promote groundwater infiltration, and provide habitat for a vast array of vegetation and wildlife. Wetlands also provide recreational, educational, and research opportunities while adding to the visual resources of the town (US Fish & Wildlife Service, 2021).

The National Wetlands Inventory (NWI) administered by the United States Fish and Wildlife Service (USFWS) is the most important national-scale data source for wetland maps and classifications. The principal types of wetlands with standing water in the spring have been mapped from aerial photos and can be easily viewed, downloaded, and shared online as GIS files. The resulting NWI maps contain errors of omission (and less frequently, errors of commission) and therefore do not depict all wetlands in a given area, as some are not easily detected by examining aerial imagery, especially small wetlands and vernal pools. Vernal pools are seasonal depressional wetlands that typically fill during the spring or fall. They are often small and under forest canopy which makes them difficult to detect on aerial imagery. Therefore, it is likely that NWI maps underestimate the number of

Wetland Types Defined

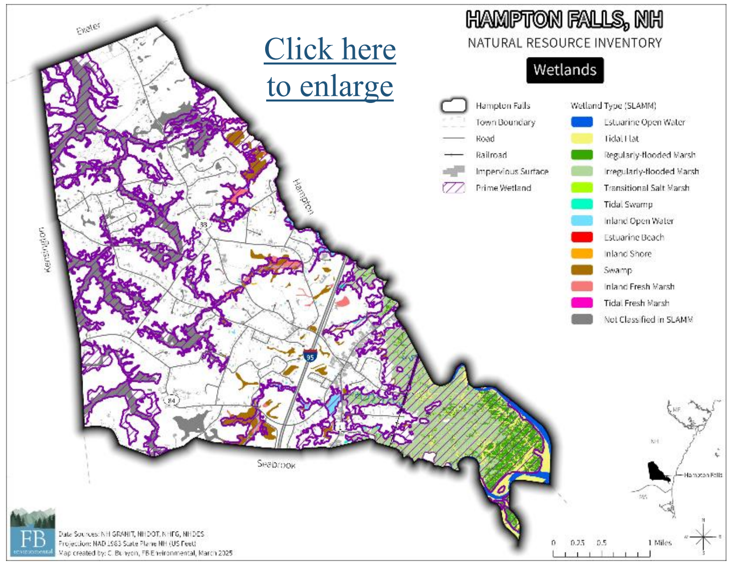
Palustrine: Non-tidal, freshwater, wetlands dominated by emergent and woody vegetation (trees, shrubs, ferns, forbs, mosses, or lichens). Or, wetlands that contain the following: (1) < 20 acres, (2) lacking active wave-formed or bedrock shoreline features, (3) water depth is < 8.2 ft, and (4) salinity from ocean-derived salt water is < 0.5 ppt.

Lacustrine: Wetlands that are located in a topographic low point, contain ≤ 30% of emergent vegetation, and are ≥ 20 acres. If active wave-formed or bedrock shoreline features are present or the maximum water depth is > 8.2 ft, a wetland < 20 acres can be classified as Lacustrine. These wetlands can be either tidal or non-tidal as long as salinity concentrations from ocean waters are < 0.5 ppt.

Estuarine: Deepwater tidal habitats semi enclosed by land with unobstructed or sporadic access to an open ocean. Estuarine waters consist of mixing freshwater and marine waters.

Marine: Areas of open ocean exposed to wave action and tidal fluctuations. Salinity concentrations are > 30 ppt. Examples include shallow bays and coasts with exposed rocky islands.

(US Fish & Wildlife Service, 2021)



wetlands in Hampton Falls. While these inaccuracies are known to exist in NWI data, the NWI maps are nevertheless very useful in serving as a baseline reference to locate wetlands.

Hampton Falls features a diverse range of wetland types, including palustrine, lacustrine, estuarine, and marine wetlands (see inset to the right). The town contains approximately 2,208 acres of mapped wetlands, accounting for about 27% of its total area (see Table 2 and Appendix A, Map 3). These wetlands are nearly evenly divided between saltwater (1,087 acres) and freshwater (1,035 acres). See Section 4.1.2 for a description of hydric soils in Hampton Falls.

Wetlands in the United States are typically classified using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin, Carter, Golet, & LaRoe, 1979). This water resource classification system was developed by the USFWS and is commonly referred to as the "Cowardin Classification" (Appendix B, Table 3). The Cowardin Classification is used to define wetlands and other aquatic resources by their landscape position, cover type, and hydrologic regime. Special modifiers can be added that describe water regime/chemistry, soil types, or disturbances.

For the purpose of this document, wetlands are grouped according to the Cowardin System, Subsystem, and Class. Note however that in the section below, wetlands appearing on New Hampshire Wildlife Action Plan (NHWAP) maps are simplified and combined as one of five categories – Floodplain Forests, Northern Swamps, Temperate Swamps, Peatlands, Marsh and Shrub Wetlands.

Table 3. Hampton Falls, New Hampshire wetlands and associated Cowardin classifications.

Cowardin Classification	Acres	Percent Total Wetland Area
Estuarine Subtidal Unconsolidated Bottom (E1UB)	105	4.8%
Estuarine Intertidal Emergent (E2EM)	813	37%
Estuarine Intertidal Unconsolidated Shore (E2US)	169	7.6%
Limnetic Aquatic Bed (L1AB)	2.4	2.4%
Limnetic Unconsolidated Bottom (L1UB)	14.8	15%
Persistent Aquatic Bed (PAB)	25.1	1.1%
Persistent Emergent (PEM)	292	13%
Palustrine Forested (PFO)	451	20%
Palustrine Scrub/Shrub (PSS)	292	13%
Semi-permanently Flooded Ponds (PUB)	20.8	0.8%

Cowardin Classification	Acres	Percent Total Wetland Area
Riverine Lower Perennial Aquatic Bed (R2AB)	1.5	0.1%
Riverine Lower Perennial Unconsolidated Bottom (R2UB)	20.8	0.9%
Riverine Intermittent Streambed (R4SB)	3.1	0.1%
Total	**2,208**	**100%**

2.2.3 VERNAL POOLS

The authoritative resource on the science and conservation of vernal pools is provided by Calhoun and Klemens (2012) *Best development practices: conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States.* They give the following description of vernal pools:

> ...seasonal bodies of water that attain maximum depths in spring or fall and lack permanent surface water connections with other wetlands or water bodies. Pools fill with snowmelt or runoff in the spring, although some may be fed primarily by groundwater sources. The duration of surface flooding, known as hydroperiod, varies depending upon the pool and the year; vernal pool hydroperiods range along a continuum from less than 30 days to more than one year (Semlitsch, 2000). Pools are generally small in size (< 2 acres), with the extent of vegetation varying widely. They lack established fish populations, usually as a result of periodic drying, and support communities dominated by animals adapted to living in temporary, fishless pools. In New Hampshire they provide essential breeding habitat for one or more wildlife species including Ambystomatid salamanders (*Ambystoma* spp., called "mole salamanders" because they live in burrows), wood frogs (*Lithobates sylvaticus*), and fairy shrimp (*Eubranchipus* spp.).


Photo Credit: Sara McNamara-Gagnon

Vernal pools can either be stand-alone (referred to as "classic" vernal pools) or part of larger wetland complexes (e.g., an area of pooled water in a large, forested wetland). The pools and their adjacent terrestrial habitat contribute significantly to the overall biodiversity of Northeastern landscapes. They support large quantities of frogs that serve as the base of the food chain. Even though vernal pools typically cover a small area, they provide numerous important functions including flood water detention, aquifer recharge, nutrient cycling, and denitrification. However, due to their small size and seasonality, vernal pools are often overlooked or discounted and are therefore disproportionately impacted by development, notably suburban sprawl (Klemens, Davison, & Oko, 2012).

Vernal pools undoubtedly exist and have been identified in Hampton Falls. As of the writing of this report, however, there have been no formal efforts to survey and map vernal pools throughout the town except when development is proposed, and wetlands are mapped by the applicant's wetland scientist. However, the Hampton Falls Conservation Commission holds Vernal Pool Walk & Talks to educate community members on how to identify vernal pools. The Conservation Commission also submits vernal pool information to the NHFGD including vernal pool species. Additionally, they have asked property owners to let the town know if their property contained a potential vernal pool.

2.2.4 PRIME WETLANDS

In New Hampshire, towns have the discretion to designate certain wetlands in town as "Prime Wetlands" through a review and assessment process regulated by the New Hampshire Department of Environmental Services (NHDES). This designation affords high-functioning and highly valued wetlands additional protection. NHDES' Prime Wetlands in New Hampshire Communities webpage (Bennett, 2012) provides the following description:

> Under New Hampshire law (RSA 482-A:15 and administrative rules Env-Wt 700), individual municipalities may elect to designate wetlands as "prime wetlands" if, after thorough analysis, it is determined that high-quality wetlands are present. Typically, a wetland receives this designation because of its large size, unspoiled character, and ability to sustain populations of rare or threatened plant and animal species. Field and "desktop" data are used for the evaluation process.
>
> After high-value wetlands are identified, the municipality holds a public hearing before the residents of the community to vote on the designation. Once the municipality approves the wetlands for designation as prime, the municipality provides to the Department of Environmental Services (DES) Wetlands Program a copy of the study and tax maps with the designated prime wetlands identified. DES reviews the submission from the municipality to ensure that it is complete and in accordance with Env-Wt 702.03.
>
> Once the town's prime wetland submission is considered complete and approved, DES will apply the law and rules that are applicable to any future projects that are within the prime wetland or the 100-foot prime wetland buffer.

There are currently 33 towns in New Hampshire that have designated prime wetlands. This designation provides a means by which these towns can provide additional protection to wetlands that are particularly unique or sensitive to disturbance by restricting construction or earthwork in or within 100 feet of these resources. In 2008, Hampton Falls designated 1,270 acres of prime wetlands, approved by a town vote, not including the approximately 978 acres of the Hampton Falls Salt Marsh.

Table 4 shows the wetland complexes selected for Prime Wetland designation by the town (Hampton Falls Conservation Commission, 2023).

Table 4. Prime wetlands identified in Hampton Falls by Gove Environmental Services, Inc. (2006) and voted by the town in 2008.

Wetland Complex		Acres
Hampton Falls Salt Marsh*		(~ 978)
Taylor River Complex (Central)		244.9
Taylor River Complex (West)		221.4
Winkley Brook Complex		208.4
The Cove Complex		186.9
Taylor River Headwaters Complex		141.5
Grapevine Run Headwaters		113
Dodge Ponds Complexes		73.5
Grapevine Run Complex		40.7
Hampton Falls River Complex		40.5
	Total*	**1,270**

*The Gove Environmental Services, Inc. (2006) report did not break up the acreage of the salt marsh by town. The 978-acre value is based on the area displayed in the NHDES Wetlands Permit Planning Tool, which is a rough approximation of the marsh's true boundaries.

2.3 BEDROCK, SURFICIAL GEOLOGY AND SAND AND GRAVEL RESOURCES

2.3.1 BEDROCK GEOLOGY

Bedrock geology describes the solid rocks underlying the looser and softer soils, sediments, and deposits at the Earth's surface. A region's bedrock sets the template for the formation of the soils, surficial geology, rivers, lakes, and other features of the landscape. Over eons, bedrock, along with the shallow deposits of materials left by the retreating glaciers mixed with oceanic elements, is weathered and transformed into soil. For this reason, geologists term the underlying rocks the "parent material" of soils.

The bedrock underlying Hampton Falls is metamorphic, formed through the transformation of older rocks by intense heat, pressure, or mineral-rich fluids (USGS, n.d.). The Kittery Formation, which dominates the bedrock in the town, resulted from the convergence of quartz-feldspar granitic gneiss and pegmatite, producing migmatite. Other formations present in Hampton Falls include the Eliot Formation, Exeter Diorite, and Newburyport Complex.

2.3.2 SURFICIAL GEOLOGY

Surficial geology describes the looser rocks and unconsolidated materials that lie above bedrock and below the ground surface. Understanding surficial geology is important because the characteristics of materials below the Earth's surface influence soils, water resources, and the feasibility of constructing buildings, utility lines, and roads. Materials deposited by running water typically consist of sand and gravel carried into valleys and other low-lying areas.

Between 10,000 and 15,000 years ago, the land area of New Hampshire emerged from the last ice age. The melting and receding ice caused dramatic changes in the landscape. Mountains were rounded by glacial erosion. Chunks of bedrock were picked up and dragged for miles, then left behind as large glacial boulders, called erratics. When the glaciers receded, the rock and debris frozen within the ice were left behind in various formations, depending largely upon the speed at which the glacier receded and how much melting water was flowing from the glacier. These formations contain various sized particles and are classified by the shape of formation, the thickness, and the type and size of particles found (Goldthwait, Goldthwait, & Goldthwait, 1951).

Streams and rivers flowing from the melting glaciers formed the stratified drift aquifers (layered sand and gravel) now used for many water supply wells. Stratified drift aquifers have been surveyed statewide by the USGS using drilling and data extrapolation methods (Mack & Lawlor, 1992). Transitioning to finer materials such as silts and clays, these materials were deposited in still or slow-moving water in marshes, lakes, ponds, and bays. The pattern of a general northwest to southeast direction of the receding glaciers over 12,000 years ago can be seen today in most of New England (Billings, 1980). This process formed the rivers, lakes, and wetlands that we see today.

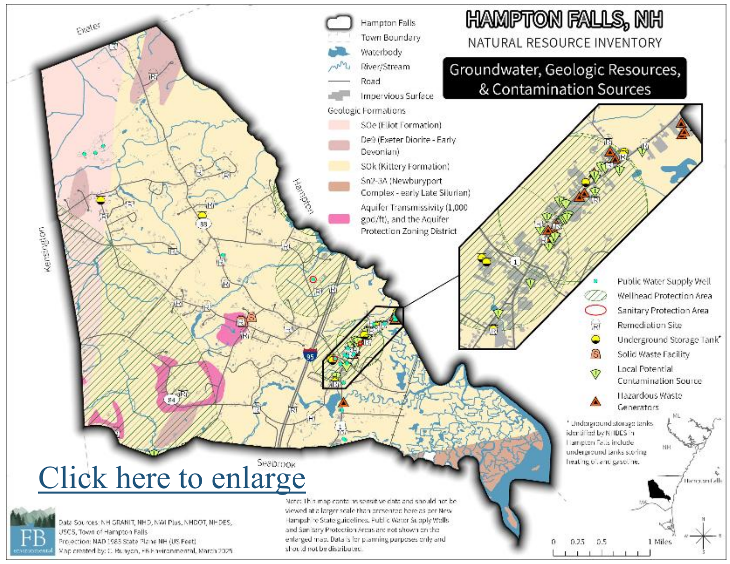
Along with bedrock, surficial geology and deposits commonly determine soil composition and therefore may affect agricultural viability. Sections 4.1 Soils of Special Importance and 2.4.1 Aquifers & Groundwater provide more details on some of the natural resources in Hampton Falls that are influenced by the area's surficial geology. Further details about New Hampshire geology are available at *www.nhgeology.org*.

2.3.3 SAND AND GRAVEL RESOURCES

According to Google Earth imagery (7/27/24), there are no active sand or gravel pits in the Town of Hampton Falls though sand and gravel distributors are present. Sand and gravel extraction operations remove vegetation from target parcels of land to extract the underlying geologic resources. If improperly managed, this process can contribute to erosion and sedimentation of nearby waterways. There are four areas identified by the USGS's open-source soil data platform, the Web Soil Survey, as "pits, sand and gravel" in Hampton Falls; however, inspection via Google Earth imagery revealed the areas are forested, farmland and/or developed and that no open excavation is present.

2.4 AQUIFERS, GROUNDWATER, WELLS, AND WELLHEAD PROTECTION AREAS

2.4.1 AQUIFERS AND GROUNDWATER



Click here to enlarge

An aquifer is a geologic unit or formation, such as sand and gravel deposits or fractured bedrock, that contains a usable supply of water. A stratified drift aquifer consists mainly of layers of sand and gravel, which are saturated and can yield water to wells or springs. In New Hampshire, stratified drift aquifers are the most productive in supplying large-volume water needs such as public water supply wells (Medalie & Moore, 1995). Based on GIS data obtained from NH GRANIT, approximately 195 acres (2% of Hampton Falls) of Hampton Falls' total land area is underlain by stratified drift aquifers. A key measure of an aquifer's ability to supply water is transmissivity, the rate at which water can pass through the entire saturated thickness of the aquifer (ft^2/d). In Hampton Falls, the stratified drift aquifers have a transmissivity of approximately 1,000 ft^2/day. Although this is lower than that of some other aquifers in the state—limiting the volume of water that can move through the subsurface—these aquifers remain important to groundwater availability, well productivity, and the recharge and storage of groundwater. They also support ecological balance by sustaining wetland systems and maintaining base flow in rivers and streams. The four areas of aquifer transmissivity in Hampton Falls are all found west of I-95; one along Drinkwater Road, one along NH Route 84 (Kensington Road), and two north of NH Route 107 near the Seabrook Water Department (Appendix A, Map 4). The Kittery Formation (SOk) is the source of groundwater for 24 public water supply wells, while the Eliot Formation (SOe) is the source for four public supply wells. Also identified in Appendix A, Map 4, are state-designated Groundwater Classification Areas represented by transmissivity. These areas, with a transmissivity greater than 1000 gpd/ft, are all classified by the NHDES as class GA2, or "high-yield stratified drift aquifers mapped by the USGS that are potentially valuable sources of drinking water" (NHDES, The New Hampshire Groundwater Protection Act: RSA 485-C, An Overview., 2020).

2.4.2 WELLS AND WELLHEAD PROTECTION AREAS

Drinking water in Hampton Falls is supplied entirely by groundwater resources, mostly through the use of on-site domestic water wells (Town of Hampton Falls, 2019), although the Seabrook Water Department supplies water to 35 residences near the Seabrook town border. Additionally, there are 11 wells in Hampton Falls that qualify as "public water systems" under RSA 485:1. These systems are classified as non-community, transient systems by the New Hampshire Water Supply Engineering Bureau, and each draws water from its own well to serve surrounding businesses (Town of Hampton Falls, 2019).

Eleven public water supply wells in Hampton Falls are located within state-designated wellhead protection areas (WHPAs), which extend beyond the sanitary radius to include the broader area from which groundwater flows to each well (Appendix A, Map 4). These WHPAs cover approximately 28% of the town's total area. Designed to safeguard drinking water sources from contamination, WPHAs play a critical role in protecting water quality, public health, and avoiding the increased costs associated with additional water treatment.

NHDES supports communities in protecting groundwater supplies by offering grants and technical assistance. Their preferred strategy emphasizes the permanent conservation of "sensitive areas immediately around public water supply wells." In addition to land conservation, groundwater protection is strengthened by managing land use activities through best management practices (BMPs) and by restricting high-risk activities within WHPAs using local regulations (NHDES, 2015).

2.4.3 SOURCES OF CONTAMINATION

The US Clean Water Act (CWA) categorizes sources of pollutants such as nutrients into two major groups: point source pollution and nonpoint source (NPS) pollution. Point sources are regulated under the CWA's National Pollutant Discharge Elimination System (NPDES) permit program. This section describes these two types of pollution, their key contributing sources, and the process of regulating and controlling pollutants.

Point Source Contamination Sources

Point source pollution can be traced back to a specific source such as a discharge pipe from an industrial facility, municipal treatment plant, permitted stormwater outfall, or a regulated animal feeding operation, making this type of pollution relatively easy to identify. According to the CWA and Regulations of Connecticut State Agencies (RCSA) § 22a-426-1-9, point sources are defined as follows:

> *"Point source means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture."*

Section 402 of the CWA requires all such point source discharges to be regulated under the NPDES program to control the type and quantity of pollutants discharged. NPDES is the national program for regulating point source pollution through issuance of permit limitations specifying monitoring, reporting, and other requirements under Sections 307, 318, 402, and 405 of the CWA.

The NHDES operates and maintains the OneStop database and data mapper which houses data on Potential Contamination Sources (PCS) within the State of New Hampshire. Identifying the types and locations of PCS within the watersheds may help identify sources of pollution and or areas to target for restoration efforts. Within Hampton Falls, these data identify potential sources of pollution to both surface water and groundwater resources. See Appendix F and Appendix A, Map 4 for potential point sources of pollution in Hampton Falls.

Non-point Source Contamination Sources

Fertilizers: When lawn and garden fertilizers are applied in excessive amounts, in the wrong season, or just before heavy precipitation, they can be transported by rain or snowmelt runoff to wetlands, streams, and other surface waters where they can promote cultural eutrophication and impair the recreational and aquatic life uses of the waterbody.

Agriculture: Agriculture in the Town of Hampton Falls includes small patches of cropland, hayfields, and pastures. Agricultural activities, including community and residential gardens add to the aesthetic of Hampton Falls, but when improperly managed can be sources of excess nutrients entering Hampton Falls' surface waters through stormwater runoff.

Agricultural activities and facilities with the potential to contribute to nutrient impairment include:

- Plowing and earth moving
- Fertilizer and manure storage and application
- Livestock grazing
- Animal feeding operations and barnyards
- Paddock and exercise areas for horses and other animals
- Leachate from haylage/silage storage bunkers

Diffuse runoff of farm animal waste from land surfaces (whether from manure stockpiles or cropland/pastureland where manure is spread), as well as direct deposition of fecal matter from farm animals adjacent to surface waters, are significant sources of agricultural nutrient pollution in surface waters (EPA, 2003). Farm activities like plowing, livestock grazing, vegetation clearing, and vehicle traffic can also result in soil erosion which can contribute to nutrient pollution.

Excessive or ill-timed application of fertilizer or poor storage which allows nutrients to wash away with precipitation not only endangers streams, ponds, and other waters, but also means those nutrients are not reaching the intended crop or lawn. The key to nutrient application is to apply the right amount of nutrients at the right time. When appropriately applied to soil, synthetic fertilizers or animal manure can fertilize crops and restore nutrients to the land. When improperly managed, fertilizers and manure can enter surface waters through several pathways, including surface runoff and erosion, direct discharges to surface water, spills, and other dry-weather discharges, and leaching into soil and groundwater.

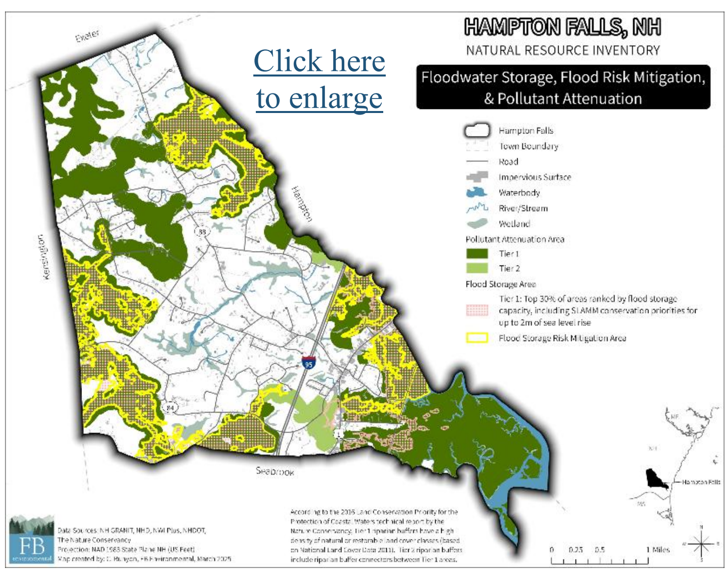
Pets: In residential areas, fecal matter from pets can be a significant contributor of nutrients and fecal pathogens to surface waters. On average, a dog produces 200 grams of feces per day, containing concentrated phosphorus and nitrogen (CWP, 1999). If pet feces are not properly disposed, these nutrients can be washed off the land and transported to surface waters by stormwater runoff. Pet feces can also enter surface waters by direct deposition of fecal matter from pets standing or swimming in surface waters.

Wildlife: Fecal matter from wildlife such as geese, gulls, other birds, deer, and beaver may be a significant source of nutrients and pathogens in some watersheds. This is particularly true when human activities, including the direct and indirect feeding of wildlife and habitat modification, result in the congregation of wildlife (CWP, 1999). Congregations of geese, gulls, and ducks are of concern because they often deposit their fecal matter next to or directly into surface waters. Examples include large, mowed fields adjacent to streams where geese and other waterfowl gather, as well as the underside of bridges with pipes or joists directly over the water that attract large numbers of pigeons or other birds. Studies show that geese inhabiting riparian areas increase soil nitrogen availability (Choi, et al., 2020) and gulls along shorelines increase phosphorus concentration in beach sand pore water that then enters surface waters through groundwater transport and wave action (Staley, He, Shum, Vender, & Edge, 2018). When submerged in water, the droppings from geese and gulls quickly release nitrogen and phosphorus into the water column, contributing to eutrophication in freshwater ecosystems (Mariash, Rautio, Mallory, & Smith, 2019). On a global scale, fluxes of nitrogen and phosphorus from seabird populations have been estimated at 591 Gg N per year and 99 Gg P per year, respectively (with the highest values derived from arctic and southern shorelines) (Otero, De La Peña-Lastra, Pérez-Alberti, Osorio Ferreria, & Huerta-Diaz, 2018). Additionally, other studies show greater concentrations of nitrogen, ammonia, and dissolved organic carbon downstream of beaver impoundments when compared to similar streams with no beaver activity in New England (Bledzki, Bubier, Moulton, & Kyker-Snowman, 2010).

***Septic Systems and Public Sewer*:** Hampton Falls does not have a municipal sewer system or wastewater treatment facility. Residents and businesses therefore rely on private septic systems, holding tanks, and/or other on-site waste disposal facilities. The town requires all development to provide adequate on-site sewer disposal provisions and a relatively large minimum lot size (Town of Hampton Falls, 2019).

Untreated discharges of sewage (domestic wastewater) are prohibited regardless of source. An example of an NPS discharge of untreated wastewater is from an illicit discharge of wastewater or insufficient or malfunctioning septic systems. When properly designed, installed, operated, and maintained, septic systems effectively reduce bacteria and phosphorus concentrations from sewage through the leach field. Nitrogen loading is more complex. Depending on soil type and groundwater conditions, some systems are a source of nitrates to groundwater and ultimately surface waters. Age, overloading, or poor maintenance can result in system failure and the release of nutrients, bacteria, and other pollutants into surface waters (EPA, 2002). Nutrients from undersized or poorly maintained systems can enter surface waters through surface overflow or breakout, stormwater runoff, or groundwater.

2.5 FLOODPLAINS AND FLOODWATER STORAGE



Floodplains are areas of low elevation typically adjacent to streams, rivers, estuaries, coasts, or other surface waters into which a water body overflows during high flow events such as heavy rain, storm surges, or snowmelt. In estuarine and salt marsh areas, flooding can result from high tides, storm surges, and rising sea levels associated with climate change. Floodplain areas are subject to reoccurring flooding. The Federal Emergency Management Agency (FEMA) produces flood hazard maps through the National Flood Insurance Program (NFIP) for communities as a resource for understanding and insuring against flood risk. FEMA's flood zones are based on the

100-year flood frequency (1% annual chance of being flooded during any year) and 500-year flood frequency (0.2% annual chance of being flooded during any year). When mapped, there is a small difference between the total area inundated with floodwaters under each scenario (Appendix A, Map 5). Approximately 21% (1,731 acres) of the town is within the 100-year floodplain, while 2.4% (194 acres) falls within the 500-year flood risk area.

A 100-year flood is a term used to describe a flood that has a 1% chance (or 1-in-100 chance) of occurring in any given year. Relating this to a homeowner’s mortgage, there is a one-in-four chance over a 30-year mortgage that a flood of this magnitude could occur and has the potential to cause flooding and damage (Wake, et al., 2019). FEMA reports that just one inch of floodwater can cause up to $25,000 in damage to a home (FEMA, n.d.). The baseline for determining the volume of precipitation produced by a 100-year flood comes from historical records of precipitation, groundwater and streamflow records, and computer modeling results. These models do not account for the projected climate change impacts on flooding hazard severity, including future increases in flooding intensity and frequency as well as sea level rise. According to the *New Hampshire Coastal Flood Risk Summary – Part I: Science,* “The magnitude of daily extreme precipitation events has increased by 15–38% in NH’s coastal watershed since the 1950s” (Wake, et al., 2019). According to the National Weather Service, a rainfall event producing between 6.29 and 12.3 inches of rain within a 24-hour period would be classified as a 100-year storm event (National Weather Service, n.d.). Recent examples of a 100-year storms that caused flooding include the Nor’easter that passed through the seacoast on March 5, 2018 (USGS, n.d.) the December 2023 storm (NOAA, n.d.) as well as the January and March storms of 2024. Other past significant flood events that have impacted Hampton Falls include Superstorm Sandy in 2012 and a December 2011 Nor’easter, both causing inland and tidal flooding, and the Patriot’s Day Nor’easter storm of 2007, causing inland flooding due to 6.5” inches of rain.

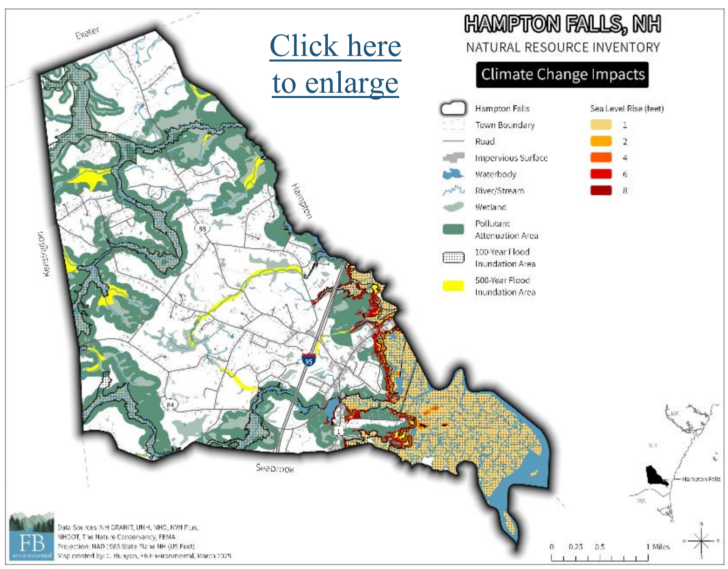
Photos by Paul Melanson

With extensive freshwater and tidal wetlands, Hampton Falls' natural resource assets are susceptible to flooding impacts and future increased severity of coastal storm surges and flooding. At-risk areas include, but are not limited to, sections of US Route 1, the eastern end of Depot Road, and Marsh Lane.

Tidal and freshwater wetland systems provide essential flood storage capacity during storm and flooding events, and other coastal natural features, such as beaches and rocky shoreline, serve as natural defensive barriers to help protect against storm surges and erosion. Natural undeveloped land, especially in the harbor, helps reduce Hampton Falls' risk and vulnerability to future increases in coastal storm flooding and sea level rise.

With rising sea levels and increased storm surge, existing salt marsh systems may disappear, migrate inland to higher elevation, or a combination. High water levels can drown salt marshes causing the low marsh to turn into mudflats, and the mudflats into subtidal zones. A dynamic balance can be maintained only if there is space for the natural habitat to migrate inland. In developed areas marshes may disappear altogether. Habitat and species loss will likely be greatest in areas where marsh systems cannot retreat or migrate inland. Storm surges can also cause sedimentation in habitat that lies behind beaches, smothering shellfish beds. Saltwater intrusion into freshwater wetlands can affect habitat that was formerly freshwater turned brackish (NH Coastal Risk & Hazards Commission, 2016). Altered coastal habitats can affect the timing of nesting and migration for seabirds (NHFGD, 2015).

2.5.1 FLOOD STORAGE AND RISK MITIGATION

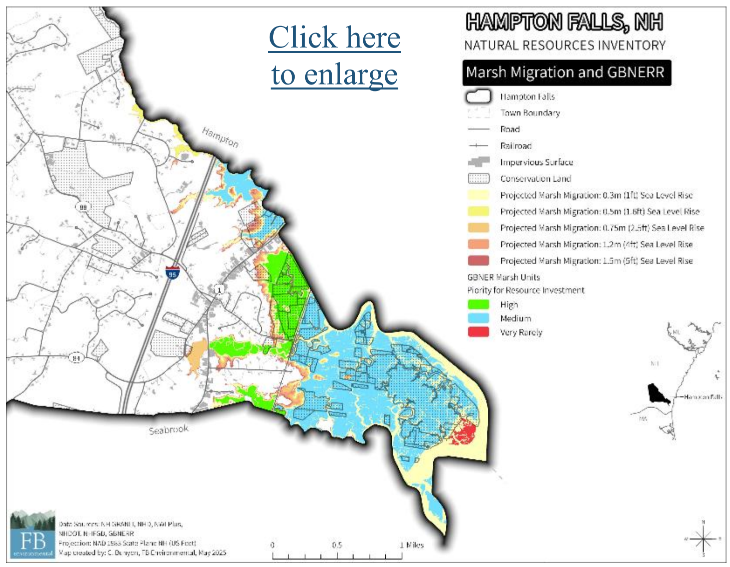


Flood storage and risk mitigation areas are defined as areas that have high flood storage capacities, or sponge-like areas, that can reduce the risk of floods in downstream areas, or areas of lower elevations. These areas include those that will help mitigate the effects of sea level rise on infrastructure. To address threats to water resources based on existing land uses and future development, The Nature Conservancy in 2016 provided an update to the Land Conservation Plan for Water Resource Conservation Focus Areas. These areas include pollutant attenuation focus areas, flood storage and risk mitigation focus areas, and public water supply focus areas. These prioritized focus areas for conservation have the "greatest benefits to coastal water resources" (NHGRANIT, Land Conservation Plan, Water Resource Conservation Focus Areas, 2016). Pollutant attenuation and removal areas are defined as riparian buffer areas that maintain natural vegetative cover while intercepting and filtering stormwater runoff.

The study used a computer model that has been widely applied to assess impacts of sea level rise on US coastal areas, the Sea Level Affecting Marshes Model (SLAMM), dividing flood storage areas into two tiers. Tier 1 is the top 30% (by area) of flood storage capacity and includes SLAMM conservation priorities up to 2 meters of sea level rise. Tier 2 is the top scoring flood storage areas in each HUC 12 watershed (hydrologic unit code that refers to a local watershed level) not included in Tier 1. In total, there are 1,394 acres of flood storage areas in Hampton Falls. These areas are primarily located within and along the saltwater marshes east of I-95. These larger areas are also identified as risk mitigation areas and therefore contain a high priority for conservation efforts to minimize risk of sea level rise on developed areas (Appendix A, Map 6).

Pollutant attenuation areas are also categorized into two tiers. Tier 1 areas are identified through GIS analyses, and Tier 2 areas are identified through manual inspections (Appendix A, Map 6). In total, there are 3,578 acres of Tier 1 and 170 acres of Tier 2 pollutant attenuation areas in Hampton Falls of which most are a part of the Prioritized Habitat Blocks through the Connect THE Coast initiative and the FBE co-occurrence analysis (see Section 3.5 describing Wildlife Priority Conservation Areas).

