Natural Resources and Implementation Report for the Big River Management Area

Central Rhode Island

Prepared for

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TROUT UNLIMITED
Rhode Island Chapter 225

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CONTENTS

Page

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF EXHIBITS

LIST OF APPENDIXES

LIST OF ACRONYMS AND ABBREVIATIONS

AOP	Aquatic Organism Passage
ATV	All-terrain vehicle
BRMA	Big River Management Area
cm	centimeters
°F	degrees Fahrenheit
EA	EA Engineering, Science, and Technology, Inc., PBC
EPA	U.S. Environmental Protection Agency
ft	foot (feet)
HUC	Hydrologic Unit Code
IPaC	Information for Planning and Consultation
NAACC	North Atlantic Aquatic Connectivity Collaborative
NLEB	Northern long-eared bat
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
RIDEM	Rhode Island Department of Environmental Management
RIDOT	Rhode Island Department of Transportation
RIGIS	Rhode Island Geographic Information System
RINHS	Rhode Island Natural History Survey
RITU	Rhode Island Chapter of Trout Unlimited
RIWAP	Rhode Island Wildlife Action Plan
RIWRB	Rhode Island Water Resources Board
SGCN	Species of greatest conservation need
TNC	The Nature Conservancy
TU	Trout Unlimited
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
YOY	Young-of-year

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1. INTRODUCTION

1.1 INTRODUCTION AND PURPOSE

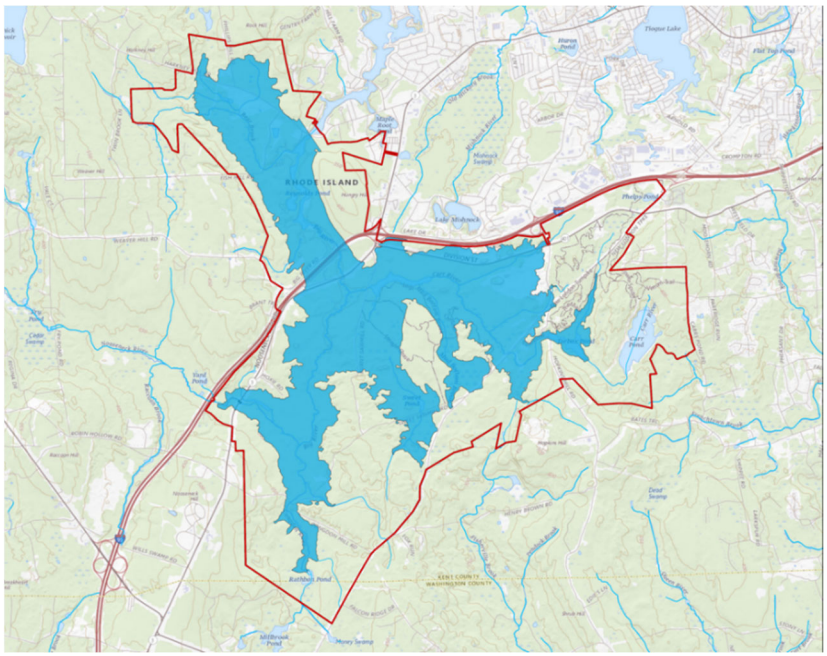
This Natural Resources and Implementation Report has been developed by EA Engineering, Science, and Technology, Inc., PBC (EA) for the Rhode Island Chapter of Trout Unlimited (RITU) to provide baseline environmental information on the Big River Management Area (BRMA) and to identify implementation projects within the BRMA.

The goal of this project was to assist RITU, and its partner the Rhode Island Water Resources Board (RIWRB), in collecting information on brook trout (*Salvelinus fontinalis*) populations and habitat in the BRMA, and to identify ways to preserve and enhance the species' habitat.

This report details the findings of the desktop natural resources assessment and field data collection efforts, provides an analysis of the field data, and outlines implementation actions that RITU and the RIWRB may complete in the future. Based on the desktop and field data, EA has determined specific implementation actions within the BRMA that will help preserve, restore, or enhance long-term persistence of native brook trout within the aquatic systems of the BRMA.

1.2 SITE DESCRIPTION AND BACKGROUND

The BRMA spans 8,400 acres across central Rhode Island (Coventry, Exeter, East Greenwich, and West Greenwich). The property contains four main rivers - Big River, Nooseneck River, Congdon River, and Carr River. and over 30 miles of mapped streams (see Figures 1 and 2). The area is owned by the State of Rhode Island and managed by RIWRB in partnership with the Division of Capital Asset Management & Maintenance, and the Rhode Island Department of Environmental Management (RIDEM). The concept of the Big River Reservoir was initiated in 1928 and included flooding a portion of the present day BRMA (south of Interstate 95) and creating a drinking water reservoir to secure a drinking water source for current and future needs of the State of Rhode Island. In 1964, the General Assembly, under the Big River-Wood River Acquisition Act, established a referendum for a bond to acquire the property. Under the powers of eminent domain, the State began acquiring properties in 1965. Due to opposition to the reservoir by the federal government, the U.S. Environmental Protection Agency (EPA), and environmental



Conceptual area in the BRMA originally proposed for a drinking water reservoir based on recent Lidar data and the original planned pool elevation.

organizations, who cited the current need for drinking water did not outweigh the significant environmental impacts, the state placed the project on indefinite hold in 1990. In 1993, the General Assembly prohibited development and designated the property as "open space" until needed to serve as a future drinking water supply. A 1996 BRMA land use study established specific guidelines for uses that will not impact future water supply including wildlife management, sustainable forestry, historic preservation, environmental education, and passive recreation (RIWRB 1996). Currently, apart from several remaining commercial, residential, and recreational leases, and several roads that cross the area, the land is undeveloped and continues to be managed as open space as defined in statute and regulation (490-RICR-00-00-5).

Over time the area has become increasingly popular for hiking, hunting, and mountain biking. Users have published maps and created trails and stream crossings. Prohibited activities such as ATVs and other off-road vehicles, as well as camping and open fires, are increasing. Illegal dumping is an ongoing issue that threatens to undermine the area's future use as a water supply. The size of the area, its openness, the potential for use conflicts, concerns about public safety, and the continuing need to ensure that the level and types of uses do not undermine the ability of the area to support a clean drinking water source support the need for a comprehensive management plan. Though not slated for immediate development of a drinking water reservoir, the area remains an invaluable water resource as a future drinking water source.

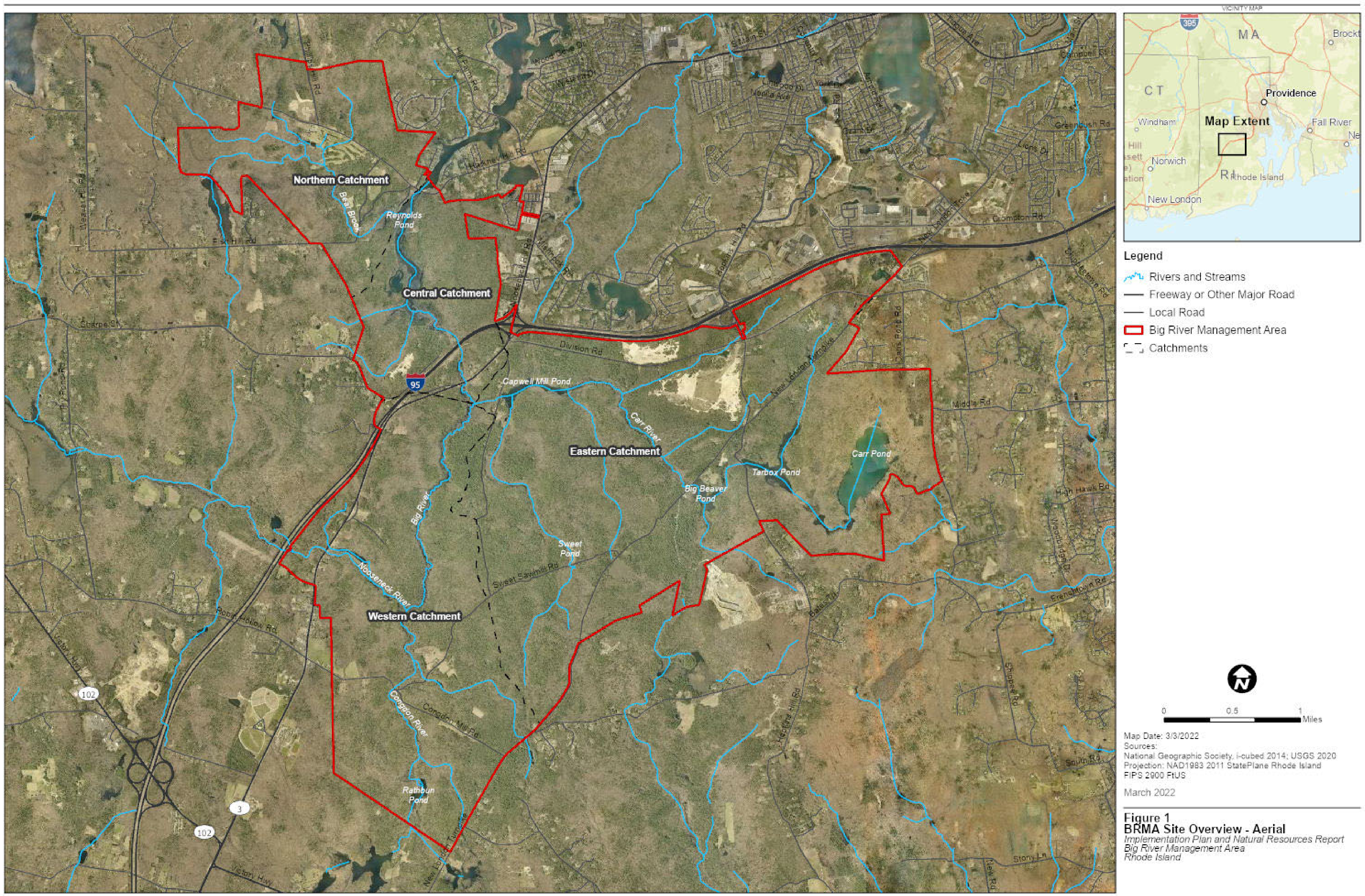


Figure 1
BRMA Site Overview - Aerial
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Big River Management Area
Rhode Island

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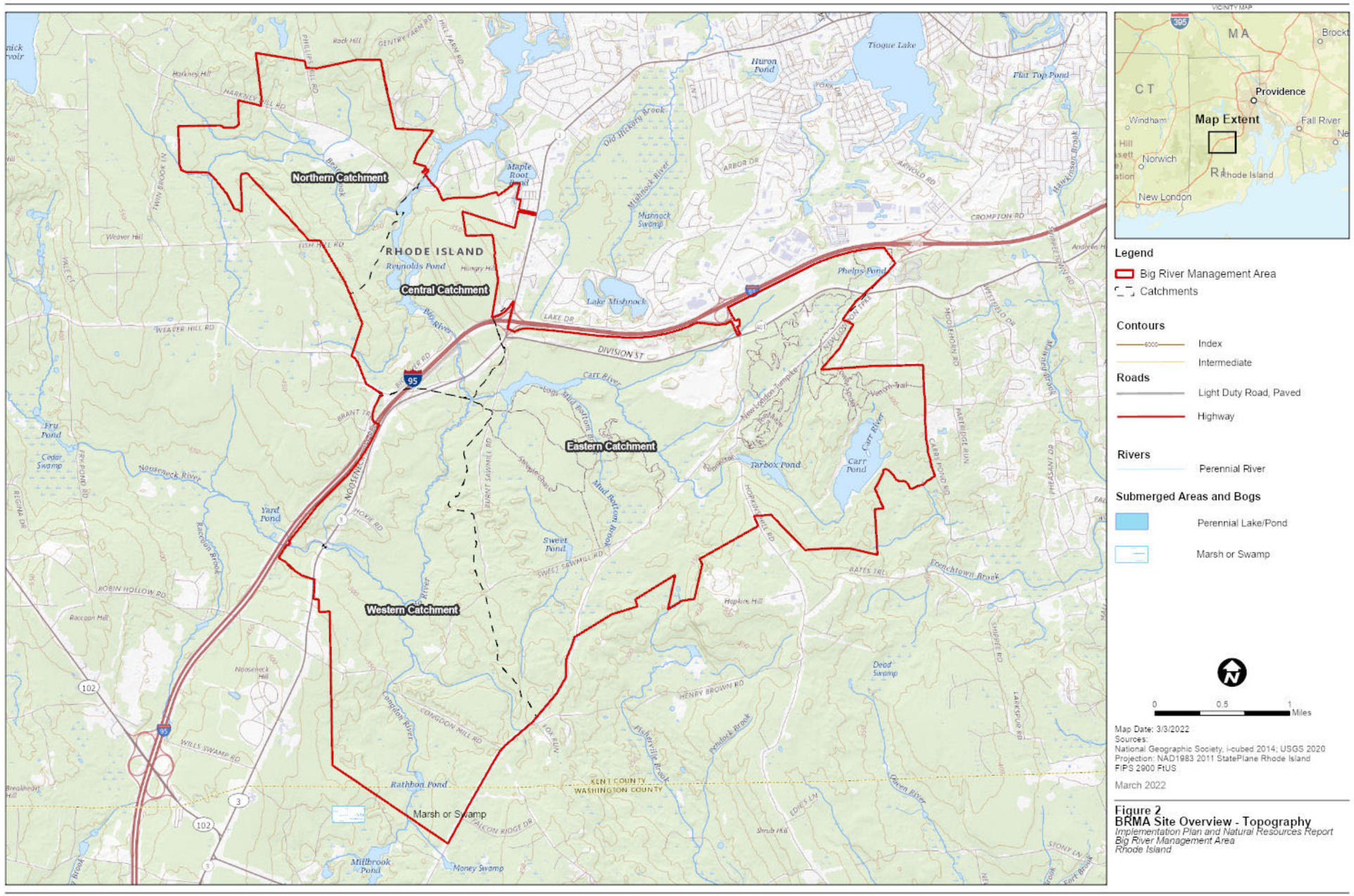

Figure 2
BRMA Site Overview - Topography
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Rhode Island

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2. EXISTING CONDITIONS

The Existing Conditions section of this report provides an overview of various natural resources within the BRMA. Information was compiled from a variety of publicly available sources and historical reports on BRMA. An overview of the soils, geology, topography, climate, and water resources of the BRMA is provided. The overall ecology of the area is discussed, including information on vegetation, fish, wildlife, and the general ecosystem. Additionally, because of the popularity of the BRMA, EA covered its various recreational uses and general human activity in the BRMA.

2.1 SOILS

Soil information was obtained from U.S. Department of Agriculture (USDA) National Resource Conservation Service (NRCS) Web Soil Survey data and from historical reports on the BRMA. Soil types that are found in the BRMA are depicted on Figure 3a and listed in Table A1, which is included in Appendix A. The Soil Map and Soil Resource Report for this project is also included in Appendix A. The BRMA includes a wide variety of soil types and is comprised mostly of sandy and silt loams, stony soils, and till substratum (USDA NRCS 2021). A 2012 U.S. Geological Society (USGS) study collected soil samples from the wetland areas within the BRMA to determine the effect groundwater withdrawal would have on soil subsidence in the wetlands. Soils in the wetlands were found to have high water contents and contained organic material, which are more prone to subsidence (Borenstein et al. 2012).

2.2 GEOLOGY

Bedrock geology in the hilly upland areas of BRMA is comprised primarily of granite from the Devonian period with some patches of schist, quartzite, and greenstone (see Figure 4). Bedrock in areas of lower elevations is comprised of conglomerate rocks, sandstone, and shale from the Carboniferous age. Previous studies in the BRMA have determined that groundwater is present in fractures in the granitic bedrock, which exhibits low primary porosity (Stone and Dickerman 2002). Surficial geology is a mix of till and outwash (meltwater) deposits from the last glacial period approximately 20,000 years ago. These deposits vary in thickness throughout the BRMA and are generally unconsolidated and made up of boulders, pebbles, gravels, sands, silts, and clays (U.S. Army Corps of Engineers 1981). The outwash deposits and the overlying network of rivers, streams, lakes, ponds, and wetlands account for the major stream-aquifer system in the BRMA (Stone and Dickerman 2002).

2.3 TOPOGRAPHY

The BRMA is located in the seaboard lowland section of Rhode Island consisting of gentle rounded hills. The topography within the BRMA is generally flat with rolling hills and valleys trending north to northwest, with average elevations less than 400 feet (ft) above sea level (see Figure 2). The lowest elevation in the BRMA is located along Big River at Harkney Hill Road. Topography influences the drainage patterns of a watershed. For this project, the BRMA was divided into four catchments (Northern, Central, Eastern, Western) based on RIDEM sub-watershed of RI

hydrologic unit code (HUC) 12 Watershed Boundary Delineations as obtained from the RIDEM online Environmental Resource Mapper (see Figures 1 and 2).

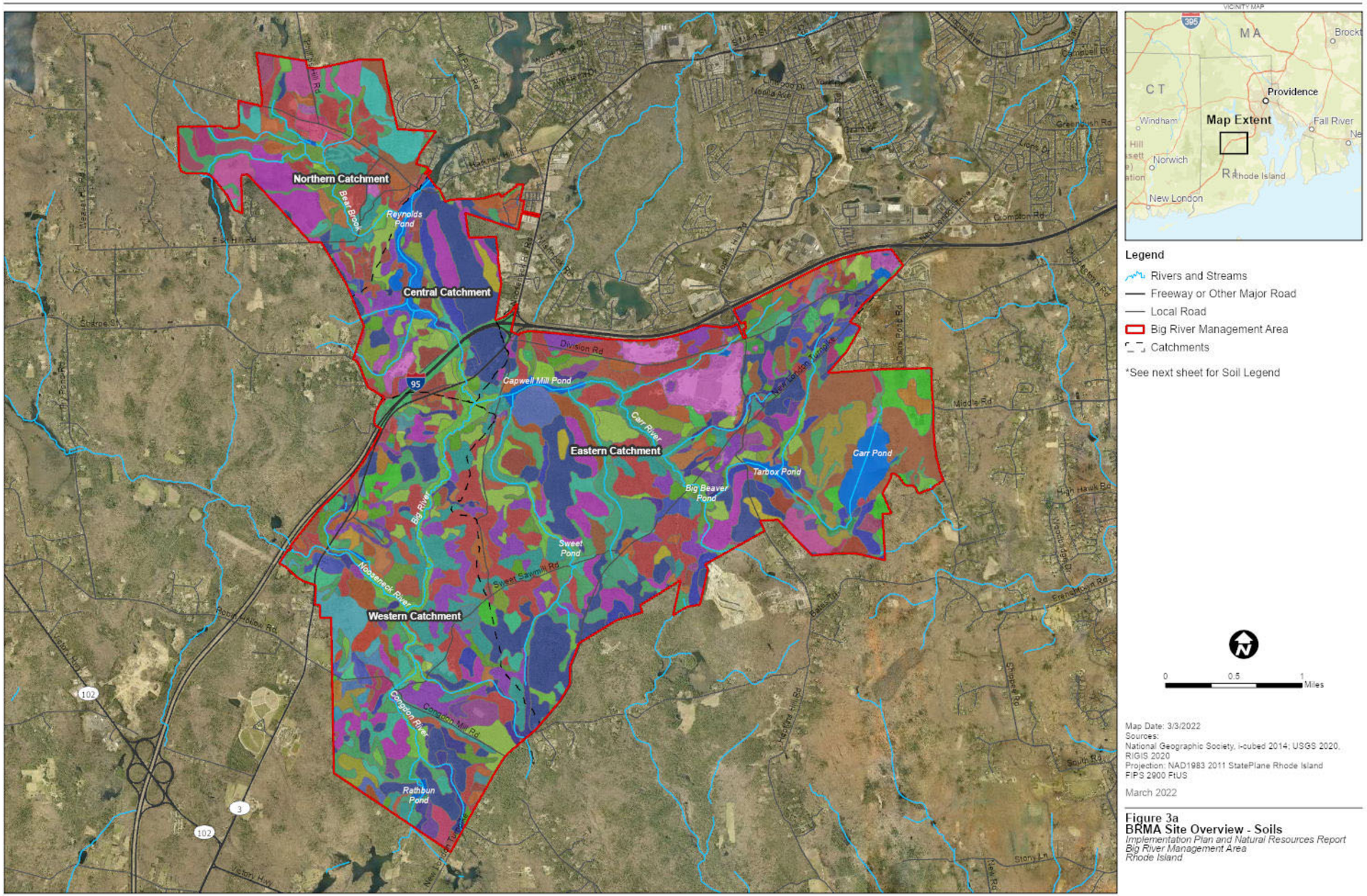

Figure 3a
BRMA Site Overview - Soils
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Rhode Island

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NRCS Soils

- Agawam fine sandy loam, 0 to 3 % slopes
- Agawam fine sandy loam, 3 to 8 % slopes
- Bridgehampton silt loam, 0 to 3 % slopes
- Bridgehampton silt loam, 3 to 8 % slopes
- Bridgehampton silt loam, till Substratum, 0 to 3 % slopes
- Bridgehampton silt loam, till Substratum, 3 to 8 % slopes
- Bridgehampton-Charlton complex, extremely stony, 3 to 15 % slopes
- Bridgehampton-Charlton complex, very stony, 0 to 8 % slopes
- Bridgehampton-Charlton complex, very stony, 8 to 15 % slopes
- Broadbrook very stony silt loam, 0 to 8 % slopes
- Canton And Charlton extremely stony fine sandy loams, 3 to 15 % slopes
- Canton And Charlton fine sandy loams, 0 to 3 % slopes
- Canton And Charlton fine sandy loams, 3 to 8 % slopes
- Canton And Charlton fine sandy loams, very rocky, 3 to 15 % slopes
- Canton And Charlton very stony fine sandy loams, 15 to 25 % slopes
- Canton And Charlton very stony fine sandy loams, 3 to 8 % slopes
- Canton And Charlton very stony fine sandy loams, 8 to 15 % slopes
- Canton-Charlton-Rock outcrop complex, 15 to 35 % slopes
- Canton-Charlton-Rock outcrop complex, 3 to 15 % slopes
- Deerfield loamy fine Sand
- Enfield silt loam, 0 to 3 % slopes
- Enfield silt loam, 3 to 8 % slopes
- Freetown, mucky peat, 0 to 2 % slopes
- Gloucester-Hinckley very stony sandy loams, hilly
- Gloucester-Hinckley very stony sandy loams, rolling
- Hinckley gravelly sandy loam, 0 to 3 % slopes
- Hinckley gravelly sandy loam, hilly
- Hinckley gravelly sandy loam, rolling
- Hinckley-Enfield complex, rolling
- Lippitt gravelly sandy loam, very rocky, 3 to 15 % slopes
- Merrimac sandy loam, 0 to 3 % slopes
- Merrimac sandy loam, 3 to 8 % slopes
- Narragansett extremely stony silt loam, 3 to 15 % slopes
- Narragansett silt loam, 0 to 3 % slopes
- Narragansett very stony silt loam, 0 to 8 % slopes
- Narragansett very stony silt loam, 8 to 15 % slopes
- Ninigret fine sandy loam
- Paxton fine sandy loam, 0 to 3 % slopes
- Paxton very stony fine sandy loam, 0 to 8 % slopes
- Paxton very stony fine sandy loam, 8 to 15 % slopes
- Pits, gravel
- Rainbow very stony silt loam, 0 to 8 % slopes
- Raypol silt loam
- Ridgebury, Whitman, And Leicester extremely stony fine sandy loams
- Rock outcrop-Canton complex
- Scarboro mucky sandy loam
- Sudbury sandy loam
- Sutton extremely stony fine sandy loam, 0 to 8 % slopes
- Sutton fine sandy loam, 0 to 3 % slopes
- Sutton fine sandy loam, 3 to 8 % slopes
- Sutton very stony fine sandy loam, 0 to 8 % slopes
- Swansea mucky peat, 0 to 2 percent slopes
- Tisbury silt loam
- Udorthents-Urban land complex
- Walpole sandy loam
- Wapping extremely stony silt loam, 0 to 8 % slopes
- Wapping very stony silt loam, 0 to 8 % slopes
- Water
- Windsor loamy sand, 0 to 3 % slopes
- Windsor loamy sand, 3 to 8 % slopes
- Woodbridge extremely stony fine sandy loam, 0 to 8 % slopes
- Woodbridge fine sandy loam, 0 to 3 % slopes
- Woodbridge fine sandy loam, 3 to 8 % slopes
- Woodbridge very stony fine sandy loam, 0 to 8 % slopes

Map Date: 3/3/2022

March 2022

Figure 3b
BRMA Site Overview - Soils Legend
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Rhode Island

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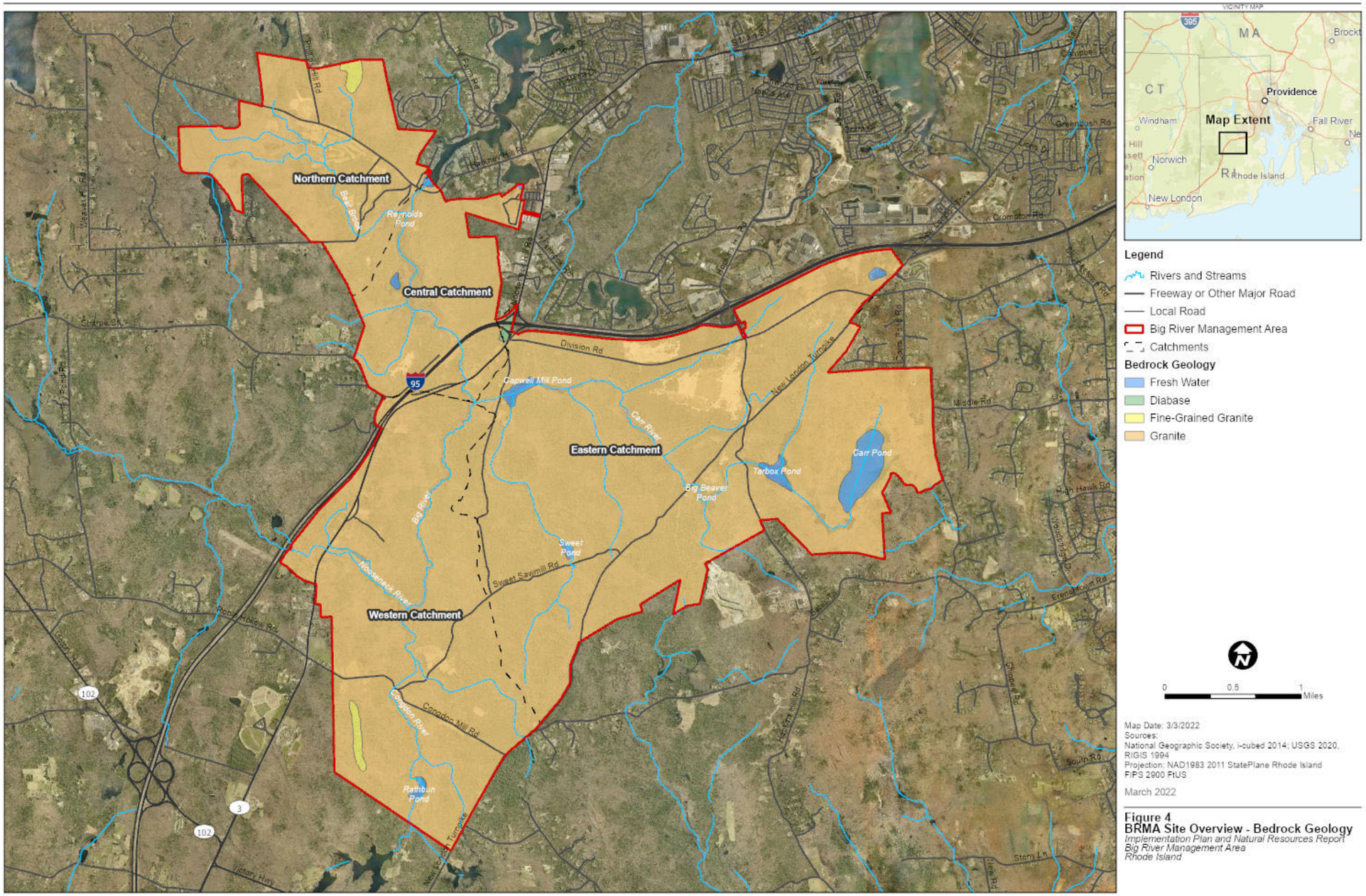

Figure 4
BRMA Site Overview - Bedrock Geology
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Rhode Island

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2.4 CLIMATE

Rhode Island is influenced by wet, dry, hot, and cold airstreams, causing daily weather to be highly variable. Average annual precipitation is approximately 42-46 inches a year and is well distributed throughout the year (RIDEM 2022a). The average annual temperature is 48 degrees Fahrenheit (°F), with warmest temperatures in July and coldest in January and February (RIDEM 2022a). Rhode Island is subject to coastal storms traveling up the Atlantic coast, with the most severe storms usually occurring during late summer and early fall. The state is also subject to cyclonic storms that move into New England from the north or southwest (U.S. Army Corp of Engineers 1981).