2.5.2 SALT MARSH MIGRATION



Sea level rise is a growing concern for coastal communities worldwide. Fortunately, New Hampshire has been increasingly studying, researching, and modeling these effects. This effort enables seacoast communities and the state to better prepare and plan for the future. Notably, the Sea Level Affecting Marshes Model (SLAMM) database covers 47% of Hampton Falls. According to the SLAMM, Hampton Falls currently has 1,097 acres of estuarine beaches, estuarine open waters, irregularly and regularly flooded marshes, tidal flats, tidal fresh marshes, tidal swamps, and transitional salt marshes (approximately 14% of the town's total area) (Map 7). Statistics were not gathered for inland areas as the database does not span all of Hampton Falls (i.e., inland freshwaters and swamps). See Section 2.2.2 for a description of estuarine wetlands. Since intertidal wetlands directly connect to ocean tides and sea levels, these wetland types have been at the forefront of modeling for the effects of sea level rise on marsh ecosystems.

In 2022, the NHFGD ran the SLAMM for coastal communities to estimate the changes in marsh area and habitat type as a result of climate change (particularly sea level rise). The model tracks the rise of water levels and the salt boundary under various scenarios of sea level rise. By projecting changes to wetland habitat by 2050 and 2100, it utilizes known relationships between wetland types and tide ranges. The purpose of these data are to guide conservation efforts protecting coastal wetland areas likely to provide the highest quality of wildlife habitat and hold up the longest in the wake of climate change (NHGRANIT, 2022).

Four scenarios were examined to estimate changes in salt marsh area and related habitat types (Table 5). The baseline, representing 2022 conditions, includes mudflats, salt marshes, tidal waters, tidal wetlands, and transitional salt marshes—totaling 1,097 acres (13.6% of Hampton

Falls)—and excludes freshwater wetlands and ponds. All additional acreage is measured relative to this baseline. Under a 0.5-meter sea level rise (SLR) scenario by 2050, saltwater habitats would expand by 73 acres to 1,170 acres (14.5% of the town). Under a 0.75-meter SLR scenario by 2100, an extra 125 acres would increase the total to 1,222 acres (15.1%). A scenario with 1.2 meters of SLR by 2100 adds 163 acres, reaching 1,260 acres (15.6%), while a 1.5-meter SLR scenario by 2100 expands these habitats by 187 acres to a total of 1,284 acres (15.9% of Hampton Falls).

The habitat types projected to increase in area the most are tidal water and transitional salt marshes. Under 1.5 meters of sea level rise by 2100, a decrease in salt marshes and tidal wetlands is projected. Mudflats are also predicted to decrease under every scenario except the most extreme.

Table 5. Hampton Falls, New Hampshire SLAMM data. Initial conditions represent data analyzed in 2022. The small gray numbers within each scenario represent the change in acreage of that habitat type compared to the initial condition, not to a previous scenario.

Habitat Type	**Initial Condition in 2022 (acres)**	0.5m SLR by 2050 (acres)		0.75m SLR by 2100 (acres)		1.2m SLR by 2100 (acres)		1.5m SLR by 2100 (total acres)	
Mud flat	**229**	189	-40	147	-82	189	-40	296	+67
Salt marsh	**766**	738	-28	741	-25	666	-100	542	-224
Tidal water	**92**	190	+98	268	+177	326	+233	351	+259
Tidal wetland	**7.7**	7.7	0	7.7	0	7.6	0	7.0	-0.7
Transitional salt marsh	**1.8**	46	+44	57	+55	73	+71	89	+87
TOTAL	**1,097**	1,170		1,222		1,260		1,284	
% of town	**13.6%**	14.5%		15.1%		15.6%		15.9%	
Total change from Initial Condition	**-**	+73		+125		+163		+187	

2.6 WATER QUALITY

The State of New Hampshire is required to follow federal regulations under the Clean Water Act (CWA) with some flexibility as to how those regulations are enacted. The main components of water quality regulations include designated uses, water quality criteria, and antidegradation provisions. The Federal CWA, the NH RSA 485-A Water Pollution and Waste Control, and the New Hampshire Surface Water Quality Regulations (Env-Wq 1700) form the regulatory basis for water quality protection in New Hampshire, including the state's regulatory and permitting programs related to surface waters. States are required to submit biennial water quality status reports to Congress via the USEPA. The reports are named for the relevant sections of the CWA;

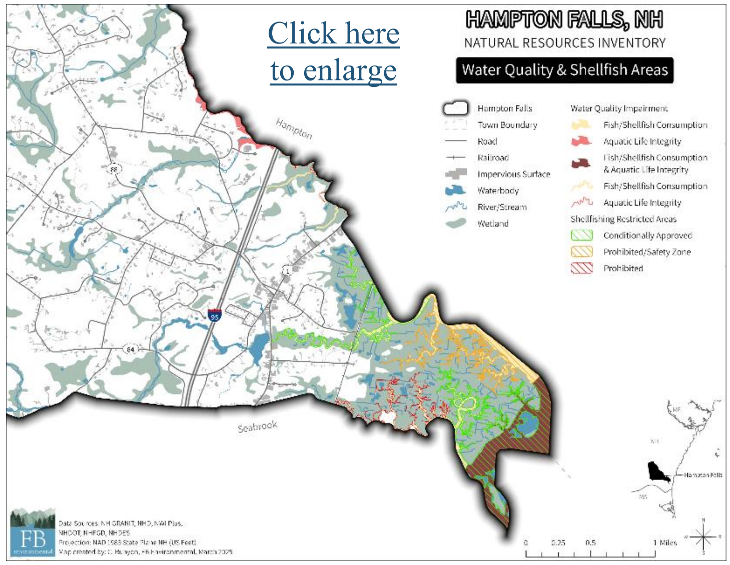
the first provides an inventory of all waters assessed by the state (the "Section 305(b) report") and the second lists the waterbodies that do not meet the state's water quality standards (the "Section 303(d) list").

2.6.1 DESIGNATED USES AND WATER QUALITY CLASSIFICATION

The CWA requires states to determine water quality standards for all surface waters in their jurisdiction. Water quality standards have two components, designated uses and water quality criteria. Designated uses are the desirable activities and services that surface waters should be able to support, and include uses for aquatic life, fish consumption, shellfish consumption, drinking water supply, primary contact recreation (swimming), secondary contact recreation (boating and fishing), and wildlife. In New Hampshire, NHDES defines these designated uses (Table 6). Surface waters can have multiple designated uses. Water quality criteria are measurable numerical or qualitative thresholds that define whether a water body is safely providing the uses for which it is designated.

Table 6. Designated uses for New Hampshire surface waters (adapted from (NHDES, 2020)).

Designated Use	NHDES Definition
Aquatic Life	Waters that provide suitable chemical and physical conditions for supporting a balanced, integrated, and adaptive community of aquatic organisms.
Fish Consumption	Waters that support fish free from contamination at levels that pose a human health risk to consumers.
Shellfish Consumption	Waters that support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers.
Drinking Water Supply After Adequate Treatment	Waters that with adequate treatment will be suitable for human intake and meet state/federal drinking water regulations.
Primary Contact Recreation	Waters suitable for recreational uses that require or are likely to result in full body contact and/or incidental ingestion of water.
Secondary Contact Recreation	Waters that support recreational uses that involve minor contact with the water.
Wildlife	Waters that provide suitable physical and chemical conditions in the water and the riparian corridor to support wildlife as well as aquatic life.



Refer to Table 7 for a list of impaired surface waters in Hampton Falls. Criteria for Fish Consumption use indicate a threshold in which waters support fish free from levels of contamination that pose a human health risk to those consuming the fish (Appendix A, Map 8).

As mentioned in Section 2.5.1, conservation efforts should prioritize areas with high pollutant attenuation and removal abilities such as riparian buffers of natural vegetative cover adjacent to waterways. Vegetative buffers slow the surface runoff of rainwater, limiting erosion associated with stormwater. In addition, vegetative buffers can help reduce the concentration of pollutants entering a waterbody or wetland (including chloride, nitrogen, phosphorus, bacteria, etc.) by up-taking and retaining the stormwater and filtering sediment. In total, there are 3,749 acres of pollutant attenuation areas in Hampton Falls.

Although the eastern portion of Hampton Falls is designated by the US EPA as a municipal separate storm sewer (MS4) area, the town has been granted a waiver to MS4 permitting requirements because of its small, relatively unpopulated urban area, large minimum lot size requirements, and lack of a sewer system (US EPA, 2013). Nevertheless, the town actively manages stormwater runoff to protect local water bodies and habitats by using best management practices, such as drainage swales, to treat non-point source pollutants like bacteria, nitrogen, phosphorus, and chloride.

Table 7. List of impaired waterbodies in Hampton Falls, NH including their designated uses and the parameters causing the impairment status for that use. An “X” indicates that specific designated use is not being met for the impairment parameters also marked with an “X”. For example, the Taylor River is currently listed as impaired for Fish Consumption and Shellfish Consumption due to elevated concentrations of Fecal Coliform, Mercury, PCBs, and Dioxin. WWTF SZ stands for Wastewater Treatment Facility Safety Zone.

	Designated Use				Impairment Parameters																							
					Physical Parameters		Bacteria			Metals								Pesticide/Herbicide Byproducts						Combustion Byproducts				
Waterbody	Fish Consumption	Shellfish Consumption	Aquatic Life Integrity	Primary Contact Recreation	Oxygen, Dissolved	pH	Fecal Coliform	Enterococcus	E. coli	Mercury	Aluminum	Lead	Zinc	Nickel	Arsenic	Barium	PCBs	Dioxin	DDD	DDE	Dieldrin	Lindane	Trans-Nonachlor	Benzo(a)pyrene (PAHs)	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Indeno[1,2,3-cd]pyrene	Anthracene
Hampton Falls River	X	X					X			X							X	X										
Hampton Falls River (2)	X	X					X			X							X	X										
Hampton Falls River (WWTF SZ)	X	X								X							X	X										
Hampton River WWTF SZ	X	X								X							X	X										
Hampton/Seabrook Harbor	X	X	X				X			X	X						X	X	X		X	X	X					
Taylor River	X	X					X			X							X	X										
Taylor River Refuge Pond	X		X		X					X		X	X	X	X	X			X	X				X	X	X	X	X
Rice Dam Pond – On Taylor River	X		X							X			X	X	X	X				X				X	X	X	X	
Browns River (Lower)	X	X					X			X							X	X										

	Designated Use				Impairment Parameters																							
					Physical Parameters		Bacteria			Metals								Pesticide/Herbicide Byproducts						Combustion Byproducts				
Waterbody	Fish Consumption	Shellfish Consumption	Aquatic Life Integrity	Primary Contact Recreation	Oxygen, Dissolved	pH	Fecal Coliform	Enterococcus	E. coli	Mercury	Aluminum	Lead	Zinc	Nickel	Arsenic	Barium	PCBs	Dioxin	DDD	DDE	Dieldrin	Lindane	Trans-Nonachlor	Benzo(a)pyrene (PAHs)	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Indeno[1,2,3-cd]pyrene	Anthracene
Browns River (Upper)	X	X					X			X							X	X										
Swains Creek	X	X					X			X							X	X										

2.7 AQUATIC AND TIDAL HABITATS

2.7.1 FISHERIES AND BIRDS

Hampton Falls' estuaries, tidal marshes and tidal flats contain diverse fisheries and supporting habitats. Hampton Falls' aquatic, estuarine and tidal habitats support fish, mammals, migratory birds, aquatic vegetation, microscopic communities and more. Fish species in the town's streams, ponds and reservoirs include bluegill, largemouth bass, striped bass, rainbow trout, chain pickerel, and black crappie. In addition, a combined total of 171 resident and migratory bird species have been observed at the Hampton-Seabrook Marsh according to eBird (an online database of bird observations) (eBird, 2025). A 2006–2007 NH Audubon study on avian use of the Hampton-Seabrook Estuary (McKinley & Hunt, 2008) found that over 20 species regularly migrate through the estuary during southbound migration, with semipalmated plovers (*Charadrius semipalmatus*) and semipalmated sandpipers (*Calidris pusilla*) making up two-thirds of the individuals. The Hampton-Seabrook Marsh also provides key habitat for the vulnerable saltmarsh sparrow (*Ammospiza caudacuta*), which only breeds in tidal salt marshes along the Atlantic coast from Virginia to Maine (PREP, 2023).

2.7.2 SHELLFISH

Shellfish harvesting, including aquatic shelled mollusks such as clams, mussels and oysters, plays an important role in Hampton Falls as it does in the culture of many coastal New England towns. These aquatic species provide many ecosystem functions including filtering sediment from the water column. Local fishermen supply restaurants and residents with locally farmed shellfish. The Hampton-Seabrook Harbor, including the channels in the Hampton-Seabrook salt marsh, is included as a Shellfish Harvest Area regulated by NHDES. Species regulated include the eastern oyster (*Crassostera virginica*), blue mussel (*Mytilus edulis*), mahogany quahog (*Arctica islandica*), razor clam (*Ensis leei*), and Atlantic surf clam (*Spisula solidissima*).

Invasive crabs pose a threat to native mollusk fisheries in Hampton Falls. The invasive green crab (*Carcinas maenas*) and the Asian shore crab (*Hemigrapsus sanguineus*) were first spotted in NH in the mid-1990s and 1998, respectively (USGS, 2018). Due to their ability to thrive in a variety of environmental conditions, including warming ocean temperatures, they are threatening the NH

Shellfish Harvesting Classifications

Restricted: When marine water quality monitoring is not available for the area or if the sanitary survey shows a limited degree of pollution, including from non-human sources, the area may be classified as restricted. Shellfish harvested commercially from restricted growing areas cannot be marketed directly. They must be transplanted to approved growing areas for a specified amount of time, allowing shellfish to naturally cleanse themselves of any contaminants before they are harvested for market.[1]

Prohibited: This classification applies to growing areas near sewage treatment plant and industrial outfalls, marinas, and other pollution sources. Commercial shellfish harvests are not allowed from prohibited areas.[1]

Safety Zone: A designated portion of the shellfish waters adjacent to a source of contamination (such as an outfall) in which harvesting of shellfish would be prohibited. It exists between conditionally approved growing areas and the source of pollution.[2]

Unclassified: Waters that have not had a sanitary shellfish harvest area survey completed.[3]

[1] (EPA, 2021) [2] (EPA, 1974) [3] (FDACS, n.d.)

native crustaceans with their increasing population via competition for food, shelters, and other resources. Unfortunately, there is no established fishery market for these crabs although green crabs are often used as a bait species. Current studies are underway by the NH Green Crab Project and local universities to find markets for these species to help maintain their overabundance and decrease the overpopulation and competition for resources with native crustaceans (USGS, Hemigrapsus sanguineus, 2018; New Hampshire Sea Grant, 2021).

Under the authority granted by RSA 143:21, RSA 143:21-a and RSA 487:34, NHDES uses a set of guidelines and standards known as the National Shellfish Sanitation Program (NSSP) for classifying shellfish growing areas (NHGRANIT, 2015). The Town of Hampton Falls contains areas of conditionally approved shellfish harvesting (parts of Hampton Flats), and areas of prohibited and prohibited/safety zone shellfish harvesting. Most notably, the Taylor River (east of the Taylor River Reservoir) and the southwestern parts of Hampton Flats have been identified as prohibited zones.

2.8 SUMMARY OF THREATS AND RECOMMENDATIONS FOR PROTECTING WETLAND, WATER, AND GEOLOGIC RESOURCES

The goal of water and wetland resource protection is to ensure these resources remain at their highest possible quality for ecosystem health and community wellbeing and/or use. Water quality and wetland degradation can be caused by natural events or by human actions. Climate change for coastal communities is reshaping coastal water resources through sea level rise, salt marsh migration, and through an increase in storm frequency. Development can also pose a threat to water resources by increasing stormwater runoff from impervious surfaces which introduces pollutants to watersheds and to wetlands through direct (dredge and fill) or indirect (adjacent clearing and development) impacts.

Recommendations to protect water and wetland resources start by identifying problem areas. These are areas that contribute disproportionate amounts of pollutants to surface waters and pose a threat to developing within or adjacent to wetland resources. Pollutants can include sediment, phosphorus, nitrogen, oils and greases, household chemicals and soaps, heavy metals, and bacteria. These sources can be identified through watershed surveys, long-term water quality monitoring and investigatory sampling, and septic system surveys and vulnerability assessments. Development and land use directly within and in close proximity to wetlands are the greatest threats to wetland resources. However natural threats, like sea level rise and intensifying storms pose a threat as well. Additional protection and management to safeguarding wetlands is valuable. As of the writing of this report, there have been no formal efforts to map vernal pools throughout the town, but the town does have prime wetland designations and protections. See Section 3.7.2 for recommendations for vernal pools.

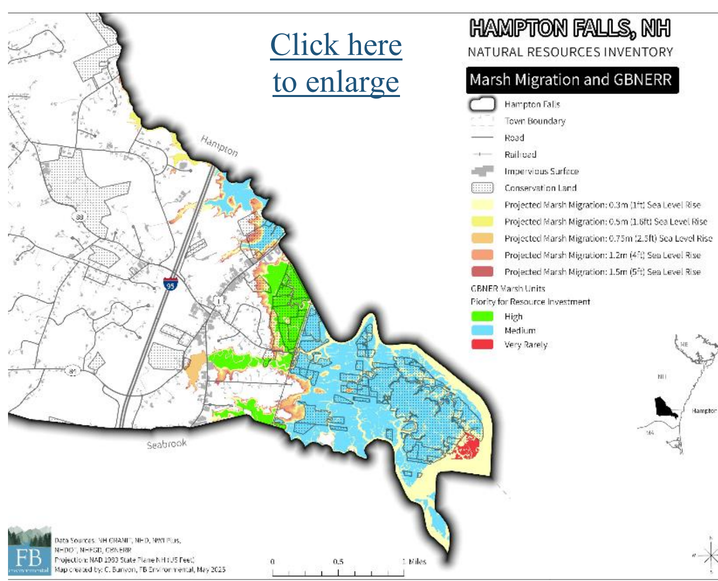
RECOMMENDATIONS – Below are management recommendations for the town's consideration which address, protect, and adapt to the threats these resources face.

Best management practices (BMPs) are often implemented to help reduce the impact development has on an adjacent or downstream environment. Hampton Falls contains many major sub-watershed areas, all of which have precious natural resources such as wetlands. See Section 6.2.3 Developed Lands and Considerations for Further Development for approaches and recommendations to lessen the impact development can have on land and water resources.


Photo Credit: Lona McNamara

Community education and involvement: Bringing the community in through educational opportunities, citizen science, and stewardship is an invaluable method of working toward protecting water resources. Incorporating a diverse network of stakeholders ensures that every aspect of the community is represented, including residential, commercial, and agricultural sectors. Recognizing the fundamental human need for a healthy environment and safe surface and groundwater, collaboration among these sectors becomes essential. Continued public awareness and outreach campaigns will aid in growing the concern and involvement of all to protect these resources. One recommendation is to encourage reduced fertilizer, pesticide, and herbicide use on town property as well as private residential lawns. These chemicals contribute to pollution of watercourses and waterbodies through stormwater runoff. Another is to improve the condition and protection of riparian areas through education. An education program geared toward the importance of natural stream buffers and their restoration has an important place in Hampton Falls due to the presence of many headwater stream systems.


Photo Credit: Sara McNamara-Gagnon



Click here to enlarge

Marsh management: The NH Salt Marsh Plan, developed by the Great Bay National Estuarine Research Reserve, NH Fish and Game Department, scientists from the University of New Hampshire, the Rockingham Planning Commission, and many technical advisors, developed resources and products by analyzing the resiliency of NH's marshes (Stevens, Riley, Callahan, & Vaccaro, 2023). Marshes' resilience to rising sea levels and their capacity to adapt will be crucial for their long-term survival. The NH Salt Marsh Plan provides an array of management options for coastal communities (Appendix D, Map 7). Management efforts range from prioritizing conservation areas where the marsh is in good condition, to marsh migration facilitation by increasing the potential and available space for marshes to adapt by removing inland topographical barriers, and limiting investment into projects within areas of the marshes that are likely to disappear in the near future. Each suggested management effort has a targeted marsh resiliency score provided in the NH Salt Marsh Plan. The score is comprised of three elements: current marsh conditions, vulnerability to SLR, and adaptation potential. A marsh with good existing conditions is healthy, has a diverse plant community, and has few signs of human impact. A marsh with high vulnerability to SLR, sits lower within the tidal flux and has soils that are more susceptible to erosion from SLR. An area with high adaptation potential has a high chance of adapting to SLR and migration due to its connectiveness to other marshes and space to migrate (Stevens, Riley, Callahan, & Vaccaro, 2023). Management efforts should first focus on the 13 marsh units identified with suggested management options of "reduce vulnerability," "improve condition," and "prioritize conservation." The data viewer within the NH Salt Marsh Plan identifies the most vulnerable marshes in Hampton Falls and provides them with a key matched to suggested management efforts (Table 8).

Septic systems. Old, mistreated, or malfunctioning septic systems are notorious for leaching pollutants into surface and groundwaters. Excess nutrients in waterbodies can increase algal growth and decrease water clarity, intrinsic values, and property values. Additionally, excessive bacteria in waterbodies can contribute to beach closures and shellfish harvesting restrictions and/or closures. However, there are other sources of pollutants (including bacteria) than septic systems, which include a flock of pigeons roosting under a bridge above a waterbody or other wildlife and waterfowl. A comprehensive septic system inventory or database, combined with a risk assessment, could help track the maintenance and replacement history of systems within the watershed. This effort would be managed by the town, particularly if a wastewater inspection and maintenance program is implemented and enforced. "Septic socials" are a great outreach tool to spread awareness of proper septic maintenance. Socials are an opportunity for neighborhoods to come together to socialize, while also learning about keeping healthy septic systems. Landowner groups can also benefit by coordinating septic system pumping discounts.

The town currently has overlay districts including the Aquifer Protection District and Wetlands Conservation District. With the purpose of protecting public health and safety, the overlay districts guide land use activities within these areas. It is imperative that the extent of these overlay districts be continuously reviewed for possible updates as the environment continues to change, marshes migrate, and new wetlands develop.

Watershed management actions from the plans presented in Table 1, include increasing land protection, designing zoning and overlay districts to enhance coastal conservation, reducing runoff from developed areas, adapting public policies to promote supporting ecosystem services, and increasing outreach and education. For a more inclusive list of management measures, see the Hampton-Seabrook Estuary Management Plan pages 65 through 84.

Establish long-term water quality monitoring programs. Annual water quality monitoring programs are used to track the health of surface waters in a watershed. Information from a monitoring program provides feedback into the effectiveness of management practices and helps optimize management actions through an adaptive management approach. Targeted monitoring programs can also help to pinpoint locations within a watershed likely contributing to degradation and thus identifying areas for remediation. Partnerships should be established with organizations such as the Seabrook-Hampton Estuary Alliance and the University of New Hampshire to build upon existing data collection efforts. Consider focusing on watersheds or streams within Hampton Falls that have yet to receive watershed management plans and are listed as impaired. Refer to Table 1 for existing watershed management planning documents.

Establishing measurable milestones. A restoration schedule with milestones for measuring actions and monitoring activities in the watershed is crucial for the success of these efforts. In addition to monitoring, several environmental, social, and programmatic indicators can be identified to measure progress. Setting benchmarks allows for periodic updates to an action plan, maintains and sustains the action items, and establishes a plan relevant to ongoing activities.

Environmental indicators are a direct measure of environmental conditions used to evaluate the relationship between introduced and existing pollutants and the environment. For example, these indicators can track the progress of implemented BMPs. Programmatic indicators measure watershed protection and restoration activities such as the number of parcels with new conservation easements, number of septic system upgrades, number of culverts remediated, etc. Lastly, social indicators measure changes in social or cultural practices and behavior that lead to implementation of management measures. This can be the number of volunteers participating in educational events, workshops, trainings, or BMP demonstrations.


Photo Credit: Sam Higginbottom

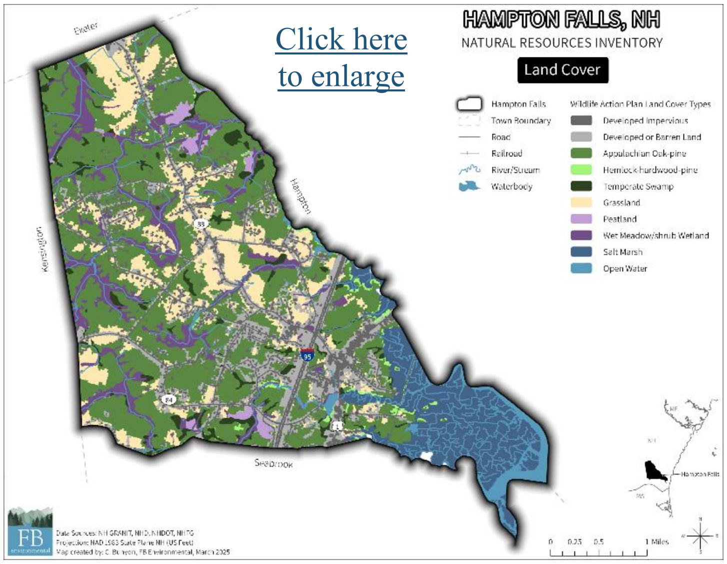
Table 8. Marsh resiliency scores and suggested management options based on the NH Salt Marsh Plan metrics. Text acquired from the Management Options to Maximize Marsh Resilience resource on pg. 12 of the NH Salt Marsh Plan. To locate marshes, view the NH Salt Marsh Plan Data Viewer.

Marsh Location (see the interactive Data Viewer)	**Elements of Marsh Resilience**			**Interpretation of this Management Category**	**Suggested Management Option**
	Current Condition	**Vulnerability to SLR**	**Adaption Potential**		
Eastman Slough	Low	High	Low	"A marsh in poor condition that will not persist in the future."	"**Limit investment**: Marsh will likely disappear so test innovative science, abandon marsh or implement high engineered solution: Limit investments in land protection or restoration activities as effectiveness will be relatively short-term."
Swains Creek Taylor Drake Confluence Nudds Canal Joseph and John Chase Grant B Sanborne	High	High	High	"A marsh in good condition that will adapt if it can out-pace current vulnerability to sea level rise."	"**Reduce vulnerability**: Increase sediment supply to current marsh footprint though strategies like thin layer sediment placement and removal of barriers to hydrologic flow within the marsh."
Blackwater River Highlands	Low	Low	High	"A marsh in poor condition that is not currently vulnerable to sea level rise and has potential to migrate inland naturally."	"**Improve condition**: Prioritize established restoration techniques. Decrease current stressors to marsh e.g., Phragmites or invasive crab control. Mitigate water quality issues in surrounding watershed, e.g., reduce fertilizer application in residential and agricultural areas."
Hampton Falls River Beckmans Island Robbins Point Sand Creek Browns River JH Sanborne	High	Low	High	"A marsh in good condition that will migrate inland naturally over the long-term."	"**Prioritize conservation**: Allow marsh to self-maintain. Fee or conservation easement purchase of marsh or migration space. Managed relocation of structures in marsh or migration space."

3. WILDLIFE AND HABITATS

3.1 WILDLIFE HABITATS

Wildlife habitats in New Hampshire are mapped and inventoried by the New Hampshire Fish and Game Department (NHFGD). NHFGD collaborated with partners in the conservation community to create the state's first Wildlife Action Plan (WAP), completed in 2005 and updated in 2010, 2015, and 2020. The plan, which was mandated and funded by the federal government through the State Wildlife Grant program, provides New Hampshire decision-makers with important tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern. The plan is a comprehensive wildlife conservation strategy that examines the health of wildlife populations and prescribes specific actions to conserve wildlife and associated vital habitat before they become rarer and more costly to protect. The Wildlife Action Plan is the most comprehensive wildlife assessment ever completed in New Hampshire. It was updated in 2020; information from it is incorporated into this report.



The sections below describe the habitat types present in Hampton Falls according to the Wildlife Action Plan. (see Table 9 and Appendix A, Map 9). Definitions of each wildlife habitat discussed below can be found in Appendix C. It is important to note that the habitat features developed by the Wildlife Action Plan and used in this study are predictive and may not reflect actual on-the-ground features, because the modeling processes used in the Wildlife Action Plan drew on many natural resource factors (e.g., soils, slope, solar aspect, vegetation) to identify those areas with high potential to contain the types of habitats mapped. In most cases, the natural communities of wildlife identified in this way will be found in those locations; however, the exact extent and distribution of patches of identified habitats may not match existing field conditions. Only careful field reconnaissance can determine the actual location and extent of natural communities and habitat features.

Forests cover approximately 40% of Hampton Falls. Forest ecosystems provide biological diversity, natural communities, scenic landscapes, and recreational opportunities. Forests also support the economy through the forest products industry in addition to a suite of ecosystem services including clean air, clean water, and carbon storage (Morin, et al., 2007).


Photo Credit: Angela Stafford


Photo Credit: Debbie Gaudreau


Photo Credit: Diane Godbout


Photo Credit: Debbie Gaudreau

Table 9. New Hampshire Wildlife Action Plan Habitat Type and acreage for Hampton Falls, New Hampshire. NLCD = National Land Cover Dataset.

Wildlife Action Plan Habitat Type	Acres	% Total Area
Appalachian oak-pine	3,228	40%
NLCD developed classes	1,539	19%
Grassland	991	12%
Salt marsh	874	11%
Wet meadow/shrub wetland	739	9%
Open water	286	4%
Temperate swamp	254	3%
Peatland	98	1%
Hemlock-hardwood-pine	70	1%

Appalachian Oak-Pine Forests: Hampton Falls contains 3,228 acres mapped as Appalachian oak-pine forests (approximately 40% of the town's total area). These areas are commonly found throughout the town in non-salt marsh, non-wetland and non-developed areas. The largest concentrations occur east and west of Exeter Road in the northern portion of town, and in the vicinity of Kensington Road in the southwest.

Developed Habitats: According to the WAP, the Town of Hampton Falls contains 1,539 acres of developed land cover types (impervious and barren developed land; 19% of the town). These areas are found in their highest densities along US Route 1 and Depot Road within the center of Town Common District, Business District North, and Business District South.

Grasslands: Hampton Falls contains 991 acres mapped as grasslands (approximately 12% of the town's total area). These areas are primarily found east of I-95, often alongside roadways, with Exter Road being a hotspot. Farmland is also included withing this land cover class.

Salt Marshes: Hampton Falls contains 874 acres mapped as salt marshes (approximately 11% of the town's total area). These areas are commonly found east of US Route 1 in addition to along the Taylor River between I-95 and US Route 1.

Wet Meadows and Shrub Wetlands: Hampton Falls contains 739 acres mapped as wet meadow and shrub wetlands (approximately 9% of the town's total area). These areas are sporadically distributed throughout the town, primarily in areas with freshwater input (e.g. along rivers and streams).

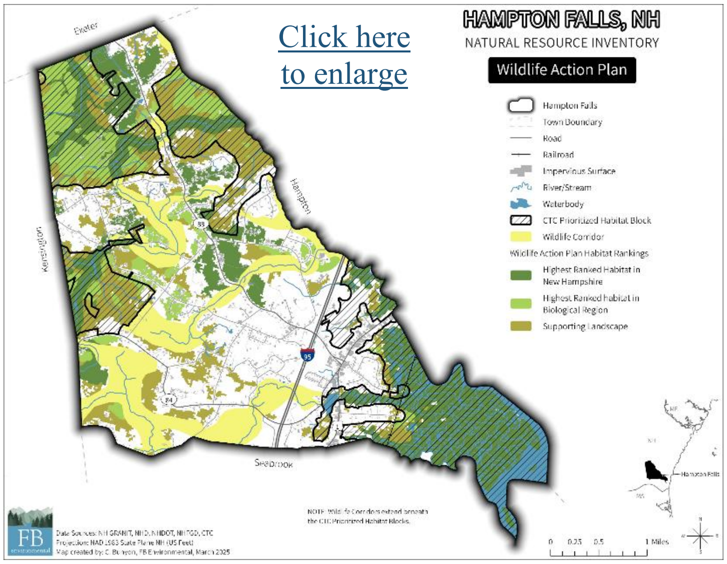
Open Water: Hampton Falls contains 286 acres mapped as open water (approximately 4% of the town's total area). These include the Taylor River reservoir, Hampton Falls River, and Dodge Ponds.

Temperate Swamps*:* The wildlife action plan has mapped 254 acres (3% of the total area of Hampton Falls) of temperate swamp in Hampton Falls. These swamps are situated in lower elevation areas of the town and are typically embedded in Appalachian oak-pine forests and wet meadow/shrub wetlands.

Peatlands: Hampton Falls contains 98 acres mapped as peatlands (approximately 1% of the town's total area). These areas are sporadically distributed throughout the town in small patches. The largest peatlands are located south of Kensington Road and along the Taylor River just west of where it flows beneath Exeter Road.

Hemlock-Hardwood-Pine Forests*:* Hampton Falls contains 70 acres mapped as hemlock-hardwood-pine forest (1% of the town's total area). This habitat type occurs in small areas on the edges of peatlands, wet meadow/shrub wetlands, temperate swamps and salt marshes. It is mapped sporadically throughout the town.

3.2 WILDLIFE ACTION PLAN HABITAT RANKS



Using habitat types mapped in the New Hampshire Wildlife Habitat Land Cover dataset with the addition of streams, rivers, lakes, and ponds, New Hampshire Fish and Game biologists analyzed which habitat patches are in the best relative ecological condition in the state. This analysis evaluates the extent to which a habitat patch supports biological diversity (particularly rare species), connects to other similar patches in the landscape, and is affected by human impacts. Within each habitat type, patches were ranked into one of four categories: 1) Highest ranked in the state by ecological condition; 2) Highest ranked in the biological region by ecological condition; 3) Supporting landscapes; and 4) Not top ranked. (Appendix A, Map 10).

Highest ranked in the state by ecological condition: This rank compares each habitat type regardless of where it occurs in the state. It includes the top 15% by area of each habitat, except for certain rare or important cover types that are 100% included (e.g., alpine areas, dunes, salt marshes, rocky shores). Critical habitat for state-listed species is included as well (NHFGD, 2020b).

Highest ranked in the biological region by ecological condition: As New Hampshire is ecologically diverse, habitats were ranked within their ecoregional subsection. Ecoregional subsections reflect broad regional patterns of geomorphology, stratigraphy, geologic origin, topography, regional climate, and dominant associations of potential natural vegetation. (Traveling south to north in the state, one can easily notice the disparity between landscapes. Therefore, comparing the North Country to the southeast is not a balanced approach.) A total of nine ecoregions in New Hampshire have been identified by The Nature Conservancy. Within each biological region (calculated separately for terrestrial versus wet habitats) the top 30% of each habitat was included, except areas already included within the highest ranked in the state. Some high priority natural communities as ranked by the New Hampshire Natural Heritage Bureau were added to highlight the importance of plant diversity in habitat quality (NHFGD, 2020b).

Supporting landscapes: The landscape surrounding both ranking types described above was also identified as being critical. The condition of a habitat patch will deteriorate if the surrounding landscape is degraded. This ranking consists of the remainder of the top 50% of each habitat type, and some very intact forest blocks (NHFGD, 2020b).

3.2.1 UTILITY OF HABITAT RANK INFORMATION

A principal use of the Wildlife Action Plan Habitat Rank dataset is to prioritize parcels for land protection. The data can be used in the decision-making process in combination with other locally collected information on a given parcel's resources such as forest stand types, wildlife sightings, recreational trails, scenic views, and water resources.

Another use is comprehensive conservation planning. For towns and conservation organizations, taking a proactive approach by evaluating an entire geographic area prior to making land-use decisions is critical. Wildlife habitats contribute to a town's character, provide protection from flooding, safeguard water resources, and create educational opportunities. Identifying the most valuable habitats within a town or region ensures that economic development and natural resource protection are strategically balanced, supporting the long-term quality of life in the area (NHFGD, 2016).

3.2.2 A PRIMER ON HABITAT CONNECTIVITY

Fragmentation of habitat units into smaller, isolated sub-units is a critical consideration and factor to prevent the reduction and loss of biodiversity (i.e., plants, animals, and habitat types) in the Northeast and nationwide (Johnson & Klemens, 2005). To maintain native biodiversity, it is critical to ensure that remaining habitat areas are large enough to support viable wildlife populations and that they are arranged in a fashion that facilitates movement of animals across the landscape (Miller, Klemens, & Schmitz, 2005).

To ensure compatibility with native species sensitive to development, it's essential to accommodate core habitat areas and the connecting corridors. In general, larger core areas are more adept to support viable wildlife populations than smaller ones. Connections between core areas (unfragmented land characterized by native species) are of the utmost importance as they facilitate animal dispersal thus enabling genetic exchange and preventing local species extirpation. These connections are typically referred to as "corridors". Note that a corridor for wildlife is not a narrow, linear green strip between core areas; rather, it is a broad swath of habitat connecting core habitat areas. Corridors may not be as pristine as the core areas they connect, but they do provide secondary habitat and most importantly, facilitate movement of wildlife among core areas (Miller, Klemens, & Schmitz, 2005). Individual conservation decisions can be more beneficial to wildlife if targeted parcels are placed in context of the matrix of wildlife habitat and corridors across the landscape (Miller, Klemens, & Schmitz, 2005).

The Priority Habitat Blocks presented in Appendix A, Map 10 are based largely on remote-sensed data. Important areas *within* these areas can be further identified by gathering field-based information on the distribution of development-sensitive wildlife throughout the town. An example of valuable information that can be collected is the vernal pool surveys discussed in Section 3.7.2 below.

3.3 RARE PLANTS, ANIMALS, AND EXEMPLARY NATURAL COMMUNITIES

Rare plant and animal species documented in Hampton Falls are inventoried by the Natural Heritage Bureau (NHB) of the New Hampshire Division of Forests and Lands, in cooperation with the New Hampshire Fish and Game Non-Game and Endangered Wildlife Program. According to the NHB's list of "Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns," (NH NHB, 2020) the species and natural communities/systems listed in Appendix E have been documented and are likely to exist in Hampton Falls based on known records and/or predicted broad distributions. The specific locations of rare species and communities are not available for this study due to data release policies of the NHB and NHFGD. As described above in Section 3.2, information on rare species and communities has been incorporated into the Wildlife Action Plan's Habitat Rank.

3.4 NATIVE AND NON-NATIVE PLANT SPECIES

A **native** plant is a part of a given ecosystem that has developed over hundreds or thousands of years in a region or ecosystem. The word native should be used with a geographic qualifier. All plants are native somewhere, but only plants that have been established for hundreds or thousands of years in New Hampshire are considered native to New Hampshire. A **non-native** plant is a plant introduced to a new place or new type of habitat where it was not previously found, whether intentionally or accidentally. Not all non-native plants are invasive. Many non-native plants that are introduced to new places cannot reproduce or spread readily without continued human help (e.g., many ornamental plants). An **invasive** plant is one that is both non-native and able to establish in many areas, grow quickly, and spread to the point of disrupting existing native plant communities or ecosystems. A **naturalized** plant is a non-native species that does not need human help to reproduce and maintain itself over time in an area where it is not native. Naturalized plants do not, over time, become native members of the local plant community. Many naturalized plants are found primarily near human-dominated areas. Since invasive plants also reproduce and spread without human help, they are considered naturalized. Naturalized invasives are a small, but troublesome, sub-category of naturalized plants.

3.4.1 NATIVE PLANT SPECIES

The University of New Hampshire Cooperative Extension has published a table of native trees, shrubs, and vines important for wildlife habitat (UNH Cooperative Extension, New Hampshire's Native Trees, Shrubs, and Vines with Wildlife Value, 1995). Hampton Falls contains many of these species including American beech (*Fagus grandifolia*), eastern hemlock (*Tsuga canadensis*), shagbark hickory (*Carya ovata*), red maple (*Acer rubrum*), flowering dogwood (*Cornus florida*), and native bittersweet (*Celastrus scandens*). These species are common throughout New Hampshire and the Seacoast and can be found through many of Hampton Falls' trails. Hampton Falls is also home to swamp white oaks (*Quercus bicolor*), a not so common species. Common native salt marsh plant species include tall-form and short-form smooth cordgrass (*Spartina alterniflora*), salt marsh hay (*Spartina patens*), spike grass (*Distichlis spicata*), and sea lavender (*Limonium nashi*) (NHFGD, 2020e). These species have adapted to become tolerant of fluctuating water levels and salinity concentrations.




Red maple Eastern hemlock American beech Swamp White Oak

Native pollinator species are critical organisms in all ecosystems. Pollinators aid in plant reproduction thus yielding fruits, flowers, and seeds to sustain environments. Over 300 species of bees, butterflies, moths, and thousands of polluting insects can be found in New Hampshire. The monarch butterfly (*Danaus plexippus*) and four species of bumble bees (Lemon Cuckoo, Rusty-patched, Yellow, and Yellow-banded) have been identified as Species of Greatest Conservation Need in New Hampshire. Because pollinator species are declining in New Hampshire due to habitat loss, the use of pesticides, and invasive species, it is ever more important to create habitats for them. The Hampton Falls Conservation Commissions will be installing a native plant/pollinator garden at the Hampton Falls Free Library. Leading by example and using resources such as the native plant species search engine provided by the Native plant Trust and educational resources provided by the NH Audubon, this garden will help educate visitors while providing habitats for these important species.

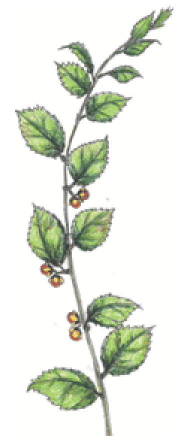

Monarch butterfly American bumble bee

3.4.2 NON-NATIVE PLANT SPECIES

Non-native, invasive vegetation can have deleterious effects on the ecology, scenic quality, and quality of public recreation in a given area. All three of these attributes stand to be compromised by the unchecked spread of non-native, invasive plants. Non-native, invasive plants outcompete native species, and with their loss so follows the loss of their native pollinators and other dependent wildlife. The seed and berry crops produced by non-native invasives are in most cases less nutritious to birds than those produced by native species. Climbing vines can be unsightly, as are dense thickets of non-native invasive species, both of which are capable of rendering foot paths impassable.

Disturbed areas, whether it is natural or resulting from human activity, are particularly susceptible to the establishment and spread of invasive species. In riparian areas, combinations of frequent ice and water scour, fertile floodplain soils, increased sunlight, and water transport of seeds and plant fragments provide excellent conditions for non-native, invasive plants to establish, grow, and spread. Often, invasive plant management includes an Integrated Vegetation Management (IVM) approach. An IVM approach utilizes multiple strategies including mechanical, biological, chemical, and cultural treatment methods. Any method chosen to target invasive species must include a monitoring plan to track the effectiveness of the eradication and to eliminate regrowth.



Perennial pepperweed Glossy false buckthorn Japanese knotweed Asiatic bittersweet

3.4.3 THREATS POSED BY INVASIVE SPECIES

Invasive plants pose a direct threat to New Hampshire's natural and working landscapes. The aggressive growth of these species can have negative effects on forest regeneration (following timber harvest, disease, fire, etc.), increase the cost of agriculture, and threaten recreational experiences (e.g., by rendering hiking trails impassable and disrupting views). Invasive plants out-compete native species for sunlight, nutrients, and space by growing quickly enough to crowd out native species. Thus, shifts to invasive species dominance may alter wildlife habitat by eliminating native foods, altering physical structure of an area, and destroying bird nesting opportunities.

Invasive species are considered the second greatest threat to worldwide biodiversity after habitat loss (Marden, 2011). Most invasive plants in the US were deliberately introduced. It is humans' decisions regarding species introductions and land use that led to the spread of these species. Conservation biologist Michael Klemens coined the term "subsidized species" to characterize invasive species that have attained population levels that have adverse effects on ecosystem function and human activities.

Considering the wealth and breadth of ecologically and historically significant features and recreational opportunities in Hampton Falls, invasive species management is worthwhile as it provides a suite of benefits, including the restoration of native land cover types and the improvement of recreational opportunities for town residents and visitors.

Invasive species pose a considerable threat in Hampton Falls. Species with the greatest threat to salt marshes include perennial pepperweed (*Lepidium latifolium)* which can tolerate higher levels of salinity in marshes, purple loosestrife (*Lythrum salicaria*), and common reed (*Phragmites australis*). These three plants are known to spread rapidly, forming monocultures that outcompete native wetland species in a relatively short time. Best management practices require multiple approaches including inventory and mapping, control at ecologically important or vulnerable sites, local policy, and regional partnerships.

Perennial pepperweed (*Lepidium latifolium)* has flourished within the Seacoast's marshes, including within the Hampton Flats (Barndollar, 2023). Native to Eurasia, this invasive species appears harmless and displays white flowers in the summer months. Pepperweed can outcompete native marsh grasses creating monoculture habitats with limited functional purpose in the region. Common eradication efforts include hand pulling, ensuring the entire plant and root system is removed. It is important to note though that removal efforts of any kind must be conducted in environmentally safe ways. Marshes are very sensitive ecosystems. Disturbing vegetation by traversing marshes and uprooting invasive plants increases exposed soil on marshes which is more susceptible to slumping and erosion. All marsh management efforts must be handled with caution to ensure marsh ecosystem function is maintained and native plants can flourish.

Since 2008, the NHDES Coastal Program has been monitoring, mapping, and responding to perennial pepperweed in Hampton Falls and other NH Seacoast communities in an effort to control the spread. In 2022, the UNH Cooperative Extension joined the effort with funding from the USFWS to identify additional sites and hand pull several hundred stems per site each year. For more information regarding perennial pepperweed, please see the UNH Cooperative Extension's resources on the subject. According to EDDMapS, two small populations of perennial pepperweed were documented within the Hampton Flats in Hampton Falls in June 2024.

Other invasive plant species posing threats to ecosystems in Hampton Falls include Asiatic bittersweet (*Celastrus orbiculatus*), Japanese knotweed (*Fallopia japonica*), glossy false buckthorn (*Frangula alnus*), Norway maple (*Acer platanoides*), Japanese barberry (*Berberis thunbergii*), and burning bush (*Euonymus alatus*) (Hampton Falls Conservation Commission, 2023). Multiflora rose (*Rosa multiflora*) has also been positively identified in Hampton Falls, according to EDDMapS.

Several non-native, invasive insect species have been recorded in Hampton Falls, including the emerald ash borer (*Agrilus planipennis*), hemlock wooly adelgid (*Adelges tsugae*), elongate hemlock scale (*Fiorinia externa*), spongy or gypsy moth (*Lymantria dispar*), and, for the first time in 2024, the Asian nematode *Litylenchus crenatae*, which causes beech leaf disease. For more

information on non-native, invasive insects and their impacts on New Hampshire's forests, visit the NHBugs website at https:// nhbugs.org/.

3.5 PRIORITY CONSERVATION AREAS

Areas of the town with the highest natural resource values were identified by the NHFGD through the 2020 Wildlife Action Plan. As mentioned above, areas of highest ranked habitat in both New Hampshire and in the biological region as well as their supporting landscapes have been identified as priority areas for wildlife conservation, using a co-occurrence model developed by the New Hampshire Fish and Game Department. These rankings were developed through a co-occurrence analysis by overlaying raster images in GIS. The raster images used in the co-occurrence analysis consisted of the town as a surface divided into a regular grid of cells. For each raster (e.g., wetlands, agricultural soil), each cell containing a given natural resource feature was assigned a value of one. Individual raster layers were then overlaid on top of one another to determine which areas of the town support the greatest number of significant natural resources. NHFGD has since replaced this original co-occurrence model with the New Hampshire Wildlife Action Plan Habitat Ranks (discussed in Section 3.2).

The 2020 WAP identified a total of 2,052 acres (25% of the town) as highest ranked habitat in New Hampshire. An additional 848 acres (11%) are identified as highest ranked habitat in the biological region. Lastly, 1,685 acres (21%) are identified as supporting landscapes. The Nature Conservancy has studied wildlife action plans, regional conservation plans, state conservation plans, and spatial models to develop the Connect THE Coast publication and associated resources. Through this initiative, wildlife corridors have been identified which connect lands with important wildlife habitat features. If protected, these corridors will help wildlife move across the landscape through unfragmented areas.

Connect THE Coast has also identified blocks of prioritized habitat that represent where conservation efforts should be focused for the largest wildlife habitat benefit (Appendix A, Map 10). There are four blocks of prioritized habitat within Hampton Falls, all of which encompass priority ranked habitats and supporting landscapes from the WAP:

Hampton Flats: 1,411 acres located in the wetland area tidally connected to Hampton Harbor.

Taylor River and The Cove (West): 761 acres around the Tonry Christmas Tree Farm and Taylor River, west of NH Route 88 (Exeter Rd). This block connects to the Great Brook/ Exeter River confluence to the west of Hampton Falls.

Taylor River and The Cove (East): 560 acres located along the Taylor River and Clay Brook, east of NH Route 88 (Exeter Rd).

Upper Taylor River: 349 acres located around the Taylor River headwaters in the vicinity of Drinkwater Rd.

3.6 ADDITIONAL CO-OCCURRENCE ANALYSIS

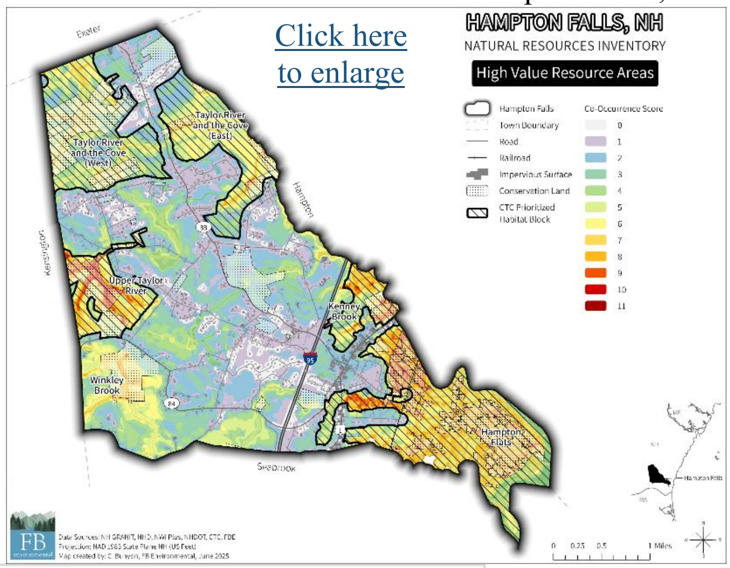
As previously mentioned, co-occurrence analysis identifies areas with the highest resource values in a specific area. The analysis incorporates multiple sources of data including but not limited to already conserved areas, natural resources such as waters, wetlands, forests, and environmental services such as water supply areas, pollutant attenuation areas, flood storage areas, and more. The highest resource areas are those with multiple resources and ecosystem services present. The compilation of multiple resource types helps identify areas in which to expand conservation efforts while serving the most ecological benefit and shared vision across the community.

To conduct the co-occurrence mapping for the Hampton Falls NRI, FBE compiled a subset of data layers gathered for the creation of the maps found in Appendix A into seven categories (Table 10). Each data layer, along with the town footprint, was left in polygon form and unioned together. Each data layer was comprised of polygons of 0s and 1s. A 0 represented land within Hampton Falls that is not part of that data layer, and 1 represented land within Hampton Falls that is part of that data layer. For example, areas that are already conserved received a score of 1, while areas not conserved received a score of 0. Once all data layers were scored and unioned together, a new field called "CoOccScore" was created in which the sum of each data layer's 0s and 1s were calculated. A co-occurrence score of 16 indicates all 16 resources are present at that location. A co-occurrence value of 0 indicates no resources are present at that location.

Table 10. Data layers used in the co-occurrence analysis. Co-occurrence areas described as "as is" were analyzed as the extent they cover with no buffers added.

Category	Data Layer	Co-occurrence Area
Existing Conservation Land	Conservation Land	+Buffer of 500'
Existing Proposed Co-Occurrence Areas	Prioritized Habitat Blocks	As is
Non-developed areas	Unfragmented Land	Areas > 10ac
Water/Wetland Resources	Waterbody	+Buffer of 100'
	Stream/River	+Buffer of 75'
	Prime Wetland	+Buffer of 75'
	Wetland	+Buffer of 75'
Wildlife Habitat	Wildlife Corridor	As is
	Highest Priority Habitat	As is
Ecosystem Services	Prime Agricultural Soils	As is
	Stratified Drift Aquifer	As is
	High Priority Water Supply Land	As is
	Wellhead Protection Areas	As is
Climate Change Resiliency	Marsh Migration from 1.5' Sea Level Rise	As is
	Flood Storage Area	As is
	Pollutant Attenuation Area	As is

The results of the co-occurrence analysis for the Town of Hampton Falls, NH are shown in (Appendix A, Map 11). 8% of the town (632 acres) contains a co-occurrence score of 8 or greater (Figure 2). The highest co-occurrence score within the Town of Hampton Falls is 11 (<0.01%, 0.19 acres). Only 5% of the town (392 acres) has a co-occurrence score of 0, indicating none of the natural resources identified were present. 87% of the town (7,053 acres) contains between 1 and 7 of the 16 natural resources identified.



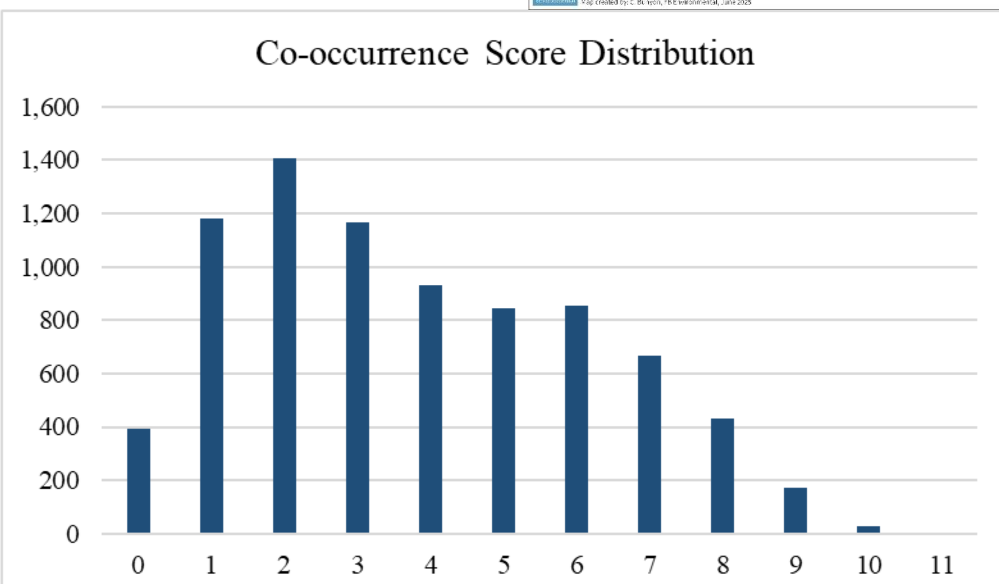


Figure 2. Distribution of co-occurrence scores by total acres in Hampton Falls, NH.

The co-occurrence analysis identified six areas of highest resource value. Additionally, these areas align well with the Prioritized Habitat Block data layer – created with a similar purpose (Appendix A, Map 12). An exception is Winkley Brook, which has a high co-occurrence score but is not identified as a Prioritized Habitat Block. Ordered from northeast and moving clockwise through the town, descriptions of the six high resource value areas are as follows. See Table 11 to learn which resources are present in each of the six high value resource areas.

1. Taylor River and the Cove (East): Located east of NH Route 88 (Exeter Road), this area contains a maximum co-occurrence score of 10.
2. Kenney Brook: Located between US Route 1 and the I-95, the habitat associated with Kenney Brook attains a maximum score of 11.

3. Hampton Flats: Located east of US Route 1, portions of the salt marsh score 11 in the co-occurrence analysis.
4. Winkley Brook: Located southwest of Kensington Road, portions of Winkley Brook and its associated habitats contain a maximum score of 9.
5. Upper Taylor River: The headwaters of the Taylor River, located west of Drinkwater Road, contain a maximum co-occurrence score of 11.
6. Taylor River and the Cove (West): Located west of NH Route 88, portions of the Taylor River and the Cove score a maximum of 9.

Table 11. Natural resources present in each of the six Priority Conservation Areas.

Natural Resource	Taylor River and the Cove (East)	Kenney Brook	Hampton Flats	Winkley Brook	Upper Taylor River	Taylor River and the Cove (West)
Conservation Land	X	X	X	X	X	X
Prioritized Habitat Blocks	X	X	X		X	X
Unfragmented Land	X	X	X	X	X	X
Waterbody	X	X	X	X	X	X
Stream/River	X	X	X	X	X	X
Prime Wetland	X	X	X	X	X	X


Photo Credit: Becky Nolan

Natural Resource	Taylor River and the Cove (East)	Kenney Brook	Hampton Flats	Winkley Brook	Upper Taylor River	Taylor River and the Cove (West)
Wetland	X	X	X	X	X	X
Wildlife Corridor						
Highest Priority Habitat						
Prime Agricultural Soils	X	X	X	X	X	X
Aquifer				X		
High Priority Water Supply Land	X	X	X	X	X	X
Wellhead Protection Areas	X	X	X	X	X	
Marsh Migration from 1.5’ Sea Level Rise		X	X			
Flood Storage Area	X	X	X	X	X	
Pollutant Attenuation Area	X	X	X	X	X	X

3.7 WILDLIFE AND HABITAT THREATS AND RECOMMENDATIONS FOR ACTION

Hampton Falls faces a challenge of how best to balance prudent economic growth, land ownership, and responsible stewardship of its natural resources while accounting for climate change. A healthy functioning environment is often placed in opposition to economic growth and human quality of life. Clean air, clean water, and ecosystem services provided by natural systems are essential to maintaining a high quality of human life. If communities can disregard the oppositional model of environmental conservation versus human progress, they can begin to have a broader discussion on how to achieve both (Klemens, Davison, & Oko, 2012).

3.7.1 CONSIDERATIONS AND CAVEATS

Priority Conservation Areas are not mapped solely for land preservation – Preservation of entire Priority Conservation Areas are not feasible, nor is that the recommendation or purpose of the co-occurrence analysis outcome. Many of the mapped areas are privately-owned lands that contribute, through taxes, to the economic stability of the town. Rather, a balanced approach to conservation and development which incorporates a suite of land use planning and conservation tools is recommended.

Environmentally mindful development and land-use activities – Regardless of location, all development proposals should receive careful review and consideration of potential environmental impacts and where they are positioned within Hampton Falls' landscape. By utilizing the NRI and the results of the co-occurrence analysis, the town is better equipped to make proactive and informed decisions.

Conservation opportunities may occur outside of the Priority Conservation Areas and highest resource value areas – Small land parcels or areas disconnected from the identified "high priority" areas may still harbor valuable resources, such as previously unknown significant species or natural communities with high conservation importance.

Photo Credit: Lona McNamara


Photo Credit: Sara McNamara-Gagnon


Photo Credit: Sara McNamara-Gagnon

3.7.2 THREATS AND RECOMMENDATIONS FOR ACTION

Prime Wetlands: Hampton Falls is among the 33 towns in New Hampshire that have designated prime wetlands. Prime Wetland designation provides a means by which towns can provide additional protection to wetlands that are particularly unique or sensitive to disturbance by restricting construction or earthwork in or within 100 feet of these resources. While prime designation does offer additional protection to a subset of wetlands within the town, the Conservation Commission may wish to spearhead a town-wide inventory of vernal pools as means to identify additional wetland resource and wildlife habitat to protect. Information obtained during the vernal pool inventory may be useful for additional Prime Wetland designation should the town wish to pursue it in the future.

Vernal Pools: New Hampshire's Nongame and Endangered Wildlife Program within NHFGD encourages citizens to document the locations of vernal pools using a downloadable form and/or through their New Hampshire Wildlife Sightings website, a web tool for reporting wildlife observations throughout the state. More information regarding documenting and reporting New Hampshire Vernal Pools can be found in the NHFGD report, "Identifying and Documenting Vernal Pools in New Hampshire" (Marchand, 2016).

Though NHFGD likely has some vernal pool information for Hampton Falls, it is recommended that vernal pools be formally documented throughout the entire town. Hiring consultants to document pools throughout the entire town is not necessary and could be cost-ineffective. Instead, the work could be carried out by trained citizen scientists, which has been accomplished in numerous towns in Maine through the Maine Municipal Vernal Pool Mapping Project. In addition to the financial advantages of using volunteers, engaging local citizens also increases awareness of natural resources, instills a sense of place and community pride, and encourages local control over quality of life through participation in planning for the future (Morgan & Calhoun, 2012). More information regarding the use of citizen scientists to map vernal pools can be found in Morgan and Calhoun's (2012) Maine Municipal Guide to Mapping and Conserving Vernal Pool Resources. The authors mention that while the focus of their publication is to provide guidance to Maine municipalities, their methodology is appropriate for any region interested in local, collaborative conservation planning and is applicable at a variety of scales. A vernal pool database would be an invaluable resource to the Hampton Falls Conservation Commission.

Lastly, Morgan and Calhoun (2012) mention that interpretation of aerial photography is the best available method for remotely identifying potential vernal pools at the municipal scale. While aerial imagery is the "gold standard," the use of LiDAR data is becoming increasingly common. LiDAR is a form of remote sensing that uses laser light pulses to help reveal highly detailed information about a landscape. While interpretation of aerial imagery involves the use of paired 9 x 9-inch stereo contact prints viewed under a mirror stereoscope or viewing digitized images in 3-D on a specialized computer screen, LiDAR requires the use of sophisticated computer modeling. Sean MacFaden of the University of Vermont Spatial Analysis Lab has developed a very accurate method of remotely sensing vernal pools with LiDAR data using Object-based Image Analysis and eCognition software.

Beyond the challenge of identifying the locations of vernal pools, another significant threat to these habitats and the species they support is development within their envelope (the area within 100 feet of the pool boundary) and critical terrestrial habitat (the area 100–750 feet from the depression's edge) (USACE, 2024). The quality of this habitat is crucial to the survival of species that require vernal pools for breeding, such as wood frog (*Lithobates sylvaticus*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*A. opacum*), Jefferson salamander (*A. jeffersonianum*), and blue-spotted salamander (*A. laterale*). Two of New Hampshire's four turtle species identified as Species in Greatest Need of Conservation, the Blandings turtles (*Emydoidea blandingii*) and wood turtles (*Glyptemys insculpta*) have been known to feed within vernal pools or occur within vernal pools respectively.

Freshwater Wetlands & Peatlands: Threats to freshwater wetlands, including rare systems such as peatland habitats, include development, altered hydrology (both in water quantity and flow), and unsustainable forest harvesting. NPS pollutants, such as road salt, lawn fertilizers, and pesticides, also threaten this habitat and wetland type by altering the acidity and nutrient concentrations. Establishing vegetated buffers around this habitat is one conservation strategy that will help minimize the threats to peatland habitats by slowing stormwater runoff, promoting groundwater recharge, and filtering nutrients and sediment from runoff.

Salt Marshes: The salt marshes of Hampton Falls have a very high density of ditches. By accumulating peat, salt marshes can gain elevation and, in many cases, keep up with rising sea levels—unless the rate of sea-level rise becomes too great. Restoring ditched sections of salt marsh can also support larger populations of Saltmarsh and Nelson's sparrows and provide additional roosting sites for shorebirds (McKinley & Hunt, 2009). An estimated 30–50% of New Hampshire's original salt marsh habitat has been lost to development. Historical activities such as salt marsh hay harvesting for livestock feed (17th–19th centuries) and mosquito control efforts (mid-20th century) have negatively impacted these ecosystems, primarily through poorly designed drainage ditches and other attempts to drain marshes (Eberhardt & Burdick, 2009). Effective conservation strategies include restoring and protecting remaining salt marsh habitat, maintaining or restoring pools used by roosting and foraging shorebirds, and preserving the surrounding upland buffer. Additionally, enhancing public education and outreach on the ecological significance of salt marshes—particularly their role in shorebird migration—can help foster long-term conservation efforts. The Hampton-Seabrook Restoration Compendium (Eberhardt & Burdick, 2009) also recommends focusing on protecting land between Lafayette Road and Depot Road from development, because this forested upland contains few barriers to the landward migration of marsh in response to increased inundation.

Rivers: The Hampton Falls River is dammed at the US Route 1 crossing to create the Dodge Ponds. The town may investigate opportunities for dam removal or construction of a fish ladder to restore fish passage between the estuary and upstream high-quality aquatic habitat. Similar opportunities apply at dams on watercourses throughout Hampton Falls.

Inland Habitats: Inputs of sediment, pesticides, and fertilizers are sources of pollution that threaten temperate swamp and forest habitats. Actions to conserve temperate swamps include supporting the Division of Forests and Lands in the implementation of the hemlock woolly adelgid action plan and working with foresters to use best management practices outlined in the document "Good Forestry in the Granite State."

Incorporating habitat conservation into local land use planning, protecting unfragmented blocks, and adopting sustainable forestry are a few examples of conservation strategies for the Appalachian oak-pine forests located within Hampton Falls.

Invasive Plant Species: Many resources currently exist for the maintenance and eradication of common invasive species found in New Hampshire's coastal communities. The Rockingham

County Conservation District (RCCD) has developed and implemented a *Phragmites* control program and created management practices for Japanese knotweed and glossy false buckthorn removal (Rockingham County Conservation District, n.d.). The early detection and eradication of perennial pepperweed in salt marshes by UNH Cooperative Extension staff and interns is another important program (see Section 3.4.3) Local citizen-driven and municipally supported efforts to identify, prioritize, monitor, and eradicate invasive plant species throughout the town are among the many effective strategies to address these pests.

The Hampton Falls Conservation Commission has held informational talks at the Hampton Falls Free Library on how to identify and remove invasive plant species, and invasive species removal events at Depot Road. Additionally, the talks and field events have included discussions on the threats and impacts these invasive species have on native plants and the greater ecosystem.

Recommendations for Actions

Promote the use of native plant species in Hampton Falls. Review of development proposals and/or municipal regulations should include the promotion of native plantings in landscaping plans. Public education and outreach about invasive species through garden clubs and other civic groups is another effective strategy.

Improve habitat diversity through land management. Enhancing biodiversity on both small and large parcels can be achieved through strategies such as decreasing lawn area, minimizing mowing frequency in fields, planting trees and shrubs along field edges with deep, strong roots, and establishing small forest openings.

Photo Credit: Ariana Spear

4. SOILS AND AGRICULTURE

4.1 SOILS OF SPECIAL IMPORTANCE

Soil is the unconsolidated mineral and organic matter on the immediate surface of the earth that serves as a natural medium for the growth of plants. Understanding the nature and properties of soils is critical to managing and conserving natural resources. Different soil types throughout the town have developed from the interaction of several natural phenomena, including climate, surficial geology, topography, and vegetation.

The US Department of Agriculture's Natural Resources Conservation Service (NRCS) studies and inventories soil resources across the country. Soil surveys contain detailed soils maps, data tables, and text narratives that assist in determining appropriate uses for the land. Soil surveys also contain predictions of soil suitability for selected land uses and highlight limitations and hazards inherent in the soil and the impact of selected land uses on the environment.

The NRCS groups soils based on their capability to produce commonly cultivated crops and pasture plants without deteriorating over a long period of time. These classifications are based on numerous criteria that include, but are not limited to, the soil's salinity, parent material, capacity to hold moisture, potential for erosion, depth, texture, and structure, as well as local climatic limitations (e.g., temperature and rainfall). These units are further sorted based on land capability such as farmland, wetland, and forest soils. Soil classifications are designed to guide choices in land use and soil management.

4.1.1 FOREST SOILS

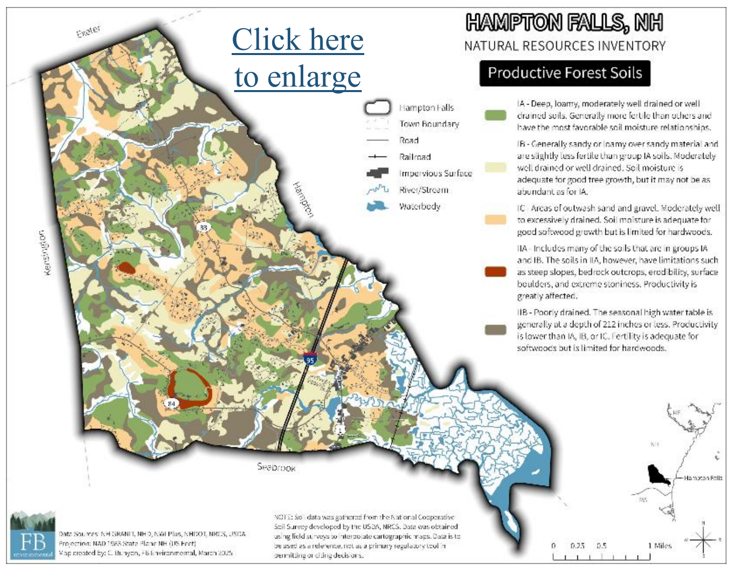
Soil is an important component of the forest ecosystem as it helps regulate important ecosystem processes, including nutrient uptake, decomposition, and water availability. Soil provides trees with anchorage, water, and nutrients. In turn, trees and other forest vegetation contribute to the creation of new soil as leaves and other vegetation rot and decompose (Food and Agriculture Organization of the UN, 2016).

Forest soils are generally subjected to fewer disturbances than agricultural soils, which are regularly plowed and planted. Forest soils typically do not receive external inputs from human management activities (e.g., fertilizer, manure, herbicides, insecticides, fungicides). Instead, they rely on internal soil nutrient cycling to support plant nutritional needs (Smith, Miles, Perry, & Pugh, 2007).

Disturbances to forest soils are mostly associated with timber harvesting and clearing for development. As with other elements of the forest, soils tend to show the effects of disturbances for many years. Activities and events, including land use change, wildfire, drainage, and timber harvest, can greatly affect soil characteristics, which in turn will affect forest productivity and health, including water quality and quantity (Smith, Miles, Perry, & Pugh, 2007).

The terrain features, topography, and soils that provide the foundation for today's forests can be traced to the action of glacial ice or melt water as the last glacier retreated northward. As a result, there is considerable variability in soil types across the town. Most variability in tree species and forest composition is due to differences in underlying soil type, available nutrients, and moisture (Thorne & Sundquist, 2001).

Soils mapped by the NRCS for each county soil survey have been grouped into six "Important Forest Soils Groups" based on interrelated soil characteristics such as: texture and moisture or wetness; inherent limitations of the soil for forest management (e.g., steep slopes, shallowness, boulders, rock outcrops); and typical forest successional trends on certain soil types (Thorne & Sundquist, 2001). The five most important forest soil groups in Hampton Falls are described below and shown in Appendix A, Map 12.