2.4.1 Climate Change

Both coastal and inland areas of Rhode Island are susceptible to impacts from climate change, including changes to weather patterns and disruptions to environmental conditions. Some impacts that the northeast is anticipated to experience include warmer air temperatures, increased precipitation, and higher intensity and more frequent flooding. The state's Climate Action Plan "Resilient Rhody" indicates that coldwater streams, freshwater marshes, and vernal pools are among the inland resources are most vulnerable to climate change (State of Rhode Island 2018). The changing climate is also anticipated to impact forests and tree health, which provide essential sources of shade for various habitats, including coldwater streams in the BRMA. In addition, the Rhode Island Water Quality Management Plan states that increases in air temperatures caused by climate changes are expected to lead to the decline in coldwater streams habitats for species such as brook trout (Rhode Island Division of Planning 2016).

Furthermore, the Rhode Island Wildlife Action Plan (RIWAP) suggests that "species and populations likely to have greater vulnerabilities to climate change include those with highly specialized habitat requirements, native species already near temperature limits or having other narrow environmental tolerances, currently isolated, rare, or declining populations with poor dispersal abilities, and groups especially sensitive to pathogens" (RIDEM 2015). Many of these characteristics apply to brook trout, which the RIWAP identifies as a species of greatest conservation need. Many of the streams in Rhode Island already exceed brook trout's preferred temperature thresholds, which makes habitats that are cold enough to sustain current book trout populations especially crucial and vulnerable to the impacts from climate change.

2.5 WATER RESOURCES

The BRMA's original (and current) primary purpose is to serve as a future water supply for the State of Rhode Island. What once was home to several hundred single-family properties, has become the largest contiguous publicly owned open space area in Rhode Island. Although the BRMA now attracts the public for recreational purposes, its main purpose remains as a water source for the state (RIWRB 2021). The BRMA aquifer is a unique water resource, instrumental to providing water to the State, and the State will continue to not only protect the aquifer, but also the habitat of the BRMA as a whole (RIWRB 1997).

2.5.1 Waters of the United States / Surface Water

Within the BRMA there are six main ponds, one impoundment created by a beaver dam, four main rivers, and several unnamed tributaries (see Figure 5). The impoundment is not officially mapped as an impoundment but has been a distinct body of water in the BRMA since the late 1990s; for the purposes of this study, it is referred to as Big Beaver Pond. In total, there are approximately 238 acres of ponds and 30 miles of rivers and streams in the BRMA. All of these waterbodies are considered Waters of the United States and are regulated under the Clean Water Act (EPA 2022).

Table 2-1. Ponds in the BRMA

Pond	Size (acres)
Tarbox Pond	22
Carr Pond	90
Capwell Mill Pond	24
Reynold's Pond	68
Sweet Pond	5.2
Rathbun Pond	5.4
Big Beaver Pond (impoundment)	23.3

Table 2-2. Rivers and Streams in the BRMA

River	Length (miles)
Big River	4.3
Carr River	4.7
Nooseneck River	1.2
Congdon River	2.1
Bear Brook	1.6
Unnamed Tributaries	16.2

2.5.2 Wetlands

Wetland communities are present throughout the BRMA. Wetlands depicted on Figure 5 and listed in Table 2-3 were mapped using the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data available on the Rhode Island Geographic Information System (RIGIS) website (RIGIS 2016a). Wetlands provide valuable services both for the ecosystem and for humans. Wetlands improve groundwater quality by filtering out sediment and removing pollutants from surface water before entering the ground or nearby rivers/streams. Thus, wetlands play a vital role in establishing clean drinking water and clean river habitats for brook trout and other species. As such, the State of Rhode Island has a vested interest in protecting and preserving existing wetlands in the BRMA. The BRMA Land Use Plan identified allowable uses including activities such as fishing, supervised educational opportunities, interim habitat maintenance, and recreational canoeing on its wetlands (RIWRB 1996). Many of these uses are daily occurrences in the BRMA, especially throughout the summer. In addition, uses have expanded well beyond the perceived uses identified in the BRMA Land Use Plan in 1996, as outdoor recreational enthusiasts throughout Rhode Island have sought out areas where they can enjoy the outdoors. Some of the illegal activities commonly occurring in or adjacent to wetlands include swimming, camping, ATV/RTV usage which can disrupt or damage wetland values or their ability to function.

Table 2-3. Wetland Communities in the BRMA

Wetlands Type	Description	Acres in BRMA
Freshwater forested/shrub	Woody wetlands, forested swamp, shrub bog. Occur only in the palustrine and estuarine systems.	633.2
Freshwater emergent	Herbaceous marsh, fen, swale, or wet meadow. Characterized by erect, rooted, herbaceous hydrophytes. Usually dominated by perennial plants.	15.5
Freshwater pond	Pond.	43.1
Total		691.8

2.5.3 Groundwater and Wells

Although the BRMA is not currently used as a public water supply area, the RIWRB is responsible for protecting the area as a potential major future source of drinking water for the state of Rhode Island as water demands grow. Because of the area's future intended use as a water source, several scientific studies have been conducted on the groundwater supply and the effects of groundwater withdrawal in the BRMA. These studies have found that the surficial aquifer in the BRMA is hydraulically connected to the streams, ponds, and wetlands (Armstrong et al. 2015). The surficial aquifer, which varies in thickness throughout the BRMA, is recharged by precipitation, natural stream leakage, groundwater inflow from uplands, septic-system discharge (Granato et al. 2013). Currently the Kent County Water Authority owns and operates two water-supply wells adjacent to the BRMA, which are located northwest of Lake Mishnock (Granato et al. 2013). These two wells are the only large-scale groundwater withdrawals in the BRMA. Most of the homes and businesses in the BRMA have private water wells which do not result in significant withdrawal (Armstrong et al. 2015).

A 2001 study analyzed groundwater and surface water samples from throughout the BRMA for water-quality (Craft 2001). Specific conductance, which is a direct measure of dissolved solids in water, was the primary parameter used to evaluate the water quality. Data collected between 1996 and 1998 showed that groundwater quality in the BRMA was generally clean and unaffected by anthropogenic contaminants. Surface water data showed that water quality in the Big River and Carr River were less affected by anthropogenic influences than water in the Nooseneck River and Mishnock River further north (Craft 2001; Granato et al. 2013).

2.5.4 Water Quality

The State of Rhode Island 2018-2020 Impaired Waters Report lists Tarbox Pond and Reynolds Pond in the BRMA as Category 4C impaired waters. Category 4C waters have impairments not caused by a pollutant and therefore do not require development of a Total Maximum Daily Load. The cause of impairment for both water bodies is listed as non-native aquatic plants (RIDEM 2021).

The presence of brook trout is also often used as a water quality indicator, as brook trout require clean cold water to survive. Brook trout are present in several of the rivers and streams in the BRMA, indicating healthy water quality in these locations.

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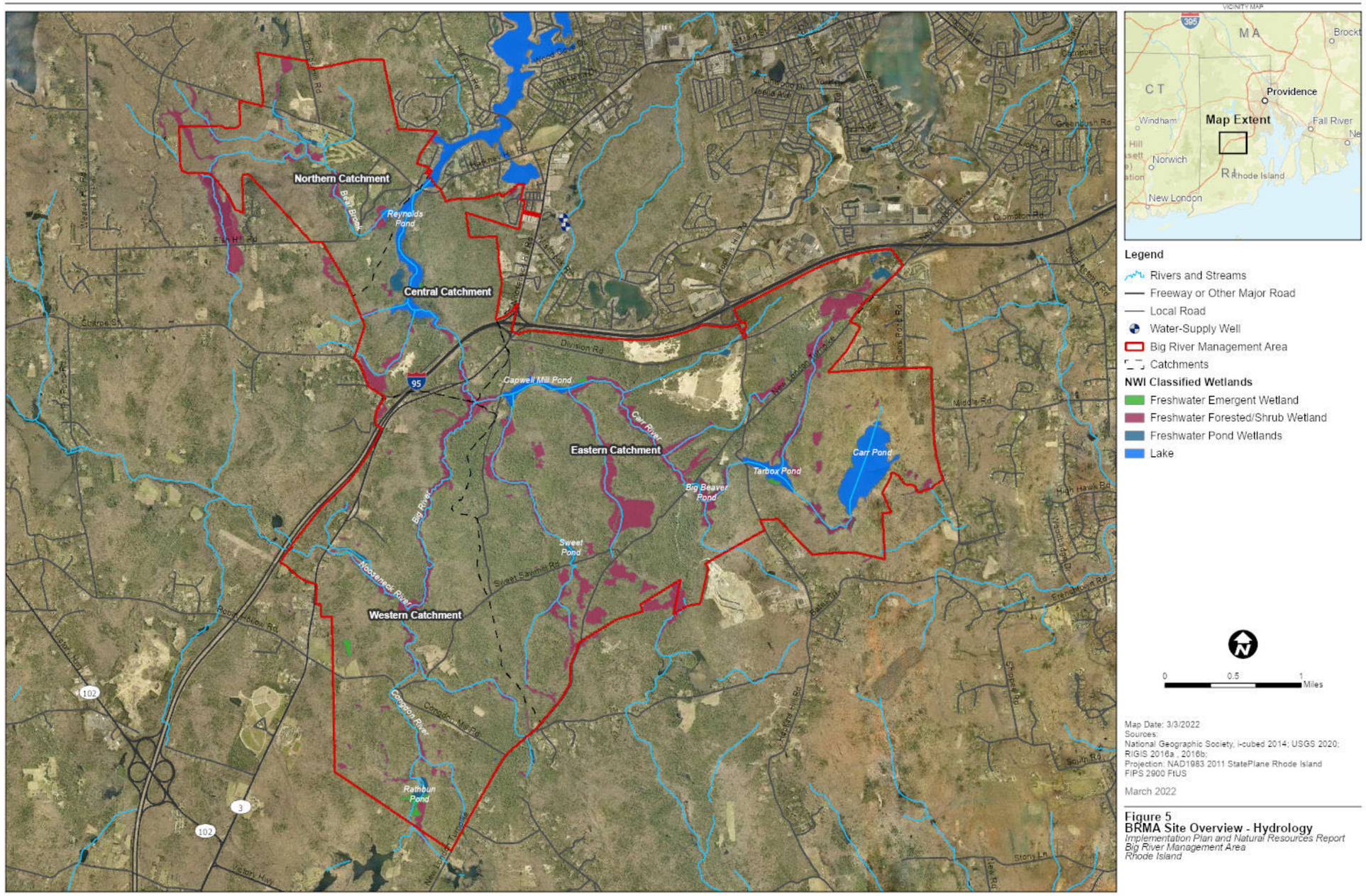

Figure 5
BRMA Site Overview - Hydrology
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Rhode Island

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2.6 TERRESTRIAL VEGETATION

2.6.1 Dominant Vegetation Communities

The natural land cover of the BRMA consists mostly of forests, soft woodlands, wetlands, and meadows. Land cover data from RIGIS indicates a variety of vegetation communities within the BRMA, shown on Figure 6 and listed in Table 2-4. Land use data was published by RIDEM and is based on orthophotography acquired during the spring of 2011.

The Rhode Island Land Use Land Cover data indicates that approximately 90 percent (%) of the BRMA is classified as forested (softwood forest, mixed forest, or deciduous forest) and only approximately 1% of the BRMA is classified as developed land.

Table 2-4. Land Cover in the BRMA

Land Cover Type	Acres in BRMA
Brushland (shrub and brush areas, reforestation)	47.2
Cropland (tillable)	32.9
Deciduous Forest (>80% hardwood)	765.2
Developed Recreation (all recreation)	67.7
Idle Agriculture (abandoned fields and orchards)	5.1
Mines, Quarries, and Gravel Pits	108.5
Mixed Barren Areas	5.1
Mixed Forest	2,855.3
Pasture (agricultural not suitable for tillage)	90.3
Sandy Areas (not beaches)	2.8
Softwood Forest (>80% softwood)	3,772.7
Transitional Areas (urban open)	11.5
Vacant Land	63
Water	238
Water and Sewage Treatment	1.1
Wetlands*	691.8
Developed	109
*Wetlands acreage obtained from NWI.	

The BRMA includes unique habitats such as Atlantic white cedar swamps and pitch pine/scrub oak barrens (Armstrong et al. 2015). The most common trees of Rhode Island are the Eastern white pine (*Pinus strobus*), red maple (*Acer rubrum*), and various oak trees. The large amount of forested land in the BRMA provides important sources of shade that keep rivers and streams cool.

Common wetland plants in Rhode Island are the blue flag iris (*Iris versicolor*), cardinal flower (*Lobelia cardinalis*), cattails (*Typha* spp.), jack in the pulpit (*Arisaema triphyllum*), pitcher plants, skunk cabbage (*Symplocarpus foetidus*), trillium (*Melanthiaceae*), white water lily (*Nymphea odorata*), woolgrass (*Scirpus cyperinus*), and boneset (*Eupatorium perfoliatum*) (RIDEM 2022b). Common non-wetland plants include pink lady's slipper (*Cypripedium acaule*), striped wintergreen (*Chimaphila maculata*), ghost pipes (*Monotropa uniflora*), partridge berry (*Mitchella repens*), and the common yarrow (*Achillea millefolium*) (RIDEM 2022b).

The Eastern white pine is the most observed tree in the BRMA on iNaturalist, which is a nonprofit citizen science website that maintains a record of citizens recorded observations of plant and animal species (iNaturalist 2021). The most common observation in the BRMA is the pink lady's slipper (iNaturalist 2021). However, this does not mean that these are the most prevalent species in the area.

2.6.2 Special Status Plant Species

A USFWS Information for Planning and Consultation (IPaC) report was generated for the BRMA (see Appendix B). The IPaC report identifies federally protected plant and animal species that have the potential to be present in an area. The report identified one federally threatened endangered plant species in the BRMA, the small whorled pogonia (*Isotria medeoloides*) (USFWS 2021).

The small whorled pogonia is a member of the orchid family that has a historical range throughout the East coast and into the Midwest. The small whorled pogonia is a rare species that was listed as endangered in 1982 (USFWS 1992). Despite its rarity, its historic distribution is vast, and botanists have been known to travel for miles to observe the flower. The plant generally lives in heavily forested areas with hardwood trees (NatureServe 2021).

The Rhode Island Natural History Survey (RINHS) developed a map of Natural Heritage Areas across Rhode Island, depicted on Figure 7. Natural heritage areas are locations that have occurrences of heritage data elements, including observations of state or federally listed rare or threatened animal and plant species (RINHS 2019). Natural Heritage rare plant species that have been observed in the BRMA include: acidic graminoid fen, bigseed alfalfa dodder (*Cuscuta indecora*), blunt-leaved or clasping milkweed (*Asclepias amplexicaulis*), Collin's sedge (*Carex collinsii*), common oak fern (*Gymnocarpium dryopteris*), common yellow flax (*Linum medium*), goat's rue (*Tephrosia virginiana*), greater poverty rush (*Juncus anthelatus*), long or northern beech-fern (*Phegopteris connectilis*), pitch pine - scrub oak barrens, pink tickseed (*Coreopsis rosea*), sand-cherry (*Prunus pumila*), sickle-leaved or falcate golden aster (*Pityopsis falcata*), slimspike three-awn (*Aristida longespica*), spring ladies'-tresses (*Spiranthes vernalis*), tooth-cup (*Rotala ramosior*), variegated horsetail (*Equisetum variegatum*), wild lupine (*Lupinus perennis*), wild rice (*Zizania aquatica*), and winged screwstem (*Bartonia paniculata*) (RIDEM 2022c). There are approximately 4,050 acres of natural heritage areas in the BRMA.

2.6.3 Noxious Weeds and Invasive Plant Species

The Rhode Island Forest Health Works Project, a partnership between the RINHS and RIDEM, surveyed and mapped invasive plants across Rhode Island. Figure 7 depicts invasive plant distribution in core forested areas. Several invasive plant communities exist within the BRMA, particularly in the western and eastern parts of the BRMA. Invasive plant species that have been observed in the BRMA include: multiflora rosa (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*), autumn olive (*Elaeagnus umbellata*), oriental bittersweet (*Celastrus orbiculatus*), common barberry (*Berberis vulgaris*), Morrow's honeysuckle (*Lonicera morrowii*), glossy buckthorn (*Frangula alnus*), and burningbush (*Euonymus alatus*).

2.6.4 Riparian Areas

Riparian areas exist in transitional areas between uplands and watercourses. They are an important component of healthy watersheds and ecological function and provide critical habitat for wildlife. Riparian areas help filter pollutants such as nutrients and sediment from entering waterbodies and also help prevent bank erosion. Most importantly for the BRMA, vegetation in the riparian corridor provides shades, which lowers water temperatures and benefits the coldwater fisheries. There are an estimated 147 acres of riparian areas within the BRMA based on the buffer "method" commonly used by NWI, which uses an approximately 20 ft buffer on either side of each stream course. Based on aerial analysis, it was determined that 75% of the riparian buffer zone is forested and the remaining 25% is open space or ponded.

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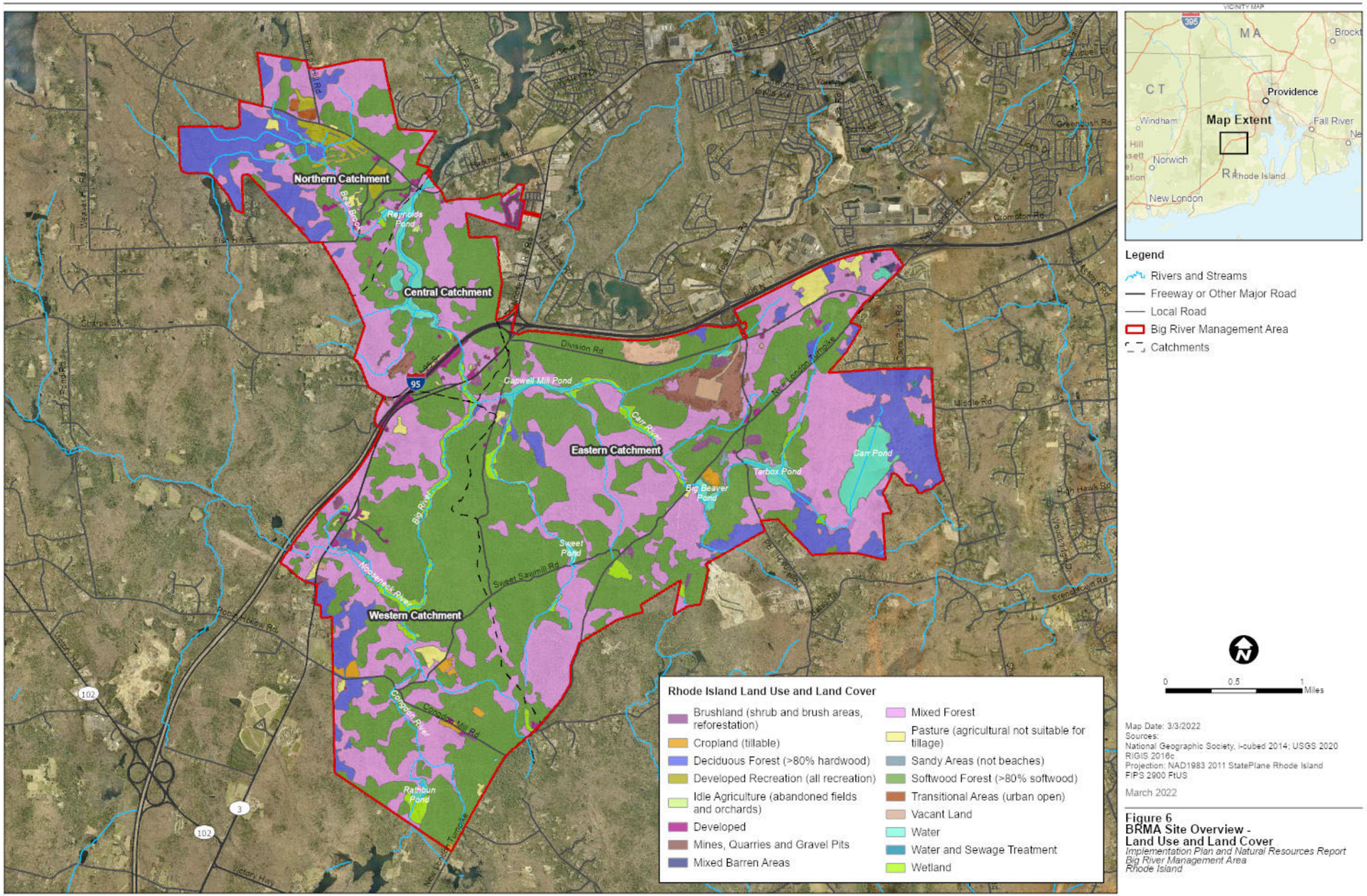

Figure 6
BRMA Site Overview - Land Use and Land Cover
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Big River Management Area
Rhode Island

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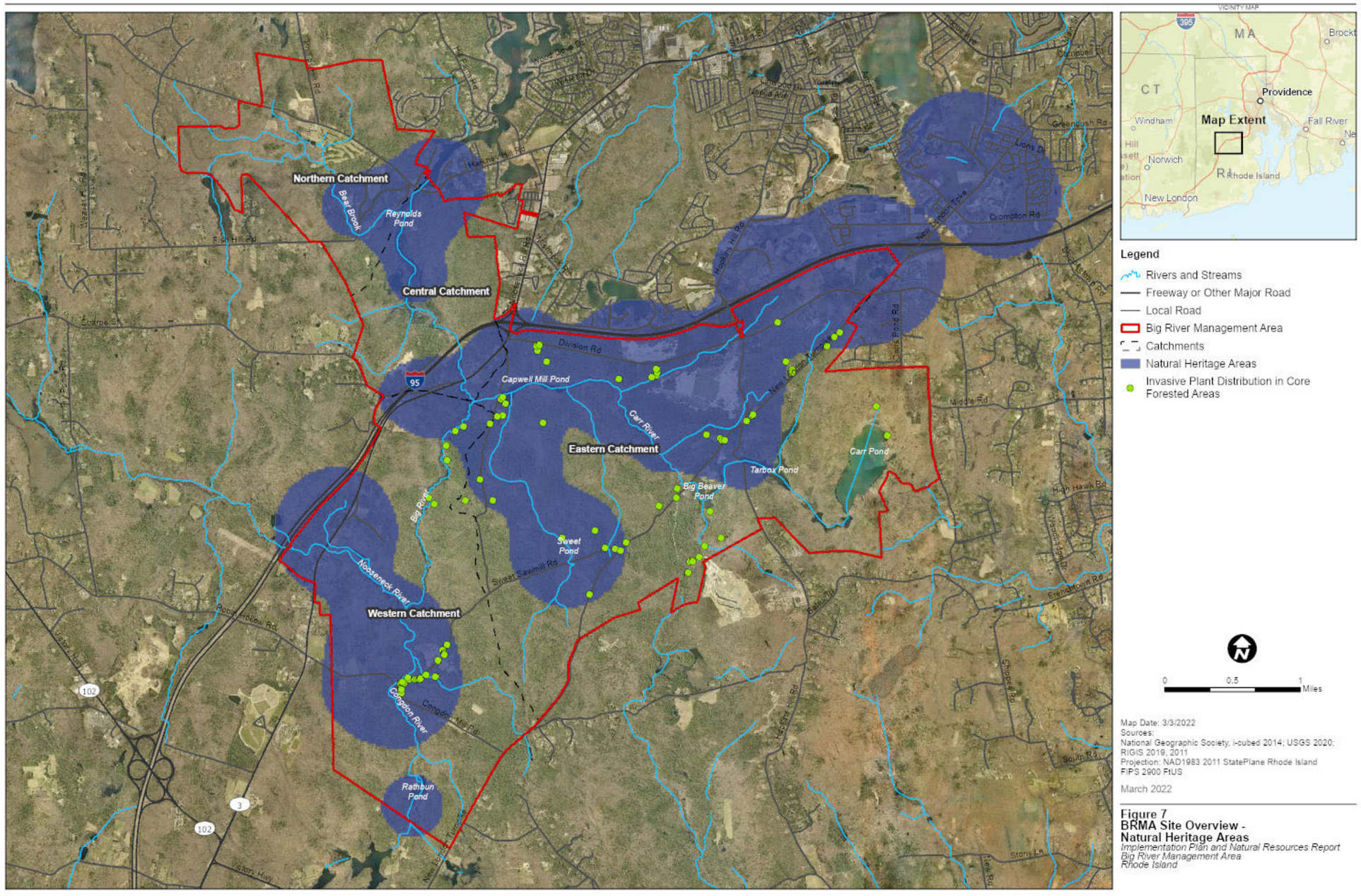

Figure 7
BRMA Site Overview - Natural Heritage Areas
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Rhode Island

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2.7 ANIMALS

2.7.1 Fish Habitat and Species

Aquatic habitats in the BRMA include wetlands, ponds, rivers, streams, and vernal pools. The BRMA contains over 30 miles of rivers and streams inhabited by various freshwater species, including brook trout. However, some of these streams have become impassable to fish species due to poorly designed and maintained culverts and presence of dams. According to a document published by the Northeast Aquatic Connectivity Assessment Project, habitat fragmentation, caused by dams and culverts, is one of the primary threats to aquatic species, leading to the loss of access to quality habitat and preventing species from reaching spawning habitat or thermal refuges.

RIDEM provides a public list of common freshwater fish of Rhode Island including various species of trout (*Oncorhynchus*) and char (*Salvelinus*), chain pickerel (*Esox niger*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), golden shiner (*Notemigonous crysoleucas*), fallfish (*Semotilus corpralis*), and American eel (*Anguilla rostrata*) (RIDEM 2022d). Other observed species in the BRMA have included sunfishes (*Lepomis*).

RIDEM begins stocking various streams and ponds with trout throughout the State of Rhode Island in the spring and continues throughout the summer and fall with brown trout, golden trout, rainbow trout, tiger trout, and brook trout. Within the BRMA, Tarbox Pond and the Big River itself are both stocked with trout (see Figure 13) (RIDEM 2022e). These hatchery-raised trout are stocked for recreational purposes in order to support recreational fishing opportunities for resident and non-resident anglers.

2.7.2 Wildlife Habitat and Species

The BRMA is intersected by many major roads and highways including Interstate 95. However, much of the area is densely forested with numerous trails running throughout, including the "Old" New London Turnpike. The BRMA provides habitat for a wide range of birds, mammals, reptiles, and amphibians. Although the majority of the area is made up of softwood forests, there are also deciduous forests, mixed forests, and brushland throughout creating a diversity of habitats. In addition to its forests, the BRMA boasts riparian and wetland habitats which foster the persistence of aquatic and semi-aquatic organisms.

Out of approximately 300 animal species observations from iNaturalist, some of the most common recorded animal species in the BRMA include: American toad (*Anaxyrus americanus*), common garter snake (*Thamnophis sirtalis),* common water snake (*Nerodia sipedon*), painted turtle (*Chrysemys picta*), American robin (*Turdus migratorius*), ring-necked snake (*Diadophis punctatus*), North American racer (*Coluber constrictor*), American bullfrog (*Lithobates catesbeianus*), Eastern gray squirrel (*Sciurus carolinensis*), white-tailed deer (*Odocoileus virginianus*), and Eastern red-backed salamander (*Plethodon cinereus*). Other animal species that are known to inhabit the area include beaver, fox, raccoon, coyote, and bobcat.

2.7.3 Endangered and Threatened Species and Species of Concern

2.7.3.1 Federally Protected Species

A USFWS IPaC search was completed for the BRMA and one federally threatened mammal species was found to be potentially present in the area: the northern long-eared bat (NLEB [*Myotis septentrionalis*]) (Appendix B; USFWS 2021). The NLEB range includes most of the eastern and north central United States.

Northern Long-Eared Bat (*Myotis septentrionalis*)

During summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live trees and snags (dead trees). NLEB are flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. Breeding begins in late summer or early fall when males begin to swarm near hibernacula, the caves or mines where NLEB will hibernate during the winter (USFWS 2015).

2.7.3.2 State Species of Concern

The RIWAP identifies animal species of greatest conservation need (SGCN), including mammal, bird, reptile, amphibian, fish, insects, and invertebrate species (RIDEM 2015). The SGCN in Rhode Island were identified based on a variety of criteria, such as federal or state listed species, imperiled species, declining species, endemic species, vulnerable species, disjunct species, indicator species, species with fragmented or isolated population, among other criteria. Included on the list of "Fish Species of Greatest Conservation Need of Rhode Island" is brook trout. It is likely that several other species of greatest conservation need inhabit the BRMA.

The RINHS developed a map of Natural Heritage Areas across Rhode Island, depicted on Figure 7. Natural heritage areas are locations that have occurrences of heritage data elements, including observations of state or federally listed rare or threatened animal and plant species (RINHS 2019). Natural Heritage rare animal species that have been observed in the BRMA include: geometrid moth (*Euchlaena madusaria*), noctuid moth (*Fagitana littera*), acadian flycatcher (*Empidonax virescens*), coastal barrens buckmoth (*Hemileuca maia*), common water shrew (*Sorex palustris*), eastern ribbon snake (*Thamnophis sauritus*), grasshopper sparrow (*Ammodramus savannarum*), hessel's hairstreak (*Callophrys hesseli*), pine barrens bluet (*Enallagma recurvatum*), pine barrens tiger beetle (*Cicindela formosa*), ringed boghaunter (*Williamsonia lintneri*), scarlet bluet (*Enallagma pictum*), sleepy duskywing (*Erynnis brizo*), white-throated sparrow (*Zonotrichia albicollis*), winter wren (*Troglodytes troglodytes*), and worm eating warbler (*Helmitheros vermivorus*) (RIDEM 2022c). There are approximately 4,050 acres of natural heritage areas in the BRMA.

2.7.4 Invasive Fish and Wildlife Species

There are three known invasive aquatic animals in Rhode Island, the Asian clam (*Corbicula fluminea*), the Chinese mystery snail (*Cipangopadula chinensis*), and Asian carp. There are no known occurrences of these species in the BRMA. However, surveys performed by RIDEM

indicate that both the Asian clam and Chinese mystery snail are present in Mishnock Lake, just 0.15 miles north of the BRMA project boundary (RIDEM 2020a; RIDEM 2020b).

2.7.5 Migratory Birds/Bald and Golden Eagles

The USFWS IPaC report for the BRMA identified migratory birds that could potentially utilize the area. These species include bald eagle (*Haliaeetus leucocephalus*), black-billed cuckoo (*Coccyzus erythropthalmus*), blue-billed cuckoo (*Coccyzus erythropthalmus*), Canada warbler (*Cardellina canadensis*), Eastern whip-poor-will (*Antrostomus vociferus*), golden eagle (*Aquila chrysaetos*), prairie warbler (*Dendroica discolor*), prothonotary warbler (*Protonotaria citrea*), purple sandpiper (*Calidris maritima*), rusty blackbird (*Euphagus carolinus*), and wood thrush (*Hylocichla mustelina*) (USFWS 2021).

2.8 ECOSYSTEM

2.8.1 Resilient and Connected Network

BRMA contains significant areas mapped as Resilient and Connected Landscapes as part of The Nature Conservancy's (TNC) effort to comprehensively map resilient land and climate corridors across eastern North America (Anderson et. al. 2016). Resilient landscapes must maintain species diversity and ecological function as the climate changes. TNC estimates the climate-resilience of an area of land (e.g., a "site") based on its landscape diversity (estimated microclimates) and local connectedness (lack of fragmentation). Each site is scored relative to all other sites in its ecoregion that have the same geophysical setting based on soils, bedrock geology, and elevation zone. TNC also identified areas of climate "flow," which refers to the gradual movement of populations in response to climate chance, and areas of "recognized biodiversity." Areas classified as "Flow" allow species to disperse, migrate, and adapt to a changing climate. "Recognized biodiversity areas" indicate the presence of rare species, exemplary unnatural community, or intact habitat. The mapped results identify land where high microclimatic diversity and low levels of human modification provide species with connected, diverse climatic conditions they will need to persist and adapt to changing regional climates. Much of the BRMA is made up of these resilient landscapes (see Figure 8 and Table 2-5).

Table 2-5. Resilient Land

Land Type	Acres in BRMA
Resilience and Flow	1,240
Resilience and Recognized Biodiversity	80
Resilience, Flow, and Recognized Biodiversity	5,255
Total Resilient Land	6,575

2.8.2 Nature's Network Conservation Design

Nature's Network, a collaborative effort facilitated by the USFWS Science Applications Program, has brought together partners from 13 states, federal agencies, nongovernmental organizations, and universities to help prioritize opportunities for conserving and connecting intact habitats. Nature's Network's Conservation Design maps an interconnected network of lands and waters that, if protected, will support a diversity of fish, wildlife, and natural resources that the people of

the Northeast and Mid-Atlantic region depend upon (Nature's Network 2017). An overview of the conservation design core networks, including terrestrial, aquatic, and imperiled species cores, are depicted on Figure 9.

2.8.2.1 Aquatic Core Network

A subset of Nature's Network's Conservation Design is "aquatic core networks," which are intact, well-connected stream reaches, lakes, and ponds in the Northeast and Mid-Atlantic region that, if protected as part of stream networks and watersheds, will support a broad diversity of aquatic species and the ecosystems on which they depend (Nature's Network 2010). The lentic core network includes high priority lakes and ponds identified based on common loon habitat and high-quality aquatic conditions. The lotic core network includes high priority streams and river segments identified for fish habitat, specifically Eastern brook trout, and high-quality aquatic conditions. The BRMA contains both lake and pond (lentic) and river and stream (lotic) aquatic core networks (see Figure 10 and Table 2-6). Specifically, Big River, Carr River, Congdon River, Nooseneck River, and Bear Brook, as well as some of their tributaries are identified as lotic core network.

Table 2-6 Aquatic Core Habitat

Habitat Type	Amount in BRMA
Lentic Core Habitat	47.4 acres
Lotic Core Habitat	17.7 miles

2.8.2.2 Core Habitat for Imperiled Species

Another subset of Nature's Network's Conservation Design, "core habitats for imperiled species," are relatively intact areas that contain habitats likely to support high levels of imperiled terrestrial and aquatic species. These habitats were identified based on an analysis of habitats used by over 600 Species of Greatest Conservation Need (Nature's Network 2017). The BRMA contains nearly 3,000 acres of core habitat, which primarily includes the main rivers and abutting land (see Figure 11 and Tale 2-7).

Table 2-7 Core Habitat for Imperiled Species

	Acres in BRMA
Core Habitat for Imperiled Species	2,924

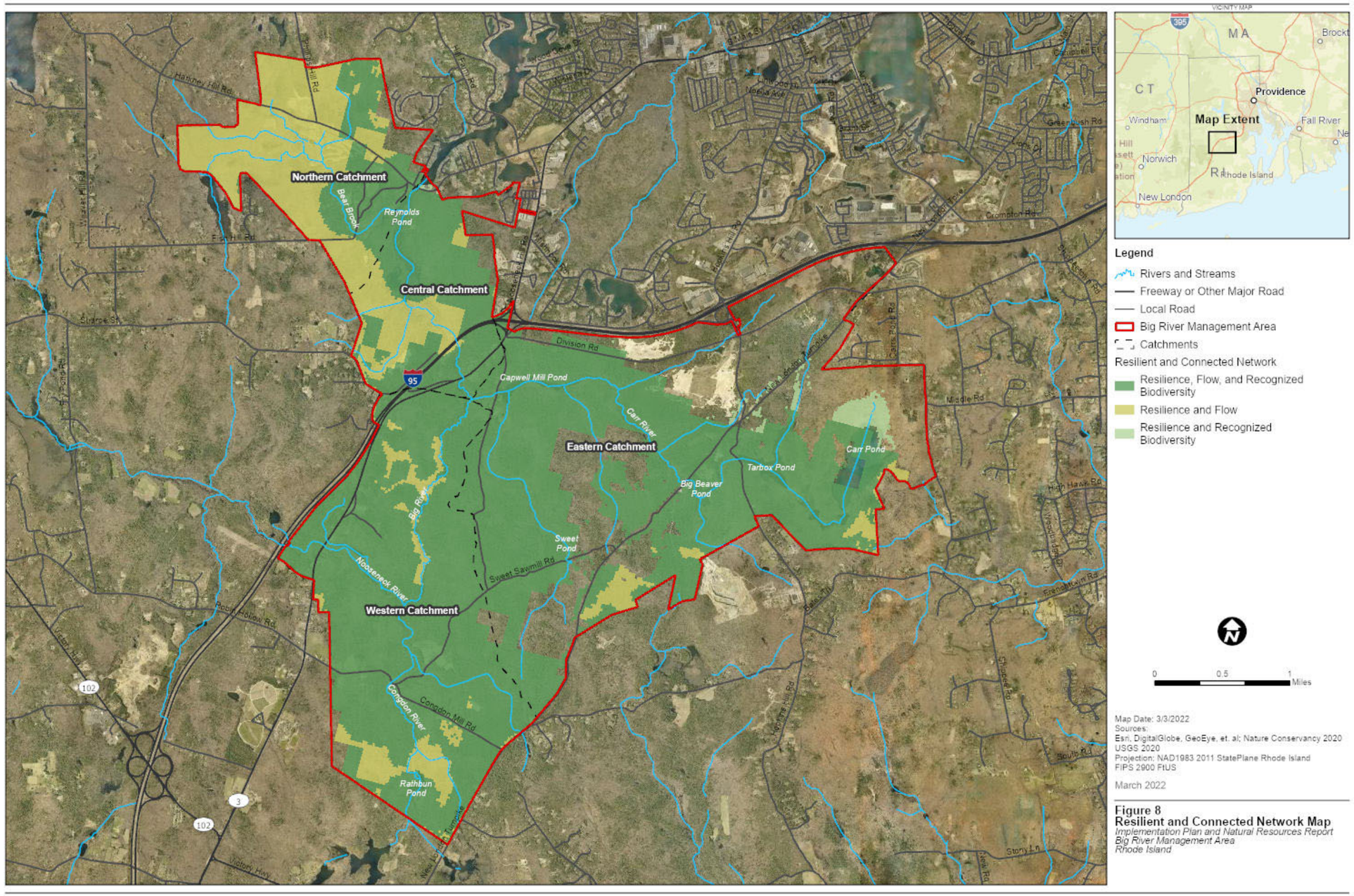

Figure 8
Resilient and Connected Network Map
Implementation Plan and Natural Resources Report
Big River Management Area
Rhode Island

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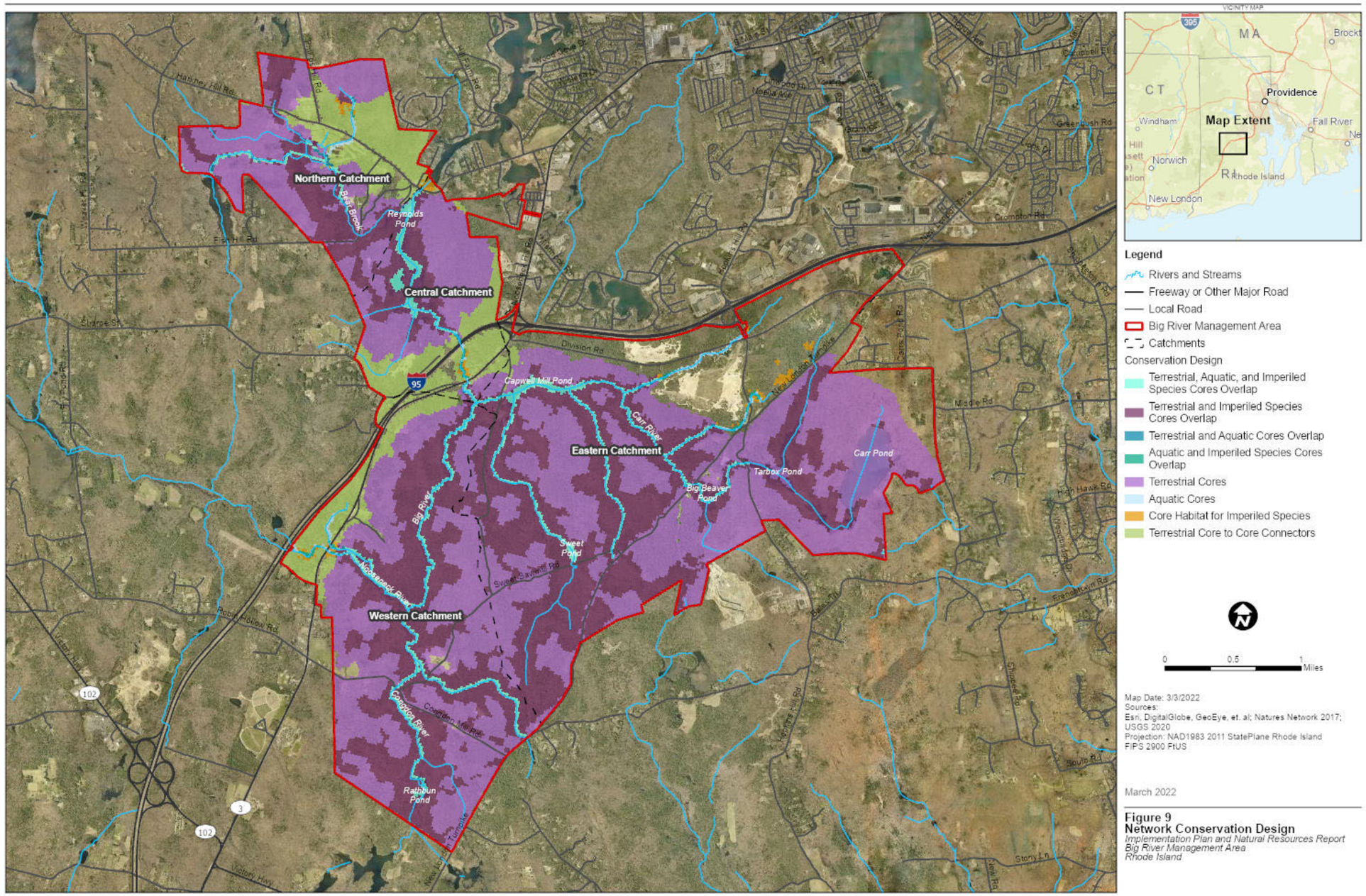

Figure 9
Network Conservation Design
Implementation Plan and Natural Resources Report
Big River Management Area
Rhode Island

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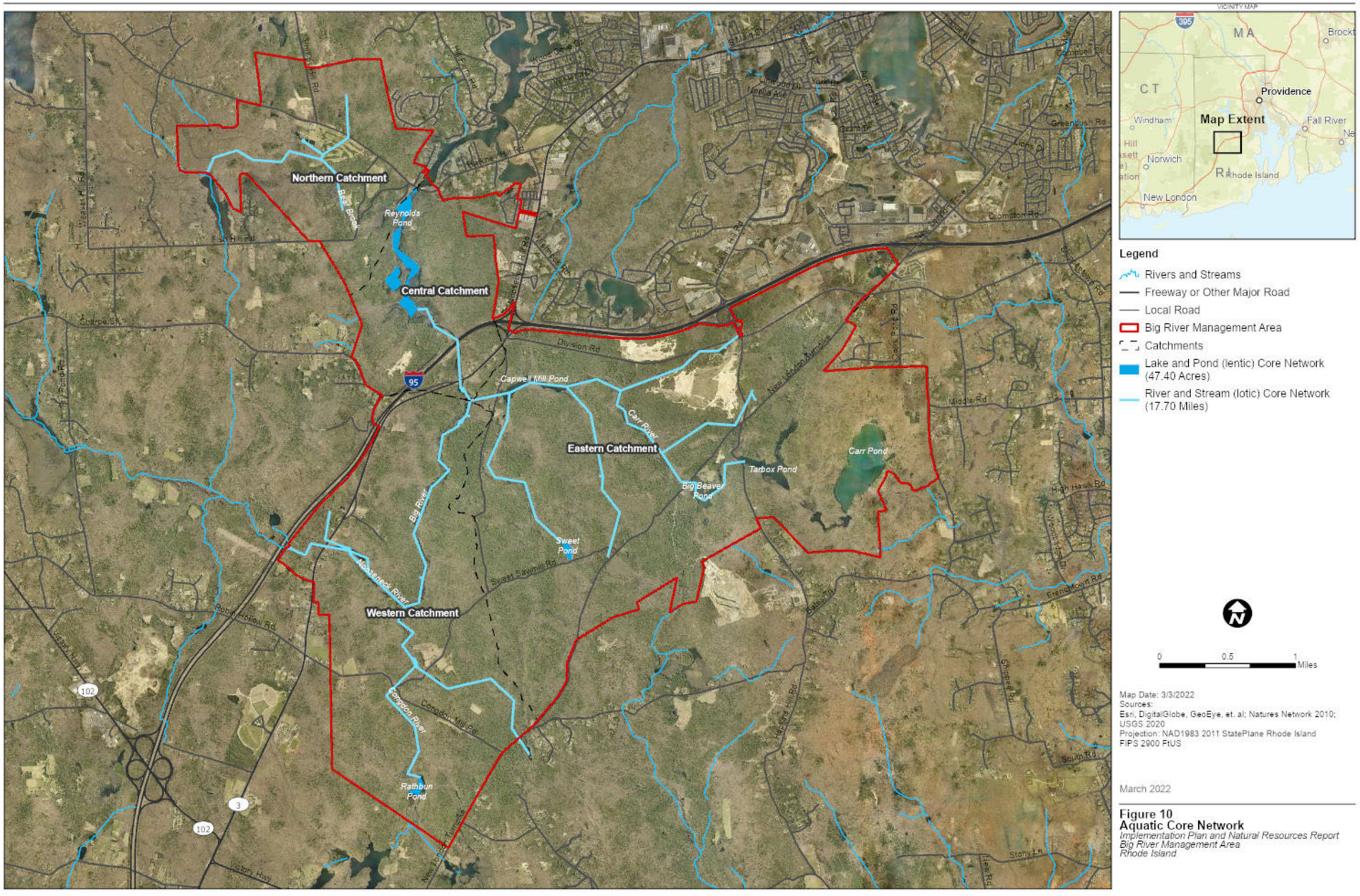

Figure 10
Aquatic Core Network
Implementation Plan and Natural Resources Report
Big River Management Area
Rhode Island

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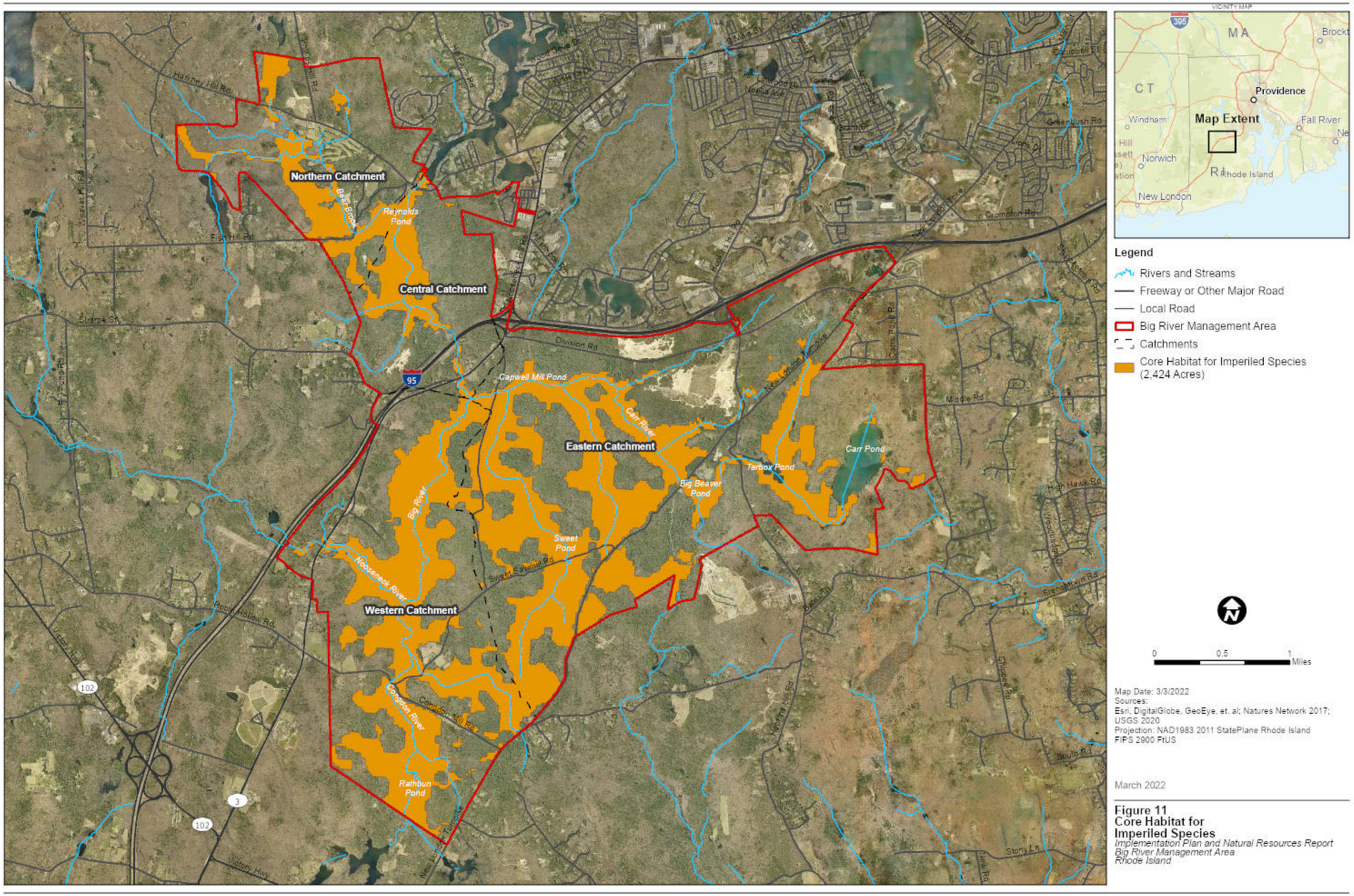

Figure 11
Core Habitat for Imperiled Species
Implementation Plan and Natural Resources Report
Big River Management Area
Rhode Island

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2.9 HUMAN ENVIRONMENT

2.9.1 Land Use

The BRMA is managed as an Open Space in accordance with current regulation (RICR 490-00-00-5) and recommendations from a 1996 land use study, which states that the main purpose of any activity in the BRMA is protection of the BRMA as a future drinking water supply. The study specifies that "land use should not adversely affect water quality and must consider the impact that land use has on the environment and proper maintenance of plant and animal habitat" (RIWRB 1996).

The Land Use Study (1996) recommended that: (1) Water quality be maintained through active oversight and management; (2) Controlled model forestry management be practiced as specified in current state forestry regulations; (3) Wildlife management follow the state wildlife regulations, as a wildlife educational model as well as recreational sport; (4) Historical areas located in the BRMA be given consideration for relocation as necessary to ensure preservation of the area's man-made history; (5) Environmental education of the state's population be enhanced through programs established in this area. It also stated that the educational aspect be combined with educational institutions at all levels with primary recognition that this is a critically sensitive and delicate water resource area significant to the State of Rhode Island's future growth and development (RIWRB 1996).

2.9.2 Recreation

The BRMA is a popular recreational area for local residents. Its designation as an open space requires that *"any use of the Big River Management Area preserves and protects the quality and quantity of water in the aquifer, protects public safety and is consistent with the development and use of the area for water supply"* (490-RICR-00-00-5). Open space use is defined in the current regulations as "activities that have a minimal and/or non-permanent impact on the physical characteristics and/or nature of the land and water resources." Some popular and permissible "passive" recreational uses include: hiking, backpacking, fishing, canoeing and kayaking (limited to ponds and Big River), and horseback riding. Other uses, or the above allowed uses in groups comprised of more than ten persons, must be reviewed and approved by RIDEM pursuant to § 5.7 of the regulations and require a special use permit. Any recreational use that would negatively impact water quality or wetlands, such as swimming, camping, and riding off-road vehicles are prohibited.

2.9.2.1 Trails

Within the BRMA, there are approximately 106 miles of trails mapped by RIDEM (see Figure 12). In addition, EA digitized an additional 32 miles of trails which were mapped from Open Street Maps. Permitted uses for these trails include hiking, backpacking, and non-mechanized or non-motorized bicycles (subject to some restrictions). Although prohibited without a special use permit, all-terrain vehicles (ATVs) and motorized dirt bikes are widely used throughout the BRMA.

2.9.2.2 Other Recreation

Hunting and fishing in the BRMA are permitted given that all RIDEM Division of Fish and Wildlife rules and regulations are followed. Hunting of deer, turkey, pheasant/quail, small game, migratory birds, and waterfowl is allowed with a valid hunting license. Pheasant are not native to Rhode Island, so the BRMA is stocked during hunting season with pheasant twice per week during October through December and typically average 590 pheasant per season (RIDEM Division of Fish and Wildlife 2021). They are stocked in West Greenwich in a field off of Congdon Mill Road approximately one quarter mile west of the New London Turnpike Trail parking, and in a second field off of the New London Turnpike approximately one quarter mile northeast of the same parking area (see Figure 13).

Fishing is permitted throughout the BRMA with a valid Rhode Island fishing license and a trout stamp, if fishing for trout. Trout are stocked at three locations within the BRMA. The Big River is stocked at the intersection of Sweet Sawmill Road and Congdon Mill Road and at the intersection of the Big River and Nooseneck Hill Road (Route 3), while Tarbox Pond is stocked at the downstream end of the pond off Hopkins Hill Road (see Figure 13) (RIDEM Division of Fish and Wildlife 2022). According to BRMA regulations, canoeing and kayaking of (limited to ponds and Big River), and horseback riding are also permitted recreational uses in the BRMA.

Figure 13 depicts public recreational areas in the BRMA, including 7 fishing and boating areas and 8 other recreational areas, including sports field, a golf course, and trailheads. There are several designated public parking areas throughout the BRMA as well as many popular "pull-off" parking areas.

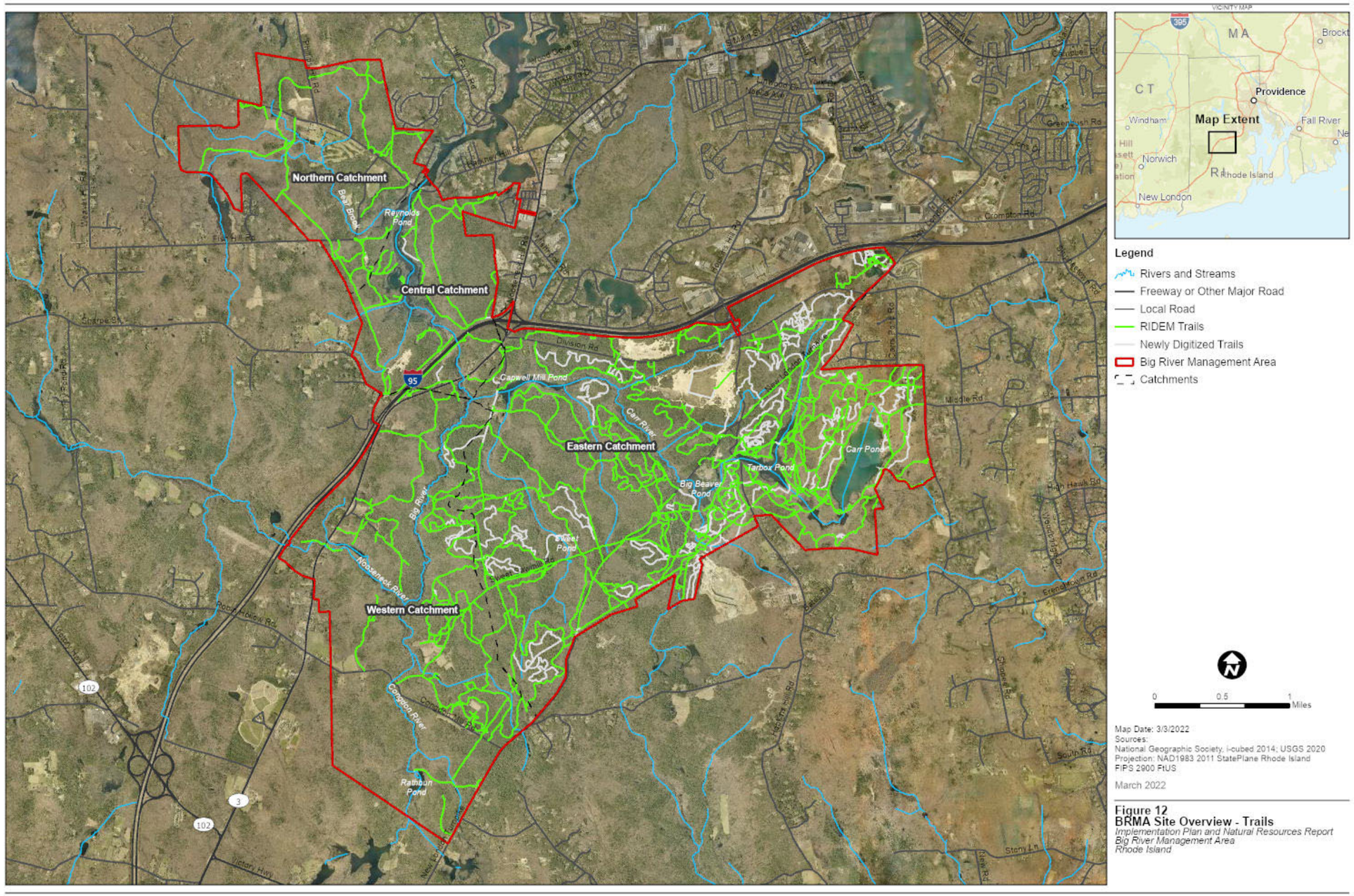

Figure 12
BRMA Site Overview - Trails
Implementation Plan and Natural Resources Report
Big River Management Area
Rhode Island

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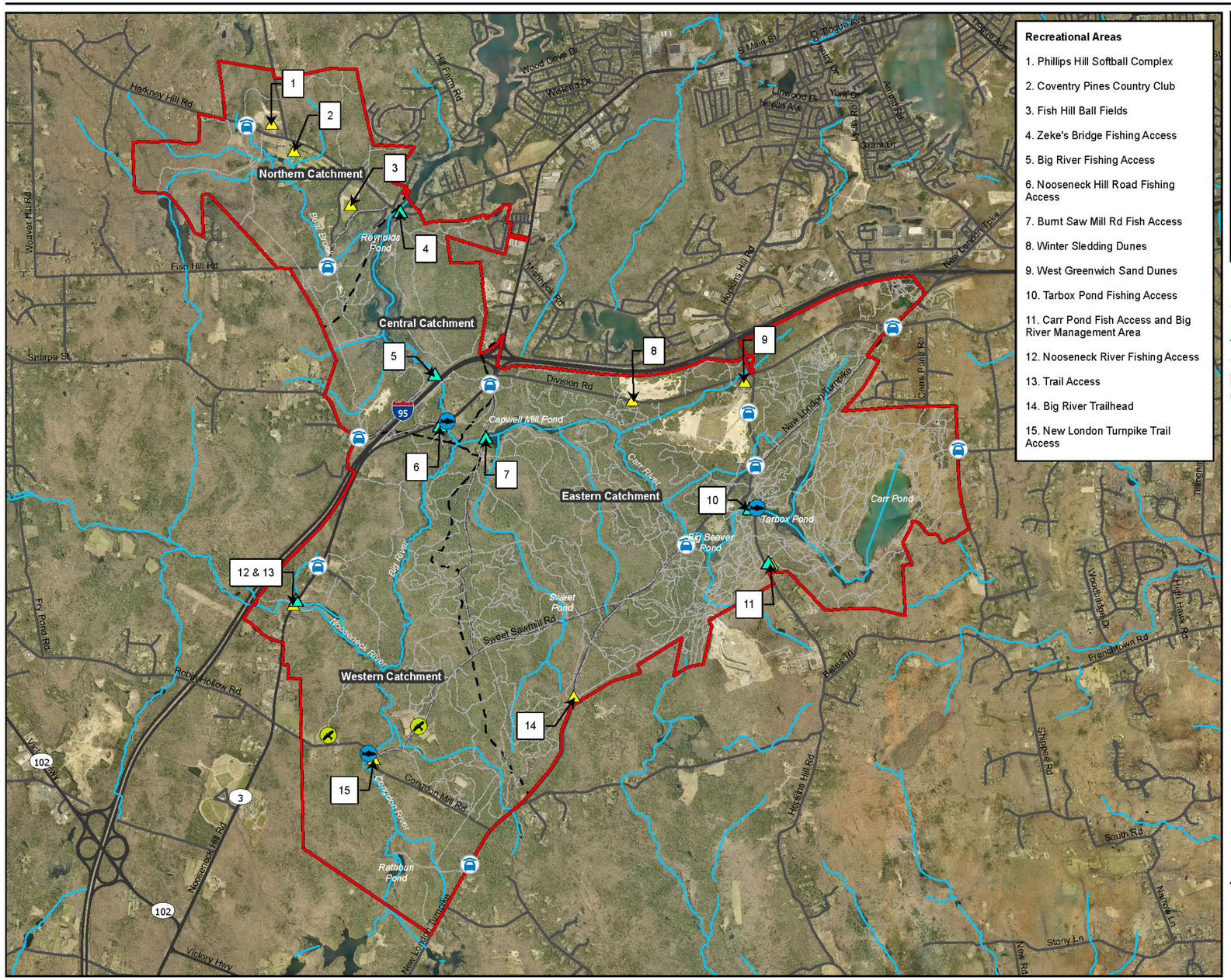

Map Date: 3/30/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020; RIGIS 2021, 2015, 2012; RIDEM 2017; RIDEM 2021
Projection: NAD1983 2011 StatePlane Rhode Island FIPS 2900 FIUS

March 2022

Figure 13
BRMA Site Overview - Recreation
Implementation Plan and Natural Resources Report
Big River Management Area
Rhode Island

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3. FIELD DATA

The primary goal of this project was to collect data within the BRMA, which previously had extremely limited (if any) data collection efforts related to water temperatures, brook trout population, stream crossings, and general data on the existing conditions within the BRMA.