Group IA forest soils include deeper, loamy soils, moderately- to well-drained, and are considered prime northern hardwood forest soils. Certain soil series in the group are also good for hemlock growth. In Hampton Falls, these soils account for approximately 1,356 acres or about 17% of the town's total area.

Group IB consists of sandy or loamy soils that are moderately- to well-drained. These soils are good for growing northern hardwoods including paper birch, beech, and oak. This forest soil group covers 1,634 (20%) of the town's total land area.

Group IC soils consist of outwash sands and gravels and support the growth of white pine. They are moderately to excessively well drained, and constitute about 1,591 acres (20%) of the town's total area.

Group IIA soils include many of the soils in groups IA and IB, but where productivity is limited by steep slopes, bedrock outcrops, erodibility, surface boulders or extreme stoniness. This group covers 50 acres or approximately 0.6% of Hampton Falls.

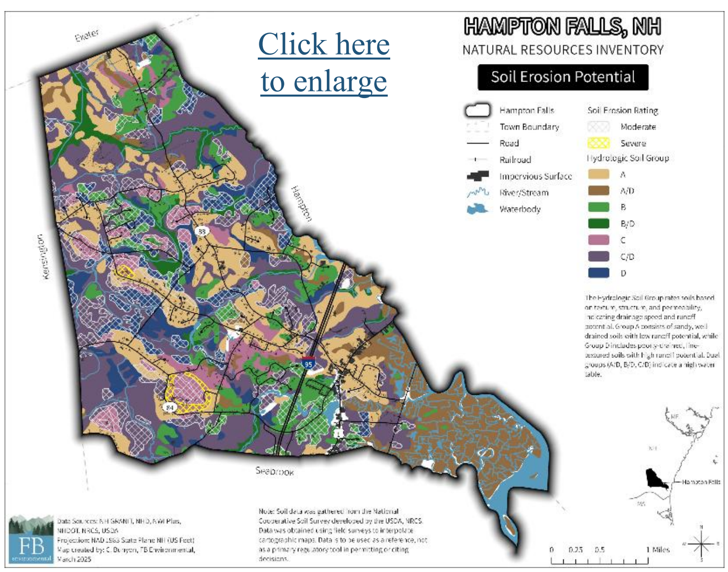
Group IIB soils are poorly drained and have a seasonal high water table within one foot of the surface. These soils cover 1,725 acres or about 21% of Hampton Falls.

In total, approximately 6,355 acres (79%) of Hampton Falls' land area is comprised of important forest soil. The majority of that area is currently undeveloped.

4.1.2 DEVELOPMENT AND SOILS

Development should occur on soils capable of supporting infrastructure, with adequate soil drainage and stable, non-eroding soils. Soil drainage characteristics are based on a soil's permeability, which refers to the ability of air and water to move through it. Permeability depends on the soil's density, structure, and texture, which determines the size, shape, and continuity of pore spaces. Texture is one of the most important characteristics since it influences many other properties of soil such as suitability for irrigation needs, erosion potential, and fertility. Soil texture describes the proportionate distribution of different sizes of mineral particles in a soil such as clay, silt, and sand.

Hydric Soils: Generally, sandy soils tend to be lower in organic matter content and fertility, resulting in the reduced ability to retain moisture and nutrients resulting in the soil being well-drained and therefore well-suited for road foundations and building sites. Fine-textured soils are generally more fertile, contain more organic matter, and are better able to retain moisture and nutrients. Clay soils, the finest-textured soils, drain slowly, are more difficult to manage for cultivation, and are poorly suited for road construction and building sites (particularly septic systems and basements). NRCS classifies such soils as "hydric soils." These soils are frequently ponded or flooded for extended periods during the growing season.



Hydric soils are divided into four groups, group A to group D. Group A soils have low runoff potential, therefore water percolates easily through the soil. These typically contain over 90% sand and less than 10% clay. Group B soils have moderately low runoff potential, therefore water percolates easily through the soil. These typically contain between 50–90% sand and 10–20% clay with some silt and loam properties. Group C soils have moderately high runoff potential; therefore, water does not percolate as easily through the soil. These soils are typically less than 50% sand and between 20 and 40% clay with some loam, silt loam, and sandy/silty loams. Lastly, group D soils have high runoff potential; therefore, water does not percolate easily through the soil. These soils are typically less than 50% sand and greater than 40% clay. Dual hydrologic soil groups, such as A/D, B/D, or C/D, contain the properties of the first letter's category but have a water table within 60 centimeters of the surface (USDA, Part 630 Hydrology National Engineering Handbook - Chapter 7, Hydrologic Soil Groups, 2007) (Appendix A, Map 13).

Soils with shallow distances to groundwater are often poorly suited for development. Over 4,423 acres (55%) within the town are between 1 and 77 centimeters above the water table. Additionally, 1,192 acres (15%) include areas where the depth to groundwater is 0 centimeters. The remaining 2,463 acres (30%) have a depth to water table of over 200 centimeters.

Soil erosion hazard is the soil's rating for how likely it is to erode, and is dependent on a combination of factors, including land contours, climate conditions, soil texture, soil composition, permeability, and soil structure (O'Green, Elkins, & Lewis, 2006). Soil erosion hazard should be a primary factor in determining the rate and placement of development within a watershed. According to the Web Soil Survey's Land Management and Erosion Hazard metadata, a rating of "slight" indicates little to no erosion is likely to occur, "moderate" indicates some erosion is likely to occur, meaning roads or infrastructure may require occasional maintenance with simple erosion control practices, and "severe" indicates that significant erosion to the landscape is expected, indicating roads and other infrastructure will require frequent maintenance and large erosion control practices.

Most of Hampton Falls was classified as having "slight" erosion hazard (75%), followed by "moderate" (20%), "severe" (1%), and not rated (4%) (Appendix A, Map 15). These areas of moderate and severe erosion hazards are scattered throughout the town.

Development should be restricted in areas with highly erodible soils due to their inherent tendency to erode at a greater rate than what is considered tolerable soil loss. Highly erodible soils pose more risk to water quality, so these areas require more effort and investment to maintain soil stability and function within the landscape, as well as stormwater management practices that prevent runoff from reaching water resources.

4.1.3 AGRICULTURAL SOILS

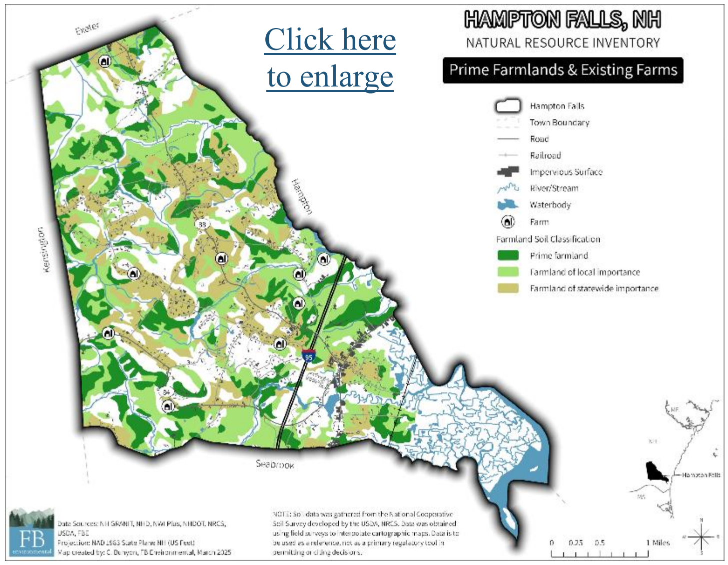
The Farmland Protection Policy Act of 1981 was established to ensure that Federal programs are compatible with state and local governments and private programs and policies to protect farmland. The NRCS uses the following three farmland soil classifications in New Hampshire for the purpose of carrying out the provisions of this Act (USDA, 1981):

Prime Agricultural Soils: Prime agricultural soils have sufficient available water capacity to produce the commonly grown cultivated crops adapted to New Hampshire. They have high nutrient availability, generally low slope and low landscape position, are not frequently flooded, and contain less than 10% rock fragments in the top six inches. The land may currently be in crops, pasture, or woodland; but not urbanized, built-up land, or water areas. It must either be used for producing food or fiber or be available for these uses.

In Hampton Falls, these soils account for approximately 1,192 acres, about 15% of the town's total area.

Soils of Statewide Importance: Farmland of statewide importance is land, in addition to prime and other unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. The state government designates farmland of statewide importance with the concurrence of the NRCS State Conservationist. Generally, these farmlands nearly qualify as prime farmland and can produce high yields of crops when treated and managed according to acceptable farming methods.

This soil type constitutes about 1,426 acres, approximately 18% of the town's total area.



Soils of Local Importance: Soils of local importance include soils that are not prime or of statewide importance, but that have local significance for the production of food, feed, fiber, forage and oilseed crops. These lands are designated by local agencies with the concurrence of the NRCS State Conservationist and may include tracts of land that have been designated for agriculture uses by local ordinance.

These soils account for approximately 2,098 acres, or about 26% of the town's total area.

In total, approximately 4,716 acres (58%) of Hampton Falls are comprised of agricultural soil (Appendix A, Map 14). These soils are scattered throughout the town in areas not classified as wetlands.

4.2 ACTIVE FARMLANDS

Farmlands are areas of land producing crops such as hayfields, consumable crops, and orchards. Farmlands also include areas of land used for pastures and the grazing of livestock including but not limited to horses, cows, goats, pigs, and sheep. According to the 2022 New Hampshire Agricultural Census, the State of New Hampshire contains 3,949 farms covering over 417,000 acres (USDA, 2024). Although the number and total area of farms in New Hampshire has been decreasing since 2012, dairy production and hay alone in New Hampshire for 2023 reached a value of over 57 million dollars (USDA, 2025). As of 2022, Rockingham County contains 527 farms covering 26,537 acres (USDA, 2024).

Farmlands are ecosystems as well and provide benefits aside from producing crops and livestock. Farmland meadows, grasslands, and scenic vistas provide habitat and connective pathways for many wildlife species and contribute to the cultural identity and history of New Hampshire. While New Hampshire is predominately forested, farmland habitats are key ecosystems due to the biodiversity and economic diversity they provide.

Hampton Falls' trend in total acres of farmland follows the statewide trend. Agricultural land use declined from 1,500 acres in 1962 to 651 acres in 2015 (Town of Hampton Falls, 2019). Nevertheless, Hampton Falls has retained its rural character, with fewer than one person per acre (Town of Hampton Falls, 2019). The protection of open space is central to the vision of the town and its residents. Forty-one acres of farmland and forest on the Raspberry Farm property are owned and managed by the Town of Hampton Falls. This protected land is adjacent to the 110-acre Hampton Falls Town Forest. The Rockingham County Conservation District manages a 100-acre conservation easement on Applecrest Farm, ensuring the land will not be developed in the future. Southeast Land Trust manages 215 acres of farmland and forest on the Tonry Christmas Tree Farm. Together, these and other farms and conservation easement preserve the cultural heritage and open landscapes characteristic of Hampton Falls.

4.3 AGRICULTURE, FORESTRY, AND SOIL THREATS AND RECOMMENDATION FOR ACTION

Agricultural areas play an especially important role in preserving open space and historical resources. Development and an increase in infrastructure and transportation networks serve as the largest threats to soils of special importance and farmlands as more people flock to the seacoast. Because the acreage of farms in Hampton Falls has been declining, conserving remaining farms for their environmental, cultural, and historical benefits should continue to be prioritized. One method is to create an agricultural profile for the town. UNH Cooperative Extension describes an agricultural profile as "a comprehensive overview of a community's agricultural industry. It includes information pertaining to soil type and acres, number and type of farms, zoning and agricultural land use, economic impact, protection of natural resources, farmland acres lost to development, and related issues of concern" (UNH Cooperative Extension, 2001). Additionally, outreach and education prove valuable tools for agricultural land conservation, even on small-scale farms. These agricultural areas provide ecological resources for habitats, wildlife, human recreation and education, and help support our local food systems. Establishing community farms, similar to the Hampton Victory Garden in Hampton, on high value agricultural soils or historic farmland areas would increase public access to tap into these resources while also serving as a tangible platform for community education.

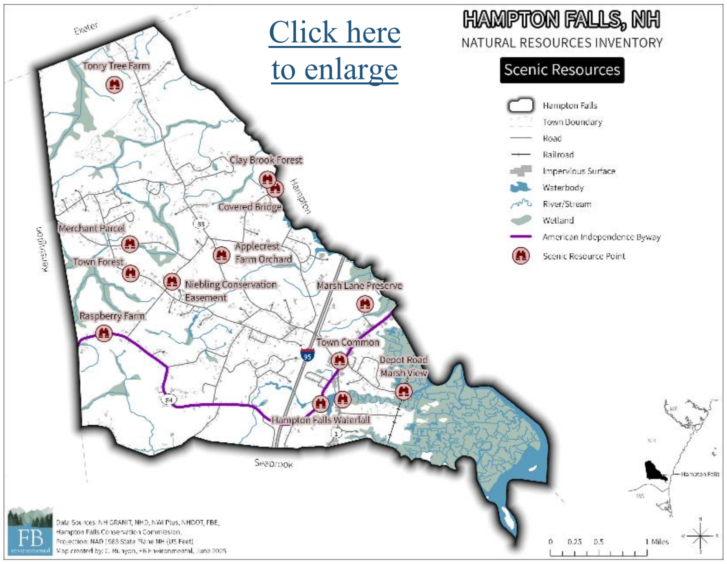
Photo Credits: Shawn Hanson

5. SCENIC RESOURCES

5.1 SCENIC AREAS

Scenic areas offer captivating views of a region or town's natural resources as well as its cultural and historic heritage. The surrounding landscape helps shape scenic areas, routes, and vistas that contribute to the appeal of a community. A key scenic area in Hampton Falls is the salt marsh of Hampton Flats. Scenic views not only enhance quality of life, but also ensure that the viewed environments, or "viewsheds," are conserved or maintained for their natural aesthetics, habitats, and ecosystem functions. Protecting scenic resources requires preserving both the vista and the scenic viewpoint.

5.1.1 SALT MARSHES



Salt marshes are tidal wetlands existing in the transition zone between ocean and upland that are characterized by periodic tidal inundation, with salt-tolerant grasses the dominant vegetation. They are among the most productive ecosystems in the world and provide vital habitat for wildlife including many bird species such as snowy egrets, great blue herons, and saltmarsh and Nelson's sparrows. The salt marshes of Hampton Falls are dynamically colorful ecosystems throughout the year. Most of the vegetation in a salt marsh follows a seasonal pattern with bright greens and lush vegetation in the summer, red and orange grasses in the fall, and tan or snow-covered vegetation over winter. Public access points to view the salt marshes include the Depot Road Scenic Vista and the Marsh Lane Conservation Preserve (Appendix A, Map 15).

Salt marshes also attract birdwatching enthusiasts who scan the marsh grasses and skies for migrant and resident species. Highlighting the significance of Hampton Falls' salt marshes and coastal areas, according to the eBird website, 11 of the 17 endangered or threatened birds of New Hampshire have been identified from the Depot Road section of the Hampton-Seabrook marsh: northern harrier (*Circus cyaneus*), least tern (*Sterna antillarum*), common tern (*Stema hirundo*), common loon (*Gavia immer*), peregrine falcon (*Falco peregrinus*), pied-billed grebe (*Podilymbus podiceps*), purple martin (*Progne subis*), eastern meadowlark (*Sturnella magna*), upland sandpiper (*Bartramia longicauda*), piping plover (*Charadrius melodus*), and roseate tern (*Sterna dougallii*).

5.1.2 PASTURELAND

Pasturelands and farmland are scenic resources that provide an exposed scenic view. These areas also contribute to scenic resources by carrying on the historic and cultural identity of small New England agricultural communities. Examples such as Tonry Tree Farm, Applecrest Farm and Raspberry Farm provide invaluable open spaces and habitats for many meadow species while preserving historic and agricultural lands.

5.1.3 AMERICAN INDEPENDENCE BYWAY

The American Independence Byway is a 21-mile road that loops through Hampton Falls, Hampton, and Exeter (Visit NH, 2025). In Hampton Falls, the byway follows Kensington Road (NH Route 84) and a portion of US Route 1. The roadway offers scenic views of agricultural fields, historic buildings, forests, the Hampton Falls Town Common, and salt marshes.

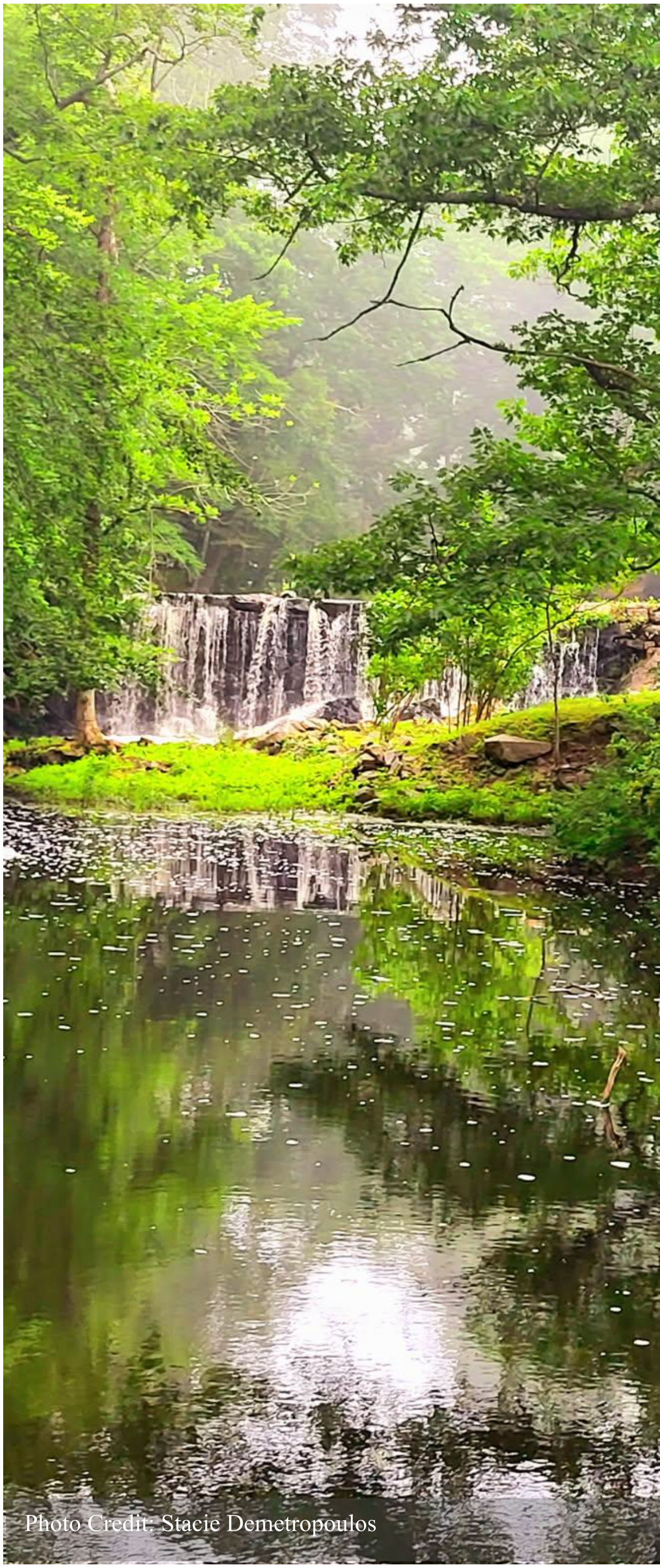


Photo Credit: Stacie Demetropoulos

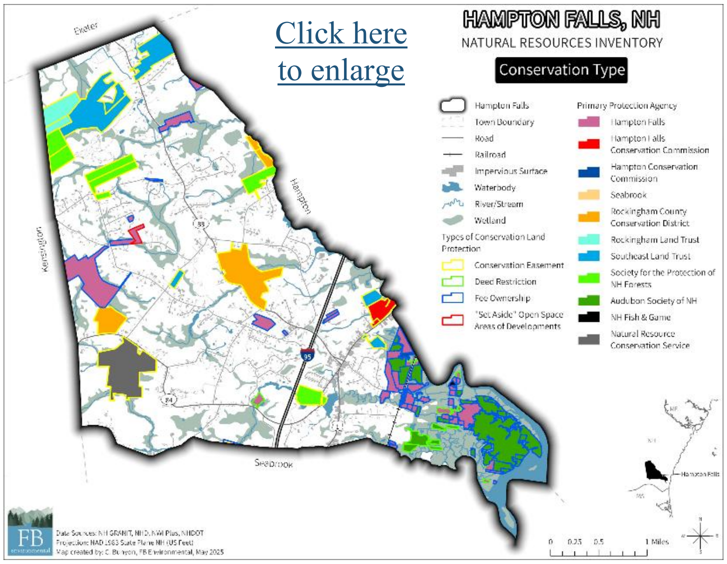
5.2 SCENIC RESOURCE THREATS AND RECOMMENDATIONS FOR ACTION

Threats to scenic resources within Hampton Falls include the reforestation or residential development of pastureland and cropland. Salt marshes, a key scenic and ecological resource, face challenges from sea level rise, increased storm surges, and the spread of invasive plants. Increased traffic along the American Independence Byway, particularly during peak seasons, could detract from its scenic and historic appeal while also eroding the town's rural character. Additionally, the influx of summer visitors to neighboring towns such as Hampton and Seabrook impacts traffic and heightens demand for seasonal accommodation in Hampton Falls.

Encroaching development and poorly managed outdoor lighting threaten to diminish the area's dark skies, an often overlooked yet significant aspect of scenic value. Seasonal population spikes also place additional stress on local ecosystems, including increased demand for fresh water and increased generation of solid and septic waste. To address these challenges, Hampton Falls must balance the economic benefits of tourism with its potential adverse effects on natural and cultural resources. Each scenic treasure must be managed sustainably, with strategies that can adapt to accommodate impacts driven by climate change and an expected increase in both residents and visitors.

The community can contribute to prioritizing action items and implementing recommendations through town-based surveys. These surveys also enable identification of popular scenic areas, vistas, and key community features. Appendix H in the natural resource inventory guide created for the Town of Madbury, New Hampshire outlines a method for identifying culturally, naturally, and historically significant features (UNH Cooperative Extension, 2001).

6. PUBLIC, CONSERVED, AND RECREATIONAL LANDS



Conserved open space is an integral part of the Hampton Falls community. Through the years, the town has taken the initiative to preserve these resources and ecosystems for the greater benefit of residents, visitors, and the environment. With the help of the community, the Town of Hampton Falls has continuously acquired plots of land through donations, town funds, grants, bonds, and easements permanently conserving several areas of forest and wetland. In total, there are over 1,418 acres of conserved land in Hampton Falls (18% of the land in town), spread throughout the town. This includes areas owned by the town, the state, and private owners (Appendix A, Map 16). The Hampton Falls Conservation Commission provided the most up-to-date Geographic Information System (GIS) database for conservation land in the town for the development of Attachment A, Map 16.

6.1 FOREST LANDS

6.1.1 CONSERVED FORESTS

The Town of Hampton Falls and the Conservation Commission own several areas of conserved forest and wetland, including several tracts within the Hampton Falls Saltmarsh, Marsh Lane Conservation Preserve, Town Forest, Raspberry Farm, and the Depot Road Scenic Vista. The parcels are all either owned by the town, held within conservation easements, or both. Some of these properties are publicly accessible and contain recreation trail networks. Residents and visitors enjoy these trails throughout the year as areas for scenic walks, trail running, dog walking, and snowshoeing.

A recent addition to Hampton Falls' conservation lands is the **Clay Brook Forest**, a 32-acre conservation easement held by the Society for Protection of NH Forests (SPNHF) along the Taylor River and one of its tributaries, Clay Brook. This easement is open to recreational use by the public. It abuts the Rockingham County Conservation District's 163-acre Hurd Farm conservation easement, and is downstream from the Town of Hampton Falls' 73-acre Taylor River Headwaters Conservation Complex (Seacoastonline, 2021). The land is owned by the Society of Protection of New Hampshire Forests.

Hurd Farm is located along the Taylor River in the northeastern part of town. Most of the farm's conservation easement is within Hampton, but about 30 acres extend across the river into Hampton Falls. With an agricultural conservation agreement, this conservation area protects important farm soils, forests, wetlands, and riparian habitats. The land is also held within a water quality and recreational preservation agreement to protect water resources such as the Taylor River and downstream waterbodies. As a popular destination for recreation, visitors enjoy hiking, snow shoeing, cross-country skiing, birding, fishing, and hunting.

The town acquired the **Raspberry Farm** property in 2009 which is under a conservation easement held by the Rockingham County Conservation District, protecting valuable farm and forest resources adjacent to the **Hampton Falls Town Forest**.

6.1.2 FOREST MANAGEMENT PLANS

A forest management plan is a site-specific document developed to help landowners understand the health and potential of their forest. It outlines key strategies for sustainable management, habitat conservation, water quality protection, and recreational enhancement. A well-designed plan can also identify opportunities for community involvement and potential revenue from forest resources. The Town Forest has obtained a forest management plan and is currently working to implement it. It remains uncertain whether other properties in Hampton Falls have and implement forest management plans. However, properties enrolled in Current Use under the "documented stewardship" category are a good proxy indicator for determining if a property has a plan in place.

6.2 PUBLIC, CONSERVED AND RECREATION LANDS

6.2.1 TOWN OWNED OPEN LANDS

Open space in Hampton Falls takes many forms — from farmland and forests to ball fields and marshes. Recreational areas, such as ball fields, are an important part of the town's open space network. One such facility is **Governor Weare Park**, located on Exeter Road (NH Route 88) and owned by the town. In addition, marshes offer valuable open space for wildlife habitat and recreational enjoyment, including birdwatching and scenic viewing. Notable examples include the conserved salt marsh parcels at the ends of Depot Road and Marsh Lane. For more information on marsh ecosystems, see Section 3.1 Wildlife Habitats, and Section 5.1.1 Salt Marshes.

6.2.2 EASEMENTS

A conservation easement is "a legally binding agreement between a landowner and the easement holder that restricts use of the land subject to the terms of the easement" (RSA 477:45-47). Conservation easements protect the natural resources of a property (wildlife habitat, water resources, agricultural soils, recreational potential, open space, etc.) by constraining the potential allowable uses of the property (or a portion of the property). The easement remains with the land in perpetuity, so that if the land is sold or transferred the subsequent owners must abide by the easement terms as well (UNH Cooperative Extension, n.d.). Placing land into a conservation easement ensures that area of land will never be developed for commercial, residential, or industrial uses.

As of 2025, there are 23 properties with conservation easements protecting 820 acres of land within Hampton Falls. These include easements for the Applecrest, Raspberry and Tonry Farms. Easements have been utilized to specifically protect Hampton Falls' agricultural soils, water and wetland resources, and wildlife habitat emphasizing the protection of established wildlife corridors.

6.2.3 DEVELOPED LANDS AND CONSIDERATIONS FOR FURTHER DEVELOPMENT

Resiliency must be designed into existing and future infrastructure due to the climate change impacts of temperature, precipitation, water levels, wind loads, storm surges, wave heights, soil moisture, and ground water level changes (Ballestero, Houle, Puls, & Barbu, 2017). Nine strategies that can aid in minimizing the adverse effects associated with climate change include the following (McCormick & Dorworth, 2019):

1. **Installing Green Infrastructure:** Planning for greener infrastructure requires that people think about creating a network of interconnected natural areas and open spaces needed for groundwater recharge, pollution mitigation, reduced runoff and erosion, and improved air quality for the communities being developed. Examples of green infrastructure include forest, wetlands, natural areas, riparian (banks of a water course) buffers, agricultural land, and flood plains; all of which already exist in the watershed and have minimized the damage created by intense storms in the past. As future development occurs, people must be able to maintain or even increase these natural barriers to reduce runoff of pollutants into freshwaters.

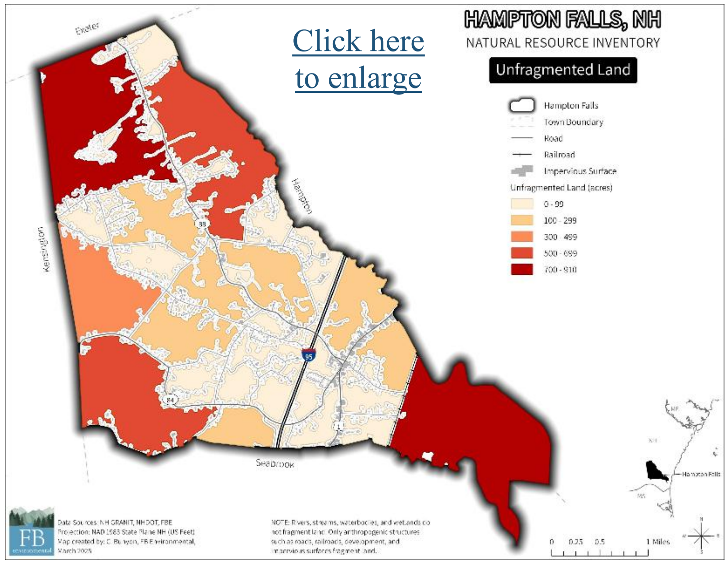
2. **Using Low Impact Development (LID) Strategies:** Use of LID strategies requires that people replace the traditional approaches to stormwater management that uses curbs, pipes, storm drains, gutters, and retention ponds with innovative approaches such as bioretention, vegetated swales, and permeable paving.

3. **Minimizing Impervious Surfaces:** Today two-thirds of our impervious surfaces come from roads, highways, and parking lots; people must minimize impervious surfaces by creating new ordinances and building construction design requirements which reduce imperviousness of new development. Parking lot design requirements should promote infiltration of runoff and roads should consider

space for pedestrians, bicyclists, and mass transit. Increasing our transportation choices reduces the need for more pavement. Private property owners can also increase the permeability of their lots by incorporating permeable driveways and walkways.

4. **Encouraging Riparian Buffers and Maintaining Flood Plains:** Town ordinances should forbid construction in flood plains, and in some instances flood plains should be expanded to increase the land area which will accommodate larger rainfall events. People also need to preserve and create riparian (vegetated) buffers and filter strips along waterways to slow runoff and filter pollutants.
5. **Protecting and Re-establishing Wetlands:** Wetlands are increasingly important in high runoff areas because wetlands hold water, recharge groundwater, and mitigate water pollution. The watershed contains many large natural wetlands that must be preserved. Preservation efforts may include invasive plant management, restoring natural structure (i.e., from stream channelization and/or ditching) and function (i.e., restoring bottom elevations) within the ecosystem. Protecting wetlands can also stem from using a watershed-wide approach where the understanding is made those actions within the watershed impact the receiving waterbody or wetland. All strategies listed here are likely to help reduce the impact of not only climate change, but also from human impact and development within the watershed, and overall improving wetland health. See resources provided by the EPA for wetland protection and restoration.
6. **Encouraging Tree Planting:** Trees help manage stormwater by reducing runoff and mitigating erosion along surface waters. In addition, trees cool heat islands in more developed areas and provide shade for pedestrians.
7. **Promoting Landscaping Using Native Vegetation:** Communities should promote the use of native vegetation in landscaping, and landscapers should become familiar with techniques which minimize runoff and the discharge of nutrients into waterbodies (Chase-Rowell, Davis, Hartnett, & Wyzga, 2012). For lists of some native vegetation utilized in landscaping see the University of New Hampshire Cooperative Extension document New Hampshire's Native Trees, Shrubs, and Vines with Wildlife Value or the NHDES document for Native Shoreland/Riparian Buffer Plantings for New Hampshire.
8. **Slowing Down the Flow of Stormwater:** To slow and infiltrate stormwater runoff, a variety of techniques can be employed. Roadside ditches can be stabilized or vegetated and equipped with turnouts, settling basins, check dams, or infiltration catch basins. Rain gardens can retain stormwater while water bars can divert water running down roads and walkways into vegetated areas for infiltration. Water running off roofs can be channeled into infiltration fields and drainage trenches (UNH Cooperative Extension, 2007).
9. **Coordinating Infrastructure, Housing, and Transportation Planning**: People should coordinate planning for infrastructure, housing, and transportation to minimize impacts on natural resources. Critical resources including groundwater must be conserved and remain free of pollutants especially as future droughts may deplete groundwater supplies.

6.2.4 UNFRAGMENTED LAND BLOCKS



Unfragmented land blocks are areas that are not divided by developed features such as roads, powerlines, development, open water, and streams/rivers. Wetlands are not considered a divider of land as they have the potential to allow for the passage of some terrestrial animals. FBE identified unfragmented blocks of land using ArcGIS analyses. Unfragmented land in Hampton Falls ranges from less than one acre to over 900 acres. The average size of unfragmented land in Hampton Falls is about 35 acres. As shown in Appendix A, Map 17, the two largest blocks of unfragmented land are the Hampton Flats east of the former railroad (at the end of Depot Road and Brimmer Lane), and the northwest corner of the town – north of Sanborn Road and west of Exeter Road.

Roadways are the primary dividers of land blocks in Hampton Falls, with the old railroad also acting as a barrier to wildlife movement. The town has approximately 42 miles of roads that fragment forests, wetlands, and urban areas. The most common unfragmented land blocks are those under 99 acres, totaling about 1,069 acres. However, the largest category by total area consists of blocks ranging from 700 to 900 acres (1,687 acres), largely due to Hampton Falls' successful land conservation efforts and zoning regulations that protect wetlands unsuitable for development.

6.3 THREATS TO PUBLIC, CONSERVED, AND RECREATIONAL LAND AND RECOMMENDATIONS FOR ACTION

To effectively preserve land in accordance with the findings of the natural resources inventory and strengthen local land use regulations and planning, the following recommendations are proposed. These strategies aim to safeguard critical ecosystems, promote sustainable land management, and foster community engagement in conservation efforts.

6.3.1 RECOMMENDATIONS FOR LAND PRESERVATION

Add area via purchase or conservation easement to existing protected areas. This recommendation epitomizes the saying that the whole is greater than the sum of the parts. Adding to existing protected areas buffers those areas from external impacts (e.g., stormwater runoff, noise pollution). Increasing the size of a given protected area also reduces “edge effects” which include changes in vegetation structure and species composition, temperature, as well as predation and parasitism levels, all of which can have deleterious effects on populations of area-sensitive wildlife species. In Hampton Falls, conserving wetlands could effectively increase existing conservation areas adjacent to wetlands while conserving ecosystem services including flood storage areas, pollutant attenuation areas, water filtration potential, and more.

Continue to actively seek partnerships with local and regional land trusts and other conservation organizations to conserve land in Hampton Falls. The Hampton Falls Conservation Commission has effectively partnered with regional land trusts such as the Society for the Protection of NH Forests, the Rockingham County Conservation District, and the Southeast Land Trust (SELT) to hold easements on acquired lands. Land use partners can be instrumental in acquiring land, holding conservation easements, and facilitating conservation projects.

Enhance resident education and communication of local land ordinances, best management practices, and actions. Hold informational workshops for new landowners and developers on relevant town ordinances, conservation easements, and watershed goals. Reach out to businesses such as museums, camps, libraries, to coordinate education and outreach opportunities.