The first step in organizing field data collection and analysis was separating the study area into catchments (Figures 1 and 2). This was based on the general understanding that individual watershed catchments tend to exhibit similar traits across ecological communities and are subject to similar atmospheric events (i.e., temperatures, precipitation, storms, etc.). In addition, water quality, terrestrial features, and biological resources are naturally more accurately delineated by watershed boundaries. The four catchments (Northern, Central, Eastern, and Western) were based on RIDEM Sub-watershed of RI HUC 12 Watershed Boundary Delineations as obtained from the RIDEM online Environmental Resource Mapper.

EA's field data collection efforts in the BRMA spanned from April 2021 to December 2021. Field data collected includes stream temperature data from 39 locations, stream depth data from 15 locations, fisheries survey data from 16 streams and one pond, assessments of 36 culverts and 14 dams, and photographic documentation of streams, wildlife, and recreational use in the BRMA (Figures 14-25).

3.1 TEMPERATURE AND DEPTH LOGGERS

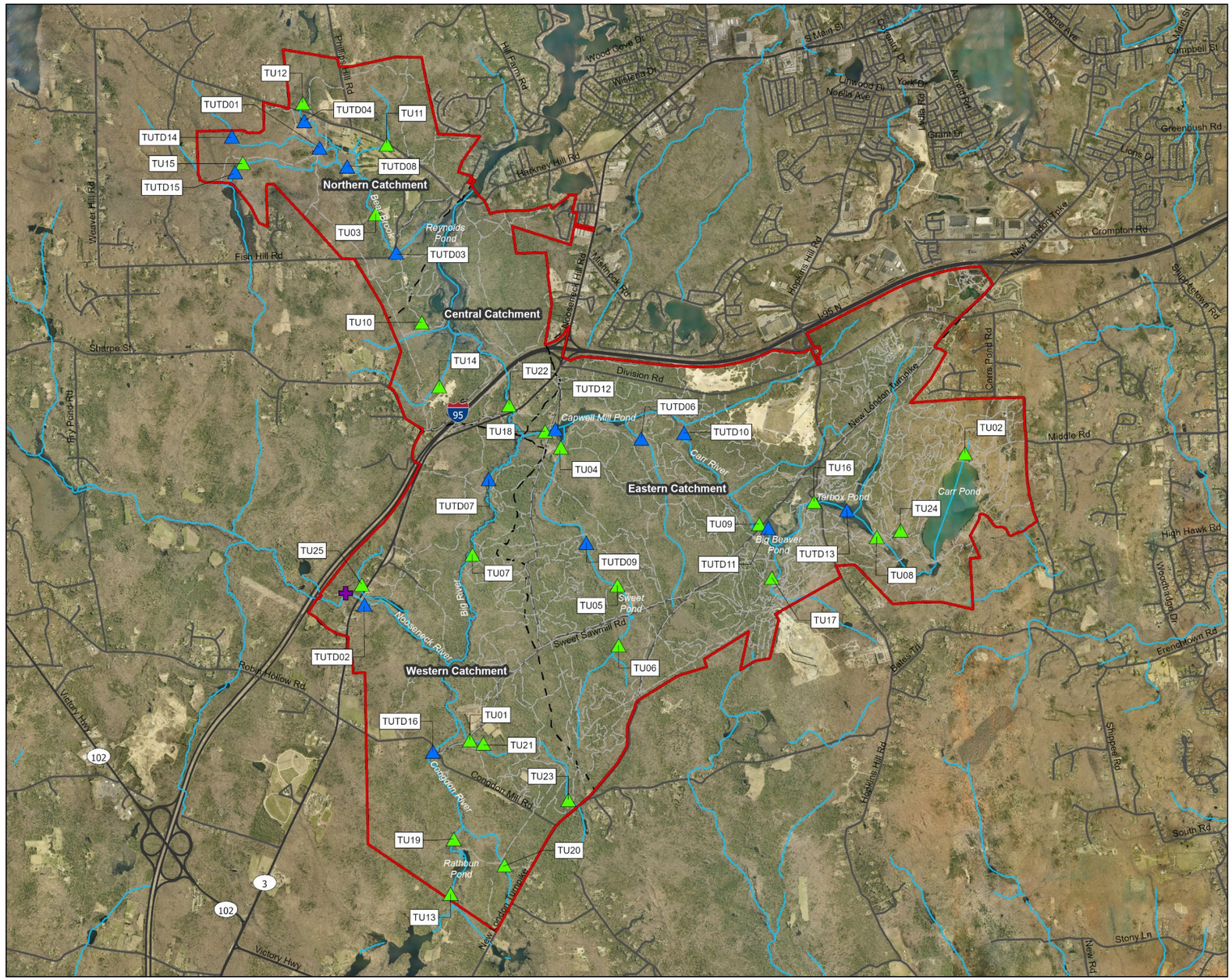
3.1.1 Methods

EA identified 40 locations throughout the 30 miles of streams in the BRMA to deploy temperature and temperature/depth loggers. Locations were chosen in conjunction with project partners (USFWS, RIDEM, and RITU) based on geographic and hydrographic features, and accessibility. A total of 23 HOBO Water Temperature Pro v2 Data Loggers and 15 HOBO U20L-04 Series Water Level Loggers were deployed throughout the streams in the BRMA (Table 3-1). Additionally, one barometric logger was also deployed to correlate the water depth readings from the temperature/depth loggers. Prior to deployment, loggers were calibrated and synchronized to a host computer with HOBO software. Each temperature logger was programmed to record at 60-minute intervals, and temperature/depth loggers were programmed to record every 15 minutes. Loggers were placed in a metal case for protection and secured to trees or other sturdy objects with rope. GPS coordinates, a picture, and a description were taken of each logger location. The loggers remained in the streams for approximately 6-8 months in order to record the full seasonal temperature and depth fluctuations in Big River and its tributaries. Locations of the loggers are shown on Figure 14.

Field Deployment of Logger TU10

Table 3-1. Logger Deployment by Catchment

Catchment	Temperature/Depth Loggers	Temperature Loggers
Northern	6	4
Central	0	3
Eastern	6	10
Western	3	8
Total	**15**	**25**



Map Date: 3/2/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020
Projection: NAD1983 2011 StatePlane Rhode Island FIPS 2900 FtUS

March 2022

Figure 14
BRMA Site Overview - Logger Locations
Big River Management Area
Rhode Island

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3.1.2 Findings

3.1.2.1 Temperature

Table 3-2 presents temperature data from 39 loggers deployed in the BRMA from spring to fall 2021 (approximately 200 days). Various temperature metrics were calculated in order to better evaluate and understand the daily, monthly, and seasonal fluctuations of the water temperatures. Figures 16-19 depict the various thermal metrics evaluated as part of this study. These temperatures metrics and associated thresholds for brook trout are based on previous research and published studies conducted by the Connecticut Department of Energy and Environmental Protection in 2014 (Beauchene et al. 2014). The thermal threshold of brook trout is the point at which they may become stressed but are not at extremely high risk of death or serious health problems unless the heightened temperatures persist for a long period of time. These thresholds are identified on the scales of Figures 16-19 and correspond to the thematic colors that are displayed.

These metrics depicted on Figures 16-19 include: summer average temperature, 7-day daily maximum temperature, summer 14-hour maximum average temperature, summer 24-hour maximum average temperature, and summer daily maximum temperature. Temperatures in the river/stream sections between logger locations were interpolated based on aerial photo interpretation, field reconnaissance, and other attributes based on literature from the USGS (Heck et al. 2018). Note that the summer 14-hour maximum temperature is calculated by determining the average temperature from 6 am to 8 pm (daylight hours) each day for the summer months (June, July, and August), then the maximum 14-hour average is determined; and the 7-day maximum temperature is a calculation of the average of the daily maximum temperatures from seven consecutive days made on a rolling basis.

Displaced TU25 logger downstream of original location. Note the logger is partially out of the water.

During logger collection, loggers TU02, TU17, and TU25 were observed and retrieved at locations downstream of their original deployment location. In addition, the new downstream location of the loggers was observed to be impacted by siltation or debris. As such, these loggers contained inconsistent data, which when correlated with ambient air temperature data was determined to be representative of the logger being out of the water (either fully or partially). This is common with this form of logger deployment as heavy or significant rainfall events can result in flow surges in streams. These surges can snag loggers on debris, relocate loggers on stream banks, or displace loggers due to siltation or new sediment deposition. As such, a boxplot was used to identify outliers in the data, which were then removed from the dataset and analyzed (see example in Appendix C). Using this method, it was determined that any temperatures greater than 75 °F were outliers and were removed for TU02 and TU17, and any temperatures greater than 68 °F were removed for

TU25. Additional examples of the boxplots used to determine temperature thresholds and outliers for the loggers are included in Appendix C.

The logger deployed in Capwell Mill Pond (TUTD12) could not be retrieved at the end of the study, and it was determined that the logger's rope was likely chewed off by a beaver, and the beaver had then constructed a submerged structure of sticks on top of the logger location. Despite significant efforts, the logger could not be located with a metal detector or retrieved after numerous attempts with a large magnet. Although this data would have been useful for data analysis, TU18 was located directly downstream and provided sufficient data to accurately inform the data processing and modeling.

Table 3-2. Temperature Logger Data

Logger ID	Units	Summer Average Temperature	Summer Daily Maximum Temperature	Summer 14-hour Maximum Temperature	Summer 24-hour Maximum Average Temperature	Summer Minimum Temperature	7-Day Maximum Temperature	Daily Average Temperature	Daily Minimum Temperature	Daily Maximum Temperature	Monthly Average Temperatures					
											May	June	July	August	September	October
TU01	°F	61.27	68.36	65.85	65.74	51.11	63.34	58.29	44.40	68.36	55.32	60.42	61.72	61.61	59.82	54.95
TU02	°F	64.76	74.38	74.16	71.11	52.47	70.36	61.26	32.00	74.99	54.60	61.68	64.91	68.09	64.41	58.97
TU03	°F	66.88	79.70	73.22	72.73	53.21	70.86	62.52	41.74	93.80	59.05	65.55	67.43	67.67	63.77	56.80
TU04	°F	71.46	84.99	80.51	80.38	60.95	75.02	65.58	31.44	84.99	NA	NA	70.58	72.38	66.30	58.89
TU05	°F	68.60	84.77	78.28	78.80	52.69	75.24	63.79	40.86	84.77	60.00	66.18	70.29	69.27	65.51	57.79
TU06	°F	63.59	69.73	68.37	68.34	51.63	67.83	59.83	42.98	69.73	54.18	60.32	64.71	65.72	62.62	56.54
TU07	°F	68.70	79.83	76.88	77.23	52.77	72.59	60.46	34.81	79.83	NA	67.14	69.05	69.92	65.19	57.47
TU08	°F	69.26	77.73	75.24	75.22	54.82	73.33	63.73	41.55	77.73	60.54	67.72	69.96	70.07	66.08	57.99
TU09	°F	76.43	90.98	86.85	86.44	56.86	80.95	69.54	44.40	90.98	65.15	76.16	76.26	76.89	70.12	60.80
TU10	°F	54.69	65.62	64.74	64.90	49.78	62.82	54.10	46.30	65.62	NA	52.37	56.88	54.79	57.38	53.78
TU11	°F	66.01	74.90	72.71	72.55	57.55	70.03	61.75	30.23	74.90	NA	65.07	64.94	67.57	63.29	57.07
TU12	°F	59.45	66.69	66.01	66.24	51.11	64.74	56.90	41.14	66.69	NA	57.25	59.29	61.89	58.39	53.52
TU13	°F	73.98	85.67	81.77	81.59	56.38	78.54	68.01	44.49	85.67	63.95	72.60	74.46	74.91	69.26	60.33
TU14	°F	63.40	71.32	69.56	69.47	51.98	68.29	60.07	40.81	71.32	NA	60.77	63.82	65.64	62.82	57.08
TU15	°F	66.64	74.08	71.83	71.33	59.01	70.36	62.42	31.24	74.08	NA	64.79	66.16	67.66	64.45	57.78
TU16	°F	75.80	89.36	85.29	84.72	56.73	79.48	69.49	44.76	89.36	65.54	75.43	75.56	76.40	70.67	61.42
TU17	°F	65.36	74.60	73.58	71.55	49.96	70.22	61.02	42.76	74.90	54.68	61.95	66.39	67.57	63.56	56.73
TU18	°F	74.48	87.03	84.26	83.78	55.30	78.78	68.16	40.95	87.03	NA	73.68	74.04	75.72	68.82	59.49
TU19	°F	75.43	90.01	85.39	85.02	56.34	79.61	68.92	42.85	90.01	64.79	75.15	75.16	76.00	69.80	60.69
TU20	°F	67.66	79.92	75.68	75.33	52.07	71.70	62.67	39.69	79.92	58.18	65.87	67.96	69.18	64.33	57.07
TU21	°F	56.42	58.20	58.15	58.14	54.17	57.84	54.91	43.72	58.20	NA	NA	56.39	57.06	56.30	52.66
TU22	°F	68.92	81.07	77.79	77.73	53.21	73.63	63.46	40.53	81.07	NA	66.72	69.43	70.60	65.78	57.83
TU23	°F	68.49	80.36	74.95	75.10	52.95	72.79	63.75	40.72	80.36	60.64	67.64	69.39	68.31	65.72	57.33
TU24	°F	65.34	72.18	71.24	71.20	52.25	69.89	60.86	40.86	72.18	55.78	62.34	66.06	67.65	64.05	57.43
TU25	°F	59.19	67.76	64.89	65.04	51.24	63.31	57.26	43.08	67.89	53.78	56.84	60.87	59.83	60.64	54.94
TUTD01	°F	62.63	69.45	68.31	69.26	52.23	67.28	59.71	42.55	69.45	54.58	59.69	63.43	64.78	62.57	56.88
TUTD02	°F	68.77	79.50	76.46	79.00	59.51	72.00	63.97	43.10	79.50	NA	NA	68.46	69.33	64.58	57.36
TUTD03	°F	67.41	77.40	73.08	76.93	57.44	70.68	62.79	40.88	77.40	NA	67.94	67.22	67.41	63.44	56.54
TUTD04	°F	67.20	74.96	74.31	74.80	53.27	71.11	61.93	41.25	74.96	58.27	64.95	68.01	68.64	63.58	54.39
TUTD06	°F	63.58	70.65	69.29	70.42	51.87	68.06	57.60	38.44	70.65	NA	60.07	64.77	65.92	63.13	57.37
TUTD07	°F	69.13	80.74	78.01	80.28	53.27	72.90	63.68	40.13	80.74	NA	67.76	69.34	70.30	65.33	57.54
TUTD08	°F	66.98	73.58	72.71	73.51	54.32	71.20	62.96	44.20	73.58	59.39	65.45	68.11	67.40	64.88	57.41
TUTD09	°F	66.37	75.66	73.22	75.33	52.93	71.01	58.93	35.95	75.66	NA	65.14	67.30	66.62	63.34	56.51
TUTD10	°F	68.73	75.48	74.88	75.43	53.10	72.24	60.19	38.44	75.48	NA	66.92	69.28	69.97	64.98	56.82
TUTD11	°F	70.66	76.53	76.05	76.20	56.92	74.23	66.59	44.20	76.53	65.93	69.72	70.97	71.32	66.99	59.08
TUTD13	°F	69.27	79.68	78.53	79.38	55.54	75.27	65.99	45.29	79.68	66.93	71.26	69.18	67.43	66.22	59.71
TUTD14	°F	64.33	67.56	67.48	67.56	59.85	67.16	61.32	46.91	67.56	NA	62.32	63.43	65.78	63.06	57.09
TUTD15	°F	72.24	89.02	79.57	87.60	62.60	76.38	72.29	62.60	89.02	NA	NA	NA	NA	NA	NA
TUTD16	°F	70.82	82.15	77.86	81.72	62.60	74.10	65.58	41.25	82.15	NA	NA	70.39	71.48	66.41	58.13

Note: Logger TUTD05 was the used for barometric pressure data collection and did not record water temperatures. Logger TUTD12 could not be retrieved at the end of the study.

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3.1.2.2 Water Depth and Precipitation

Exhibits 1-3 depict stream depth data collected by the 14 temperature/depth loggers installed from spring to fall 2021 in the eastern, northern, and western catchments. No temperature/depth loggers were deployed in the central catchment. The graphs also show daily rainfall data along the y-axis to compare water depth fluctuations with rainfall events.

Note that the TUTD16 logger in the eastern catchment appears to have shifted in mid-July but continued to reflect the representative fluctuations of water levels. This logger was deployed in Tarbox Pond with a static dam structure, so it is impossible that the water level in the impoundment dropped as indicated. The general hypothesis is that, since this logger was placed in a rocky area at depth, the logger could have inadvertently been placed on a submerged rock and then been dislodged from the top of the submerged rock during the study and come to rest at a more significant depth.

Exhibit 1. Eastern Catchment Water Depths

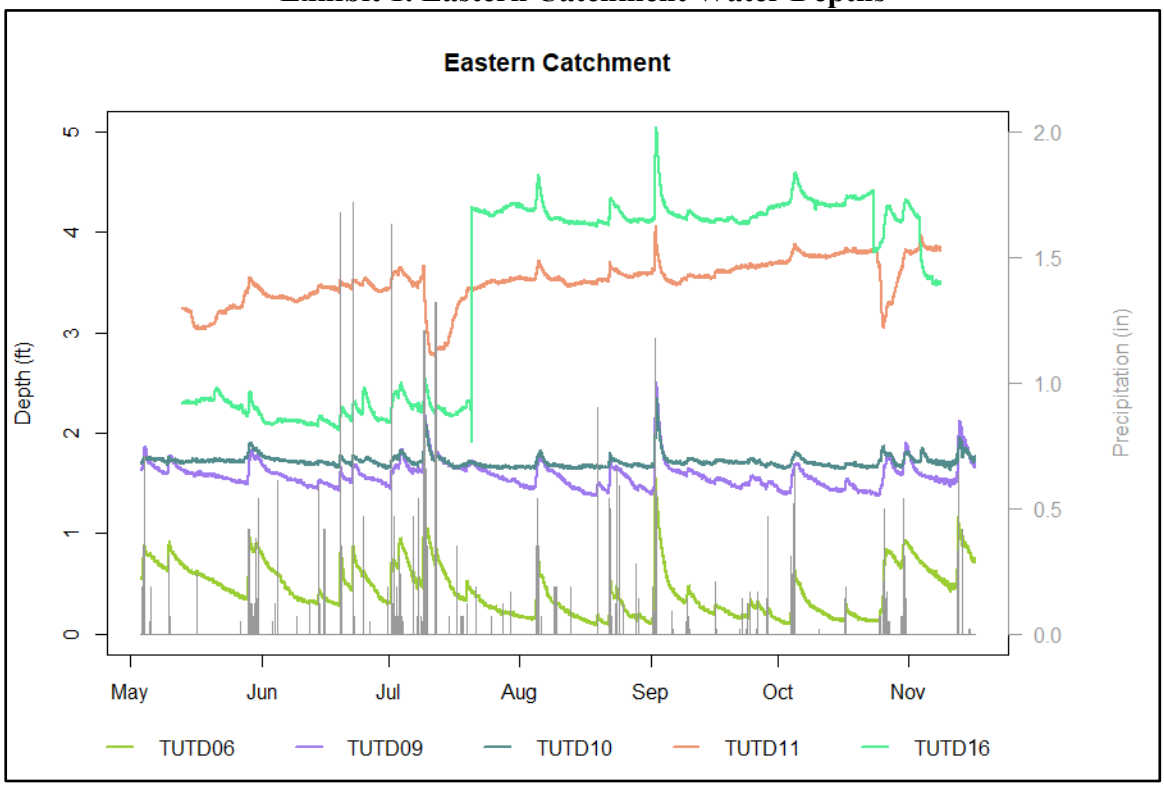


Exhibit 2. Northern Catchment Water Depths

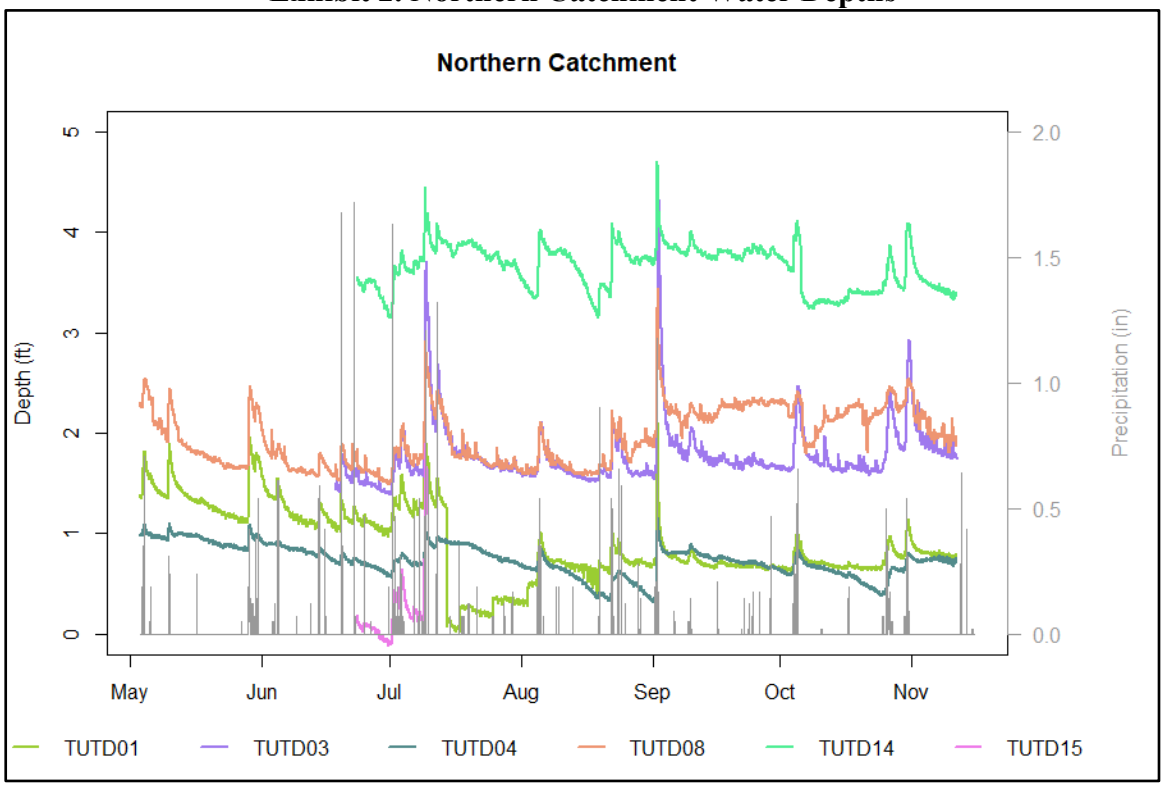
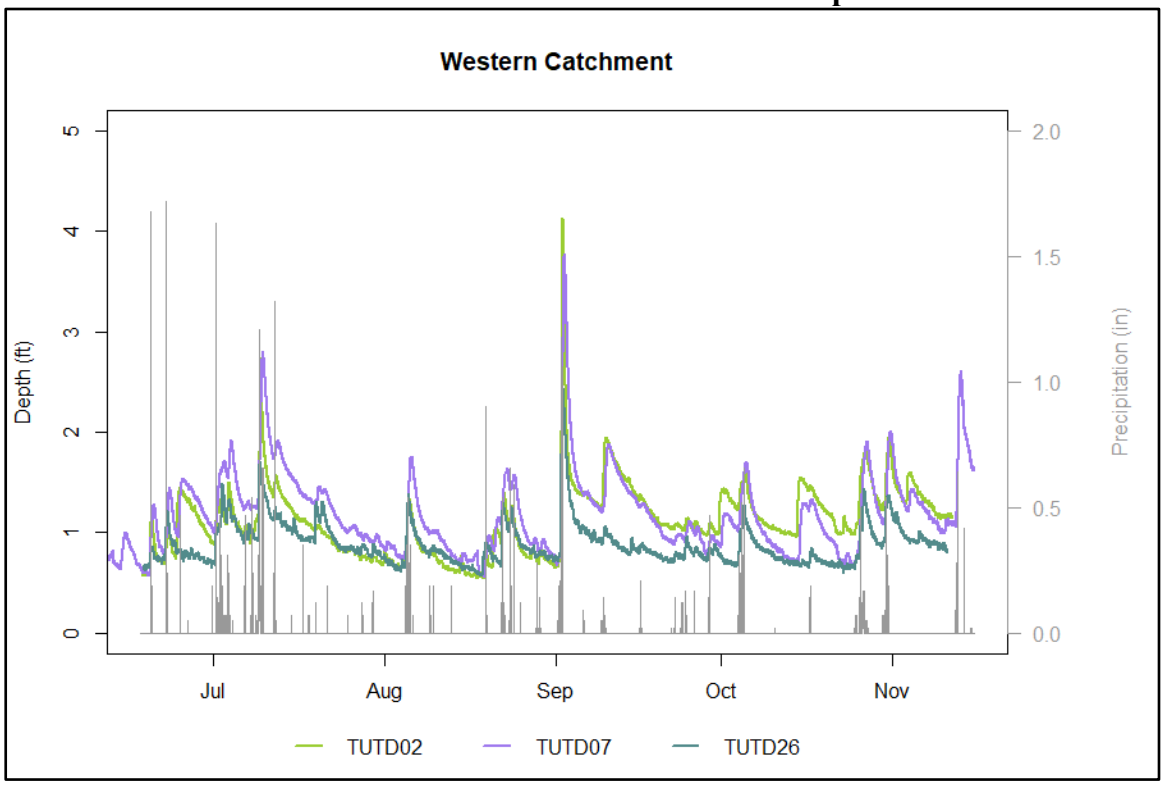


Exhibit 3. Western Catchment Water Depths



3.1.3 Discussion

Summer average temperatures in the majority of streams in the BRMA were between 65 and 71°F, which is above the preferred temperature range for brook trout. A few of the smaller tributaries, primarily in the central and eastern parts of the BRMA, maintained summer average stream temperatures within brook trout's preferred temperature range (less than approximately 65°F [Maine IFW 2022]). Most streams experienced a maximum temperature of at least 71 °F with many exceeding 80 °F. The stream segments that recorded temperatures above 71°F were all located downstream of dams or impoundments (see Figure 15). As water moves through dams, ponds, and impoundments, its flow is slowed, and temperatures subsequently increase. As water moved through these impoundments it increased in temperature, but the streams downstream of the ponds/impoundments decreased in temperature as water moved away from the impoundments. For example, downstream of Capwell Mill Pond, Big River stream temperatures decreased with distance from the dam. The densely forested areas surrounding the river in this area accelerates water cooling and helps to maintain cooler water temperatures. All the dams observed in the BRMA are run-of-river "top release/spillover" dams. Although there is insufficient information on the thermal stratification of the BRMA impoundments, it is anticipated that the majority of these ponds and water bodies in the BRMA are not able to thermally stratify. Thermal stratification involves the colder water settling on the bottom and warmer water floating over the cold.