Create/continually update an inventory of properties that have Conservation Management Plans and/or Forest Management Plans to track and promote land stewardship within Hampton Falls.

6.3.2 RECOMMENDATIONS FOR LOCAL LAND USE PLANNING

Avoid large-lot zoning. Increasing the size of buildable residential lots is often considered to be a "quick fix" to limit sprawl-type development. This change to zoning results in a development pattern that appears to be "green," with fewer houses and more trees visible. An unintended consequence of this practice is to spread the impacts of development across a larger area, destabilizing and often eliminating local populations of wildlife that are sensitive to development (i.e., require tracts of land absent of roads, driveways, houses, and lawns).

Increase building setbacks in shoreland zones. The land adjacent to a lake, pond, river, or stream, when left in its natural state, plays an important role in filtering runoff, shading streams and rivers, protecting and stabilizing banks and shorelines, and reducing erosion. Some of the benchmark standards that should be built into ordinances for protecting water quality within the shoreland zone include mandatory setbacks for primary structures, mandatory buffers between development and the waterbody, and impervious cover restrictions.

The State of New Hampshire's minimum setback requirement is 50 feet as dictated by the Shoreland Water Quality Protection Act (SWQPA). In Hampton Falls, this affects development along the Taylor River up to Ash Brook, the Hampton Falls River, and tidally influenced waters. Some towns in New Hampshire go beyond the State minimum and require a setback of 100 feet. This 100-foot setback has proven to be very effective at protecting water quality (Merrell & Moore, 2013).

Consider novel types of development, including Traditional Neighborhood Design (TND) and conservation subdivisions. By clustering housing, it is possible to reduce the amount of impact of associated infrastructure (e.g., roads) and to reduce the overall "footprint" of a given development. Conservation subdivisions could be encouraged or mandated in Priority Conservation Areas, as this type of development has been shown to have less negative impact on open space, wildlife and their habitat, and water quality, than unlimited outward expansion of low-density development into undeveloped areas (i.e., sprawl) (Hawkins, 2014).

Consider expanding low-impact development practices. Low impact development (LID) refers to a wide range of techniques specifically designed to limit the adverse effects that poorly planned development can have on water quality. Some examples of LID techniques include minimization and/or disconnection of impervious surfaces, development design that reduces the rate and volume of runoff, and reduction of the pollutant loads within runoff. Common types of techniques include but are not limited to curb-free roads, swales, bioretention cells, tree box filters, infiltration trenches, rain barrels, and rain gardens. Hampton Falls can help protect water quality and wildlife habitat by mandating the use of LID in new and renovated developments.

As of 2024, LID practices are not mentioned in the Town of Hampton Falls' building codes, site plan regulations or subdivision regulations.

More information on LID techniques can be found on the Center for Watershed Protection's website: www.cwp.org and within the New Hampshire Homeowners Guide to Stormwater Management available through NHDES: New Hampshire Homeowner's Guide to Stormwater Management. UNH Cooperative Extension has also developed a helpful guide on the selection of native plant species for New England rain gardens.

Amend the existing wetland regulations to better protect wetlands and the organisms they support. Wetlands, along with the terrestrial areas adjacent to them, tend to be biodiversity hotspots. Unfortunately, wetlands are often still impacted by development. New Hampshire's wetland regulations protect water quality and aquatic and terrestrial wildlife through best management practices, culvert and bridge design requirements, and overall project avoidance and minimization (Env-Wt 307.02, 307.04, 307.06, 307.10(g), (i), (k), 605, 609, 904.01, and 904.07).

Hampton Falls' designated prime wetlands (Table 4) are state jurisdictional areas subject to a 100-foot buffer. This means any excavation, removal, filling, dredging or construction within 100 feet of these wetlands requires a permit from the NHDES Wetlands Bureau. Hampton Falls' current zoning ordinances (Section 8.5.2) additionally require minimum setbacks for 100 feet for tidally influenced waters, surface waters not subject to the Shoreland Water Quality Protection Act, and vernal pools. Freshwater wetlands not adjacent to any of the above are additionally subject to setbacks of 25, 50 or 75 feet, depending on the wetland size. Hampton Falls may wish to increase the size of the buffer from all wetlands and waterways to 100+ feet. Buffers provide additional protection of wetlands, water quality, and wildlife habitat.

The town may wish to provide specific ordinances to better protect vernal pool communities, given their uniqueness. While a 100-foot buffer helps protect vernal pool hydrology and immediate habitat, research and guidance from the US Army Corps of Engineers suggest that amphibians and other vernal pool-dependent species rely on a much larger surrounding area, often migrating between 400 and 750 feet into adjacent uplands. Rather than applying uniform buffers in all directions, directional buffers—which prioritize the preservation of forested habitat in primary migration corridors—can offer more effective protection. These corridors provide critical overwintering habitat for species such as wood frogs and spotted salamanders, and their protection helps maintain vernal pool populations. The landscape context matters: if a vernal pool is surrounded by open land, development, or unsuitable habitat, the need for directional buffers increases in the remaining forested areas. Hampton Falls could consider strengthening protections for vernal pools by requiring larger buffer zones in areas of intact forest, encouraging conservation easements in known amphibian movement corridors, and minimizing fragmentation from roads and development.

The town is encouraged to apply for PREPA grants administered by the Piscataqua Region Estuaries Program (PREP) annually to financially support ordinance reviews and updates that protect natural resources.

Formally adopt and apply "Best Management Practices" and "Best Development Practices" that can help to reduce impacts to biodiversity during both town-wide planning and individual site review processes. Examples of such manuals are Best Development Practices Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States (Calhoun & Klemens, 2002) and Forestry Management Guidelines for Vernal Pool Wildlife (Calhoun & deMaynadier, 2004). Additional BMPs from other organizations and agencies may also prove useful, such as "Wetlands Best Management Practices Techniques for Avoidance and Minimization" (NEIWPCC, NHDES, & EPA, 2019).

Photo Credits: Debbie Gaudreau

The Hampton Falls Depot

By Debbie Gaudreau

It was late November of 2003 when I first walked to the Hampton Falls Depot. The air was cold, the trees were bare, and the sky a cloudy gray. I was with John Alston, whom I had recently met. When we reached the end of the road, the tide was low, the mud rich and full of life - and there it was: The Great Salt Marsh of New England, a wide, endless stretch of sky and open space. It was the most beautiful sight I had ever seen.

That day I began to fall in love - with both the salt marsh and with John.

Not long after, on a warm December afternoon, we canoed under the old trestle and watched a night heron resting quietly on the shore. As we drifted, John shared stories of growing up on Depot Road, of fishing and boating with his father and grandfather.

Over time, the marsh became part of our rhythm - snowshoeing in the winter, paddling canoes through the summer, walking the railroad tracks as blue herons and snowy egrets hunted for dinner. John became my husband, and the marsh became our sanctuary. Together we shared many years of sunrises and sunsets.

When John passed away in 2020, I kept going to the marsh - every day. Whether walking the trails or walking in the mud, I find comfort and connection. I watch hawks soar, listen to warblers sing, follow the flight of eagles, killdeers, flickers, and kingfishers. I photograph the sandpipers, plovers, willets, and mergansers. Each bird is a quiet reminder that life continues and that beauty still surrounds us.

The Depot and the marsh offer more than scenery - they offer space to breathe, to move, to meet others, to heal. It is a place of simple joys, like walking the trails, kayaking, or watching children leap from the old trestle.

I never imagined how much that first walk would shape my life. Now I see my daughter and grandson following the same tracks, and finding their own joy in the marsh's ever-changing light.

The salt marsh of Hampton Falls is more than a landscape - it's a place where the salt marsh brimming with life surrounds us, man and nature connect, and memories are made.

The Hampton Falls Dept by Debbie Gaudreau is one of the two selected entries from the 2025 Photo and Writing Contest held by the Hampton Falls Conservation Commission to engage the community in fostering connections with the town's natural resources.


Photo Credit: Becky Nolan

7. THREATS, RECOMMENDATIONS, & NEXT STEPS

This NRI was created with the intent to provide a detailed description and analysis of Hampton Falls' natural resources and serve as a tool to help guide future municipal planning and conservation efforts. This NRI should not be viewed as a conservation plan of action, but rather as an encyclopedia of information based on the best currently available and interpreted data. The valuable natural resources in Hampton Falls are contained within sensitive ecosystems that need protection from poorly managed development, environmental pollution, and the impacts of climate change.

Each preceding chapter within this NRI has included a section for *threats and recommendations* pertaining to the natural resources included in the chapter. Threats may include sources of contamination, examples of ecosystem stressors, etc., while recommendations explain approaches the town may wish to consider moving forward to prioritize long-term protection and improving conservation measures for the identified natural resources.

Though there is a wealth of information available, certain data gaps remain. A municipally maintained water quality monitoring program would help track changes throughout town. This could supplement or be supplemented by partnerships with the Seabrook-Hamptons Estuary Alliance (SHEA) and the University of New Hampshire. The next steps following this natural resources inventory report could include conducting a gap analysis to identify areas with limited knowledge or resource protection, establishing measurable goals and metrics, and determining key topics to focus on for community outreach and education. Creating watershed or forest property management plans will also help inform regulations, best management practices, and help track changes over time as our ecosystems adapt to existing and new pressures.

Protecting water, wetlands, and geologic resources (including aquifers) is the core of many conservation efforts with the goal of ensuring quality of ecosystem function, public health, and recreation/scenic resources. These resources may be threatened by pollutant sources including but not limited to impervious sources, malfunctioning septic systems, wildlife waste, poorly managed fertilizer use, and certain land use practices. Hampton Falls is at the forefront of experiencing the impacts of climate change in New Hampshire. With its abundance of tidal marshes, Hampton Falls has and will continue to experience coastal flooding from storm surges, king tides, and sea level rise. Marshes will migrate and habitats will change. Recommendations to reduce these detrimental effects include establishing BMPs throughout the watershed at both residential and municipal scales, using low impact design practices on homes and commercial buildings, establishing measurable milestones for restoration efforts, continued and expanded water quality monitoring programs, and public education and involvement. For more information regarding water and geologic resources in Hampton Falls as well as their threats and recommendations for long-term health, see Section 2.

Hampton Falls is a haven for many species of wildlife including terrestrial and marine mammals, amphibians, reptiles, fish, and birds. Each year, migratory birds travel to or through Hampton Falls. Ten of the 17 species of birds listed as either threatened or endangered in New Hampshire have been observed in Hampton Falls. Threats to wildlife and habitats include the spread of invasive plant and insect species, and habitat modification from both anthropogenic and climatic disturbances. Due to the abundance of unfragmented land, land cover types, and wetlands in Hampton Falls, in 2020, the NHFGD identified 25% of the town as having the highest ranked habitat in New Hampshire. Connect THE Coast then identified four prioritized habitat areas within Hampton Falls as critical for conservation efforts to support ecosystems that are either sensitive or resilient to the impacts of climate change, as well as to protect wildlife. Additionally, FBE conducted a co-occurrence analysis of natural resources and identified high-value areas within the town. Threats to wildlife and habitats include, but are not limited to, encroaching development, environmental pollution, climate change, and invasive species. This is not to say development should not occur within areas identified as primary conservation areas, but rather, development should be mindful of these sensitive ecosystems and strive to limit negative impacts. Habitat protection, education, and targeted land management efforts will help Hampton Falls' ecosystems thrive. For more information regarding wildlife and habitat areas as well as their threats and recommendations for long-term health, see Section 3.

Soil types determine which land use practices may thrive and which may not be recommended. 79% of Hampton Falls' land area is comprised of important forest soils designated by NRCS. 58% of Hampton Falls is comprised of soils suitable for agricultural practices. Soil structure may hinder development in certain areas based on hydric soil classifications, distance to the water table, and the likelihood of soil erosion to occur. The largest threat to farmlands and agricultural soils in Hampton Falls is the conversion of agricultural lands to development or forest. Recommendations for conserving agricultural lands while benefiting the surrounding environment include developing an agricultural profile for the town. To reduce the effects of soil erosion on streams and ponds, it is recommended to reduce disturbance of soils classified as having high erosion potential and to establish vegetated buffers along/around surface waters. For more information regarding soils and agriculture within Hampton Falls, see Section 4.

One of Hampton Falls' greatest treasures is its iconic scenic beauty and surrounding landscape. Containing a scenic road, historic farms, and views of the Hampton-Seabrook salt marsh, visitors come to Hampton Falls each year to enjoy everything the town and its neighboring towns have to offer. Degradation of Hampton Falls' scenic resources may occur if the pressures from visitors and development surpass what the environment can sustain. An increase in or high level of visitors comes with an increase in solid waste produced, amount of drinking water required, and amount of wastewater produced. Recommendations to sustainably manage Hampton Falls' scenic resources may include establishing a visitor information center paired with an environmental education. Surveys of the community would reveal preferences for where to establish additional scenic viewing points and/or nature trails. All established points for scenic vistas and trails should contain placards with information regarding the environmental value of the surrounding environment to increase public education regarding Hampton Falls' natural resources. For more information regarding scenic resources in Hampton Falls, see Section 5.

There are over 1,418 acres of conserved land in Hampton Falls, most owned or managed by the town. Conserved areas serve not only as preserved habitats for wildlife and ecosystem functions, but as an outlet for those looking to recreate in nature. Recommendations for enhancing and expanding conservation land in Hampton Falls includes educating the public on conservation easements and acquiring easements on town-owned land, all while continuing to build partnerships with local and regional land trusts. Land fragmentation poses a threat to habitats by segmenting parcels of land. Five of the largest blocks of unfragmented land in Hampton Falls overlap with two of the areas identified as high Priority Conservation Areas. The main divider of habitats in Hampton Falls is its road network. As development increases, efforts should be made to abide by low impact development practices, minimizing impervious surfaces, avoiding large-lot zoning, and incorporating TND and conservation subdivisions. As more land is protected, the Hampton Falls Conservation Commission should work actively with the Town Assessor's office and other entities maintaining and sharing Geographic Information System (GIS) data, such as NH GRANIT, to keep these databases up to date. For more information regarding public, conserved, and recreational lands in Hampton Falls, see Section 6.

Photo Credit: Becky Nolan

REFERENCES

Ballestero, T., Houle, J., Puls, T., & Barbu, I. (2017). Stormwater Management in a Changing Climate. Presented at NH Lakes Assoc. Annual Meeting, Meredith, NH.

Barndollar, H. (2023, December 19). *With its sights set on NH's coast, invasive pepperweed is nothing to sneeze at.* Retrieved from New Hampshire Bulletin: https://newhampshirebulletin.com/2023/12/19/with-its-sights-set-on-nhs-coast-invasive-pepperweed-is-nothing-to-sneeze-at/

Bennett, K. (2012, November). *Prime Wetlands in New Hampshire Communities.* Retrieved from UNH Cooperative Extension, NHDES: https://extension.unh.edu/resources/files/Resource002187_Rep3230.pdf

Billings, M. (1980). *The Geology of New Hampshire Part II: Bedrock Geology.* The New Hampshire State Planning and Development Commission.

Bledzki, L., Bubier, J., Moulton, L., & Kyker-Snowman, T. (2010). Downstream effects of beaver ponds on the water quality of New England first- and second-order streams. *Ecohydrology*, 698-707.

Calhoun, A., & deMaynadier, P. (2004). *Forestry habitat management guidelines for vernal pool wildlife.* Bronx, New York: Technical Paper No.6, Metropolitan Conservation Alliance, Wildlife Conservation Society.

Calhoun, A., & Klemens, M. (2002). *Best development practices: conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States.* Bronx, New York: MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society.

Chase-Rowell, C., Davis, M., Hartnett, K., & Wyzga, M. (2012). *Integrated landscaping: Following Nature's Lead.* University of New Hampshire Press.

Choi, R., Beard, K., Kelsey, K., Leffler, A., Schmutz, J., & Welker, J. (2020). Early Goose Arrival Increases Soil Nitrogen Availability More Than an Advancing Spring in Coastal Western Alaska. *Ecosystems, 23*, 1309-1324. Retrieved from https://link.springer.com/article/10.1007/s10021-019-00472-9

Cowardin, L., Carter, V., Golet, F., & LaRoe, E. (1979). *Classification of wetlands and deepwater habitats of the United States.* Washington, DC.: U.S. Department of the Interior, Fish and Wildlife Service.

CWP. (1999). *Watershed Protection Techniques.* Center for Watershed Protection.

Eberhardt, A. L., Ward, L. G., Morrison, R. C., Costello, W., & Williams, C. (2022, June 1). Connecting science and community: Volunteer beach profiling to increase coastal resilience. *Elsevier*, 104733. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0278434322000875?via%3Dihub

Eberhardt, A. L., & Burdick., D.M. (2009). *Hampton-Seabrook Estuary Habitat Restoration Compendium*. Report to the Piscataqua Region Estuaries Partnership and the New Hampshire Coastal Program, Durham and Portsmouth, NH. Retrieved from: https://scholars.unh.edu/cgi/viewcontent.cgi?article=1094&context=prep

eBird. (2025). *Rockingham New Hampshire, US, Top Hotspots*. Retrieved from https://ebird.org/region/US-NH-015/hotspots

EPA. (1974). *Protection of Shellfish Waters.* Washington, D.C.: United States Environmental Protection Agency. Retrieved from https://books.google.com/books?id=l6bo3OAsfYAC&pg=PA4&lpg=PA4&dq=what+is+a+%22safety+zone%22+shellfish+harvesting&source=bl&ots=Xy8M7Z8-Y_&sig=ACfU3U3pdekz5pdgmZWhl1kNZ0CMGfTFrg&hl=en&sa=X&ved=2ahUKEwjc1fboveXxAhXzUjUKHeP2C5AQ6AEwEHoECA4QAw#v=onepage&q=sa

EPA. (2002). *EPA Onsite Wastewater Treatment Systems Manual.* EPA/625/R-00/008. Retrieved from https://www.epa.gov/sites/production/files/2015-06/documents/2004_07_07_septics_septic_2002_osdm_all.pdf

EPA. (2003). *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems.* Retrieved from United States Environmental Protection Agency: https://nepis.epa.gov/Exe/ZyPDF.cgi/20009NAM.PDF?Dockey=20009NAM.PDF

EPA. (2021, June). *Shellfish Harvesting*. Retrieved from United States Environmental Protection Agency: https://www.epa.gov/salish-sea/shellfish-harvesting

FB Environmental Associates, & Seabrook-Hampton Estuary Alliance. (2023). *Seabrook-Hampton Estuary Alliance.* Retrieved from https://shea4nh.org/wp-content/uploads/2023/04/FINAL_EMP_4.3.23.pdf

FDACS. (n.d.). *Shellfish Harvesting Area Classification*. Retrieved from United States Florida Department of Agriculture and Consumer Services: https://www.fdacs.gov/Agriculture-Industry/Aquaculture/Shellfish-Harvesting-Area-Classification

FEMA. (n.d.). *Flood Insurance*. Retrieved from https://www.fema.gov/flood-insurance

Food and Agriculture Organization of the UN. (2016). *Forests and forest soils: an essential contribution to agricultural production and global food security.* Retrieved from http://www.fao.org/soils-2015/news/news-detail/en/c/285569/

Gibbens, S. (2019, March 18). The Atlantic Ocean, Explained. *National Geographic*. Retrieved from https://www.nationalgeographic.com/environment/article/atlantic-ocean

Goldthwait, J., Goldthwait, L., & Goldthwait, R. (1951). *The geology of New Hampshire: part 1 - surficial geology.* USGS.

Gove Environmental Services, Inc. (2006). Prime Wetland Inventory Report Town–Wide Wetlands Inventory Phase II Hampton and Hampton Falls, NH. Retrieved from https://www.hamptonnh.gov/DocumentCenter/View/7318/2006-Gove-Wetland-Inventory-Report

Hampton Falls Conservation Commission. (2023). A Guide to Hampton Falls' Land Use Regulations that Protect Critical Water Resources. Retrieved from https://www.hamptonfalls.org/sites/g/files/vyhlif5671/f/uploads/2023-04-24_hampton_falls_land_use_guide_2023.pdf

Hawkins, C. V. (2014). Landscape conservation through residential subdivision bylaws: Explanations for local adoption. *Landscape and Urban Planning, 121*, 141-148. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0169204613002053

Johnson, E., & Klemens, M. (2005). *Nature in Fragments, the Legacy of Sprawl.* Columbia Press.

Klemens, M., Davison, E., & Oko, B. (2012). *Ridgefield Natural Resource Inventory.* Ridgefield Conservation Commission.

Mack, T., & Lawlor, S. (1992). *Geohydrology and Water Quality of Stratified Drift Aquifers in the Bellamy, Cocheco and Salmon Falls River Basins, Southeastern New Hampshire.* US Geological Survey Water-Resources Investigations.

Marchand, M. (2016). *Identifying and documenting vernal pools in New Hampshire.* NHFGD. Retrieved from https://www.wildlife.state.nh.us/nongame/documents/vernal-pool-manual.pdf

Marden, C. (2011). Why invasive plants are the second biggest threat to biodiversity after habitat loss. *The Ecologist*. Retrieved from https://theecologist.org/2011/mar/23/why-invasive-plants-are-second-biggest-threat-biodiversity-after-habitat-loss

Mariash, H., Rautio, M., Mallory, M., & Smith, P. (2019). Experimental tests of water chemistry response to ornithological eutrophication: biological implications in Arctic freshwaters. *Biogeosciences*, 4719-4730.

McCormick, R., & Dorworth, L. (2019). *Climate Change: How will you manage stormwater runoff?* Purdue Extension. Retrieved from https://www.extension.purdue.edu/extmedia/FNR/FNR-426-W.pdf

McKinley, P., & Hunt., P. (2008). *Avian Use of the Hampton-Seabrook Estuary: 2006-2007*. Retrieved from: https://www.nhaudubon.org/wp-content/uploads/Hampton-Seabrook-bird-report.pdf

Medalie, L., & Moore, R. (1995). Ground-water resources in New Hampshire: Stratified drift aquifers. *U.S. Geological Survey Water-Resources Investigations*, Report 95-4100.

Merrell, L., & Moore, R. (2013). *Determining if Maine's Mandatory Shoreland Zoning Act Standards are Effective at Protecting Aquatic Habitat. Joint study conducted by the Vermont Department of Environmental Conservation and the Maine Department of Environmental Protection.*

Merriam-Webster. (n.d.). *Shellfish*. Retrieved from Merriam-Webster.com Dictionary: https://www.merriam-webster.com/dictionary/shellfish

Miller, N., Klemens, M., & Schmitz, J. (2005). *Southern Wallkill Biodiversity Plan: Balancing development and the environment in the Hudson River Estuary Watershed. MCA Technical*

Paper No. 8. Bronx, New York: Metropolitan Conservation Alliance, Wildlife Conservation Society.

Morgan, D., & Calhoun, A. (2012). *The Maine Municipal Guide to Mapping and Conserving Vernal Pools.* Orono, ME: University of Maine, Sustainability Solutions Initiative.

Morin, R., Barnett, C., Brand, G., Butler, B., Domke, G., Francher, S., . . . Woodall, C. (2007). New Hampshire's Forests 2007. *United States Department of Agriculture, United States Forest Service*.

National Weather Service. (n.d.). *Hydrometeorological Design Studies Center Precipitation Frequency Server (PFDS)*. Retrieved from NOAA Atlas 14 Point Precipitation Frequency Estimates: NH: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=pa

NEIWPCC, NHDES, & EPA. (2019). *Wetlands Best Management Practice Techniques For Avoidance and Minimization.* NEIWPCC. Retrieved from http://neiwpcc.org/wp-content/uploads/2019/03/Wetlands-BMP-Manual-2019.pdf

New Hampshire Sea Grant. (2021). *NH Green Crab Project*. Retrieved from University of New Hampshire New Hampshire Sea Grant: https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=183

NH Coastal Risk & Hazards Commission. (2016). *NH Coastal Risk and Hazards Final Report.* Retrieved from Preparing New Hampshire for Projected Storm Surge, Sea-Level Rise, and Extreme Precipitation: https://www.nhcrhc.org/wp-content/uploads/2016-CRHC-final-report.pdf

NH NHB. (2020). *Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns.* Concord, NH.: New Hampshire Natural Heritage Bureau. Retrieved from https://www.nh.gov/nhdfl/documents/town-lists.pdf

NH.gov. (2015). *Coastal Byway.* Retrieved from Scenic and Cultural Byways: https://www.nh.gov/dot/programs/scbp/tours/documents/coastal.pdf

NHDES. (2015, September). *A Guide to Groundwater Reclassification.* Retrieved from NHDES: https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/wd-11-24.pdf

NHDES. (2020). *State of New Hampshire 2018 Section 305(b) adn 303(d) Consolidated Assessment and Listing Methodology*, NHDES-R-WD-19-10. Retrieved from New Hampshire Department of Environmental Services: https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/r-wd-19-04.pdf

NHDES. (2020). *The New Hampshire Groundwater Protection Act: RSA 485-C, An Overview.* Retrieved from NHDES : https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/dwgb-22-1.pdf

NHDES. (2021). *A Summary of High Tide Flooding Recorded by the Hampton, New Hampshire Tide Gauge: 2013-2020.* Portsmouth: NHDES Coastal Program.

NHFGD. (2015). *Wildlife Action Plan.* Retrieved from Appendix A: Birds: https://www.wildlife.state.nh.us/wildlife/documents/wap/appendixa-birds.pdf

NHFGD. (2020a, 12 21). *New Hampshire Saltwater Fishing.* Retrieved from NHFGD: http://www.eregulations.com/wp-content/uploads/2020/12/21NHSW_LR3-2.pdf

NHFGD. (2020b). *The Highest Ranked Wildlife Habitat by Ecological Condition*. Retrieved from New Hampshire Fish and Game: https://www.wildlife.state.nh.us/wildlife/wap-high-rank.html

NHFGD. (2020c). *Wildlife Action Plan - Community Maps*. Retrieved from New Hampshire Fish and Game Department: https://wildlife.state.nh.us/maps/wap.html

NHFGD. (2020e). *Wildlife Action Plan, Appendix B: Habitat Profiles.* Retrieved from New Hampshire Fish and Game Department: https://www.wildlife.state.nh.us/wildlife/documents/wap/appendixb-habitats.pdf

NHFGD. (n.d. b). *Habitat Types and Species*. Retrieved from New Hampshire Fish and Game Department: https://www.wildlife.state.nh.us/habitat/types.html

NHGRANIT. (2015, February 26). *NHDES Shellfish Classification Data 2015*. Retrieved from NH GRANIT New Hampshire's Statewide GIS Clearinghouse: https://granit.unh.edu/data/metadata?file=shellfishwaterclassification/shellfishwaterclassification2015/shellfishwaterclassification2015.html

NHGRANIT. (2016). *Land Conservation Plan, Water Resource Conservation Focus Areas*. Retrieved from NH GRANIT New Hampshire Statewide GIS Clearinghouse: https://granit.unh.edu/data/metadata?file=lcp_2016update/nh/lcp_2016update.html

NHGRANIT. (2022, December 14). *Sea Level Affecting Marshes Model (SLAMM) For New Hampshire*. Retrieved from NH GRANIT New Hampshire's Statewide GIS Clearinghouse: https://granit.unh.edu/data/metadata?file=slamm2014/nh/slamm2014.html

NOAA. (n.d.). *Nor'easter December 17-18, 2023.* National WEather Service, National Oceanic and Atmospheric Administration. Retrieved from https://www.weather.gov/mhx/DecemberNoreaster2023

O'Green, A., Elkins, R., & Lewis, D. (2006). *Erodibility of Agricultural Soils, With Examples in Lake and Mendocino Counties.* University of California, Oakland, CA: Division of Agriculture and Natural Resources.

Ohio EPA. (2015, May). *Importance and Benefits of Primary Headwater Streams.* Retrieved from Primary Headwater Streams in Ohio: https://www.epa.state.oh.us/portals/35/wqs/headwaters/HWH_import.pdf

Otero, X., De La Peña-Lastra, S., Pérez-Alberti, A., Osorio Ferreria, T., & Huerta-Diaz, M. (2018). Seabird colonies as important global drivers in the nitrogen and phosphorus cycles. *Nature Communications*. Retrieved from https://www.nature.com/articles/s41467-017-02446-8

Piscataqua Regional Estuaries Partnership (PREP). (2023). *State of Our Estuaries 2023, Extended Version.* Retrieved from: https://www.stateofourestuaries.org/wp-content/uploads/2024/06/SOOE-2023-Extended-Report-updated-2024.pdf

Rockingham County Conservation District. (n.d.). *Invasive Plants.* Retrieved from http://www.rockinghamccd.org/resources/invasive-plants/

Rockingham Planning Commission. (2015). *New Hampshire Coastal Byway Corridor Management Plan.* Retrieved from https://www.therpc.org/application/files/8314/5701/9332/NHCoastalBywayCMP-2015-Final.pdf

Seacoastonline. (2021). *'A great thing for the town': Hampton Falls' Clay Brook Forest protected forever*. Retrieved from: https://www.seacoastonline.com/story/news/local/2021/05/28/clay-brook-forest-protected-forever-in-hampton-falls-nh/7440116002/

Semlitsch, R. (2000). Principles for management of aquatic-breeding amphibians. *Journal of Wildlife Management*, 64: 615-631.

Smith, W. B., Miles, P. D., Perry, C. H., & Pugh, S. A. (2007). *Forest Resources of the United States.* United States Forest Service. Retrieved from https://www.fs.fed.us/nrs/pubs/gtr/gtr_wo78.pdf

Staley, Z., He, D., Shum, P., Vender, R., & Edge, T. (2018). Foreshore beach sand as a reservoir and resource of total phosphorus in Lake Ontario. *Aquatic Ecosystem Health & Management*, 268-275. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/14634988.2018.1505353

Stevens, R., Riley, C., Callahan, C., & Vaccaro, L. (2023). *A Comprehensive Guide to Sustaining Our Marshes*. (w. s. Published by the Great Bay National Estuarine Research Reserve, Producer) Retrieved from The New Hampshire Salt Marsh Plan: https://greatbay.org/salt-marsh-plan/

Stone, A. (2001). *Natural Resources Inventories: A Guide for New Hampshire Communities and Conservation Groups.* UNH Cooperative Extension.

The Cecil Group, Inc. (2001). *Hampton Beach Area Master Plan.* Preapred for the Town of Hampton, New Hampshire, NH Departmetn of Resources and Economic Development - DIvision of Parks and Recreation. Retrieved from https://www.Hamptonnh.gov/DocumentCenter/View/6089/Hampton-Beach-Area-Master-Plan-2001-PDF

Thorne, S., & Sundquist, D. (2001). *New Hampshire's Vanishing Forests: Conversion, Fragmentation and Parcelization Forests in the Granite State - Report of the New Hampshire Forest Land Base Study.* Concord, New Hampshire: Society for the Protection of New Hampshire Forests.

Town of Hampton Falls. (2019). *2019 Master Plan*. Retrieved from https://www.hamptonfalls.org/sites/g/files/vyhlif5671/f/pages/hampton_fallls_complete_mp_2019.pdf

UNH Cooperative Extension. (1995). *New Hampshire's Native Trees, Shrubs, and Vines with Wildlife Value.* Retrieved from University of New Hampshire Cooperative Extension: https://extension.unh.edu/resources/files/Resource000427_Rep449.pdf

UNH Cooperative Extension. (2001). *Natural Resources Inventories: A Guide for New Hampshire Communities and Conservation Groups.* Retrieved from Town of Madbury: http://townofmadbury.com/Natural_Resources_Inventories-_NH_Guide.pdf

UNH Cooperative Extension. (2007). Landscaping at the Water's Edge: AN Ecological Approach. A Manual for NH Landowners and Landscapers. p. 92. Retrieved from https://extension.unh.edu/resources/files/resource004159_rep5940.pdf

UNH Cooperative Extension. (n.d.). *Conservation Options for Landowners.* Retrieved from University of New Hampshire Cooperative Extension: https://extension.unh.edu/resources/files/Resource004069_Rep5749.pdf

US Army Corps of Engineers [USACE]. (2024). New England District Compensatory Mitigation Standard Operating Procedures. Retrieved from https://www.nae.usace.army.mil/Portals/74/Compensatory_Mitigation_SOP_May2024.pdf

US Fish & Wildlife Service. (2021, May 5). *Wetland Classification Codes*. Retrieved from National Wetlands Inventory: https://www.fws.gov/wetlands/data/wetland-codes.html

USDA. (1981). *Farmland Protection Policy Act.* United States Department of Agriculture.

USDA. (2007). *Part 630 Hydrology National Engineering Handbook - Chapter 7, Hydrologic Soil Groups.* United States Department of Agriculture. Retrieved from https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba

USDA. (2024). *2022 Census of Agriculture. New Hampshire State and County Data*. Retrieved from: https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_1_State_Level/New_Hampshire/nhv1.pdf

USDA. (2025). *2023 State Agriculture Overview: Quick Stats*. Retrieved from: https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=NEW%20HAMPSHIRE

USEPA. (2013). *Hampton Falls EPA Waiver Response*. Retrieved from https://www3.epa.gov/region1/npdes/stormwater/nh/waiver-responses/WaiverResponseHamptonFallsNH.pdf

USEPA. (n.d.). *Whatzzzzup-stream: Educational Article for Middle School Students.* Retrieved from USEPA: https://www.epa.gov/sites/production/files/2016-01/documents/whatzzzzzup_article.pdf

USGS. (2018). *Hemigrapsus sanguineus*. Retrieved from USGS NAS-Nonindigenous Aquatic Species: https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=183

USGS. (n.d.). *Rye Complex, Breakfast Hill Granite of Novotny (1964)*. Retrieved from USGS Mineral Resources: https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NHOZrb%3B1

USGS. (n.d.). *STN Flood Event Database*. Retrieved from https://stn.wim.usgs.gov/STNDataPortal/#

Visit NH. 2025. *American Independence Byway*. https://www.visitnh.gov/things-to-do/scenic-drives/american-independence-byway

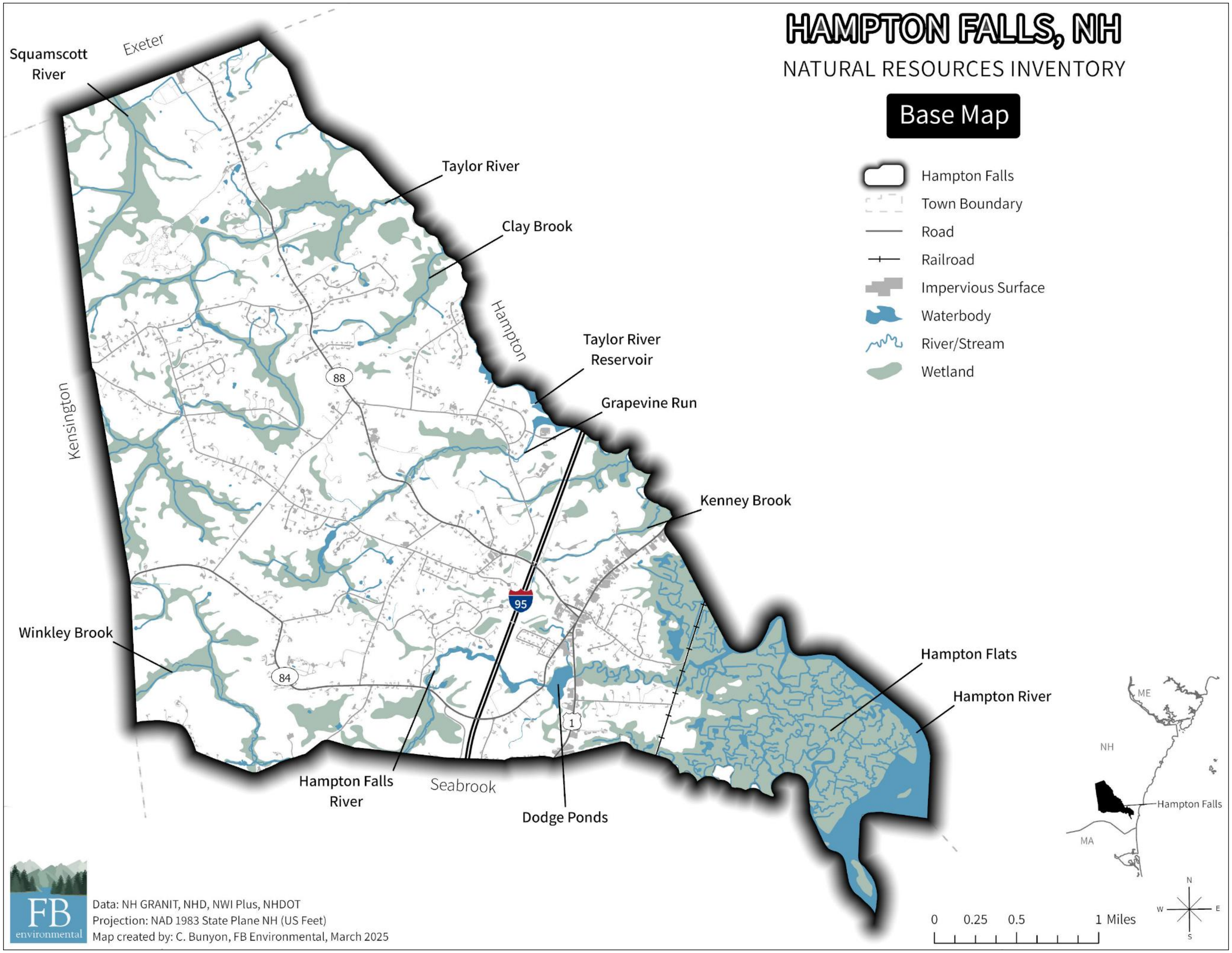
Wake, C., Knott, J., Lippmann, T., Stampone, M., Ballestero, M., Bjerklie, T., . . . Jacobs, J. (2019). *New Hampshire Coastal Flood Risk Summary – Part I: Science.* Prepared for the New Hampshire Coastal Flood Risk Science and Technical Advisory Panel. Report published by the University of New Hampshire, Durham, NH.