Brook trout were generally found in streams where the average summer temperature did not exceed approximately 70° F. Some streams with high summer maximum temperatures (> 75°F) did contain brook trout, but most streams that contained brook trout had a maximum temperature of 75°F or less. Brook trout prefer cool streams between approximately 50° and 65° F (Maine IFW 2022). As temperatures increase beyond their thermal threshold, brook trout growth becomes negatively affected until the temperature reaches a lethal level (Chadwick and McCormick 2017). A brook trout's ecological threshold temperature (the temperature at which brook trout can function efficiently and effectively is approximately 69.8° F and long-term exposure to higher temperatures often results in mortality due to endocrine stress (Chadwick Jr, Nislow, and McCormick 2015). However, brook trout can spend approximately 60 days in areas where temperatures are elevated above their ecological threshold (Chadwick Jr, Nislow, and McCormick 2015). Additionally, while long term exposure to temperatures above their preferred range may not be fatal, it can lead to diminished growth and limited lifespans (Chadwick Jr, Nislow, and McCormick 2015).

Beauchene et al. (2014) identified temperature thresholds for 26 fish species present throughout Connecticut during the summers of 2010 and 2011. They found water temperature thermal thresholds for cold water species including brook trout to be 64.92 °F or less between June and August, 65.21 °F or less in July, and 72.32 °F or less as a maximum daily average. During these timeframes, cold water fishes significantly declined in abundance when temperatures rose above those thresholds. With long term average temperature increase, in the case of climate change, ecological shifts to warm water species occur.

The presence of brook trout in streams with high temperature thresholds at first appears to be contradictory to the preponderance of thermal preferences for brook trout in literature. However, brook trout are a resilient species who actively seek out micro thermal refugia in streams for

survival. Although brook trout are present in streams with a summer average maximum temperature greater that 64.9 ° F (Beauchene et al. 2014), those streams should not be considered long-term strongholds for brooks trout. The brook trout populations in these streams should be evaluated as highly sensitive populations that are susceptible to future climatical air and water temperature increase. Though, in some scenarios these streams can have their thermal temperatures restored to increase their resiliency through practices such as riparian plantings, dam removals, or mitigation of warm water influences like stormwater outfall pipes.

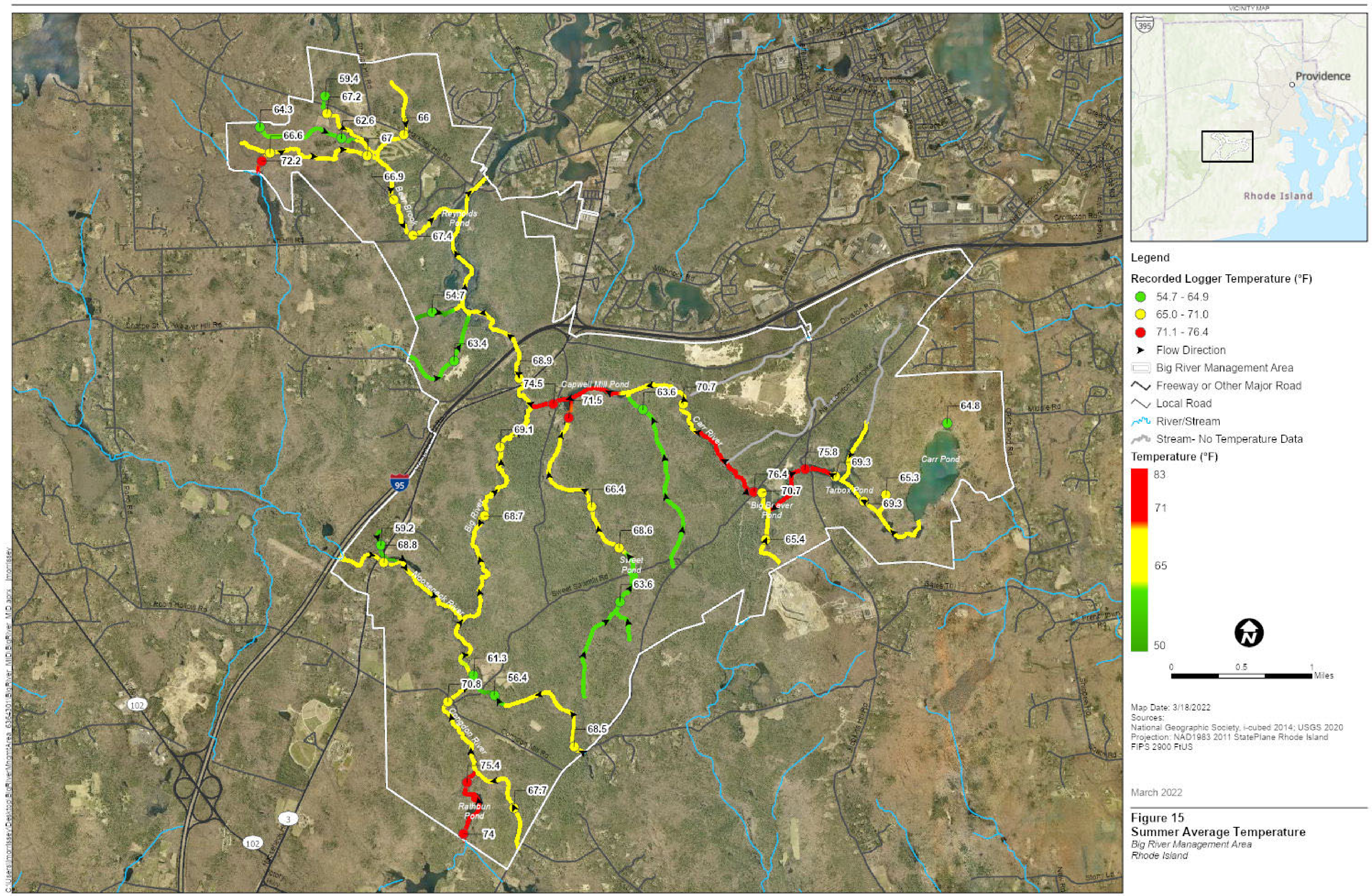


Figure 15
Summer Average Temperature
Big River Management Area
Rhode Island

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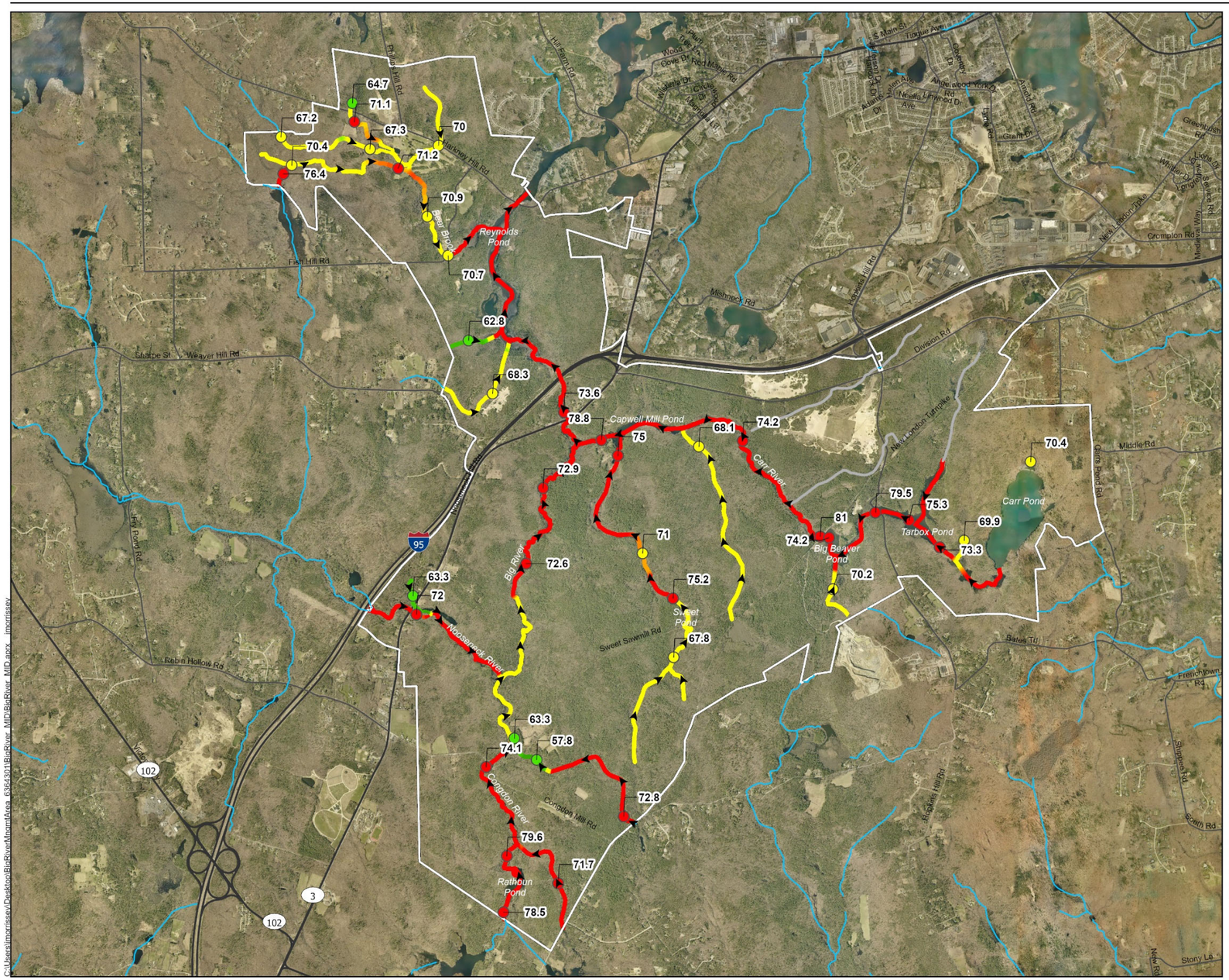

Legend

Recorded Logger Temperature (°F)
- 57.8 - 64.9
- 65.0 - 71.0
- 71.1 - 83.0
- Flow Direction
- Big River Management Area
- Freeway or Other Major Road
- Local Road
- River/Stream
- Stream- No Temperature Data

Temperature (°F)
83
71
65
50

0 0.5 1 Miles

Map Date: 3/18/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020
Projection: NAD1983 2011 StatePlane Rhode Island FIPS 2900 FtUS

March 2022

Figure 16
7-Day Maximum Temperature
Big River Management Area
Rhode Island

C:\Users\jmorrissey\Desktop\BigRiver\MgmtArea_6364301\BigRiver_MID\BigRiver_MID.aprx jmorrissey

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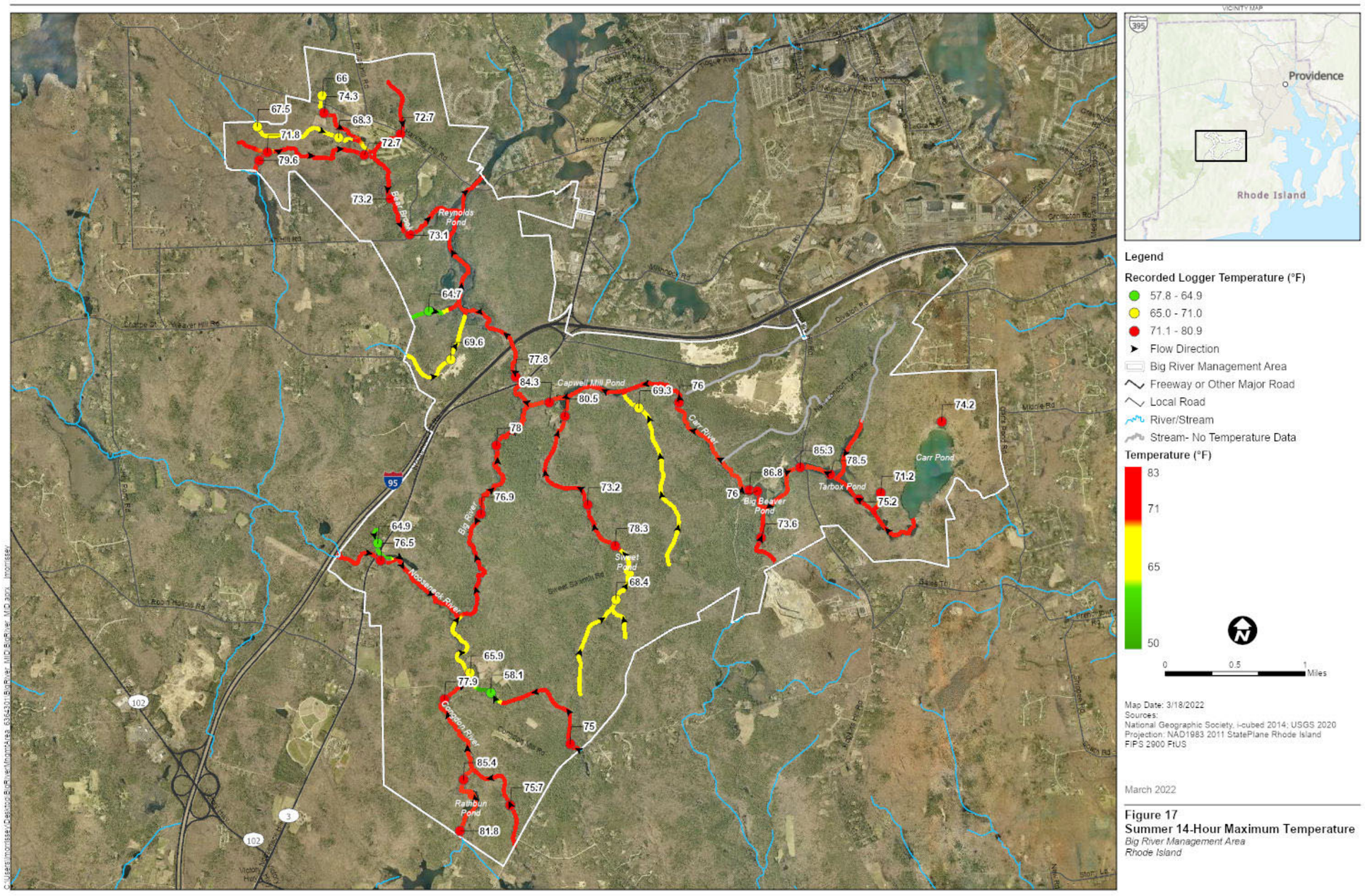

Figure 17
Summer 14-Hour Maximum Temperature
Big River Management Area
Rhode Island

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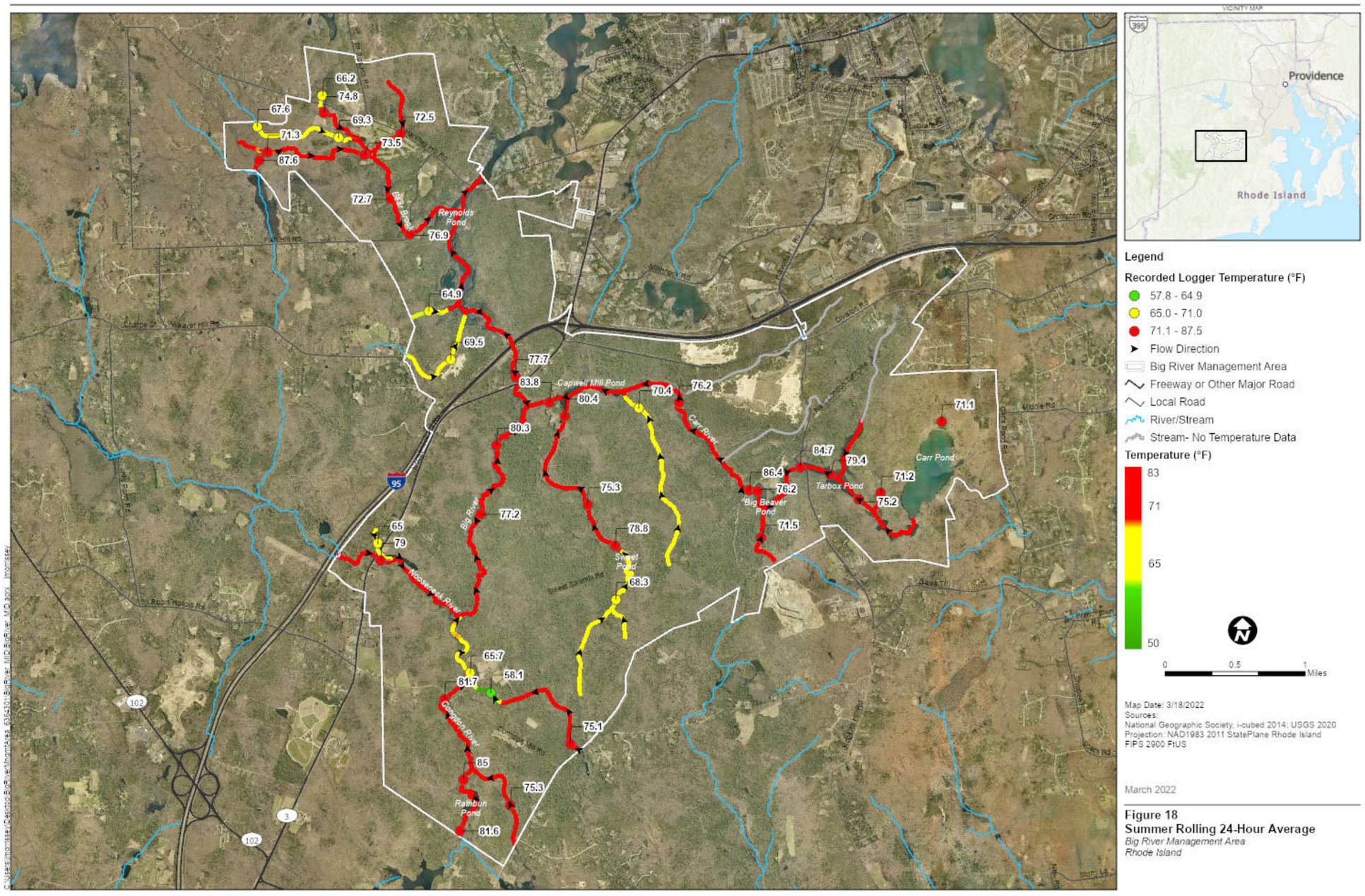

Figure 18
Summer Rolling 24-Hour Average
Big River Management Area
Rhode Island

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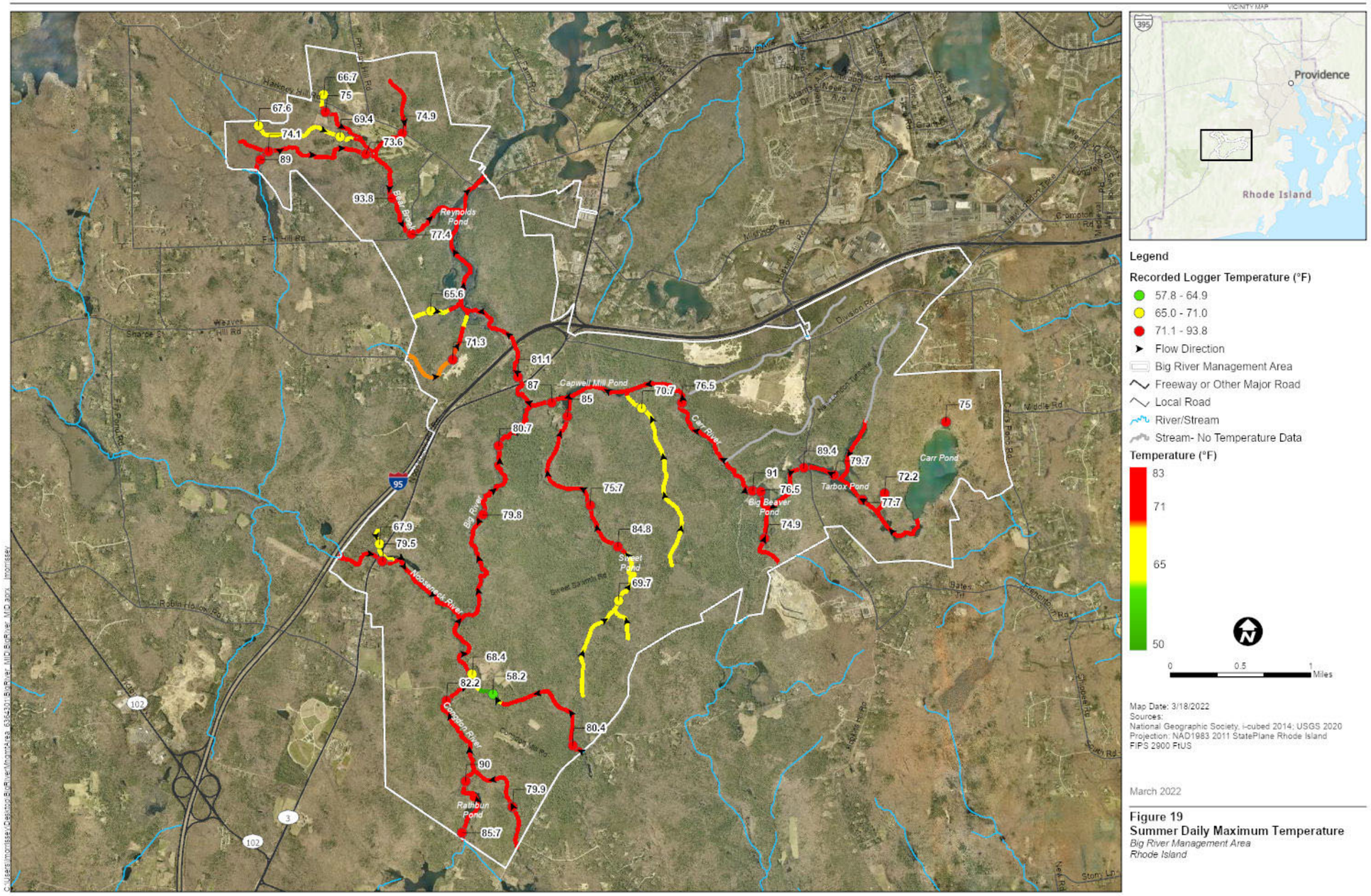

Figure 19
Summer Daily Maximum Temperature
Big River Management Area
Rhode Island

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3.2 FISHERIES SURVEYS

3.2.1 Methods

RIDEM and USFWS conducted fisheries surveys at a total of 17 sites throughout the BRMA, as shown on Figure 20 and listed in Table 3-3. These surveys were conducted using electrofishing and were performed along approximately 100-meter stream segments following methods from the American Fisheries Society manual "Standard Methods for Sampling North American Freshwater Fishes" (Bonar et al. 2009). Information about the methods used in these surveys is detailed as follows.

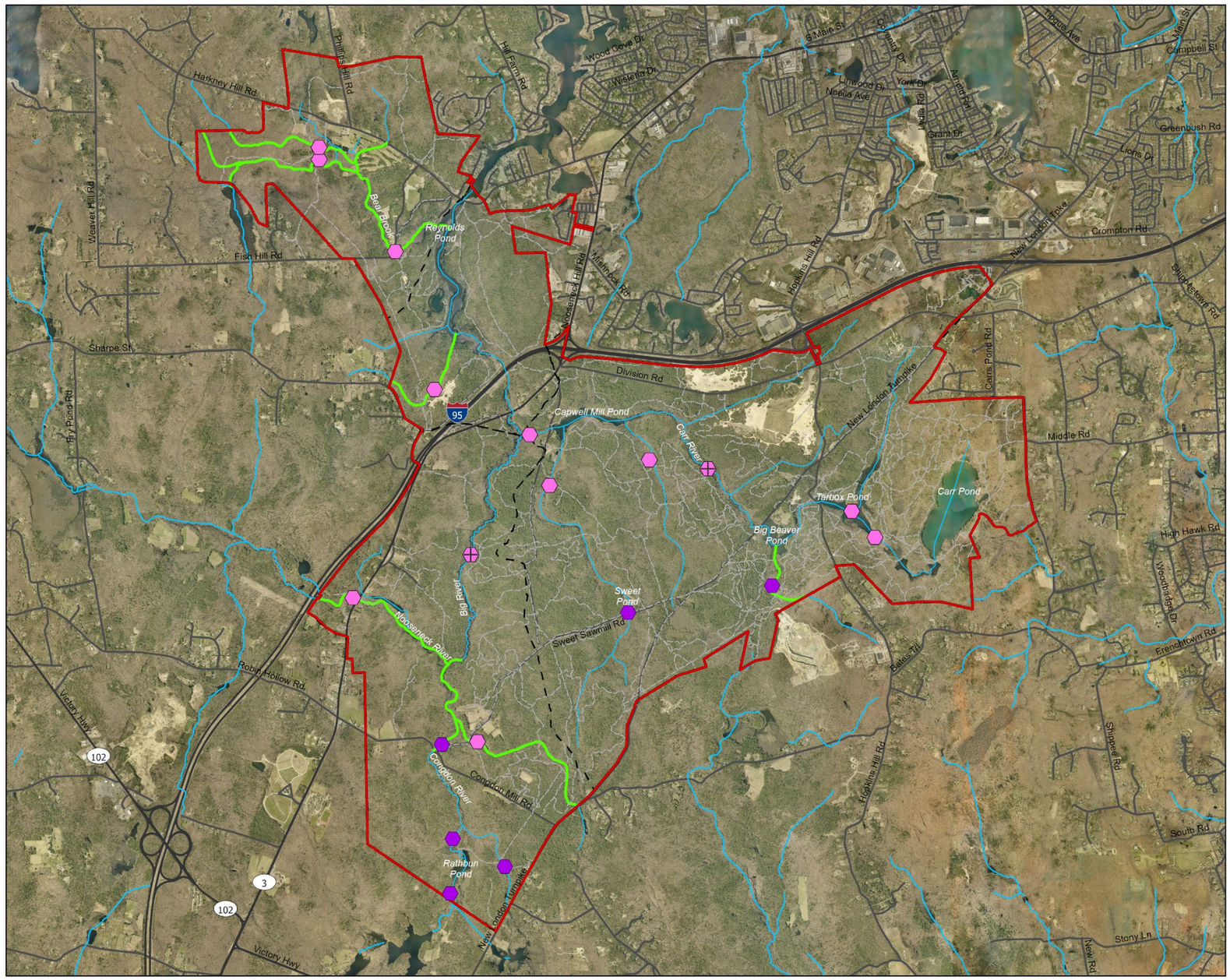
> *The "operator" used a pulsed DC backpack electro-shocker with a circular probe anode and a rat-tail cathode to expose all areas to electricity. A pulsed method is more effective than an unpulsed method but presents a higher risk of injury to fish. Effectiveness varies with target species' physical and behavioral differences and habitat use by target species. Additionally, water conductivity influences the effectiveness of the electro-shocker and was measured at each site prior to sampling to select the appropriate settings. To maximize effectiveness while minimizing fish injury, it is suggested that the electro-shocker be set to the minimum setting that will allow for fish capture.*
>
> *Upon arrival at each site, a 100 meter transect was measured by following the bank of the river or stream. The upstream end point was always strategically chosen to contain a boulder or other natural block to not allow any fish to swim further upstream. Two members of the crew walked the distance of the sampling transect and measured stream depth at three evenly spaced points. Average stream depth was calculated by adding the stream depth taken at each point and dividing by three. Notes about the location were taken and a bucket was filled with a sample of water to measure conductivity, dissolved oxygen, and pH. After logging all pertinent preliminary data, sampling commenced along the 100 meter transect. One to three "primary netters" followed the electro-shocker operator, actively capturing stunned fish near the anode with nets and placing them in buckets. At the end of the transect, one individual would measure fish using a depressed wooden measuring tool while another individual logged fish length in cm and fish species. As soon as measurements were taken and fish identified, fish were released by holding them facing upstream until they kicked away. Data were then logged digitally and prepared for analysis.*

A fish being released during electrofishing survey after identification and measurement.

Additionally, RIDEM conducted one fisheries survey in Tarbox Pond using methods from "Inland Fishes of Rhode Island" (Libby 2013). Electrofishing was conducted at night in a flat-bottom aluminum electrofishing boat equipped with a generator and two anode arrays. The cathode was insulated from the hull and mounted across the bow. Electrofishing was conducted along the entire length of the pond's shoreline. All stunned fish were netted by designated netters, and measurements of each fish were recorded before being released.

Table 3-3. Fisheries Surveys by Catchment

Catchment	RIDEM Survey Locations	USFWS Survey Locations
Northern	3	0
Central	1	0
Eastern	4	2
Western	3	4
Total	**11**	**6**



Legend

- Rivers and Streams
- Stream Segment with Found Brook Trout
- Trails
- Freeway or Other Major Road
- Local Road
- Big River Management Area
- Catchments

USFWS Electroshocking Survey Location

- Complete (6)

RIDEM Electroshocking Survey Location

- Complete (11)
- Unachievable (2)

0 0.5 1 Miles

Map Date: 3/2/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020
Projection: NAD1983 2011 StatePlane Rhode Island
FIPS 2900 FtUS

March 2022

Figure 20
Fish Survey Locations
Big River Management Area
Rhode Island

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3.2.2 Findings

Fisheries surveys revealed brook trout, along with numerous other fish species, to be present in multiple streams throughout the BRMA (see Figure 20). Young-of-year (YOY) brook trout, which refers to species born in the past year, were more prevalent than older brook trout and more prevalent than non-trout species. Brook trout were generally measured between six and fifteen centimeters (cm), although both large and small outliers were documented (Exhibits 4-11). An unnamed tributary to Congdon Brook netted the most individual brook trout and the highest extrapolated values for brook trout per mile (Table 3-4; Exhibit 12). The tables and exhibits below, do not include Tarbox Pond and one stream with "no catch" of any brook trout. The majority of streams that were found to contain brook trout contained approximately 200 brook trout per mile (Exhibit 12). Overall, throughout the study, common species captured other than brook trout were chain pickerel, largemouth bass, and redfin pickerel (Table 3-4).

3.2.2.1 Rivers and Streams

Exhibit 4. Frequency of Brook Trout in Each Size Class at Bear Brook

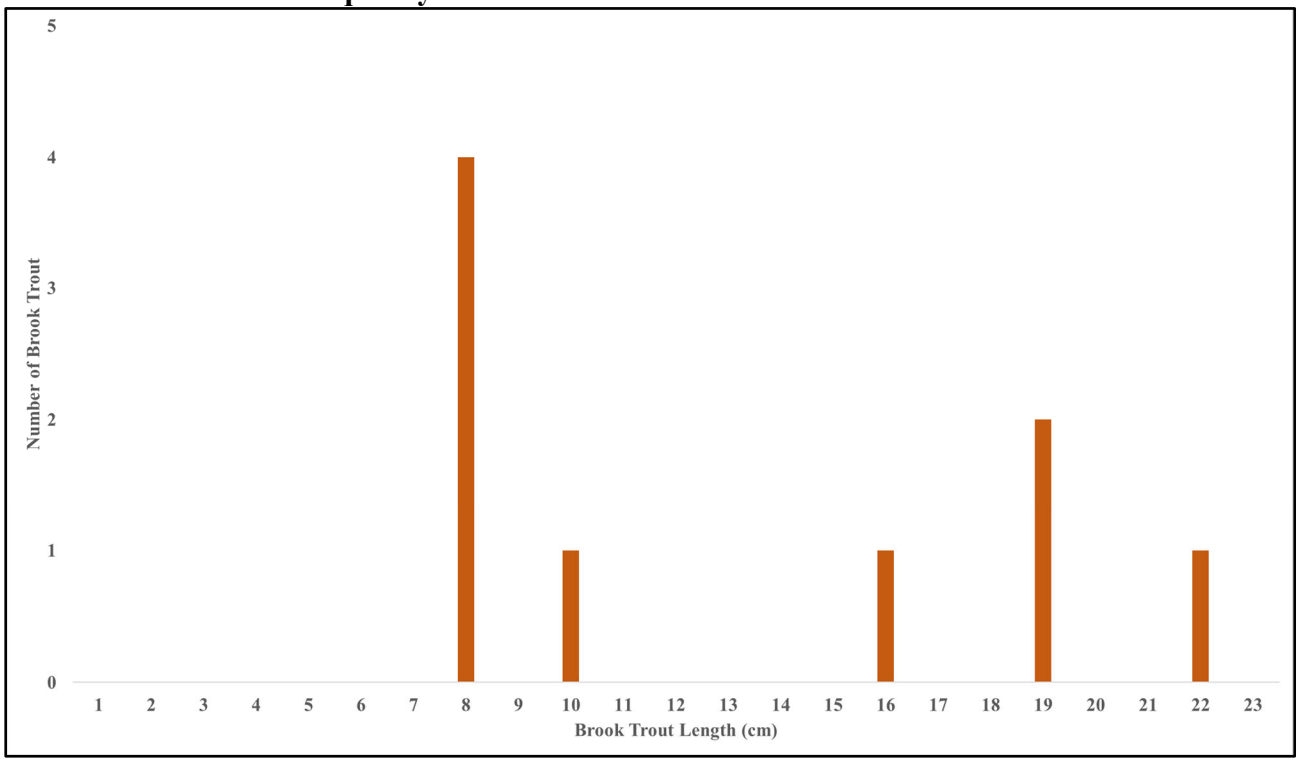

Exhibit 5. Frequency of Brook Trout in Each Size Class at Bear Brook Tributary 1

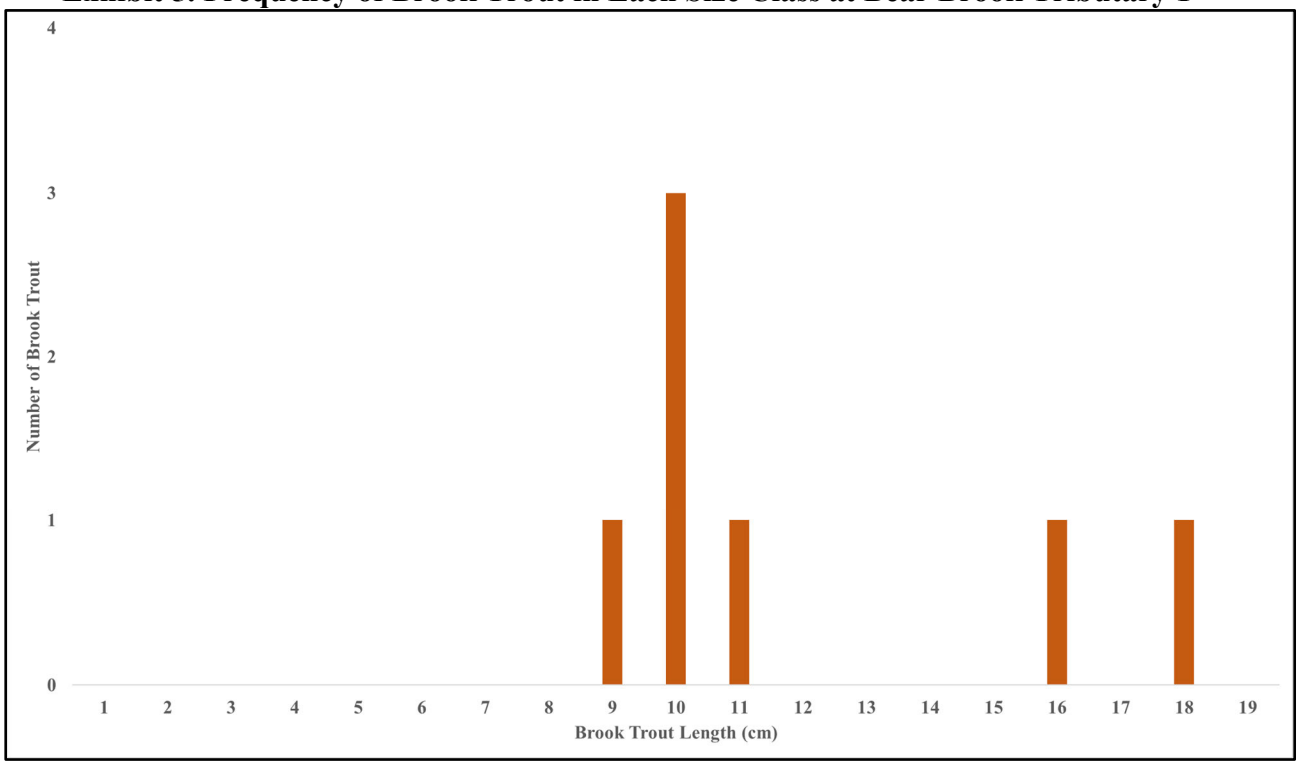

Exhibit 6. Frequency of Brook Trout in Each Size Class at Bear Brook Tributary 2

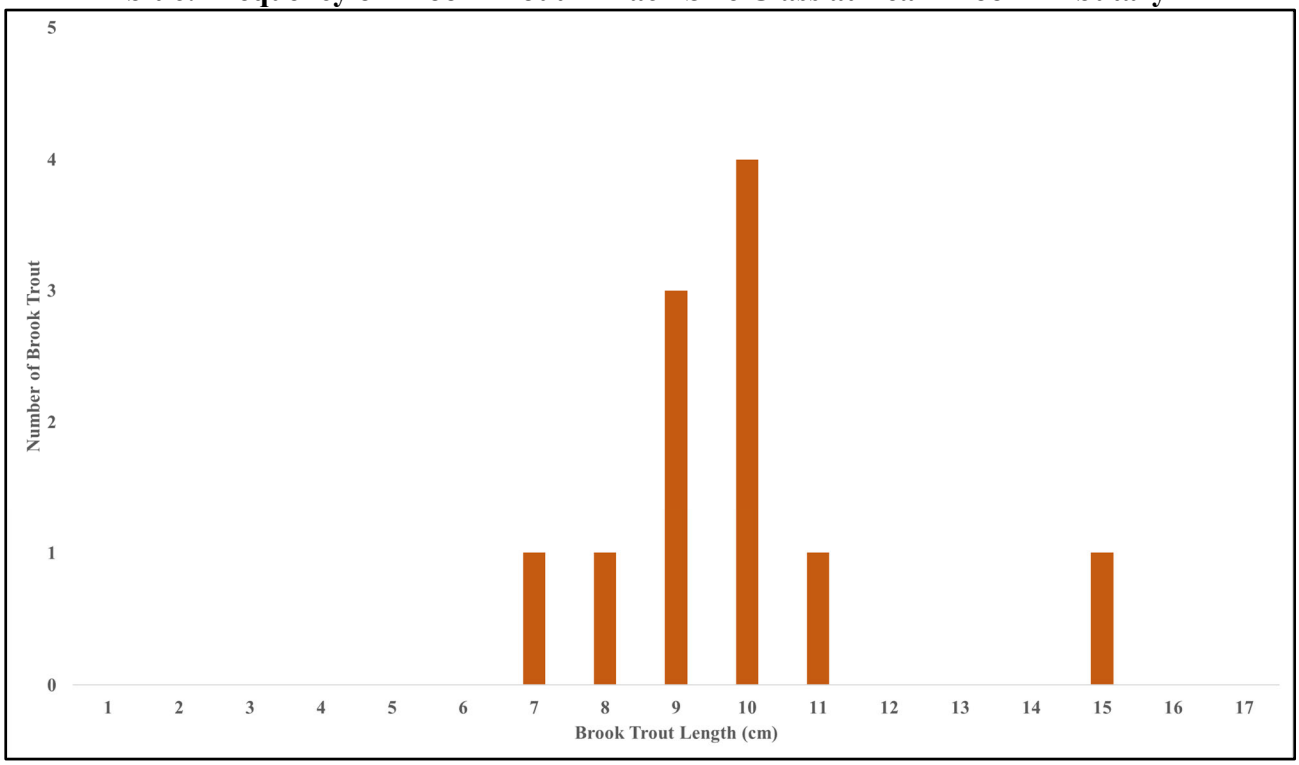

Exhibit 7. Frequency of Brook Trout in Each Size Class at Nooseneck River

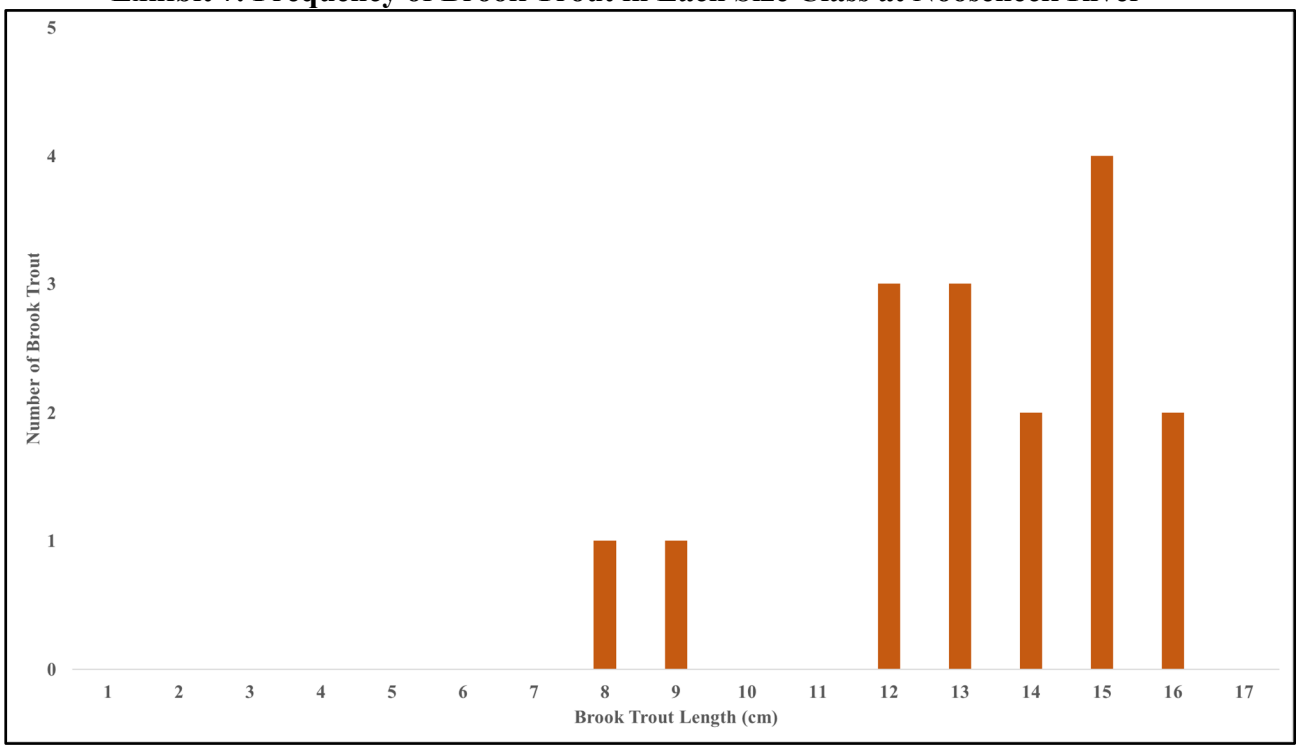

Exhibit 8. Frequency of Brook Trout in Each Size Class at Big River Tributary

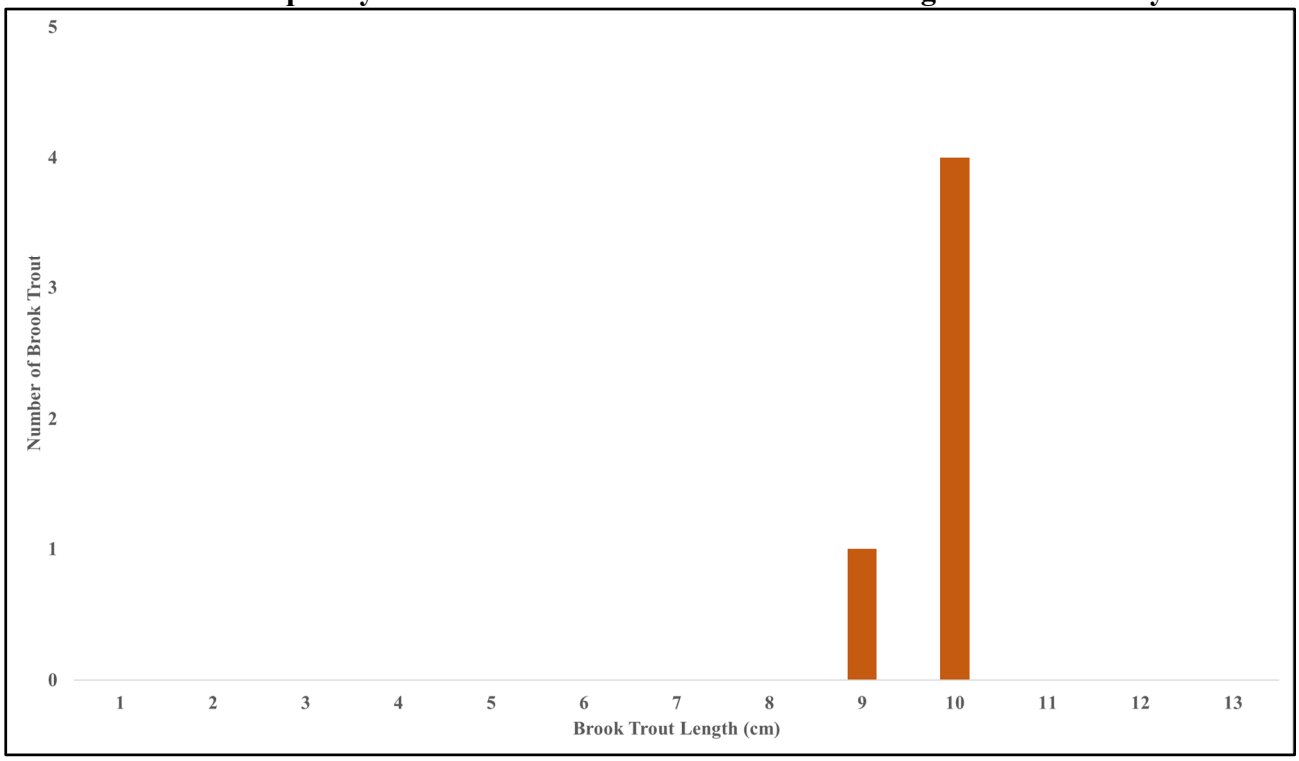

Exhibit 9. Frequency of Brook Trout in Each Size Class at Congdon Brook Unnamed Tributary

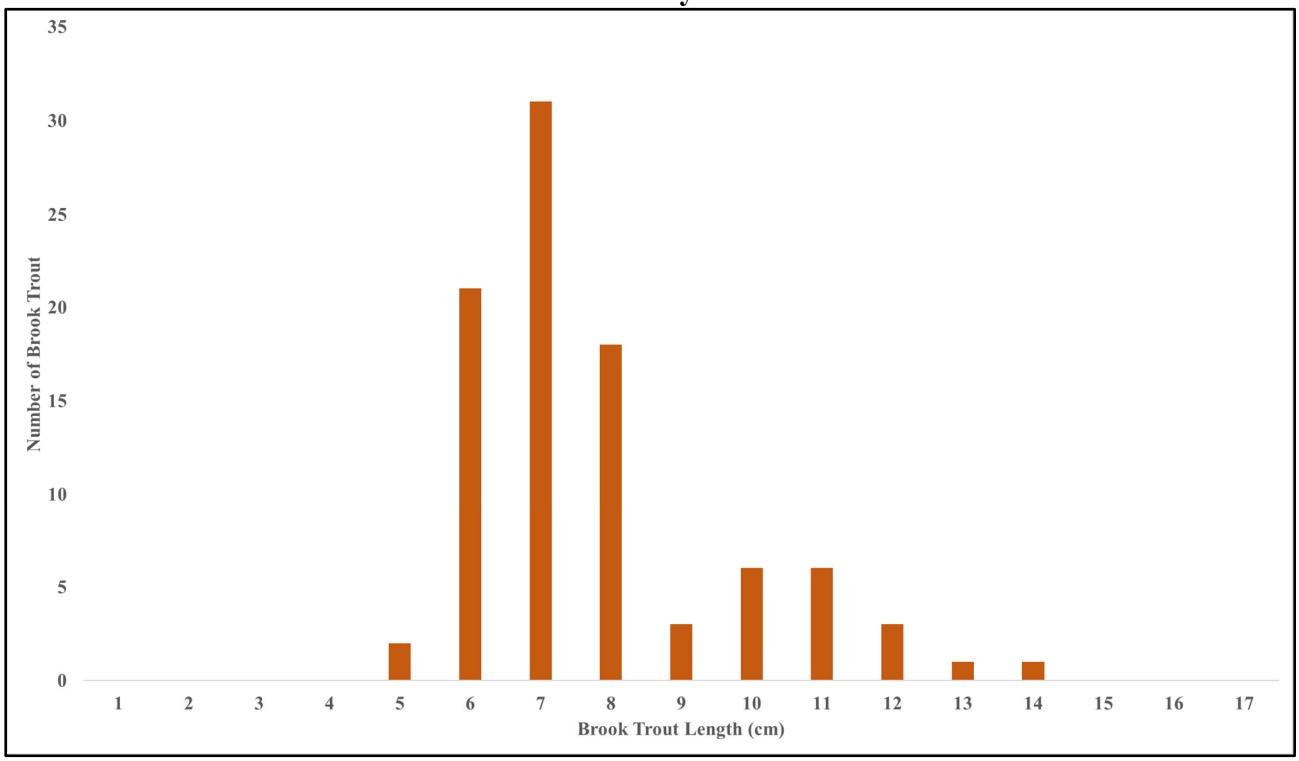

Exhibit 10. Frequency of Brook Trout in Each Size Class at Carr River Unnamed Tributary

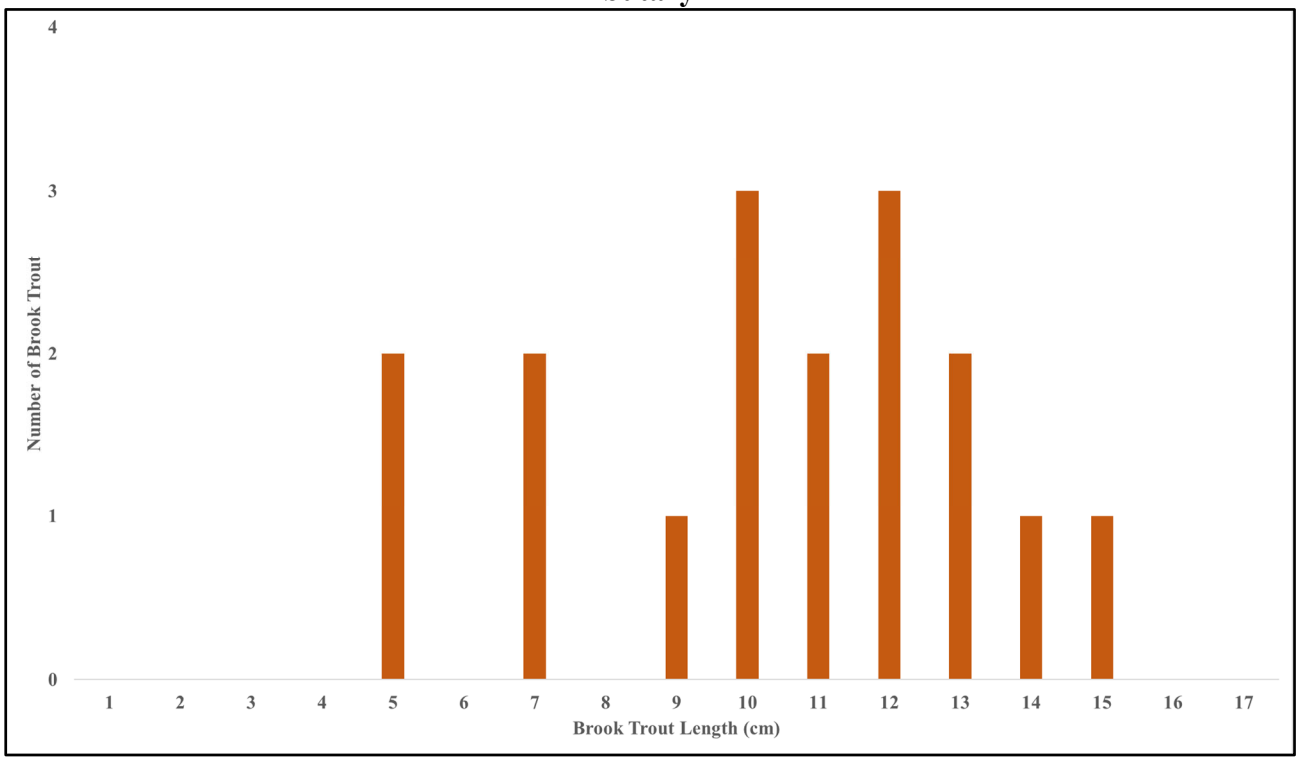

Exhibit 11. Frequency of Brook Trout in Each Size Class at Congdon River

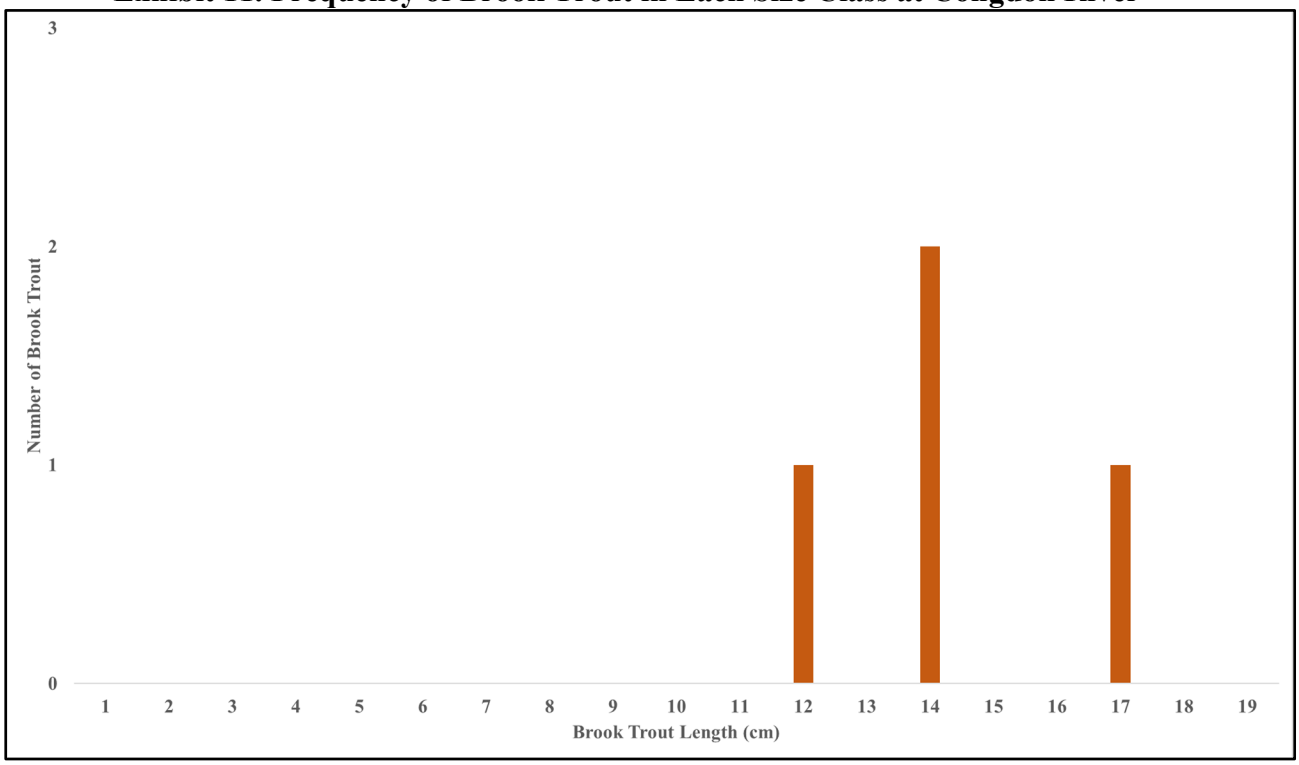

Exhibit 12. Brook Trout Density per Mile

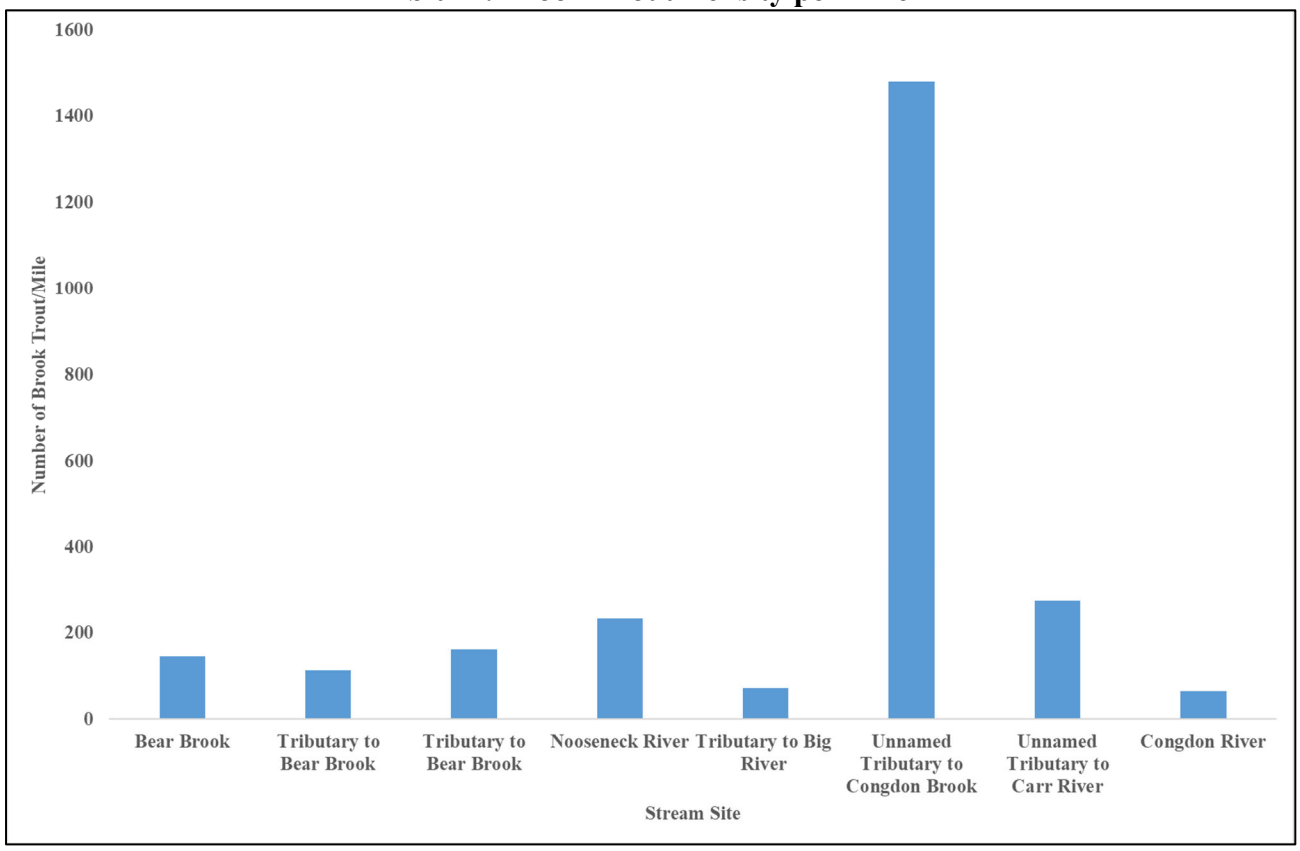

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Table 3-4. Fisheries Survey Data