Ward, L. G., Morrison, R. C., Eberhardt, A. L., Costello, W. J., McAvoy, Z. S., & Mandeville, C. P. (2021). *Erosion and Accretion Trends of New Hampshire Beaches from December 2016 to March 2020: Results of the Volunteer Beach Profile Monitoring Program.* Durham, NH: University of New Hampshire. Retrieved from https://scholars.unh.edu/cgi/viewcontent.cgi?article=2412&context=ccom

Photo Credit: Erin Sniderman

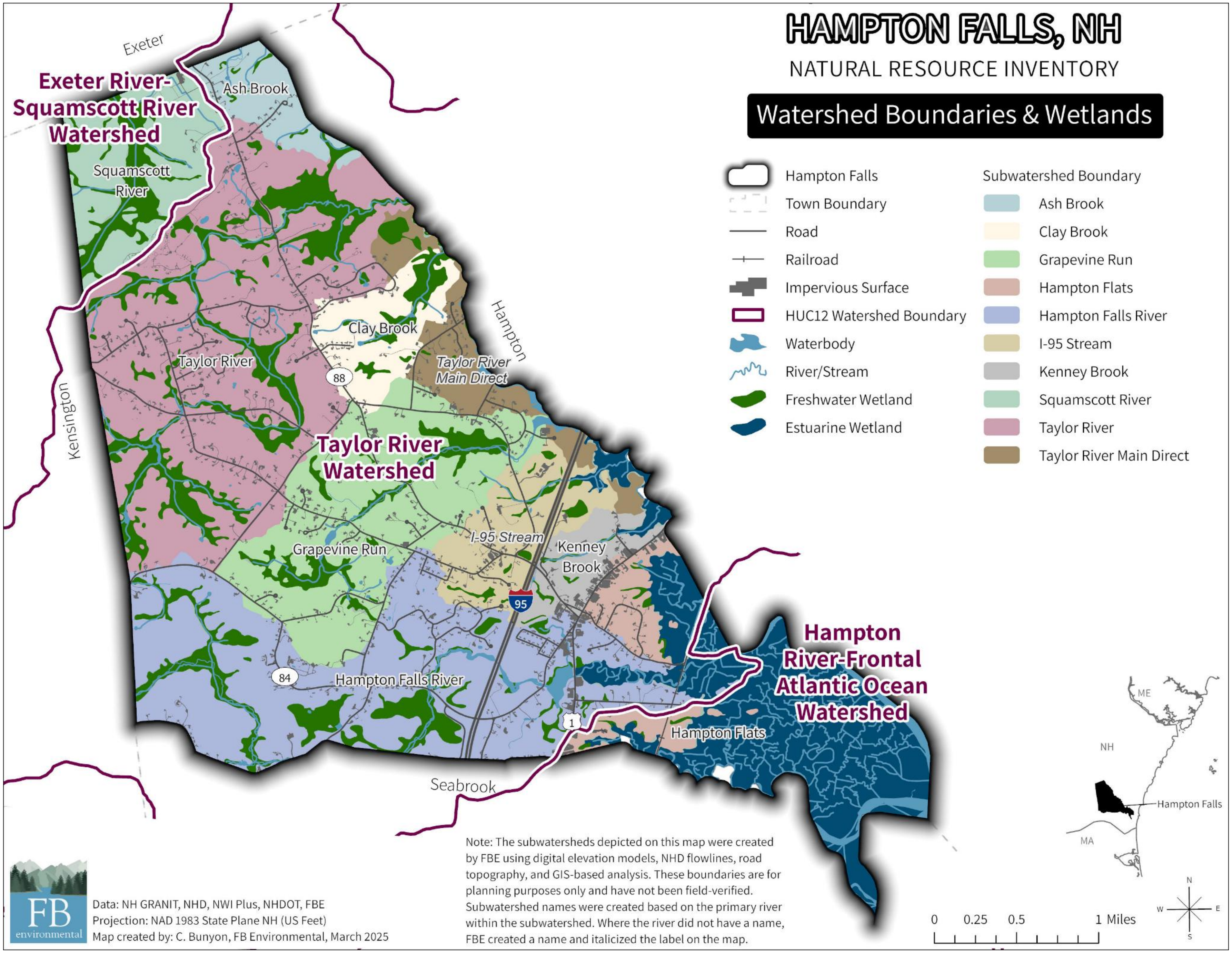
Appendix A: Maps

Map 1



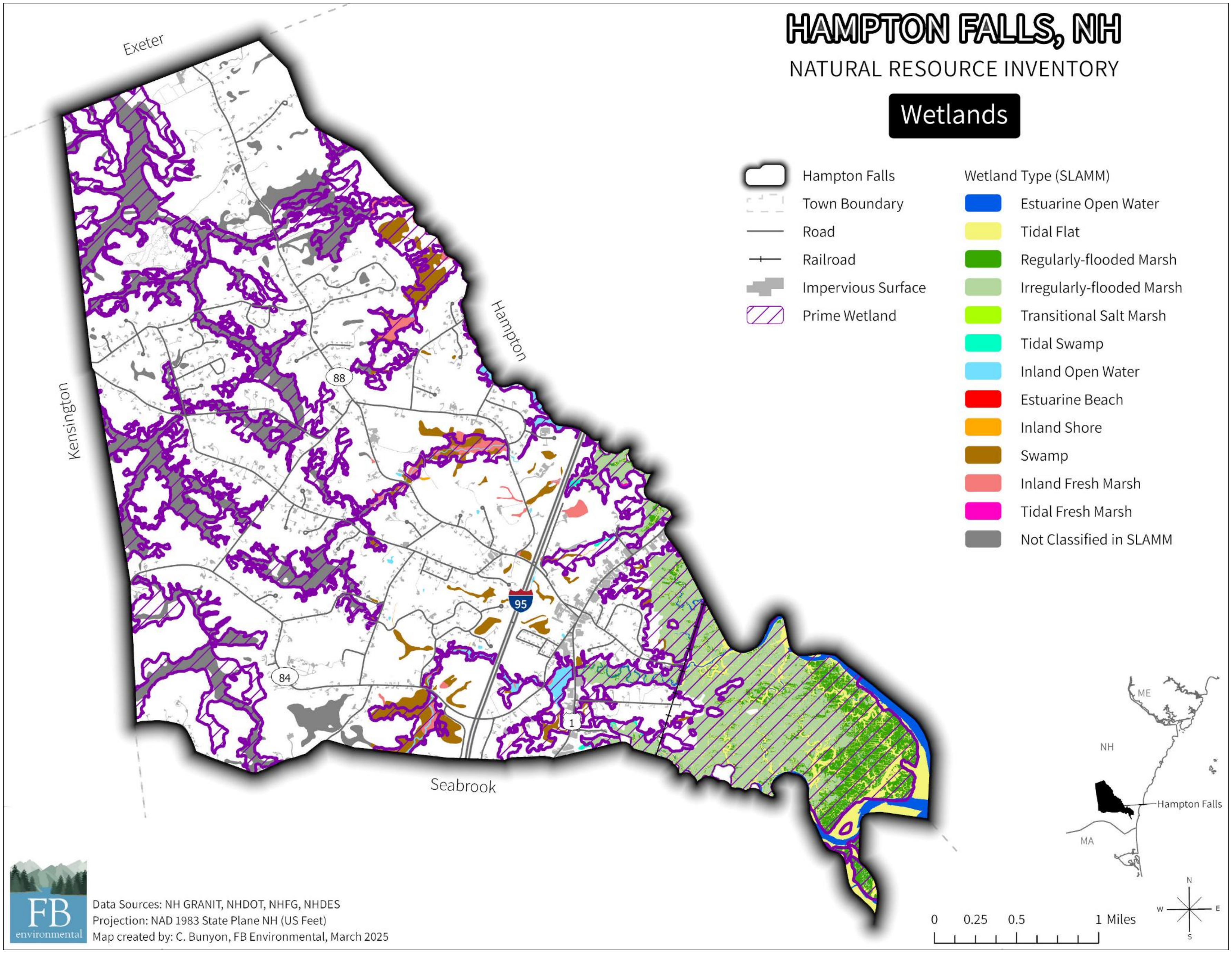
Return to Section 1.6 or Section 2.2.

Map 2



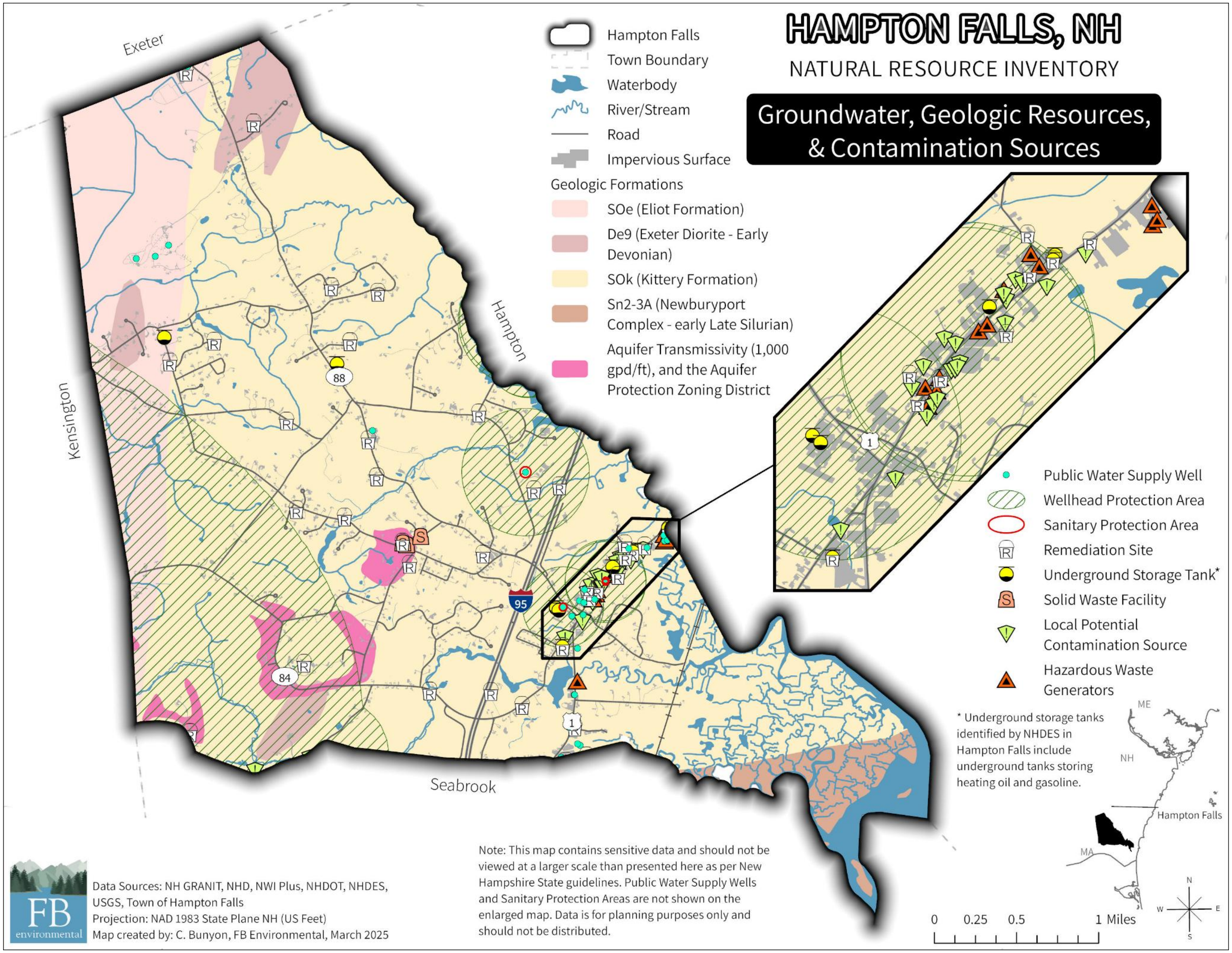
Return to Section 2.1.

Map 3



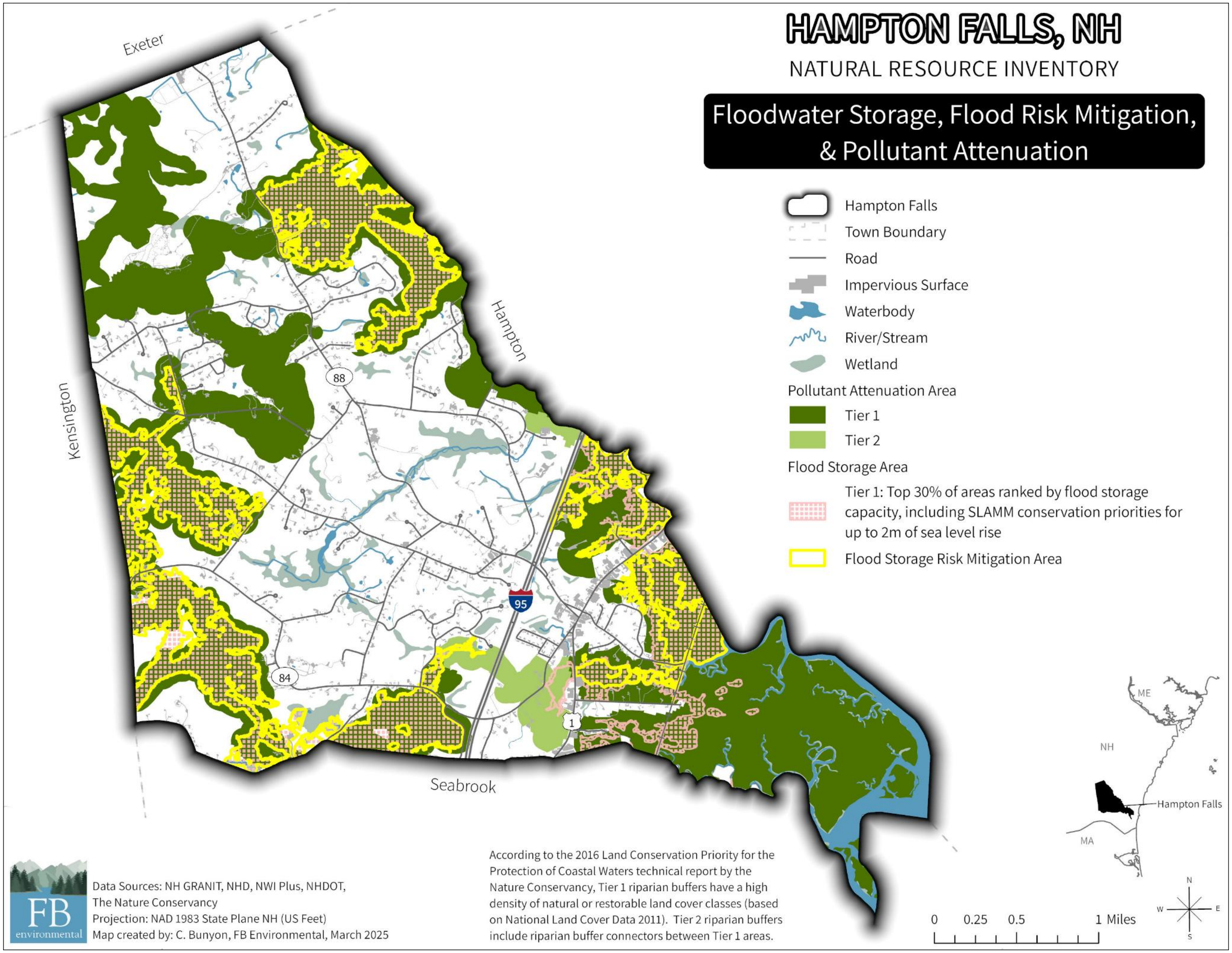
Return to [Section 2.2.2](#)

Map 4



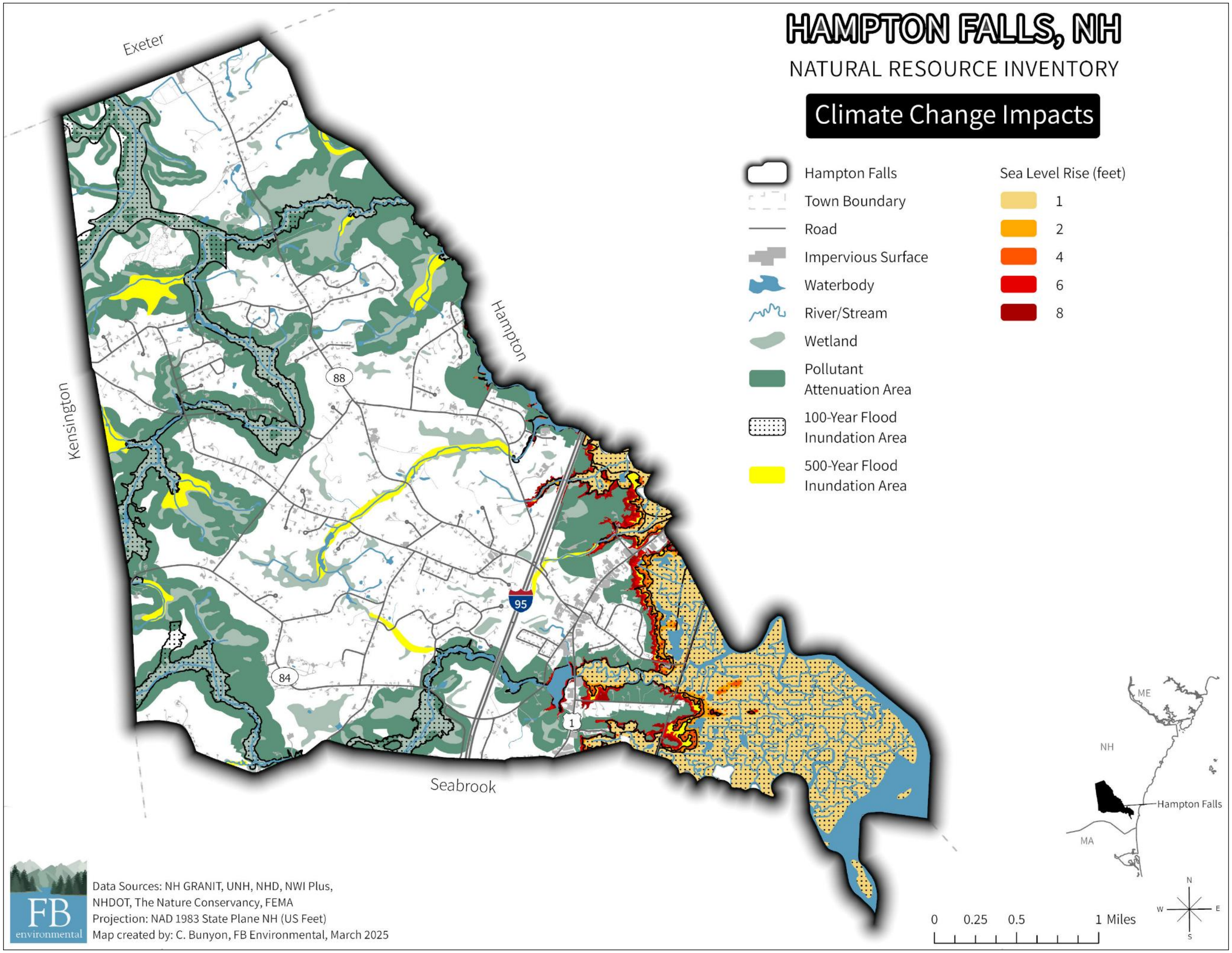
Return to [Section 2.4.1.](#)

Map 5



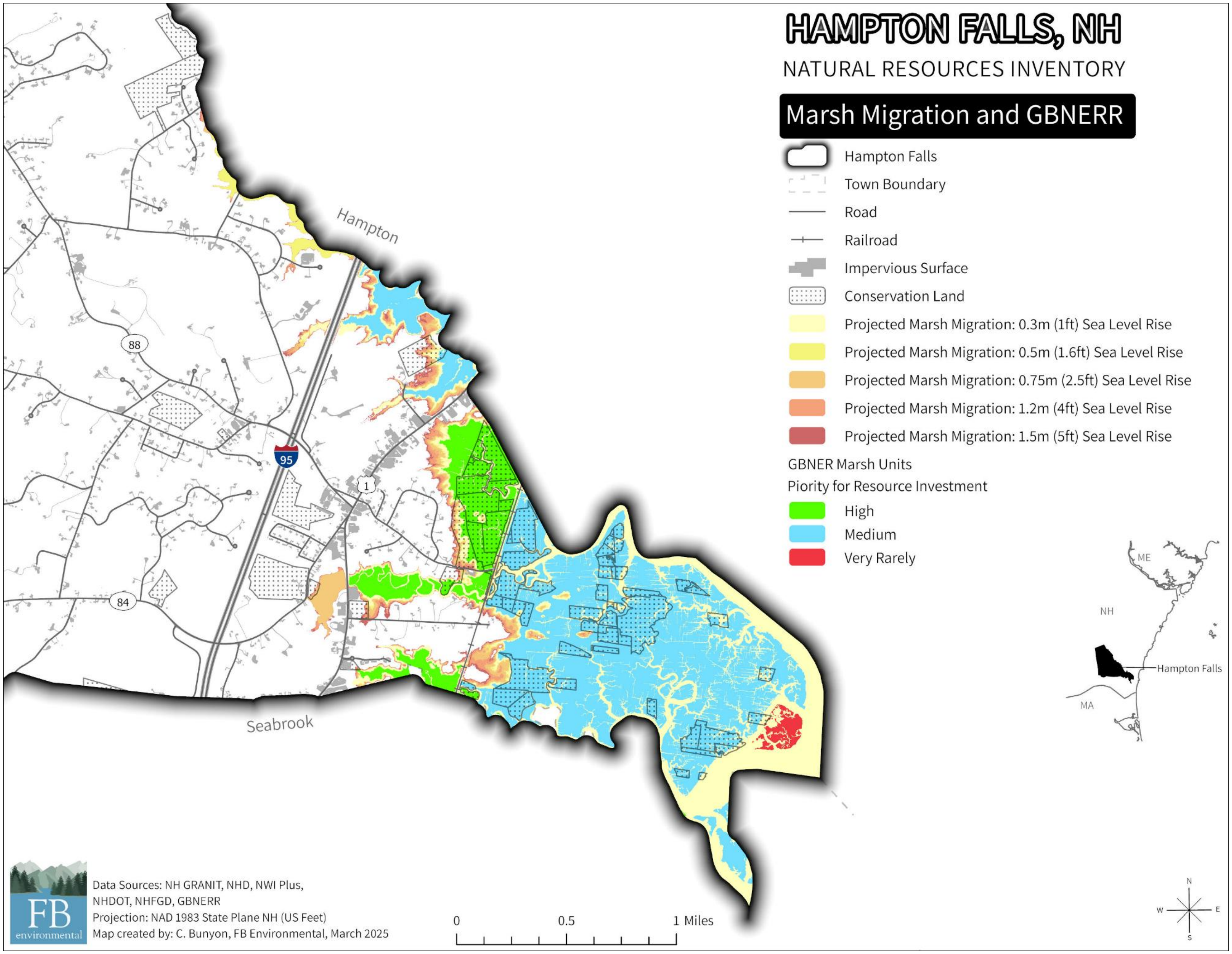
Return to [Section 2.5.](#)

Map 6



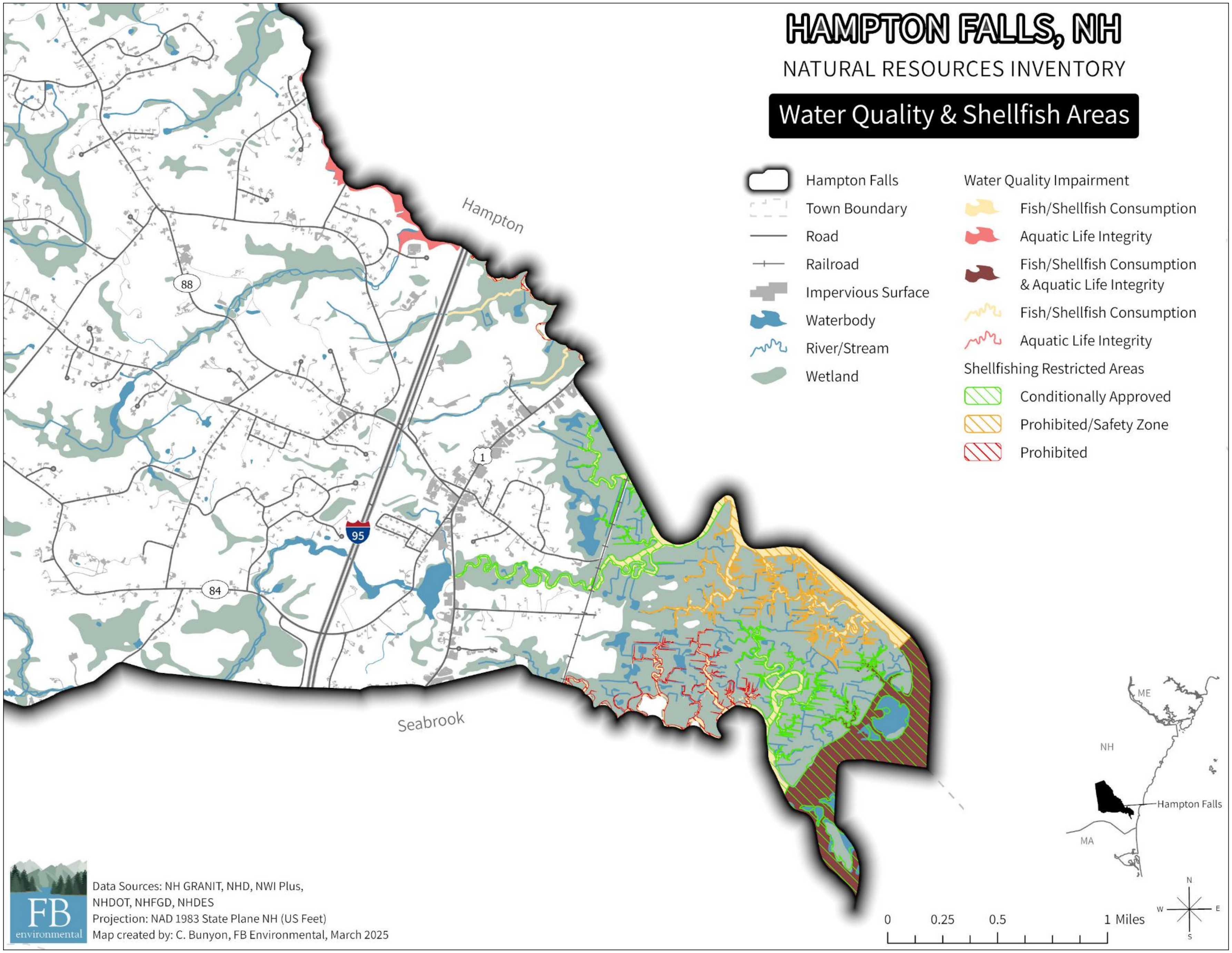
Return to *[Section 2.5.1.]*

Map 7



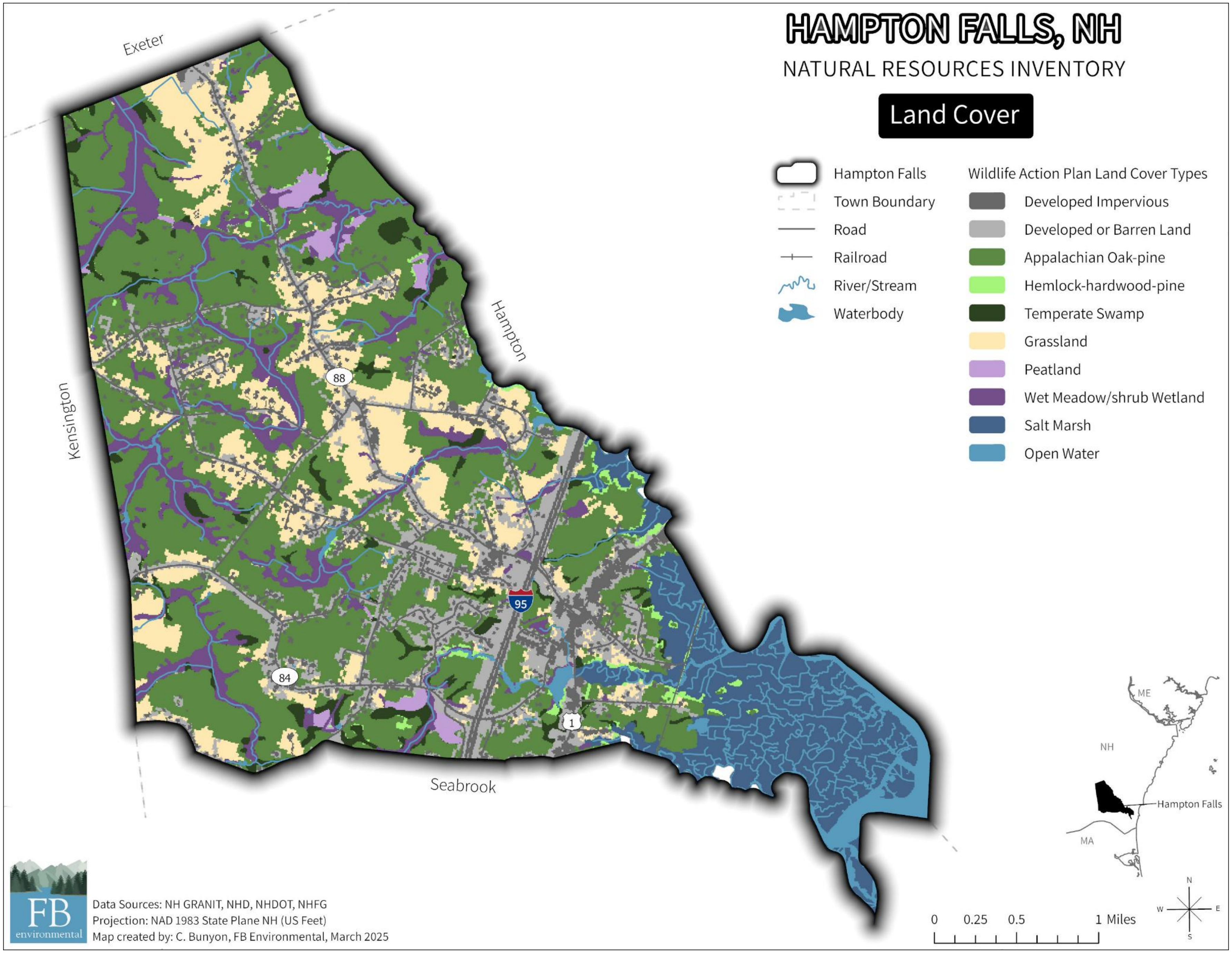
Return to *Section 2.5.2.* *or* *Section 2.8*.