						size class 1: 2-29 cm, size class 2: 30-57 cm																																	
						2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29								
Stream	**Date**	**Location**	**Species**	**Total #**	**Size Class (1or2)**	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	**Total Measured:**							
Unnamed Tributary	7/14/2021	New London Turnpike: 41.599681, -71.613172	BB	13	1						2	6	4	1																				13						
			GS	10	1					2	2	2		2	2																			10						
			RF	3	1									1		2																		3						
Congdon River	7/14/2021	Downstream of Rathbun Pond: 41.603686, -71.619377	BG	18	1				1	2	7	5	3																				18						
			LMB	1	1			1																										1						
			BB	5	1		1	2	2																									5						
			CP	1	1							1																						1						
			GS	1	1																		1											1						
			AE	1	1																			1										1						
	7/14/2021	Between Millbrook Pond and Rathbun Pond: 41.598643, -71.620678	GS	2	1								2																					2						
			FF	5	1									2	2	1																		5						
			CP	2	1							1	1																					2						
Bear Brook	7/14/2021	Fish Hill Rd: 41.660022, -71.627727	BK	9	1							4		1						1			2			1								9						
			RF	4	1					1						1		1	1															4						
			BG	1	1					1																								1						
			LMB	3	1			3																										3						
			AE	1	1																					1								1						
Tributary to Bear Brook	7/14/2021	Off Harkney Hill Rd, W of golf course, 1st stream from road: 41.670246, -71.637997	BK	7	1								1	3	1					1		1											7						
			LMB	2	1				2																									2						
	7/14/2021	Off Harkney Hill Rd, W of golf course, 2nd stream from road: 41.669316, -71.637880	BK	11	1						1	1	3	4	1				1															11						
			RF	2	1								1						1															2						
			CP	1	1							1																						1						
			LMB	1	1				1																									1						
Nooseneck River	7/20/2021	Route 3: 41.627118, -71.633497	FF	8	1					1	2	4	1																					8						
			BK	16	1							1	1			3	3	2	4	2														16						
			CP	1	1									1																				1						
			BB	1	1												1																	1						
			WS	1	1				1																									1						
Tributary to Big River	7/20/2021	Weaver Hill Rd.: 41.646992, -71.622850	BK	5	1								1	4																				5						
Capwell Mill Brook	7/20/2021	Below Dam on Burnt Sawmill Rd: 41.637709, -71.607923	LM	1	2									1																				1						
			BG	3	1						1						1		1															3						
			YP	3	1										1		1		1															3						
			CP	1	1										1																				1						
			PS	1	1							1																							1						
Unnamed Tributary to Carr River	7/20/2021	Cardi Corp: 41.628005, -71.579343	BT	17	1				2		2		1	3	2	3	2	1	1															17						
Unnamed Tributary	7/20/2021	Bog at Sweet Pond: 41.624453, -71.598037	RF	9	1			2		2	3	1									1													9						
			BS	2	1	2																												2						
Congdon River	7/20/2021	Congden Mill Road: 41.612662, -71.621618	LMB	7	1				1	5	1																							7						
			FF	6	1								4	1	1																			6						
			BT	4	1											1		2			1													4						
			RF	2	1						1						1																	2						
			BC	1	1								1																					1						
			SF	1	1					1																								1						
Tributary to Capwell Mill Pond	9/15/2021	Between pond and wetland (stream from Sweet Pond): 41.638175°, -71.607914°	CP	2	1							1																1					2						
			CP	1	2	1																												1						
Muddy Bottom Brook	9/15/2021	Access from trail off Burnt Sawmill Rd, SE corner of Capwell Mill Pond: 41.640163, -71.595154	RF	3	1				1	1	1																							3						
Unnamed Tributary to Congdon Brook	9/23/2021	Access Road (Old New Longdon Tpk) from Congdon Mill Rd below small pond: 41.612932, -71.617189	BT	92	1				2	21	31	18	3	6	6	3	1	1																92						

BK, BT = brook trout, BB = brown bullhead, GS = golden shiner, BG = bluegill, RF = redfin pickerel, AE = American eel, FF = fallfish, LMB = largemouth bass, CP = chain pickerel, WS = white sucker, YP = yellow perch, PS = pumpkin seed.

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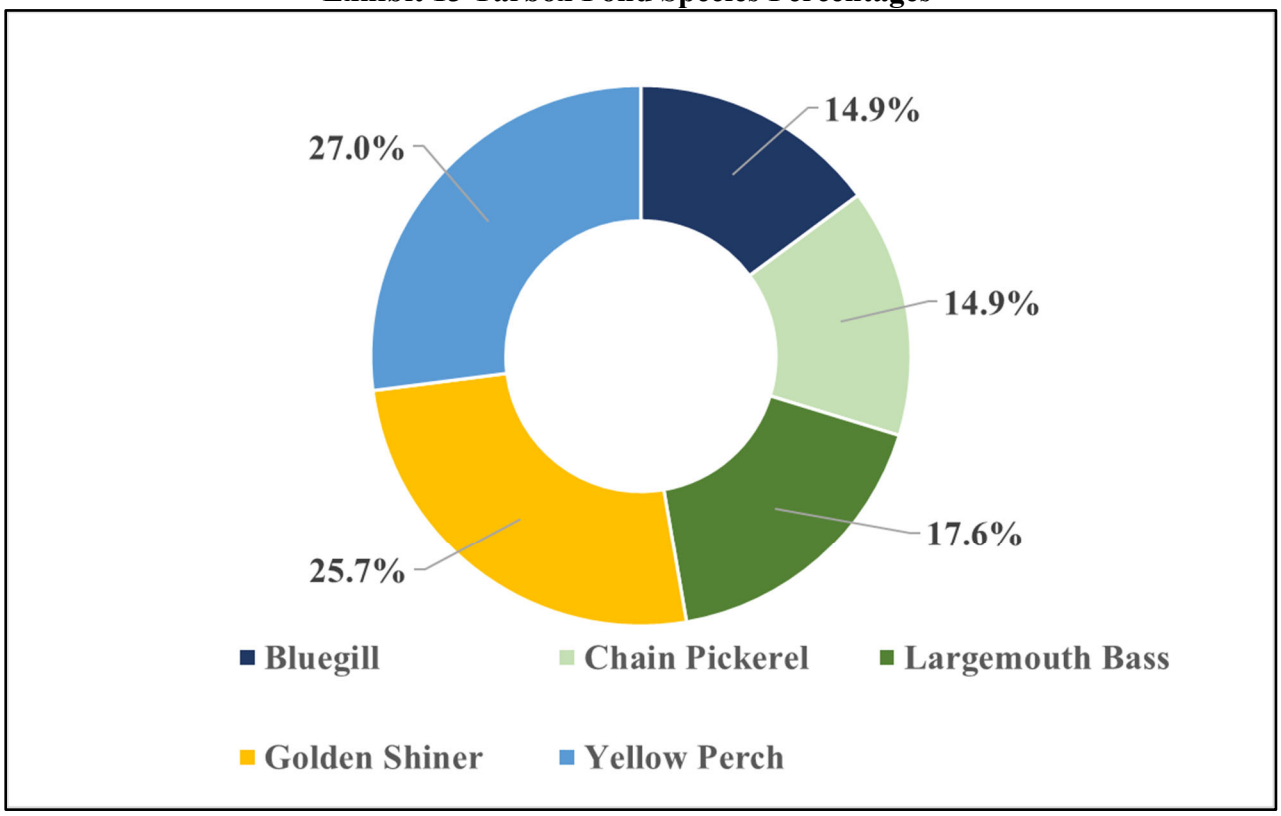
3.2.2.2 Lakes and Ponds

The fishery survey from Tarbox Pond captured a total of 74 fish, including yellow perch, golden shiner, largemouth bass, chain pickerel, and bluegill (see Exhibit 13).

Exhibit 13 Tarbox Pond Species Percentages



3.2.3 Discussion

Although brook trout were not found in every stream sampled, many of the areas sampled had temperatures suitable for brook trout habitat. Additionally, since each site was only sampled a single time on a 100 meter transect, more surveys are necessary to better quantify the extent of brook trout populations in the BRMA. However, the presence of brook trout at numerous sites is enough to formulate further hypotheses about the health of stream ecosystems in the BRMA. Further, RIDEM provided EA with data from other brook trout fish surveys conducted throughout Rhode Island. The range of brook trout density per mile was from 101.159 to 844.904 and the average density of brook trout per mile was 598.525. These data were sourced from Phillips Brook, the Beaver River, Meadow Brook, the Falls River, Fisherville Brook, Locke Brooke, the Wood River, Breakheart Brook, Brushy Brook, Bear Brook, and two different segments of Acid Factory Brook. Most of the sites sampled in this study had a density of approximately 200 brook trout per mile and further investigation could reveal data closer to the previously observed average density of brook trout per mile.

In order to accurately assess a fish's age, scale samples must be taken and processed which is a difficult and time-consuming undertaking. However, fish ages can often be estimated by using

body length. Brook trout size to age ratio can vary by waterbody, but general brook trout age estimates in Rhode Island are as follows as detailed in Guthrie, Stolgitis, and Bridges (1973); Fish aged 0-1 year old are less than 10 cm. Fish aged 1-2 years old are 10-18 cm. Fish aged 2 years and up are >18 cm. Per the data above, all brook trout caught as part of the electrofishing outings are estimated to be under two years old. Although the state of Rhode Island does stock some of the waters in the BRMA hydraulically connected to the sampled tributaries, none of the fish collected were stocked by RIDEM. RIDEM informed EA that almost all of their stocked trout are greater than 25 cm long and most of them are greater than 30 cm, so all fish sampled are believed to be individuals of wild naturally reproducing populations. Additionally, during stream surveys brook trout were visually confirmed by biologists to be of wild origin.

Understanding the ages of brook trout throughout the BRMA is important to understanding if and where brook trout are spawning. If brook trout are spawning throughout the BRMA, then the water quality is sufficient to allow the trout to not only reside in the streams within the BRMA but have a persistent and self-sustaining population. Brook trout require cold, well-oxygenated, high-quality water and, as such, are tremendous indicators of water-quality. Their presence and reproduction would indicate that the BRMA as a main Rhode Island watershed, is providing quality water to the citizens of Rhode Island. Brook trout presence or absence can also assist in identifying problem areas throughout the BRMA that need to be addressed. Illicit activity including motorized vehicle use and trash dumping was observed consistently throughout the course of this study. These activities present a risk to stream habitat and water quality. Working to eliminate or mitigate these activities would preserve both brook trout as a natural spectacle and game fish, as well as preserve water quality for Rhode Island citizens.

In Tarbox Pond a variety of warmwater species were caught (Exhibit 13). YOY individuals of both largemouth bass and chain pickerel were captured, and 36% of the largemouth bass population and 69% of chain pickerel were YOY. Both largemouth bass and chain pickerel are voracious predators and likely heavily predate on the other species observed in Tarbox Pond. Bluegills and golden shiners are especially at risk to predation due to each species' smaller size and the golden shiner's lack of defense mechanisms. Since largemouth bass and species of pickerel were observed in streams where brook trout were observed, they can present a risk to both juvenile and adult brook trout. No brook trout were found in the survey at Tarbox Pond, which is classified as a warmwater impoundment by RIDEM, and is characteristically unsuitable habitat for brook trout.

3.3 CULVERT AND BARRIER ASSESSMENTS

3.3.1 Methods

EA conducted visual culvert and barrier assessments at 36 culvert crossings and 14 dams within the BRMA (Figures 21-24; Table 3-5).

Table 3-5. Dams and Culverts by Catchment

Catchment	Dams	Culverts
Northern	6	10
Central	0	1
Eastern	5	14

Western	3	11
Total	**14**	**36**

EA used the Rhode Island Department of Transportation (RIDOT) road-stream crossing methods, which includes assessments of aquatic organism passage (AOP), structural components, hydraulic capacity components, geomorphic components, and stream conditions (RIDOT 2019). The RIDOT methods are comparable to the University of Massachusetts North Atlantic Aquatic Connectivity Collaborative (NAACC) methods. Data for each culvert and road-stream crossing was entered into the NAACC database, which calculates a score for fish and wildlife passability for each crossing (NAACC 2022).

NAACC uses a Coarse Screen scoring system, as well as a numeric scoring system, to assess the condition and AOP ability of culverts and other crossings. The coarse screen establishes one of three AOP options which are Full AOP, Reduced AOP, and No AOP. To determine the AOP option, NAACC considers the inlet and outlet grade, outlet drop variables, inlet or outlet water depth, structure substrate, and physical barrier severity. A "Full AOP" structure can accommodate the passage of aquatic organisms with ease while a "No AOP" structure likely contains severe barriers, a misaligned crossing, or freefall. A "Reduced AOP" structure falls somewhere in between.

EA developed a rapid assessment method and accompanying assessment form to assess the dams and barriers in the BRMA. Methods were adapted from the RIDOT road-stream crossing assessment form as well as from dam assessment methods from various states and agencies to determine the most important parameters to evaluate. The assessment forms include information on the dam material, flow condition, elevation, barriers, and surrounding vegetation. Ultimately the goal of EA's dam assessments was to determine the condition of the dams, barriers, and overall ability for aquatic organisms to pass.

3.3.2 Findings

The results of culvert and dam assessments are tabulated in Tables 3-6 and 3-7. Locations of the culverts with corresponding AOP coarse screen scores and locations of the dams are shown on Figures 21-24.

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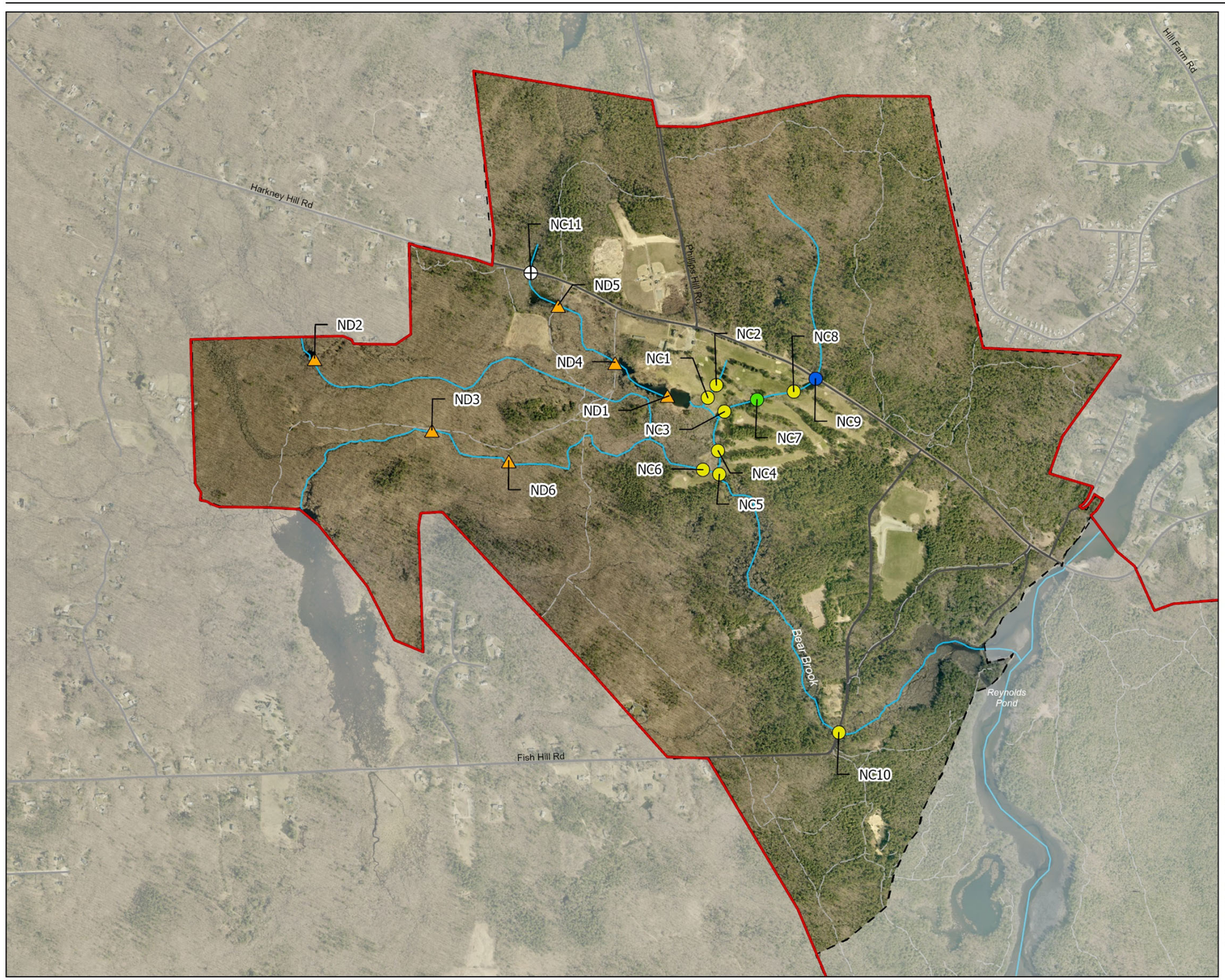

Map Date: 3/2/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020
Projection: NAD1983 2011 StatePlane Rhode Island FIPS 2900 FtUS

March 2022

Figure 21
BRMA Northern Catchment - Culvert and Barrier Assessment
Big River Management Area
Rhode Island

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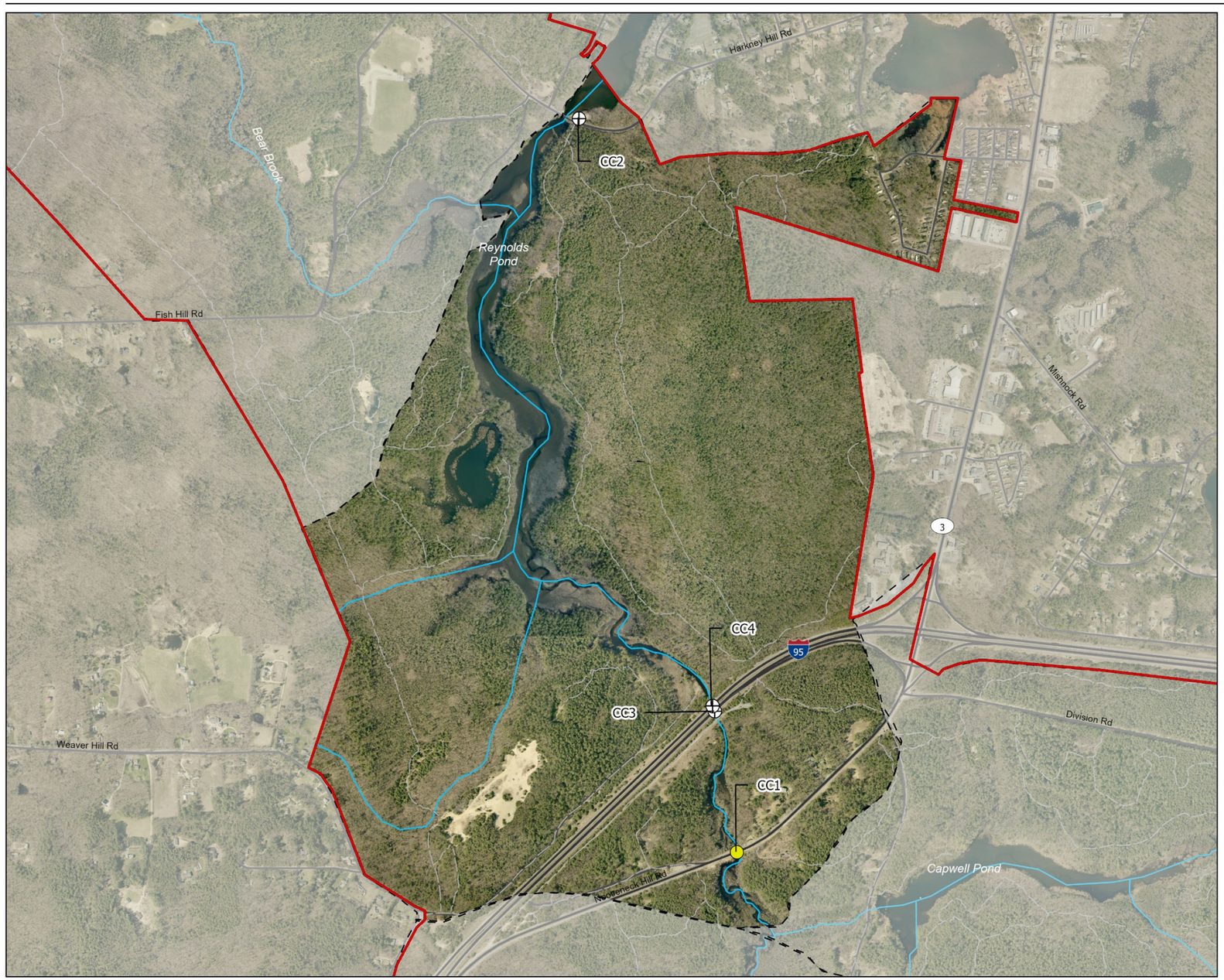

Legend

- Streams
- BRMA Trails
- Freeway or Other Major Road
- Local Road
- Big River Management Area
- Catchments

Culvert Aquatic Organism Passability

- Reduced AOP (1)
- Unaccessable for Assessment (3)

0 500 1,000 Feet

Map Date: 3/2/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020
Projection: NAD1983 2011 StatePlane Rhode Island
FIPS 2900 FtUS

March 2022

Figure 22
BRMA Central Catchment -
Culvert and Barrier Assessment
Big River Management Area
Rhode Island

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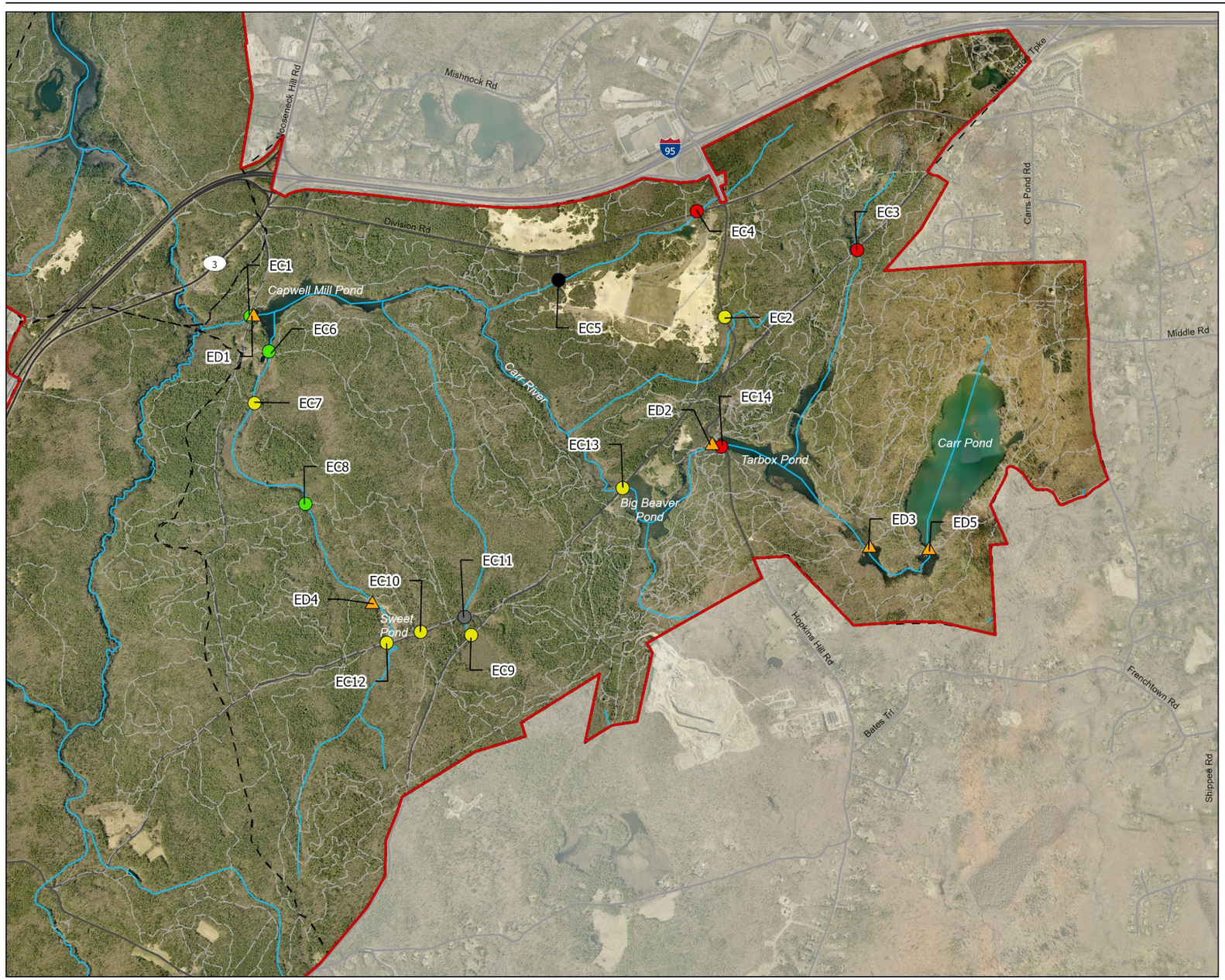

Legend

- Streams
- BRMA Trails
- Freeway or Other Major Road
- Local Road
- Big River Management Area
- Catchments
- Dam Assessment Location

Culvert Aquatic Organism Passability

- Full AOP (3)
- No AOP (3)
- Reduced AOP (6)
- Dry (1)
- Flooded (1)

0 1,000 2,000 Feet

Map Date: 3/2/2022
Sources:
National Geographic Society, i-cubed 2014; USGS 2020
Projection: NAD1983 2011 StatePlane Rhode Island
FIPS 2900 FtUS

March 2022

Figure 23
BRMA Eastern Catchment-
Culvert and Barrier Assessment
Big River Management Area
Rhode Island