Map 8



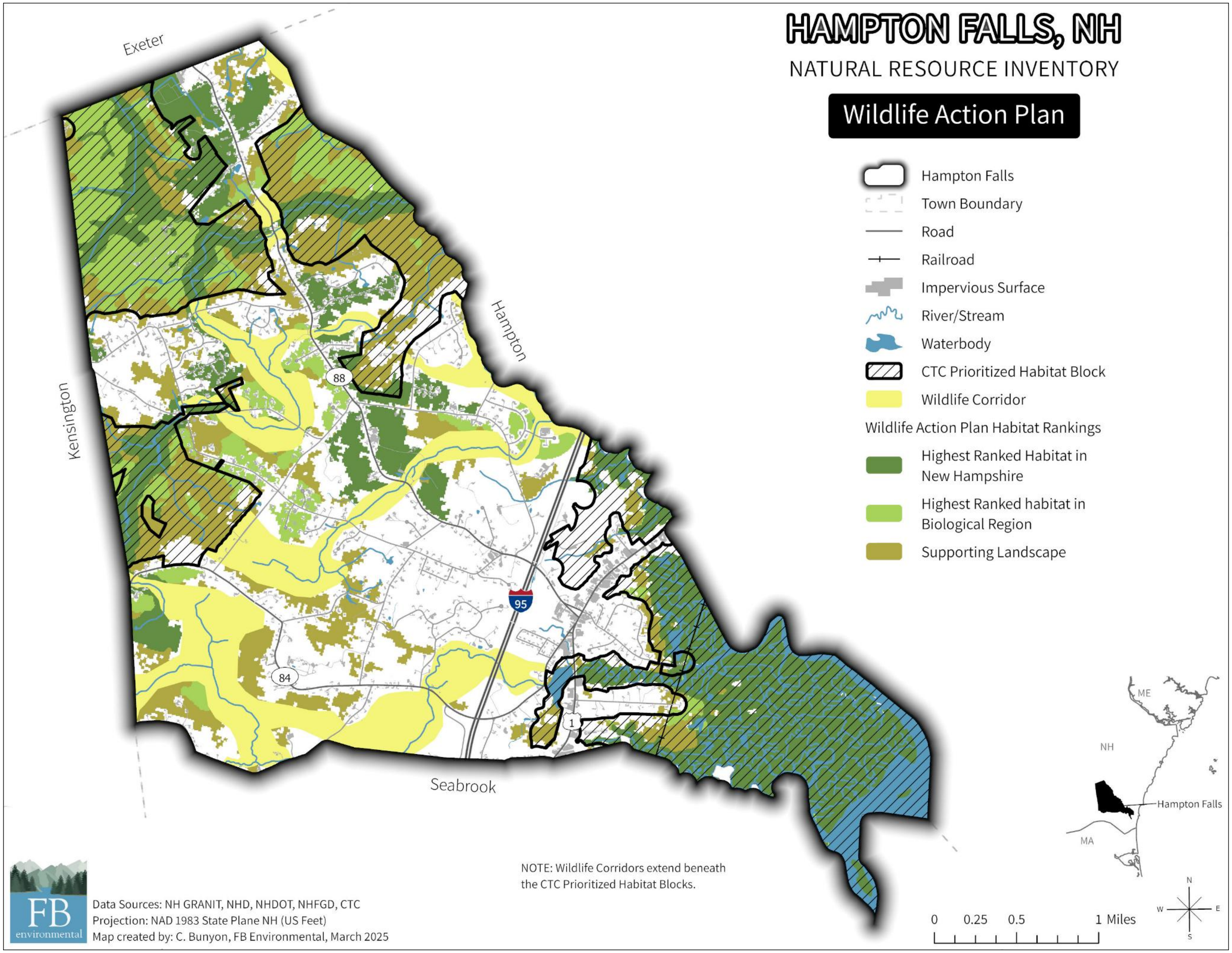
Return to *[Section 2.6.1.]*

Map 9



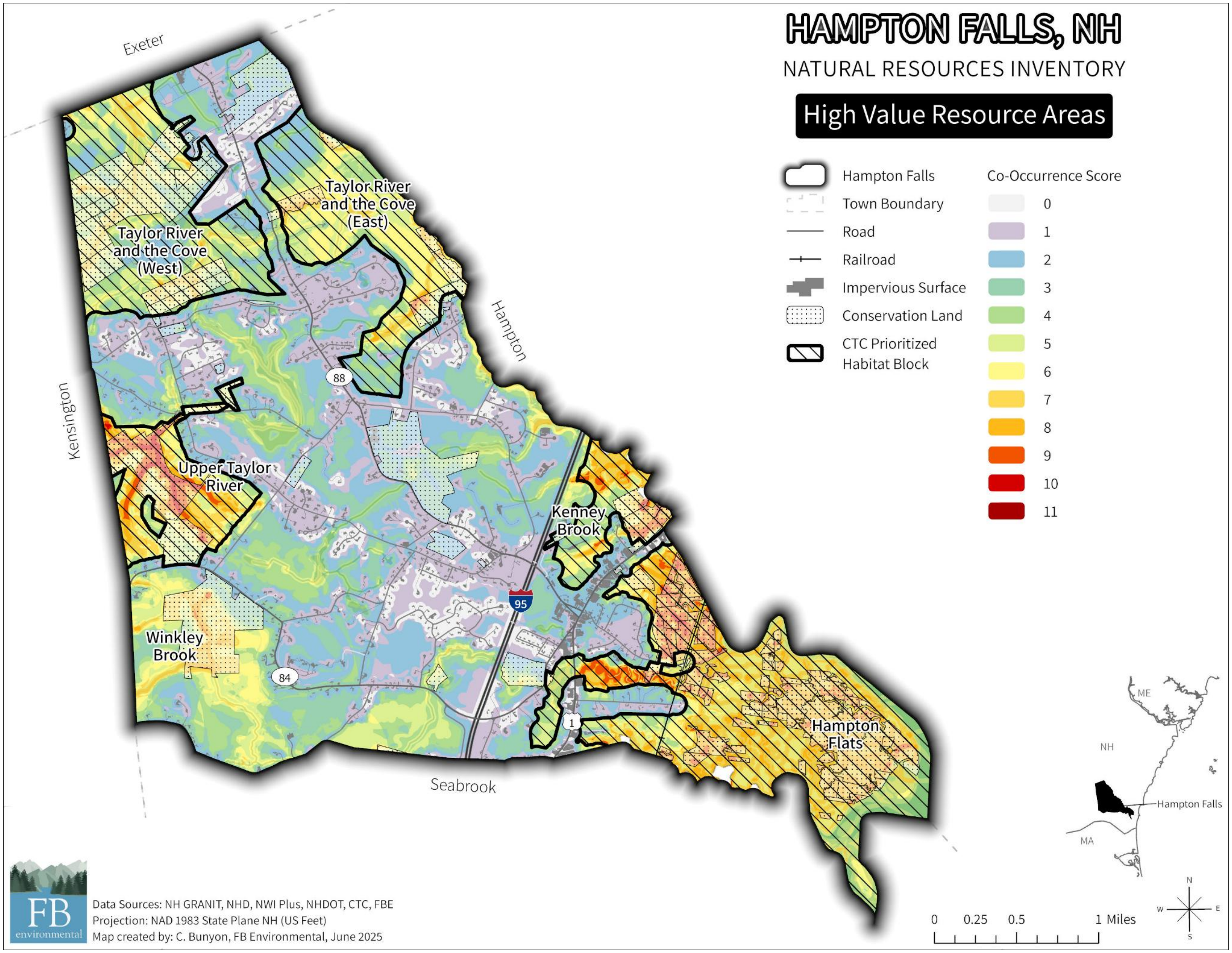
Return to [*Section 3.1.*]

Map 10



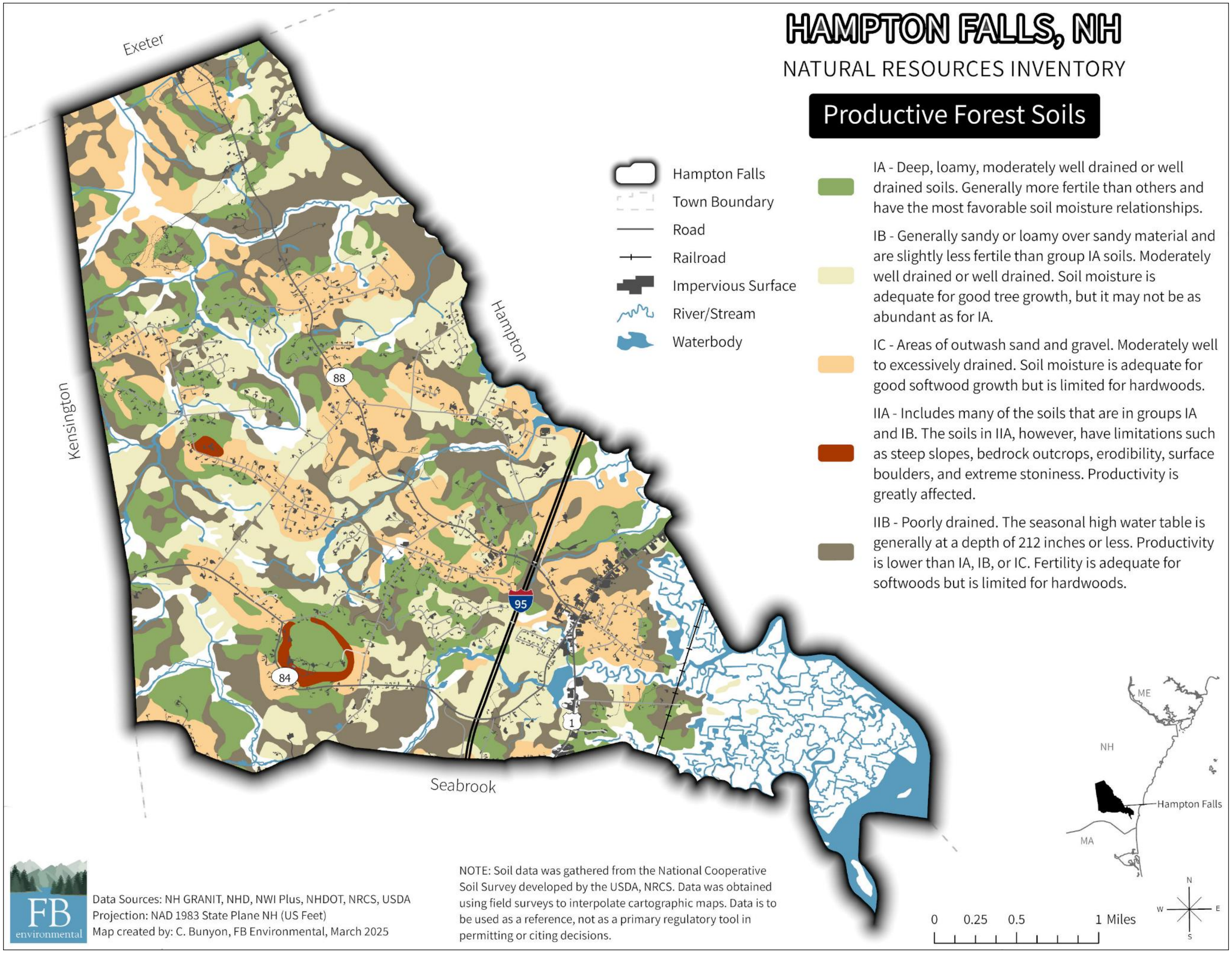
Return to [Section 3.2]() or [Section 3.5.]()

Map 11



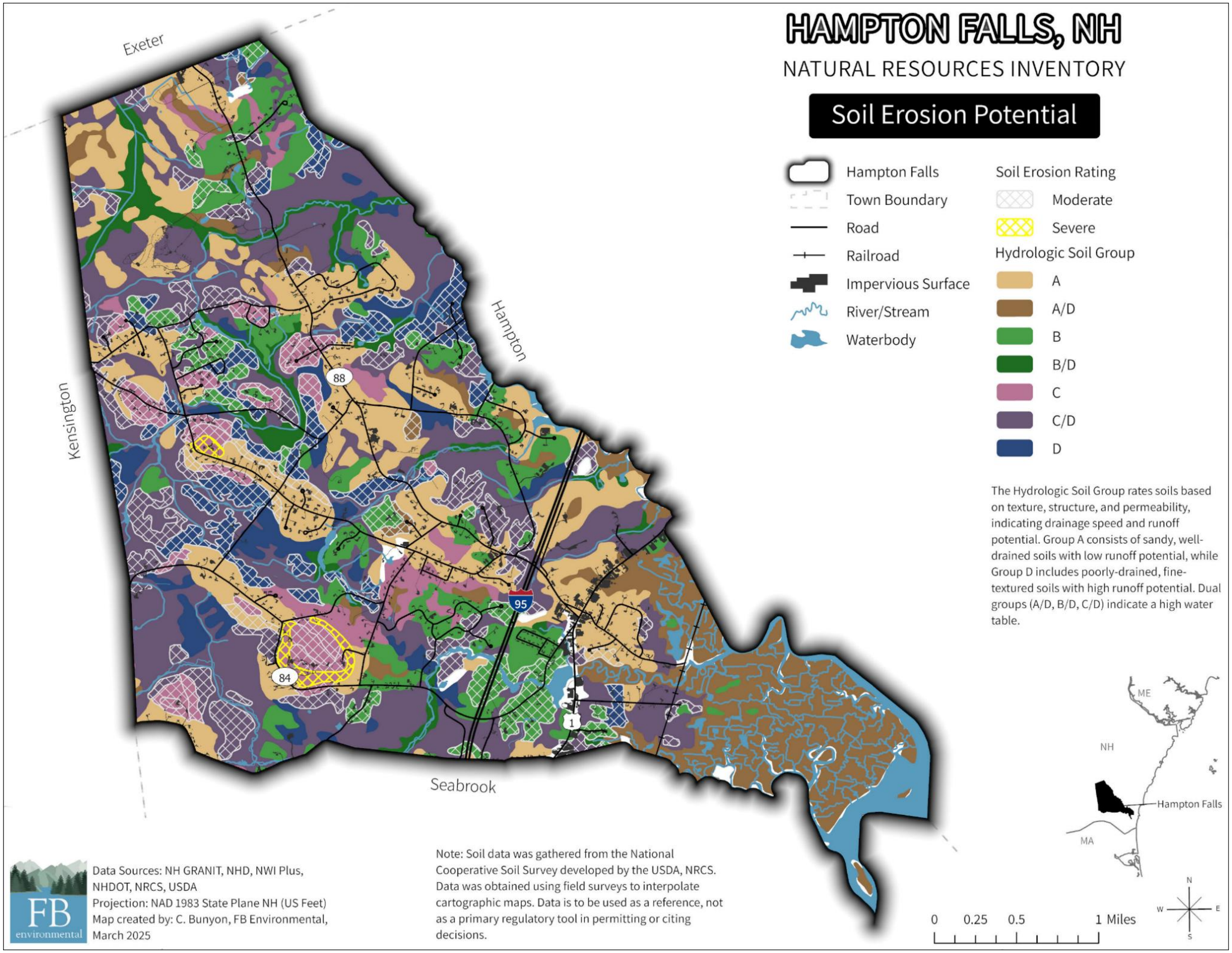
Return to [Section 3.6.]

Map 12



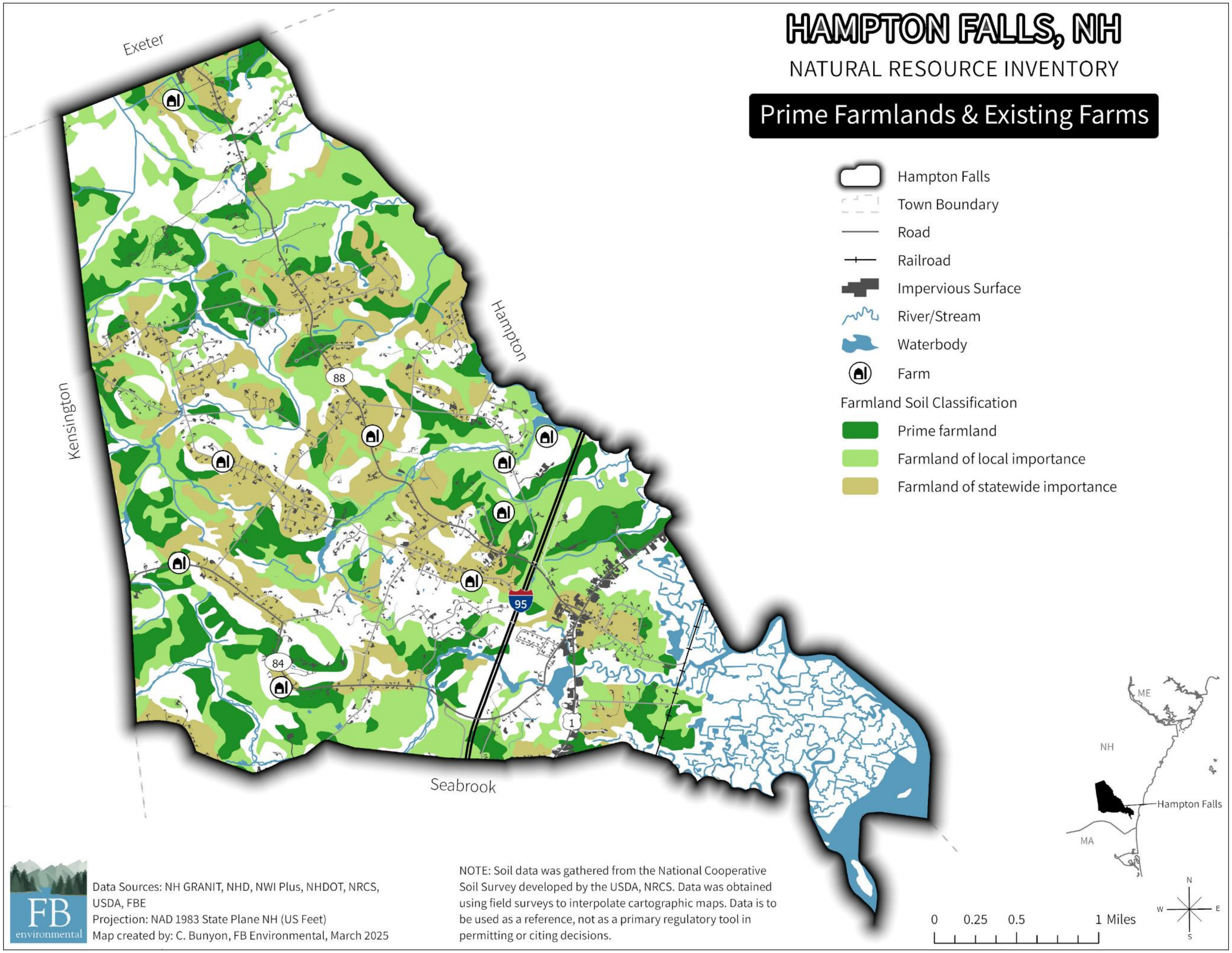
Return to Section 4.1.1.

Map 13



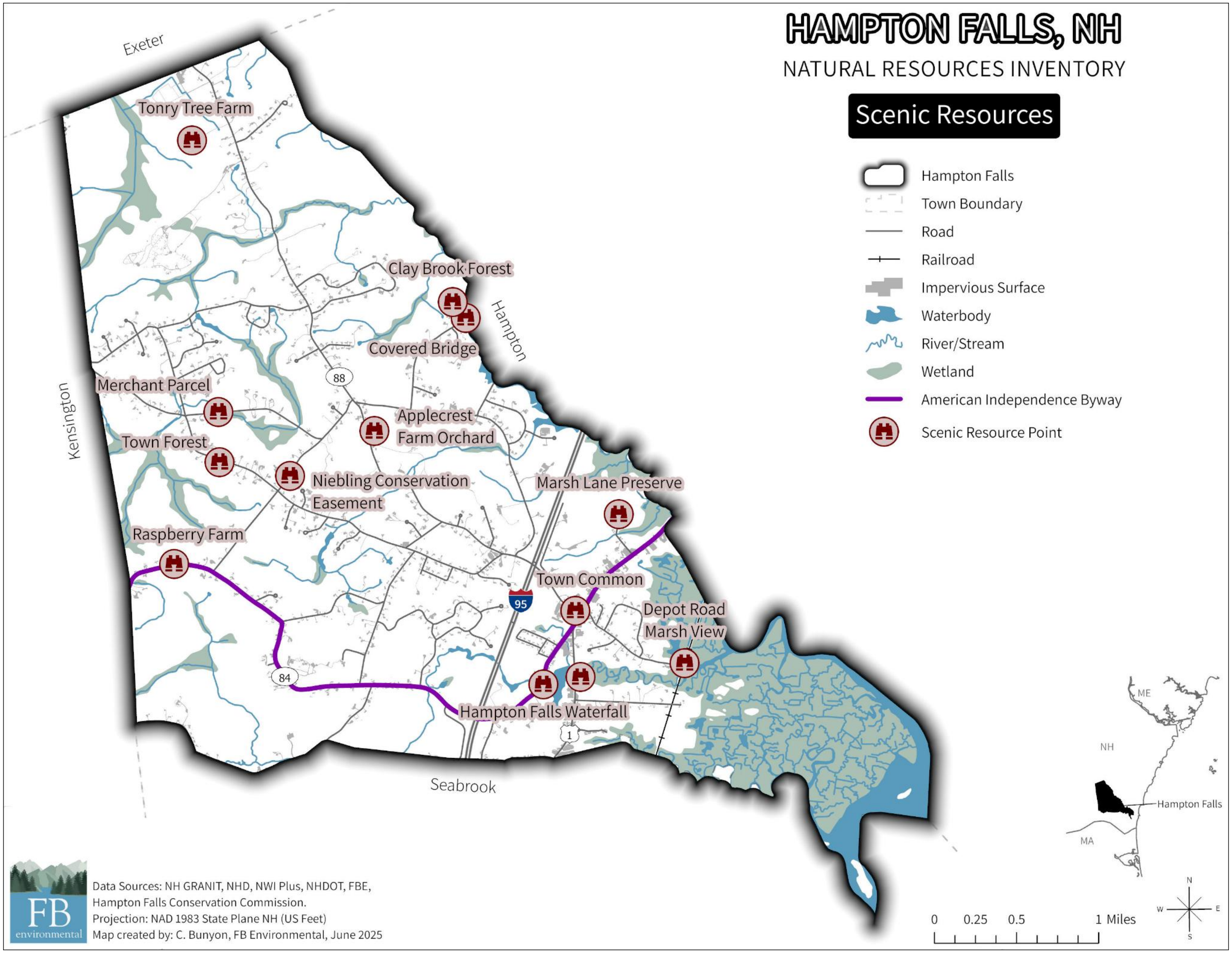
Return to [Section 4.1.2.](#)

Map 14



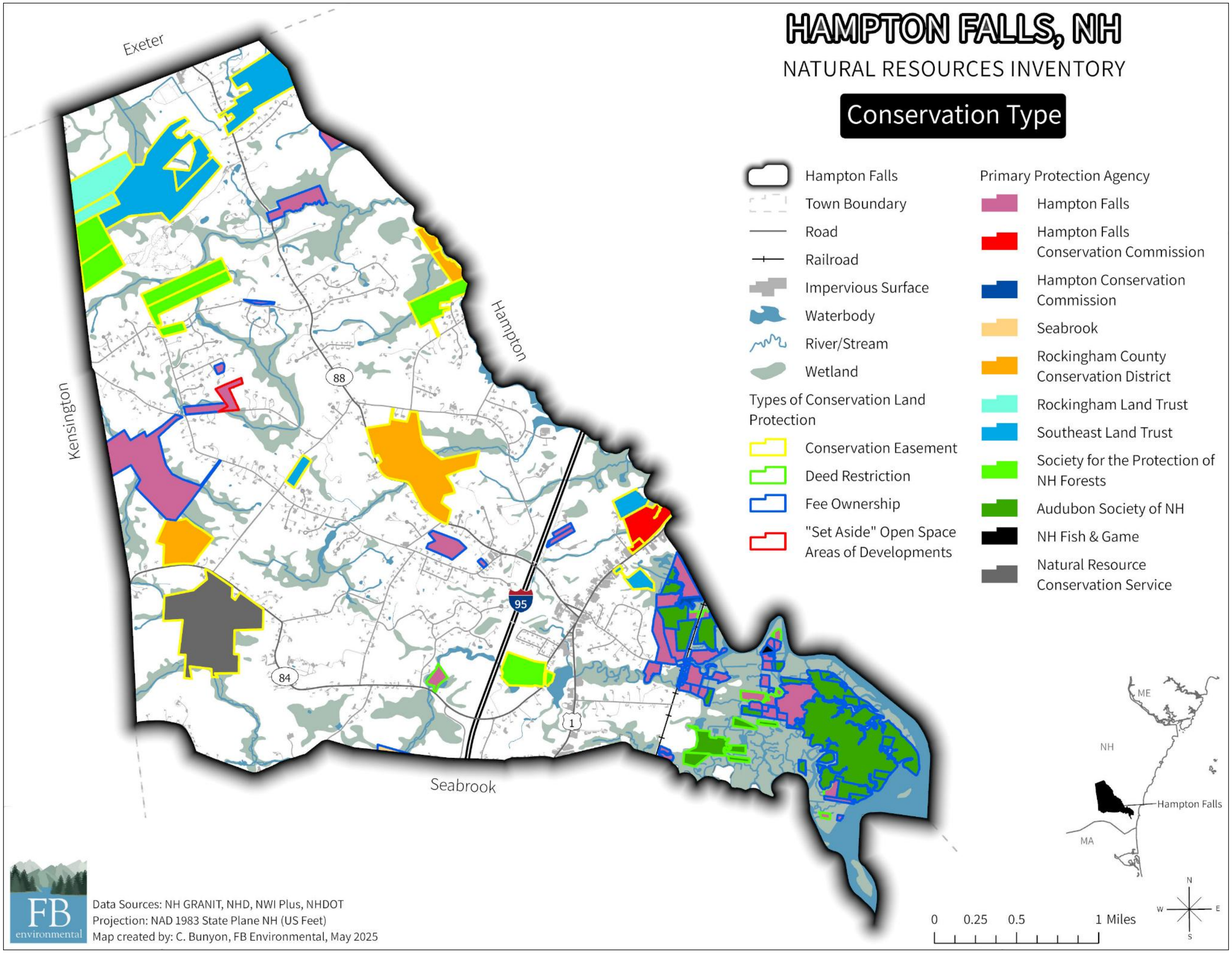
Return to [Section 4.1.3.]

Map 15



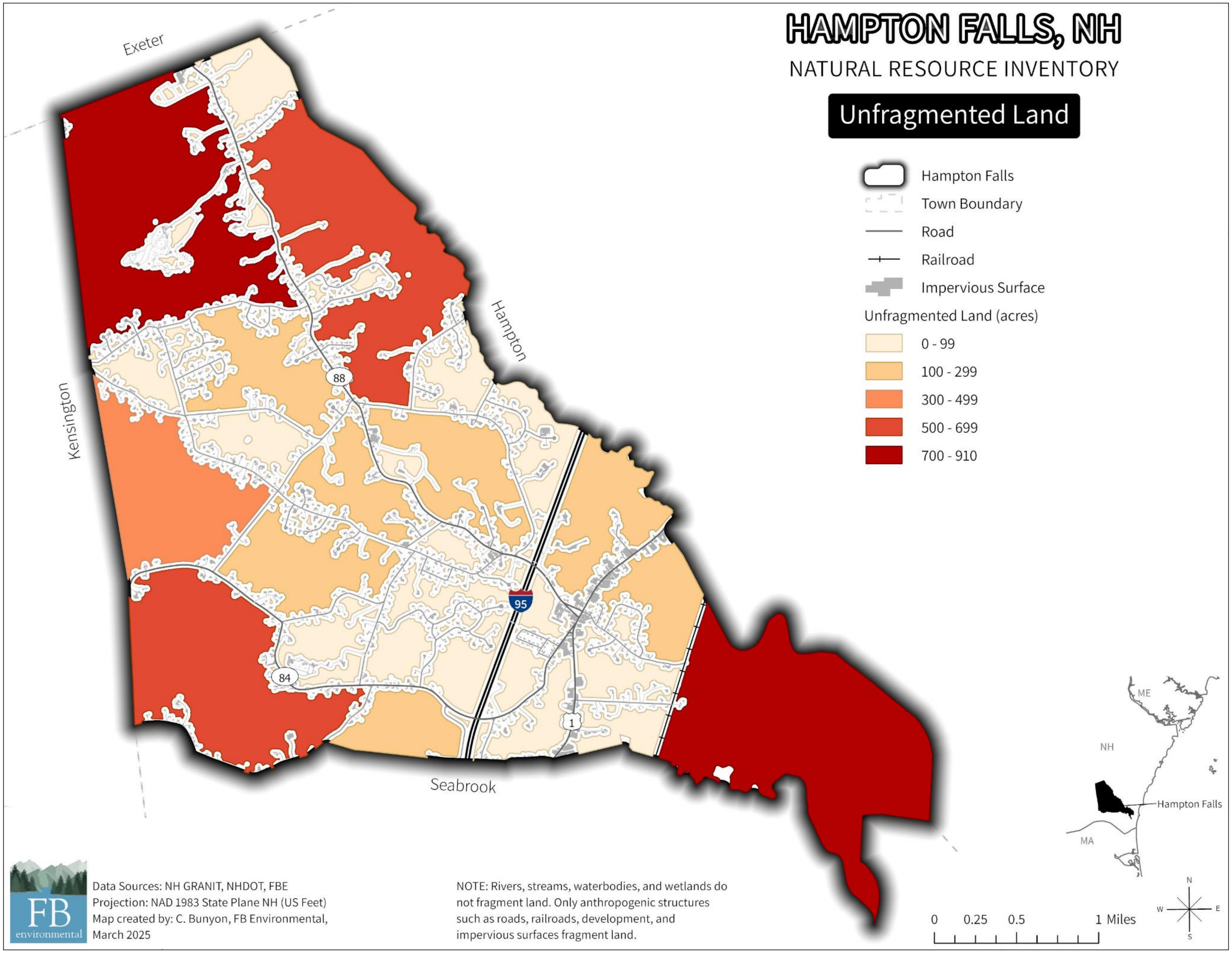
Return to [Section 5.1.1.](#)

Map 16



Return to [Section 6.]

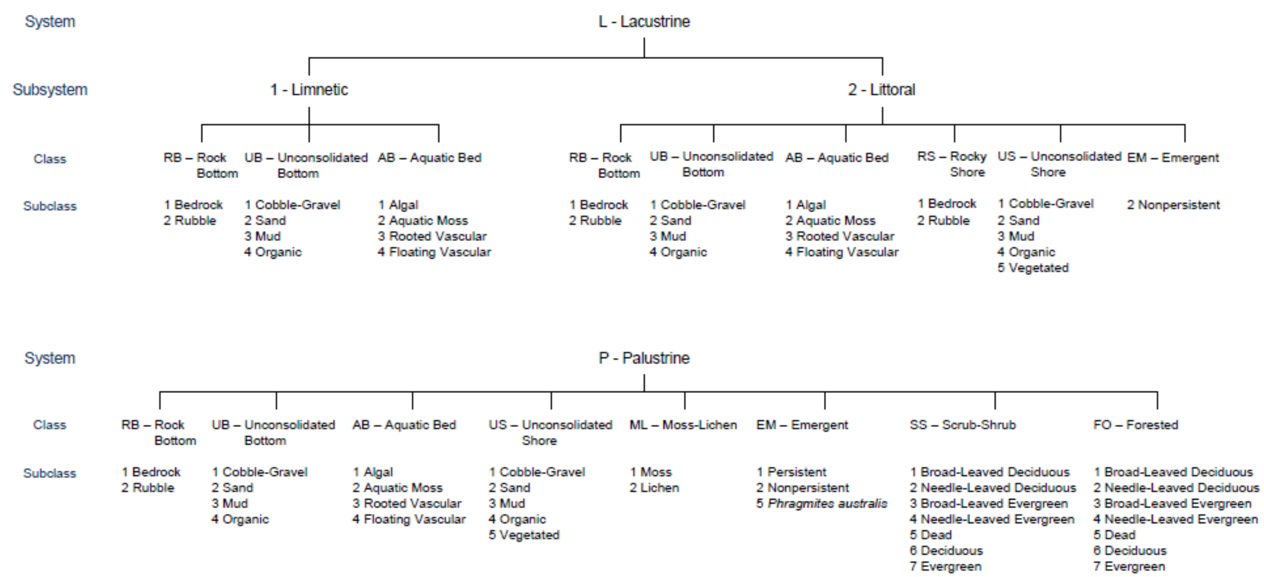
Map 17



Return to *Section 6.2.4.*

Appendix B: Cowardin et. al. (1979) Wetland and Deepwater Habitat Classification

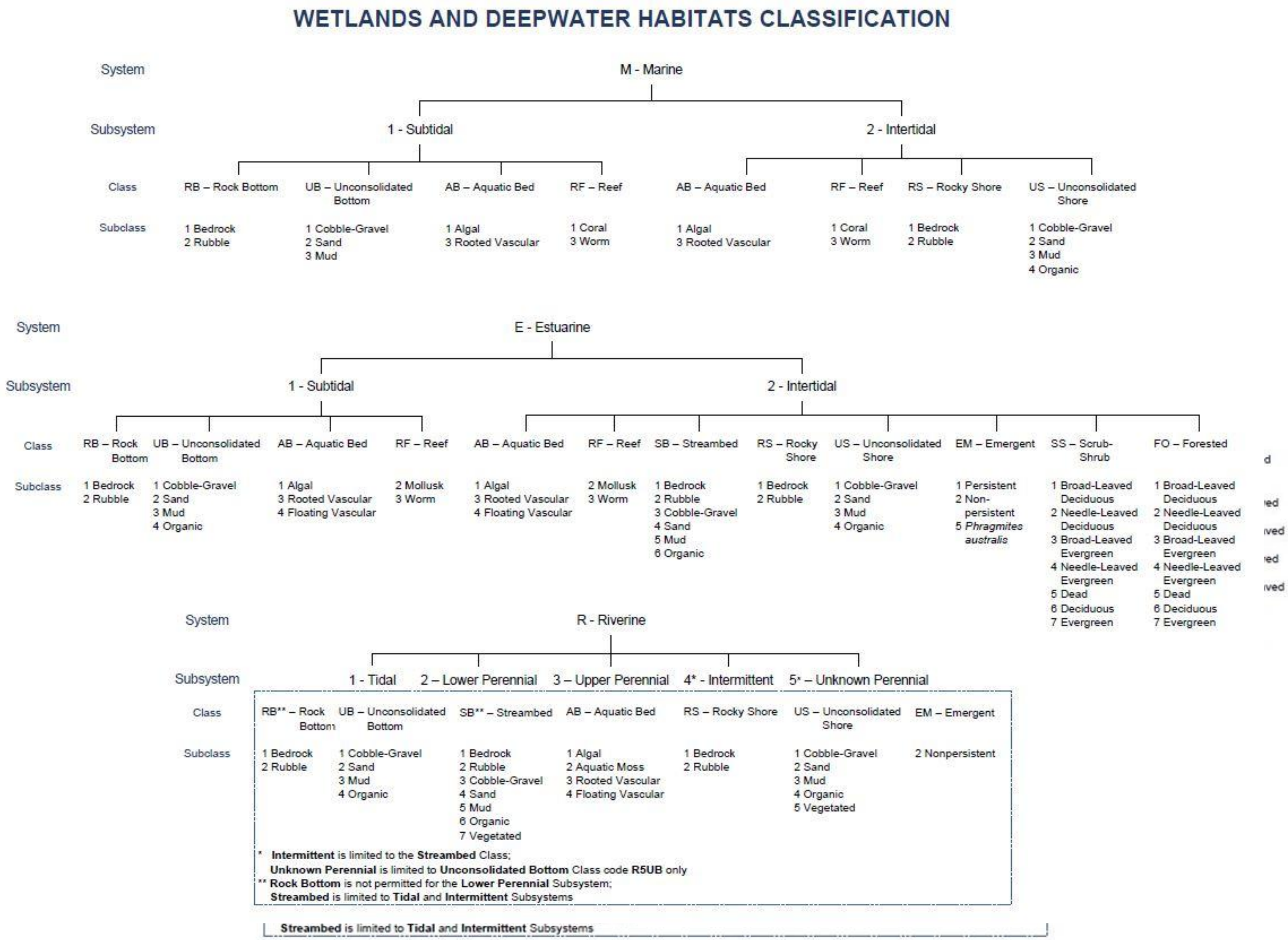
WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



MODIFIERS

In order to more adequately describe the wetland and deepwater habitats, one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

Water Regime			Special Modifiers	Water Chemistry			Soil
Nontidal	**Saltwater Tidal**	**Freshwater Tidal**		**Coastal Halinity**	**Inland Salinity**	**pH Modifiers for all Fresh Water**	
A Temporarily Flooded	L Subtidal	S Temporarily Flooded-Tidal	b Beaver	1 Hyperhaline	7 Hypersaline	a Acid	g Organic
B Saturated	M Irregularly Exposed	R Seasonally Flooded-Tidal	d Partly Drained/Ditched	2 Euhaline	8 Eusaline	t Circumneutral	n Mineral
C Seasonally Flooded	N Regularly Flooded	T Semipermanently Flooded-Tidal	f Farmed	3 Mixohaline (Brackish)	9 Mixosaline	i Alkaline	
E Seasonally Flooded/	P Irregularly Flooded	V Permanently Flooded-Tidal	h Diked/Impounded	4 Polyhaline	0 Fresh		
Saturated			r Artificial	5 Mesohaline			
F Semipermanently Flooded			s Spoil	6 Oligohaline			
G Intermittently Exposed			x Excavated	0 Fresh			
H Permanently Flooded							
J Intermittently Flooded							
K Artificially Flooded							



Return to Section 2.2.2 and Section 7.3.2.

Appendix C: Wildlife Action Plan Habitats

Note that habitat descriptions below are excerpted from New Hampshire Fish and Game's Habitat Types and Species webpage (NHFGD, n.d. b).

Salt Marshes

Salt marshes are grass-dominated tidal wetlands existing in the transition zone between ocean and upland. They are among the most productive ecosystems in the world and provide great habitat for many bird species including American bittern (*Botaurus lentiginosus*), Nelson's sharp-tailed sparrow (*Ammospiza nelson*), salt marsh sharp-tailed sparrow (*Ammodramus caudacutus*), seaside sparrow (*Ammodramus maritimus*), and semipalmated sandpiper (*Calidris pusilla*). Salt marsh plants are salt-tolerant and adapted to fluctuating water levels. Nutrients that stimulate marsh plant growth are carried in with the tides, and organic matter that feeds fish and other organisms is carried out by the tides. Over time, organic matter accumulates on the marsh and forms peat. By building up more peat, salt marsh elevation can keep pace with rising sea level, unless the rate of sea-level rise becomes too great, such as is predicted from climate change. Salt marshes help protect coastal areas from storm surges, but an estimated 30–50% of New Hampshire's original salt marsh habitat has been lost to development. Some of the conservation strategies for salt marshes are restoring and protecting the remaining salt marsh habitat and surrounding upland buffer habitat.

Appalachian Oak-Pine Forests

Appalachian oak-pine forests are found mostly below 900 feet elevation in southern New Hampshire and along the Connecticut River in western New Hampshire. The nutrient-poor, dry, sandy soils and warm, dry, climate influences the typical vegetation including oak, hickory (*Carya spp.*), mountain laurel (*Kalmia latifolia*), and sugar maple (*Acer saccharum*). Many wildlife species use these forests for part or all of their life cycle including whippoorwills (*Antrostomus vociferous*), black bears, northern myotis (*Myotis septentrionalis*), and state-determined endangered eastern hognose snakes (*Heterodon platirhinos*). Traditionally, Appalachian oak-pine forests are influenced by frequent fires, which change the age structure of the forest. Diverse age and structure of the forest help to promote wildlife diversity. Intense development pressure, particularly in the southeast corner of New Hampshire, has dramatically reduced naturally occurring fires and increased fragmentation of this forest type. Incorporating habitat conservation into local land use planning, protecting unfragmented blocks, and adopting sustainable forestry are a few examples of conservation strategies for Appalachian oak-pine forests.

Temperate Swamps

This habitat consists of forested wetlands found primarily in central and southern New Hampshire. Temperate peat swamps are typically found in isolated or stagnant basins with saturated, organic soils. The temperate swamps classification also includes the four known Atlantic white cedar communities in New Hampshire, and the pitch pine-heath swamp, a rare community usually associated with the Pine Barrens landscape. Most coastal conifer peat swamps occur within 30 miles of the Atlantic coast. These wetlands provide a number of functions such as flood control, pollutant filters, shoreline stabilization, sediment retention and erosion control, food web productivity, wildlife habitat, recreation, and education. Since hemlock is a common component of temperate swamps across New Hampshire, threats to this habitat include habitat degradation from insect pests such as the hemlock woolly adelgid (*Adelges tsugae*). Inputs of sedimentation, insecticides, and fertilizers are sources of pollution that threaten temperate swamp habitats. Actions to conserve temperate swamps include supporting the Division of Forests and Lands in the implementation of the hemlock woolly adelgid action plan and working with foresters to use best management practices outlined in the document "Good Forestry in the Granite State".

Wet Meadows and Shrub Wetlands

Emergent marsh and shrub swamp systems have a broad range of flood regimes, sometimes controlled by the presence or departure of beavers, but mostly controlled by groundwater. This system, which is an important food source for many species, is often grouped into three broad habitat categories: wet meadows, emergent marshes, and scrub-shrub wetlands. Marsh and shrub wetlands filter pollutants, preventing them from getting into local streams, and help hold water to reduce flooding. Many wildlife species use marsh and shrub wetlands, including common species like red-winged blackbirds (*Agelaius phoeniceus*), beavers (*Castor canadensis*), and painted turtles (*Chrysemys picta*). Marsh and shrub wetlands are also critically important for state endangered Blanding's turtles (*Emydoidea blandingii*), New England cottontails (*Sylvilagus transitionalis*), northern harriers (*Circus hudsonius*), ringed boghaunters (*Williamsonia lintneri*), and sedge wrens (*Cistothorus stellaris*) plus those on the state list of threatened wildlife: spotted turtles (*Clemmys guttata*) and pied billed grebes (*Podilymbus podiceps*). Development is a threat to these habitats mostly from driveways and roads that fragment wetlands or change the flow of water. The loss of an upland habitat around a marsh or shrub wetland also increases the amount of pollution and sedimentation threatening the habitat. Another constant threat to marsh and shrub wetlands is invasive plants such as purple loosestrife (*Lythrum salicaria*) and Japanese knotweed (*Fallopia japonica*) that compete with native vegetation. Some conservation strategies for marsh and shrub wetlands are restoration and protection of these important habitats. Many marsh and shrub wetlands are on private land and landowners can help restore and conserve them.

Grasslands

Grasslands are comprised of grasses, sedges, and wildflowers with little to no shrubs and trees. The most common grassland habitats are airports, capped landfills, wet meadows, and agricultural fields such as hayfields, pastures, and fallow fields. Pre-colonial grasslands in New Hampshire were probably only maintained by beaver (*Castor canadensis*) and fires started by lightning and Native Americans. The numerous agricultural lands maintained by early European settlers provided ideal habitat for some wildlife species that need grassland habitat. As these agricultural lands were abandoned, these populations began to decline and there are now on the state endangered list such species as the eastern hognose snake, northern harrier (*Circus cyaneus*), upland sandpiper (*Bartramia longicauda*) and on the state threatened list species such as the grasshopper sparrow (*Ammodramus savannarum*). Other species such as wood turtles (*Glyptemys insculpta*) and numerous species of butterflies also benefit from these open grass fields. Development and natural forest succession have reduced grassland habitat in the state. Grasslands require maintenance and must be mowed to prevent them from becoming shrublands or forests. Reclaiming and maintaining grasslands are two important conservation strategies for grassland habitats. Many grassland and potential grassland habitats are on private land and landowners can help restore and conserve them.

Peatlands

Peatland habitats are extremely important for carbon sequestration on a local and global scale. The water in peatlands has low nutrient content and typically high acidity caused by limited groundwater input and surface runoff. These environmental conditions are such that plant and animal material take a very long time to decompose. This organic material contains carbon and other nutrients, storing it away and slowly releasing it into the atmosphere. Drainage and destruction of peatlands releases this carbon into the atmosphere more quickly, increasing greenhouse gas emissions. Conservation of the

11 different natural communities that comprise peatlands is also vital to the continued existence of many rare plant and wildlife species in New Hampshire. On the state endangered list is the ringed bog haunter (*Williamsonia lintneri*), a dragonfly which uses peatlands and the surrounding uplands in the southern part of the state. Also on the state list is the northern bog lemming (*Synaptomys borealis*) which inhabits burrows in the sphagnum moss and associated grasses. Typical vegetation in a peatland includes sphagnum moss, leather leaf (*Chamaedaphne calyculata*), northern white cedar (*Thuja occidentalis*), and American larch (*Larix laricina*). Threats to peatland habitats are development, altered hydrology (amount and flow of water), and unsustainable forest harvesting. Non-point source pollutants, such as road salt, lawn fertilizers, and pesticides, also threaten this habitat by altering the acidity and nutrients. Establishing buffers around this habitat is one conservation strategy that will help minimize the threats to peatland habitats.

Hemlock Hardwood Pine Forest

Hemlock-hardwood-pine forests are comprised of mostly hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), beech (*Fagus grandifolia*), and oak (*Quercus spp.*) trees. Since this is a transitional forest, it can occur at different elevations and over different types of soil and topography, and the composition of vegetation can be variable. This forest type is the most common in New Hampshire and covers nearly 50% of the state and provides habitat for numerous wildlife species such as the cerulean warbler (*Setophaga cerulean*), eastern pipistrelle (*Perimyotis subflavus*), and bobcat (*Lynx rufus*). Many of the species that use this habitat type require large blocks of unfragmented forest such as the northern goshawk (*Accipiter gentilis*) and black bear (*Ursus americanus*). Since this forest type is so common in the state, it is sometimes overlooked in conservation efforts. Development and fragmentation are huge threats to the continued existence of hemlock-hardwood-pine forest. Some conservation strategies for hemlock-hardwood-pine forests are incorporating habitat conservation into local land use planning, protecting unfragmented blocks of land, and educating landowners.

Return to Section 3.1.

Appendix D: Best Management Options for Enhancing Tidal Marsh Resiliency – The NH Salt Marsh

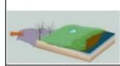
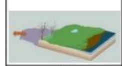
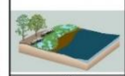
Best Management Options for Enhancing Tidal Marsh Resiliency

This table summarizes recommended management options to enhance tidal marsh resiliency based on the current condition of each marsh and its predicted adaptive capacity to relative sea level rise. Management options are considered from an ecological, rather than socioeconomic, perspective. For example, "managed relocation" refers to marsh gain in the footprint of a former building rather than societal consequences of abandoning or buying out property.

Management options in this table are recommended conservatively so that only the most relevant for each marsh resiliency category are shown.

A "✓" means that option is ***highly* relevant** for this marsh resiliency category and a "**x**" means the financial, ecological or logistical **cost is high** so this type of management option should be avoided.

Recommendations are made as an objective overview. It is fully recognized other factors, such as funding availability, need for a demonstration

			1	2	3	4	5	6	7	8
		Current Condition	High	High	High	High	Low	Low	Low	Low
		Current vulnerability to RSLR	Low	High	Low	High	High	Low	High	Low
		Adaptation Potential	High	High	Low	Low	Low	Low	High	High
			Good condition marsh that is likely to migrate inland naturally for the long-term. It's in good shape, don't mess with it!	Marsh is in good shape for now but try to make less vulnerable (e.g., living shoreline or thin layer placement) so it has a chance to adapt in the future.	Its in good shape for now. Focus on upland modifications that enhance adaptation potential.	Cannot maintain current footprint without active management. Address upland options *only if* vulnerability is mitigated first. Exception is if essential function is present so protect all current high marsh.	Low condition marsh that is unlikely to persist in the future. Makes this a good place to test experimental restoration approaches. Would require highly engineered approach to maintain this marsh.	There is a need to restore current conditions *but prioritize only if* barriers to adaption in upland are mitigated.	Focus established restoration techniques that improve current condition ***and*** decrease vulnerability to RSLR here. Need to address both aspects to make a project sustainable.	Prioritize established restoration projects here. This marsh is likely to self-sustain in the long term so projects will be cost effective.
										
		Number of MUCs in NH	17	30	17	50	33	11	19	47
		Total acreage in NH	1132.5	2,110	452	611	197	50.2	882.1	355.4
		Average size (acres)	66.6	70.3	26.6	12.2	6.0	4.6	46.4	7.6
		Size range (acres)	0.57-194.8	1.2-212.8	0.5-115.8	0.64-174.8	0.03-47.5	0.16-21	0.04-212	0.2-70.1
		Priority for resource investment in NH?	HIGH	MEDIUM	MEDIUM	LOW	VERY RARELY	LOW	LOW	MEDIUM
Management Options	Rationale	Example project types								
NO ACTION is the default for all Marsh Units										
LAND USE / POLICY										
Remove / decrease / modify development potential on salt marsh itself.	When current condition is high and either vulnerability is low or adaptation potential high.	Special overlay districts. Building restrictions. Road infrastructure modification.	✓	✓	✓	✓				
Remove / decrease / modify development potential in the migration pathway.	When adaptation potential is high.	Removal and restoration of parking areas. Removal of buildings. Abandonment of roads. Removal of septic systems.	✓	✓					✓	✓
Managed relocation of structures and/or infrastructure in the saltmarsh itself	When current condition is high and either vulnerability is low or adaptation potential high.		✓	✓	✓	✓				
Managed relocation of structures and/or infrastructure in the way of the migration pathway	When adaptation potential is high.		✓	✓					✓	✓
Incentives for voluntary easements or land acquisition of critical migration pathways and buffer strips.	When adaptation potential is high.	Set back or buffer ordinances. Zoning or overlay districts.	✓	✓					✓	✓
LAND PROTECTION										
Priority for protection of marsh itself (all high current condition marshes are considered important for protection).	When current condition is high and either vulnerability is low or adaptation potential high.	Fee purchase.	✓	✓	✓	✓				
Protection of migration space.	When adaptation potential is high.	Purchase fee or conservation easement.	✓	✓	x	x	x	x	✓	✓
Incentives for voluntary easements or land acquisition of critical migration pathways and buffer strips.	When adaptation potential is high.	Purchased easement. Rolling easements. Deed restrictions. Tax incentives.	✓	✓					✓	✓
Limit investment in land protection as effectiveness will be relatively short-term.	When all three resiliency categories (current condition, vulnerability, and adaptive potential) are negative.	Save your $!					✓			
RESTORATION OR ADAPTATION TECHNIQUES										
Traditional, well proven, techniques with most benefits to the current marsh footprint.	When current condition is low or vulnerability is high.	Removal of barriers to hydrologic flow (tidal restrictions, ditch remediation etc.). Open marsh water management (OMWM) remediation. Invasive species management.		✓		✓	✓	✓	✓	✓
Experimental, or highly manipulative, techniques within the current marsh footprint.	When current condition is low and vulnerability is high.	Thin layer deposition, ditch remediation, runneling, tide gates, dredge material removal.					✓		✓	
Traditional, well proven, techniques within the migration pathway that do not require slope modification.	When adaptation potential is high.	Removal of elevation barriers to migration, either close to the marsh edge or higher up in the watershed. Conversion of built, non-occupied, infrastructure in migration pathway to natural cover.	✓	✓					✓	✓
Experimental landscape modifications on either the seaward or upland side of the current marsh footprint.	When adaptation potential is low and current condition high.	Lower topology of the migration pathway. Removal of woody vegetation along ecotone. Living shoreline projects. Build hardened "toe" to extend marsh seaward. Use coir logs to promote sediment stabilization.			✓	✓				
Limit investment in restoration or adaptation projects as effectiveness will be short-term.	When all three resiliency categories (current condition, vulnerability, and adaptive potential) are negative.	Save your $!					✓			

Return to [Section 2.8](#)

Appendix E: Species of Greatest Conservation Need for Hampton Falls, NH

NH Fish and Game Department and NH Natural Heritage Bureau

DISCLAIMER:

This lists of Species of Greatest Conservation Need (SGCN) per Town represent potential occurrences of species based on known or predicted broad distributions of species within New Hampshire and are for information purposes only. They do not necessarily represent known occurrences and in some cases a species may not occur in a town even though it is listed. As such, users should evaluate whether potential habitat is present within the area of question to further assess potential of such species occurring. These species lists shall not be used for permitting purposes. For a permitting data check of known occurrences and/or a landowner data check of protected species, see: https://www.nh.gov/nhdfl/land-conservation/natural-heritage-bureau.htm

Not intended to be a substitute for required data check of NH Natural Heritage records for permit and grant applications.

https://www.nh.gov/nhdfl/land-conservation/natural-heritage-bureau.htm

Legend

E = Endangered

T = Threatened

SC = Special concern

Flags

**** = Highest importance

*** = Extremely high importance

** = Very high importance

* = High importance

~ = Historical Record

These flags are based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town. Please contact the Natural Heritage Bureau at (603) 271-2215 to learn more about approaches to setting priorities.

New Hampshire
Natural Heritage Bureau
DNCR - Division of Forests & Lands
172 Pembroke Road, Concord, NH 03301
(603) 271-2215

Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns

July 2020

NH Natural Heritage Bureau

NH Natural Heritage is a bureau in the Division of Forests & Lands. Our mission is to find, track, and facilitate the protection of New Hampshire's rare plants and exemplary natural communities. We currently study 686 plant and animal species, 197 natural communities, and 45 natural community systems. Our database contains information on more than 7,300 species, natural community, and system occurrences throughout the state.

Plants, Animals, and Natural Communities Tracked by the NH Natural Heritage Bureau

The following lists note the rare plants, rare animals, and exemplary natural communities and systems that the NH Natural Heritage Bureau has on record in each town. This document may not be used as a substitute for NH Natural Heritage Bureau reviews that are required by the Department of Environmental Services, Federal Energy Regulatory Commission, or any other local, state, or federal government agency. *A few species that are highly vulnerable to collection are not included in the town lists.* In addition, the list is dynamic: as new populations and natural communities are reported to our office, the list grows. Planners and interested residents should therefore contact the NH Natural Heritage Bureau directly if they need up-to-date information or have questions.

Rare Plant Species

The NH Natural Heritage Bureau tracks the state's rarest and most imperiled plant species. We have identified these species in cooperation with researchers, conservation organizations such as The Nature Conservancy, and knowledgeable amateur botanists. Population locations for these species are obtained from a variety of sources including herbarium specimens (some dating from the late 1800s), personal contacts, scientific literature, and extensive field research. The NH Natural Heritage Bureau undertakes surveys on private property only with landowner permission.

Rare Animal Species

The NH Natural Heritage Bureau tracks rare animal species in cooperation with the Nongame & Endangered Wildlife Program of the NH Fish & Game Department. The Nongame Program has identified these species in cooperation with researchers, conservation organizations such as the Audubon Society of New Hampshire, knowledgeable amateur biologists, and the NH Natural Heritage Bureau. Wildlife locations were obtained from sources including museum specimens, personal contacts, the scientific literature, and through extensive field research.

Exemplary Natural Communities

Natural communities are defined as assemblages of plants and animals that recur in predictable patterns across the landscape under similar physical conditions. Basically they are different types of habitats or ecosystems such as forests, wetlands, grasslands, etc. Most of the New Hampshire landscape is covered by relatively common natural community types. Scattered throughout the state, however, and usually in predictable areas, are distinctive communities found in few other places.

Particular sets of natural communities tend to co-occur in the landscape and are linked by a common set of driving forces (such as landforms, flooding, soils, and nutrient regime). These groups of communities are referred to as *natural community systems* (sometimes just referred to as *systems*). Systems are often at an appropriate scale for many applications, including mapping and predictive modeling, identifying wildlife and wildlife habitats, and conservation planning.

The NH Natural Heritage Bureau tracks "exemplary" natural community and system occurrences. To qualify as exemplary, a natural community or system in a given place must be of a rare type, such as a calcareous riverside seep, or must be a relatively undisturbed occurrence of a common community in good condition, such as an old-growth spruce - fir forest. Exemplary natural communities and systems represent the best remaining examples of New Hampshire's biological diversity.

For each plant, animal, exemplary natural community, and system within a town, we have provided the following information:

Name

Plants: Readers should remember that common names vary across the range of the plant. For example, "wild lupine" (*Lupinus perennis*) in New Hampshire is called "wild blue lupine" in New York and "sundial lupine" in other parts of its range; the name also commonly leads to confusion with garden lupine (*Lupinus polyphyllus*) which is not native to New Hampshire but grows wild in some areas. Scientific names are more standardized. The primary reference used for New Hampshire plants as of 2011 is:

> Haines, Arthur. 2011. New England Wild Flower Society's Flora Novae Angliae A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England. Yale University Press. New Haven and London.

Wildlife: Common names are provided for all species that have them. Many insect species, particularly moths, do not have common names, so general terms such as "A Noctuid Moth" are used or no name is given ("--"). Scientific names are standardized with the scientific names used by other Natural Heritage programs.

Natural Communities: The names of natural communities reflect the plants that help define them, such as a ***beech forest***, or the environmental processes that influence them, such as a ***boulder - cobble river channel***.

Listing

Plants: Most of New Hampshire's rare plants are listed as "threatened" or "endangered" under the NH Native Plant Protection Act of 1987 (NH RSA 217-A). A subset of species are also listed under the federal Endangered Species Act of 1973 (42 USCA ээ 4321-4370c). Listing represents a political recognition of rarity, so some species that are biologically rare (and therefore included in the list) may not be listed as "threatened" or "endangered." Under the NH Native Plant Protection Act, "endangered" species are those in danger of being extirpated from the state, while "threatened" species face the possibility of becoming "endangered."

The presence of a rare plant or natural community does not limit a landowner's ability to use their land – this is stated explicitly in the NH Native Plant Protection Act. Landowners applying for state wetland permits are required by the NH Department of Environmental Services to review options for achieving their land-use objectives while protecting a rare plant or natural community, but projects will not be denied solely on the basis of a rare plant occurrence. In our experience, rare plants are typically destroyed because landowners are not aware of them; minor changes to their projects usually could have saved the rarities. Our goal is to help landowners protect rarities on their properties *voluntarily*.

NH Natural Heritage Bureau

Wildlife: A portion of New Hampshire's rare animals are listed as "threatened" or "endangered" under the NH Endangered Species Conservation Act of 1979 (NH RSA 212-A). "Endangered" species are those in danger of being extirpated from the state, while "threatened" species face the possibility of becoming "endangered." A subset of these species are also listed under the federal Endangered Species Act of 1973. In New Hampshire, an additional "special concern" list contains (a) species that could become "threatened" in the foreseeable future if conservation actions are not taken or that were recently recovered enough to be removed from the endangered and threatened category and (b) species for which a large portion of their global or regional range (or population) occurs in New Hampshire and where actions to protect these species habitat will benefit the species' global population. Species that do not meet the criteria for "endangered", "threatened", or "special concern", but that are still biologically rare, as indicated by the State and Global Ranks, are also listed as rare in New Hampshire.

Rare wildlife in New Hampshire are under the jurisdiction of the Nongame and Endangered Wildlife Program in the NH Fish & Game Department.

Known Locations

We have noted the number of known occurrences of a given plant, animal, or natural community within each town. There has not been a comprehensive search of the state for rare species or natural communities, so we are frequently finding or learning about previously unknown populations and adding them to the list. Further, many rare plant and animal populations have not been checked since they were originally found, sometimes more than 50 years ago, so we do not know the current status of these populations. We have listed populations that have not been reported to us in the last 20 years as "historical only"; these populations may still be present, but field surveys are necessary to confirm their survival.

We have also included the number of known occurrences of each plant, animal, natural community, and system within the entire state. If no locations are indicated (- -), the species or natural community is known to have once occurred in the state, but specific sites are not in our database.

Flags

When considering rarity, it is important to consider the status of a species or natural community both in New Hampshire and across its entire range. Some species, such as Robbins' cinquefoil (*Potentilla robbinsiana*), are critically imperiled throughout their global range. Other species, such as green-dragon (*Arisaema dracontium*), are very rare in New Hampshire but quite common in other parts of their range.

A plant species is "globally rare" if it has fewer than 20 populations anywhere in the world, or if it has more populations but few reproducing individuals. "State rare" species are those that have few populations or total individuals in New Hampshire.

The rankings for wildlife are based more on the degree of imperilment than on the number of occurrences in the state, although abundance certainly plays a role in assessing a species' long-term viability in New Hampshire. Some species, such as the fish crow (*Corvus ossifragus*) have only a few occurrences in New Hampshire but, since they are expanding northward into the state, they are considered to be vulnerable but not imperiled. Blanding's turtles (*Emydoidea blandingii*), on the other hand, are distributed

NHNatural Heritage Bureau

A Quick Overview of the NH Natural Heritage Bureau's Purpose and Policies

The Natural Heritage Bureau is mandated by the Native Plant Protection Act of 1987 (NH RSA 217-A) to determine protective measures and requirements necessary for the survival of native plant species in the state, to investigate the condition and degree of rarity of plant species, and to distribute information regarding the condition and protection of these species and their habitats.

The Natural Heritage Bureau provides information to facilitate informed land-use decision-making. We are not a regulatory agency; instead, we work with landowners and land managers to help them protect the State's natural heritage and meet their land-use needs.

The Natural Heritage Bureau has three facets:

Inventory involves identifying new occurrences of sensitive species and classifying New Hampshire's biodiversity. We currently study more than 680 plant and animal species and 240 natural communities. Surveys for rarities on private lands are conducted only with landowner permission.

Tracking is the management of occurrence data. Our database currently contains information about more than 7,300 plant, animal, and natural community occurrences in New Hampshire.

Interpretation is the communication of Natural Heritage Bureau information. Our goal is to cooperate with public and private land managers to help them *protect* rare species populations and exemplary natural communities.

NH Natural Heritage Bureau

Town Flag	Species or Community Name	Listed? US	Listed? NH	~ reports last 20 yrs Town	~ reports last 20 yrs State
	Hampton Falls				
	Natural Communities - Estuarine				
~	*- Brackish marsh*	--	--	Historical	12
***	*- High salt marsh*	--	--	1	14
~	*- Intertidal flat*	--	--	Historical	5
~	*- Low salt marsh*	--	--	Historical	6
*	*- Salt marsh system*	--	--	1	6
	Plants				
~	blunt-leaved pondweed - *Potamogeton obtusifolius*	--	E	Historical	4
~	broad-winged sedge - *Carex alata*	--	E	Historical	2
~	bulbous bitter-cress - *Cardamine bulbosa*	--	E	Historical	5
~	climbing hempvine - *Mikania scandens*	--	E	Historical	11
~	crested sedge - *Carex cristatella*	--	E	Historical	12
~	dragon's-mouth - *Arethusa bulbosa*	--	E	Historical	24
~	drum-heads milkwort - *Polygala cruciata* ssp. *aquilonia*	--	E	Historical	3
~	dwarf glasswort - *Salicornia bigelovii*	--	E	Historical	7
~	Engelmann's quillwort - *Isoetes engelmannii*	--	E	Historical	15
~	field wormwood - *Artemisia campestris* ssp. *caudata*	--	E	Historical	4
~	great bur-reed - *Sparganium eurycarpum*	--	T	Historical	21
~	greater fringed-gentian - *Gentianopsis crinita*	--	T	Historical	30
~	hollow Joe-Pye weed - *Eutrochium fistulosum*	--	E	Historical	10
~	ivy-leaved duckweed - *Lemna trisulca*	--	E	Historical	6
~	large whorled pogonia - *Isotria verticillata*	--	E	Historical	4
~	northern tubercled bog-orchid - *Platanthera flava* var. *herbiola*	--	T	Historical	18
*	perennial glasswort - *Salicornia ambigua*	--	E	1	4
~	prolific yellow-flowered knotweed - *Polygonum ramosissimum* ssp. *prolificum*	--	E	Historical	11
**	saltmarsh agalinis - *Agalinis maritima* ssp. *maritima*	--	T	1	12
**	slender blue beardless-iris - *Limniris prismatica*	--	E	1	10
~	stout dotted smartweed - *Persicaria robustior*	--	E	Historical	6
~	upright knotweed - *Polygonum erectum*	--	E	Historical	3
~	yellow thistle - *Cirsium horridulum* var. *horridulum*	--	E	1	3
	Vertebrates - Birds				
**	Bald Eagle - *Haliaeetus leucocephalus*	T	SC	1	140
~	Common Tern - *Sterna hirundo*	--	T	Historical	9
***	Saltmarsh Sparrow - *Ammodramus caudacutus*	--	SC	1	8
**	Willet - *Catoptrophorus semipalmatus*	--	SC	1	8
	Vertebrates - Fish				
**	American Eel - *Anguilla rostrata*	--	SC	2	177
~	Banded Sunfish - *Enneacanthus obesus*	--	SC	Historical	32
**	Redfin Pickerel - *Esox americanus americanus*	--	SC	1	32

Listed? E = Endangered T = Threatened SC = Special concern

Flags
**** = Highest importance
*** = Extremely high importance
** = Very high importance
* = High importance
~ = Historical Record

These flags are based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town. Please contact the Natural Heritage Bureau at (603) 271-2215 to learn more about approaches to setting priorities.

July 2020

Return to Section 3.3.

Appendix F: Point Sources of Pollution in Hampton Falls

Above and underground storage tanks: The aboveground storage tank and underground storage tank layers identify the locations of registered above- and belowground storage tanks in NH. There are currently no aboveground storage tanks and 11 underground storage tanks in Hampton Falls. Ownership of these tanks ranges from commercial industries, gas stations, municipal facilities, and more.

Solid waste facilities: There are three solid waste facilities within the Town of Hampton Falls, two of which are unlined closed landfill no longer operating – the Hampton Falls Municipal Landfill on Parsonage Road and the Town Dump/Brush and Stump Dump, on the same property but with a listed address on Drinkwater Road. The third is the actively operating Hampton Falls Brush Dump on 11 Parsonage Road.

Hazardous waste sites: Hazardous waste-generating facilities are identified through the United States Environmental Protection Agency's (USEPA's) Resource Conservation and Recovery Act (RCRA), which the state must apply to such facilities through either federal or state regulation. Only 4 of the 13 listed hazardous waste sites in Hampton Falls are active. The rest are classified as inactive (8) or declassified (1).

Local potential contamination sources: Local potential contamination sources are sites that may represent a hazard to drinking water quality supplies due to the use, handling, or storage of hazardous substances. There may be overlap between local potential contamination sources and other PCS identified in this section. Following the procedure for "Performing an Inventory for Drinking Water" (NHDES Fact Sheet WD-DWGB 12-3), NHDES has identified 21 total potential contamination sources in Hampton Falls.

NPDES outfalls: No National Pollutant Discharge Elimination System outfalls discharge pollutants directly to a surface water within the Town of Hampton Falls.

Remediation sites: The 34 remediation sites present within the Town of Hampton Falls are sites that once consisted of leaking storage facilities that contain fuel or oil, sites with chlorinated solvents and other non-petroleum products, non-hazardous and non-sanitary holding tanks, initial spill response sites, historical dump sites, previously leaking residential or commercial oil tanks for heating or motor oil tanks, historic underground injection control of wastewaters not requiring a groundwater discharge permit, unlined wastewater lagoons, or a flagged groundwater sample for contamination but with no direct connection to a source of contamination. These sites are identified as remediation sites for the source of contamination has since been eliminated (although legacy effects from the contamination site may still be present).

Return to Section 2.4.3.

Appendix G: Community Engagement Events

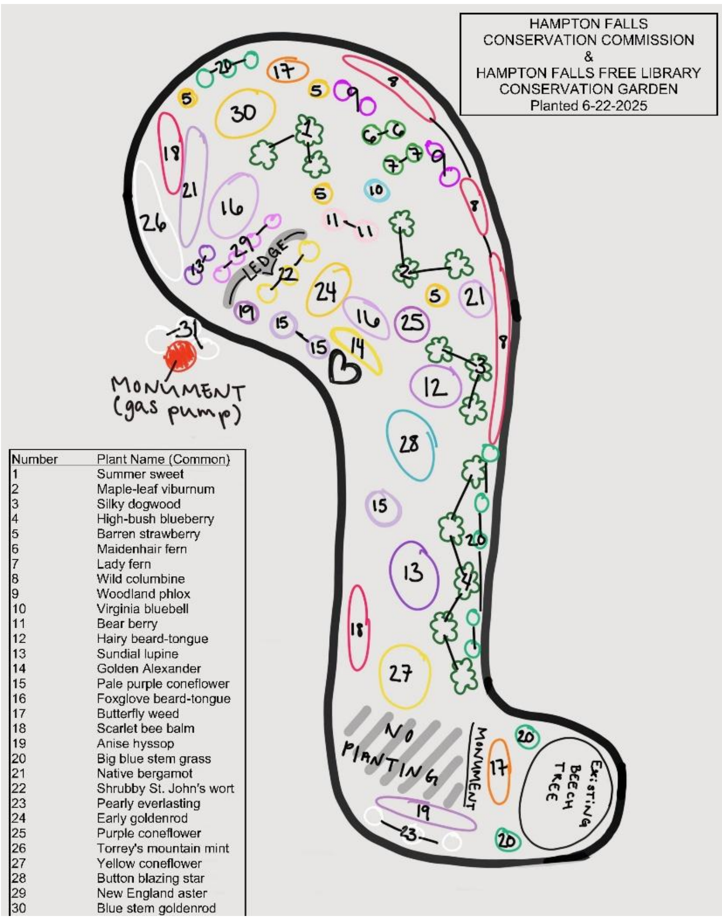
Community engagement is a vital component of the Natural Resources Inventory (NRI) process. It inspires a sense of environmental stewardship and fosters a deeper connection between residents and their local landscape. By involving the community, the NRI combines residents' perspective with spatial data and technical analysis to create a meaningful and informed understanding of the natural resources in Hampton Falls. To support this effort, the Hampton Falls Conservation Commission organized several outreach events focused on education, hands-on stewardship, and community collaboration:

- **Invasive Plant Removal at Depot Road** where Commission members and volunteers removed species such as oriental bittersweet, oriental honeysuckle, and glossy buckthorn. Participants manually removed roots, trimmed berries and flowers, and disposed of plants in accordance with NH DES guidelines (Invasive Plants Aquatic and Upland). Also see Methods for Disposing Non-native Invasive Plants (UNH) for more information.
- An **Invasive Plants Talk** was held at the Hampton Falls Free Library. This presentation by the Conservation Commission helped residents learn how to identify various invasive plant species, understand how they spread, and explore effective control and removal methods for use at home.
- A **DIY Wildlife Habitat Box Building** event focused on bluebirds, bats, and wood ducks. This project was done as a collaborative effort between the Conservation Commission and library as a Saturday morning craft event. Materials were supplied by the Conservation Commission for participants to build and take home, after learning about the wildlife species' habitat requirements, or donate to the Commission to install on conservation land.
- A **Photo & Writing Contest** to celebrate and showcase Hampton Falls' natural beauty. One entry per person was selected by the Commission and displayed at the Hampton Falls Free Library. In addition, selected submissions were incorporated into this NRI report, providing a community-driven perspective on the town's natural features.

Photo Credit: Shawn Hanson

Photo Credit: Sara McNamara-Gagnon

- A **Native Plant Conservation Garden** was installed as part of a broader library landscape project. The library prepared the garden space and installed mature plants while the Commission supplied young flowers, shrubs, ferns, and grasses. Volunteers assisted with planting, watering, and weeding the garden. The garden will include StoryWalk signs with educational content on native plants, pollinators, and wildlife habitat benefits.




Photos: Sara McNamara-Gagnon

- **Vernal Pool "Walk"** presentation as a supplement to the 2024 Vernal Pool Walk & Talk. The Commission produced a recorded presentation that includes photographs and videos of vernal pools to increase accessibility for those unable to visit active vernal pools. The presentation highlights vernal pool characteristics, obligate wildlife species, ecological importance, and current threats.