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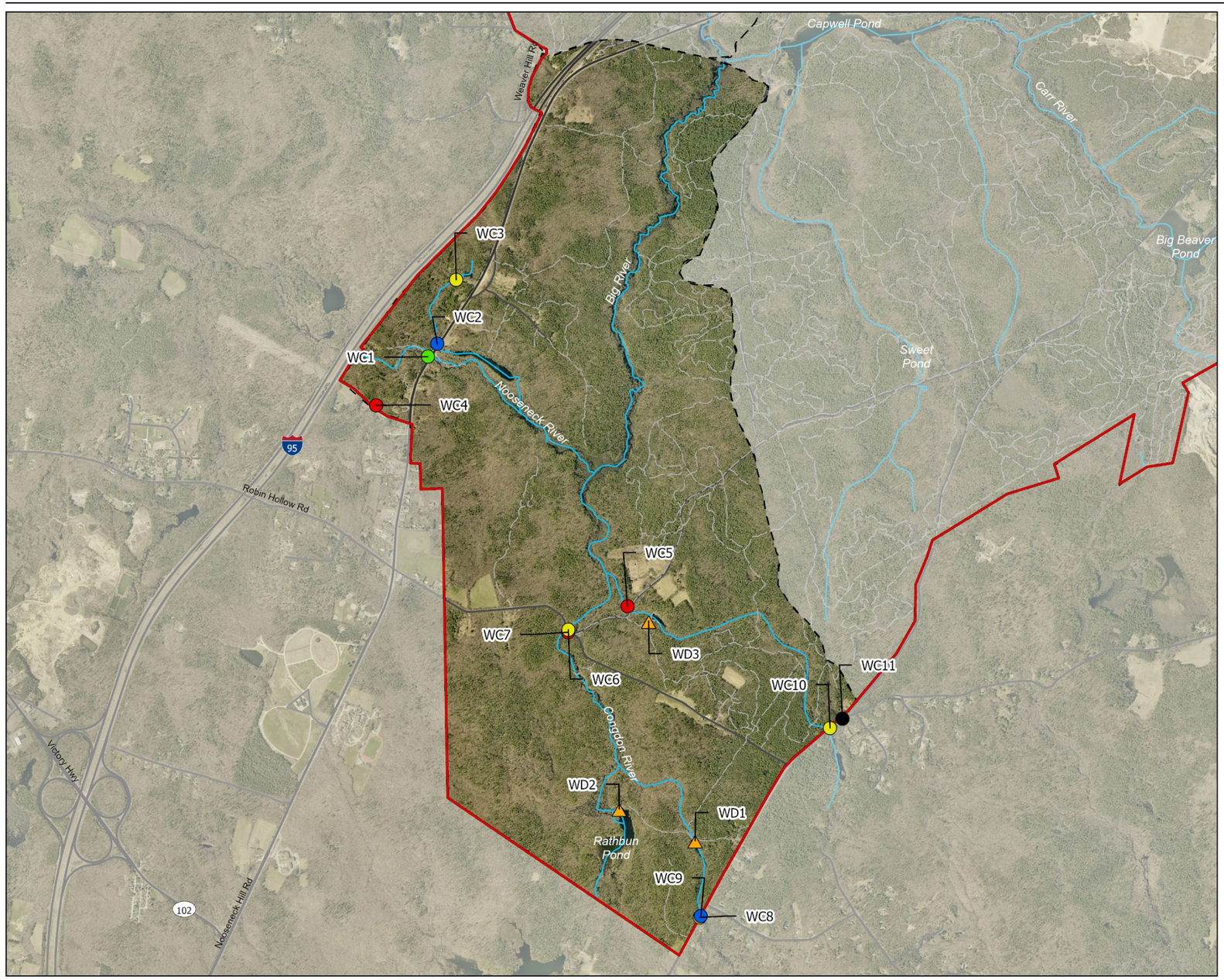

Figure 24
BRMA Western Catchment-
Culvert and Barrier Assessment
Big River Management Area
Rhode Island

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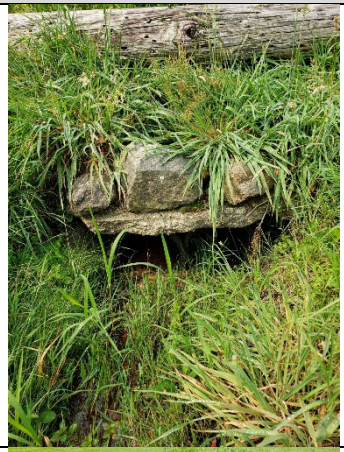
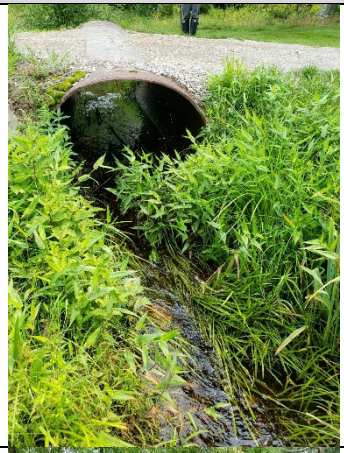
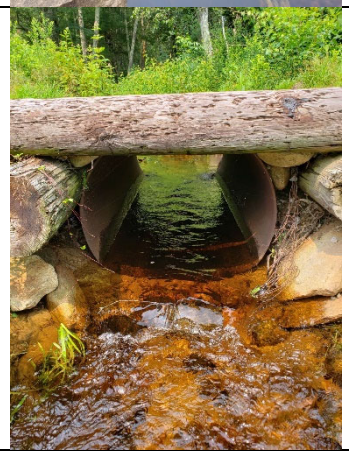
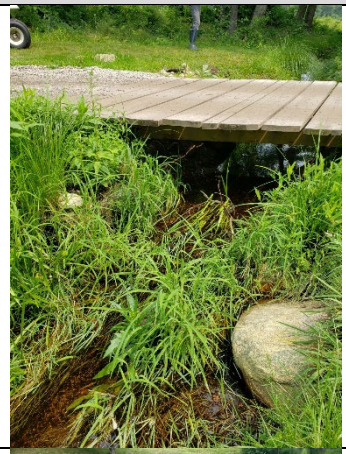
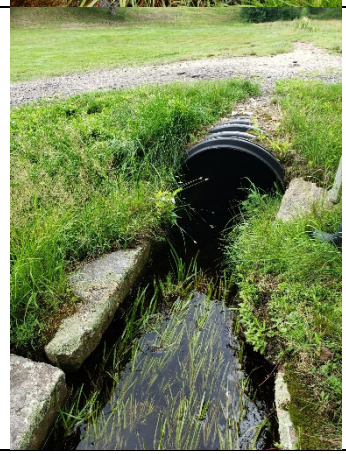
Table 3-6. Culvert Assessment Findings

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
NC1	xy4167016771633280 (NAACC) xy41670187163328 (RIDOT)	41.67018, -71.63328	Golf Course Path	Bear Brook Tributary	Insignificant Barrier	Reduced AOP	
NC2	xy4167053071632937 (NAACC) xy41670547163296 (RIDOT)	41.67054, -71.63296	Golf Course Path	Bear Brook Tributary	Minor Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
NC3	xy4166976571632590 (NAACC) xy41669687163253 (RIDOT)	41.66968, -71.63253	Golf Course Path	Bear Brook	Insignificant Barrier	Reduced AOP	
NC4	xy4166860471632861 (NAACC) xy41668637163279 (RIDOT)	41.66863, -71.63279	Golf Course Path	Bear Brook	Minor Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
NC5	xy4166791271632802 (NAACC) xy41667947163286 (RIDOT)	41.66799, -71.63286	Golf Course Path	Bear Brook	Minor Barrier	Reduced AOP	
NC6	xy4166806471633469 (NAACC) xy41668057163348 (RIDOT)	41.66805, -71.63348	Golf Course Path	Bear Brook Tributary	Minor Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
NC7	xy4167011471631335 (NAACC) xy41670027163136 (RIDOT)	41.67002, -71.63136	Golf Course Path	Bear Brook	Insignificant Barrier	Full AOP	
NC8	xy4167036071629876 (NAACC) xy41670497162986 (RIDOT)	41.67049, -71.62986	Golf Course Path	Bear Brook	Minor Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
NC9	(No NAACC) xy41670657162911(RI DOT)	41.67065, -71.62911	Golf Course Path	Bear Brook	Outlet Only	No score-missing data	
NC10	xy4166033071628090 (NAACC) xy416603307162809 (RIDOT)	41.660335, -71.628096	Fish Hill Road	Bear Brook	Minor Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
CC1	xy4164487371612678 (NAACC) xy41644987161292 (RIDOT)	41.64498 -71.61292	Route 3	Big River	Insignificant Barrier	Reduced AOP	
EC1	xy4164324171607873 (NAACC) xy4164324171607873 (RIDOT)	41.643241, -71.607873	Burnt Sawmill Road	Carr River	Insignificant Barrier	Full AOP	

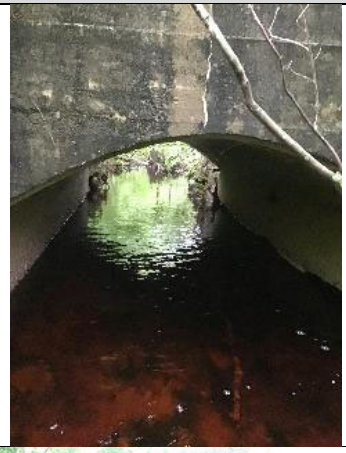
Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
EC2	xy4164307071573013 (NAACC) xy41643067157301 (RIDOT)	41.64307, -71.573013	Hopkins Hill Road	Unnamed Stream	Minor Barrier	Reduced AOP	
EC3	xy4164681471563656 (NAACC) xy41646817156365 (RIDOT)	41.646814, -71.563656	New London Turnpike	Unnamed Stream	Moderate Barrier	No AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
EC4	xy4164901371575203 (NAACC) xy41648967157533 (RIDOT)	41.648966, -71.57534	Division Street`	Unnamed Stream	Moderate Barrier	No AOP	
EC5	NA	41.645238, -71.585315	Trail off of Division Road	Unnamed Stream	DRY	DRY	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
EC6	xy4164128871606537 (NAACC) xy41641287160653 (RIDOT)	41.64128832, -71.6065367	Foot Trail	Unnamed Stream	Insignificant Barrier	Full AOP	
EC7	xy4163836771607651 (NAACC) xy41638367160765 (RIDOT)	41.63836745, -71.6076511	Steeple Chase Trail	Unnamed Stream	Insignificant Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
EC8	xy4163298471603982 (NAACC) xy41632987160398 (RIDOT)	41.63298442, -71.6039815	Unnamed Trail	Unnamed Stream	Insignificant Barrier	Full AOP	
EC9	xy4162579471591657 (NAACC) xy41625797159165 (RIDOT)	41.62579367, -71.5916565	New London Turnpike	Unnamed Stream	Minor Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
EC10	xy4162588971595502 (NAACC) xy41625887159550 (RIDOT)	41.62588927, -71.5955017	New London Turnpike	Unnamed Stream	Insignificant Barrier	Reduced AOP	
EC11	xy41626997159216 (RIDOT)	41.62699, -71.59216	Sweet Sawmill Road	Unnamed Stream	Flooded	Flooded	

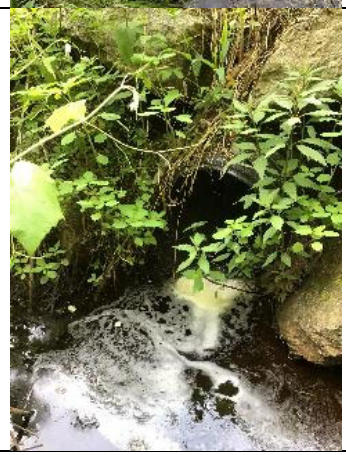
Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
EC12	xy4162536671598073 (NAACC) xy41625367159807 (RIDOT)	41.62536632, -71.5980732	New London Turnpike	Sweet Pond Tributary	Insignificant Barrier	Reduced AOP	
EC13	xy4163388571580606 (NAACC) xy4163388571580606 (RIDOT)	41.633885, -71.580606	New London Turnpike	Carr River	Moderate Barrier	Reduced AOP	
EC14	xy4163615271573399 (NAACC) xy4163615271573399 (RIDOT)	41.636152, -71.573399	Hopkins Hill Road	Carr River	Severe Barrier	No AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
							
WC1	xy4162684171632513 (NAACC) xy4162684171632513 (RIDOT)	41.62684, -71.632672	Nooseneck Hill Road	Nooseneck River	Insignificant Barrier	Full AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
WC2	xy4162736671632094 (NAACC) xy41627287163209 (RIDOT)	41.62728, -71.6320999	Route 3	Unnamed Stream	No score	No Score – missing data	
WC3	xy4163093671630914 (NAACC) xy41630937163091 (RIDOT)	41.630936, -71.630914	Unnamed Trail off Route 3	Unnamed Tributary	Moderate Barrier	Reduced AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
WC4	xy4162396471636589 (NAACC) xy41623967163658 (RIDOT)	41.6239643, -71.636589	Gardener Matteson Ln	Unnamed Stream	Minor Barrier	No AOP	
WC5	xy4161326271618240 (NAACC) xy41613267161824 (RIDOT)	41.6132623, -71.6182403	Unnamed Dirt Road	Unnamed Stream	Minor Barrier	No AOP	

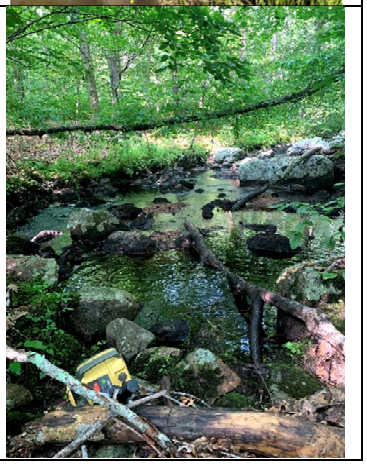
Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
WC6	xy4161194071622613 (NAACC) xy41611937162261 (RIDOT)	41.6119399, -71.6226128	Congdon Mill Road	Unnamed Stream	Minor Barrier	Reduced AOP	
WC7	xy4161222071622825 (NAACC) xy4161222071622825 (RIDOT)	41.612283 - 71.622874	Congdon Mill Road	Congdon River	Moderate Barrier	No AOP	

Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
WC8	xy4159695371613219 (NAACC) xy41596927161321 (RIDOT)	41.5969233, -71.613219	New London Turnpike	Unnamed Stream	Moderate Barrier	Reduced AOP	
WC9	xy4159689971613251 (NAACC) xy41596897161325 (RIDOT)	41.596899, -71.613251	New London Turnpike	Unnamed Stream	Minor Barrier	No score – missing data	

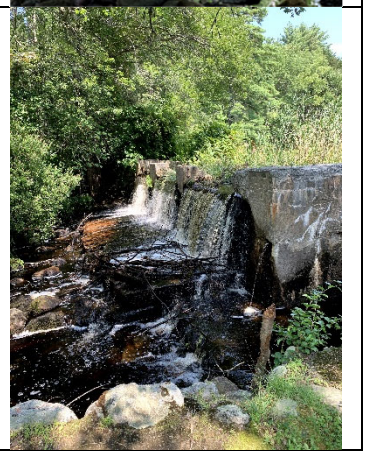
Crossing Name	Culvert ID	Location	Road/Trail Name	River/Stream	Evaluation	AOP Coarse Screen	Photograph
WC10	xy4160682371604209 (NAACC) xy41606917160413 (RIDOT)	41.606916, -71.6041395	New London Turnpike	Unnamed Stream	Minor Barrier	Reduced AOP	
WC11	NA	41.607450, -71.603134	New London Turnpike	Unnamed Stream	Dry	Dry	

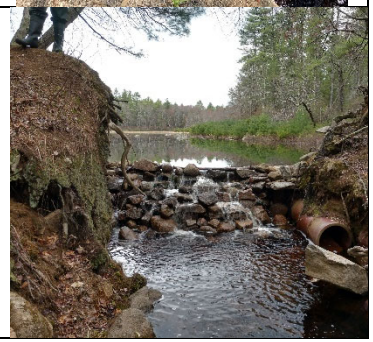
Note: NC9 and WC9 are anticipated to be No AOP because of free fall at the culvert outlets. WC2 is anticipated to be reduced AOP based on water depth and structure condition.

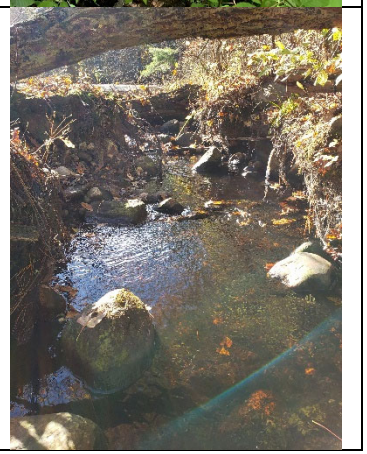
Table 3-7. Dam Assessment Findings

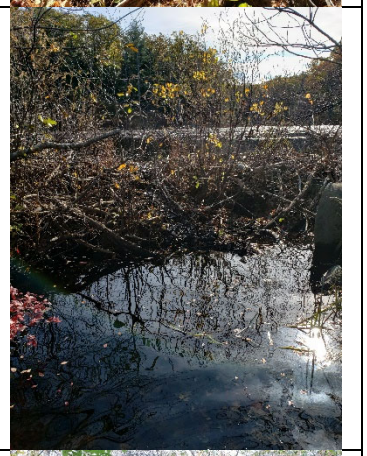
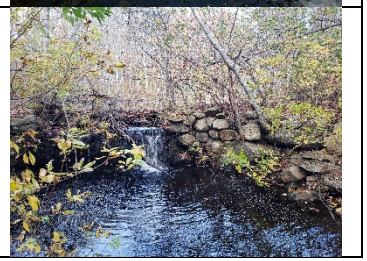
Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
Anderson Farm Pond Dam	ND1	433	41.67032, -71.63482	Bear Brook Tributary	Good (previously breached)	Passable - no significant obstruction	
xy41669207164430	ND3	NA	41.66920, -71.64430	Bear Brook Tributary	Breached (previously breached)	Passable - no significant obstruction	

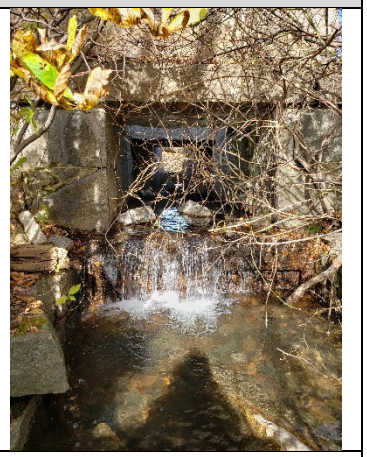
Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
xy41671257163683	ND4	NA	41.67125, -71.63683	Bear Brook Tributary	Good	Passable impoundment	
xy41672827163920	ND5	NA	41.67282, -71.63920	Bear Brook Tributary	Partially breached	Not passable	

Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
xy41668317164104	ND6	NA	41.66831, -71.64104	Bear Brook Tributary	Breached	Not passable (Scour pool/free fall restricts downstream passage)	
Capwell Mill Pond Dam	ED1	281	41.64324, -71.60764	Carr River	Poor	Not passable (Free fall restricts downstream passage)	

Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
Tarbox Pond Dam	ED2	183	41.63612, -71.57324	Tarbox Pond/Carr River	Good	Not passable (Free fall restricts downstream passage)	
Sweet Pond Dam	ED4	NA	41.62760, -71.59910	Bear Brook Tributary	Good	Not passable	

Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
xy41613047161685	WD3	NA	41.61304, -71.61685	Congdon River Tributary	Poor	Not passable	
xy41600977161376	WD1	NA	41.60097, -71.61376	Nooseneck River	Partially breached	Some smaller aquatic organisms may pass into pool during high flow events	

Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
xy41602587161915	WD2	NA	41.60258, -71.61915	Congdon River	Fair	Not passable	
xy41630697156253	ED3	NA	41.63069, -71.56253	Unnamed Impoundment directly down stream of Carr Pond	Poor - Leaking	Not passable	
xy41671327164900	ND2	NA	41.67132, -71.64900	Bear Brook Tributary/Snow Farm Pond	Fair	Not passable (Free fall restricts downstream passage)	

Dam Name	Dam Number	State ID	Location	River/Stream	Condition	Aquatic Organism Passability Assessment	Photograph
xy41630447155805	ED5	NA	41.63044, -71.55805	Carr Pond	Fair	Not passable (Free fall restricts downstream passage)	
Note: NA = Not Applicable							

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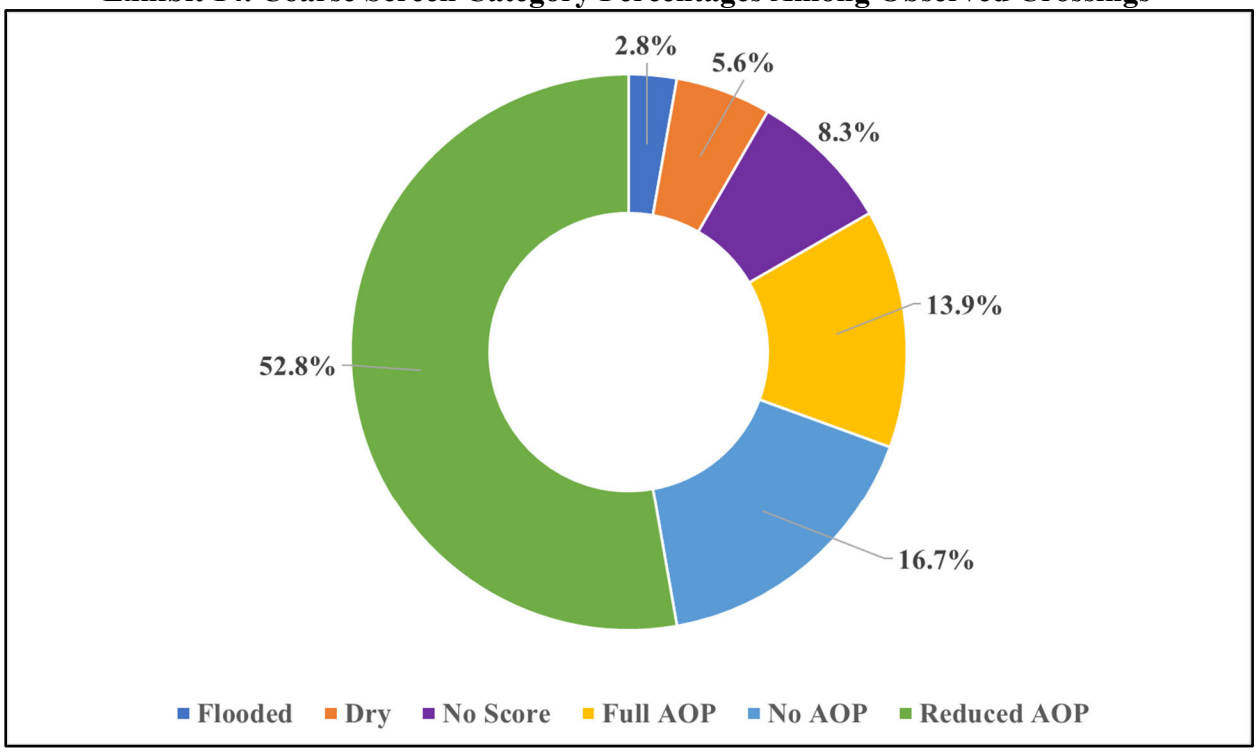
3.3.3 Discussion

Only five out of the forty culverts assessed in the BRMA were evaluated as having "Full AOP." Three culverts in the eastern catchment and three culverts in the western catchment were assessed as having "No AOP" (Figures 23 and 24). Nineteen culverts were assessed as "Reduced AOP" with minor barriers for aquatic organisms. The remaining six culverts did not receive AOP coarse screen scores because they were either dry, flooded, or not all parameters could be recorded due to culvert condition or location. Exhibit 14 depicts the breakdown of AOP scores for all assessed culverts.

Exhibit 14. Coarse Screen Category Percentages Among Observed Crossings



Most of dams in the BRMA are old mill dams constructed over 50 years ago. Many of these dams now exhibit deteriorated conditions and have either partially or fully breached. Ten of the 14 dams assessed were evaluated to be not passable by aquatic organisms. The dams identified as being passable had been breached.

The culvert and barrier assessment data indicate that most of the dams and culverts in the BRMA create significant barriers for fish and other aquatic organisms, preventing species from reaching suitable habitats and thermal refuges. This fragmentation of river habitats, especially coldwater streams, is one of the primary threats to aquatic species in the BRMA, particularly brook trout. When fish can't reach preferred habitats or thermal refugia, it severely impacts their ability to maintain their population. Removing these manmade barriers would allow aquatic organisms to migrate freely upstream and downstream to suitable habitats, which is likely to enhance species populations.

Additionally, the dams create impoundments, which allow for thermal absorption in the pooled water before it continues flowing into streams, creating yet another disadvantage for coldwater fish species in the BRMA. The warmed impounded water increases the temperature of rivers downstream, as seen in Figures 15-19, eliminating essential coldwater stream habitat for brook trout. The removal of dams and their impoundments has the potential to significantly reduce temperatures of connected streams, which would in turn increase the amount of suitable habitat for brook trout and other aquatic species.

3.4 PHOTOGRAPHIC DOCUMENTATION

3.4.1 Methods

Four trail cameras were installed in the BRMA beginning in May 2021 to collect/document various activities and to monitor stream levels. The trail cameras used were Stealth Cam G45NGMAX2 and were placed in locked security boxes bolted to trees and set on a motion sensing setting. Locations of the trail cameras, one in each catchment, are shown on Figure 25.

The main purpose of trail cameras was to monitor changes in stream depth over time and provide a visual comparison of the fluctuations of stream levels juxtaposed to the data collected by the loggers. This data collection effort was based on similar work done by CT DEEP who used trail cameras to evaluate stream connectivity (Bellucci et al. 2020).

A by-product of the camera positioning on streams was the observation of wildlife and recreational use. This helped identify animal species that are generally in the area and common recreational uses in the BRMA. In late November and early December 2021, the cameras were relocated (if necessary) in the central, eastern, and western catchments to locations along BRMA trails to further document recreational activity and continue documenting wildlife occurrences (see Figure 25). Recreational use in the BRMA is limited and this data was of specific importance to the RIWRB who is the legislatively appointed steward of the BRMA.

Each time the camera was triggered, each individual animal was logged according to its species and each individual person was logged according to the activity they were doing. Each individual animal or person was logged as many times as they passed the camera unless they continuously triggered the camera by loitering in front of it. These data were used to create pie charts on the occurrence percentages of various human activity and wildlife prevalence.

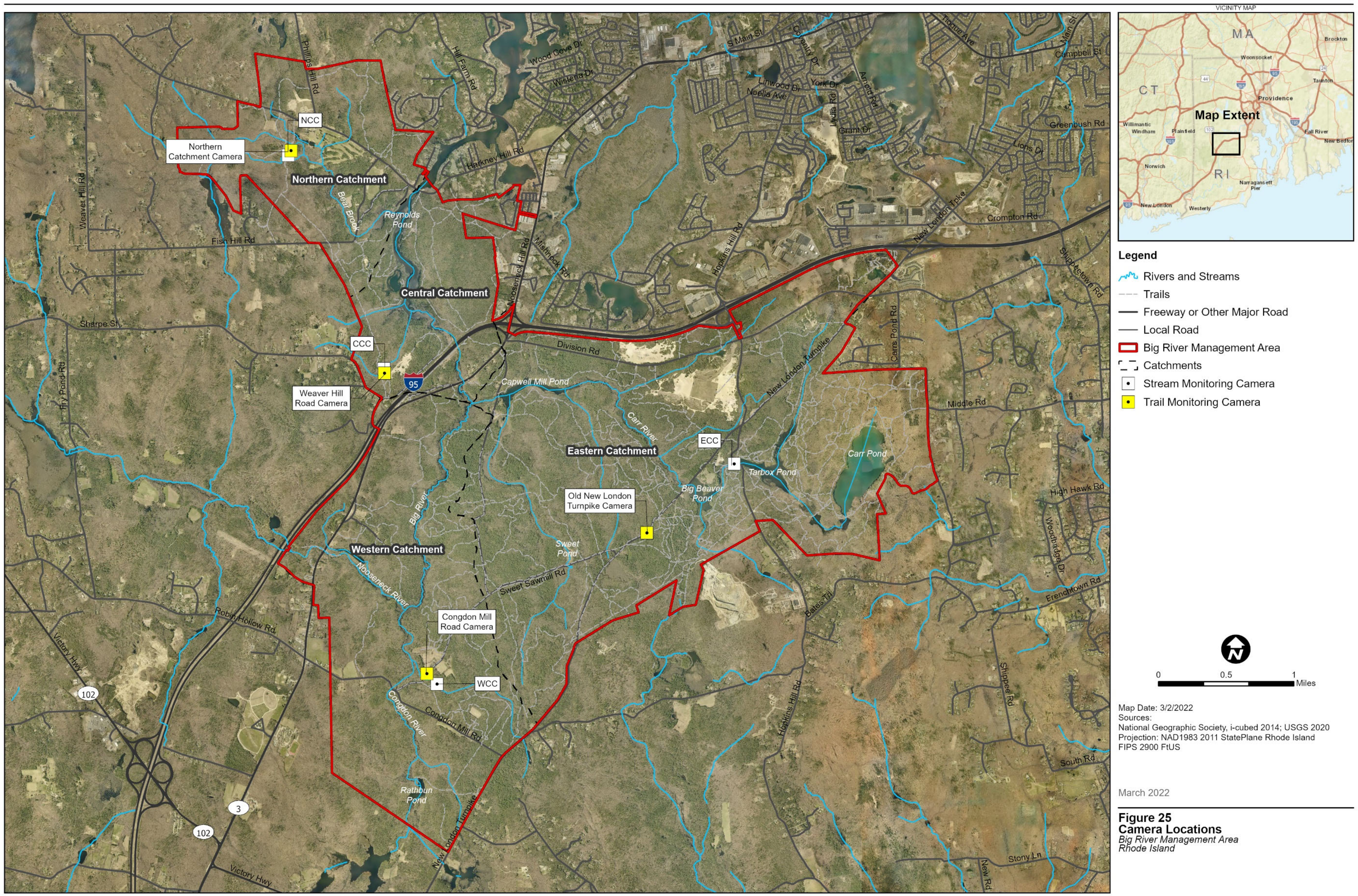


Figure 25
Camera Locations
Big River Management Area
Rhode Island

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Western Catchment Camera (Pond Monitoring)

Central Catchment Camera (Stream Monitoring)

Eastern Catchment Camera (Stream Monitoring)

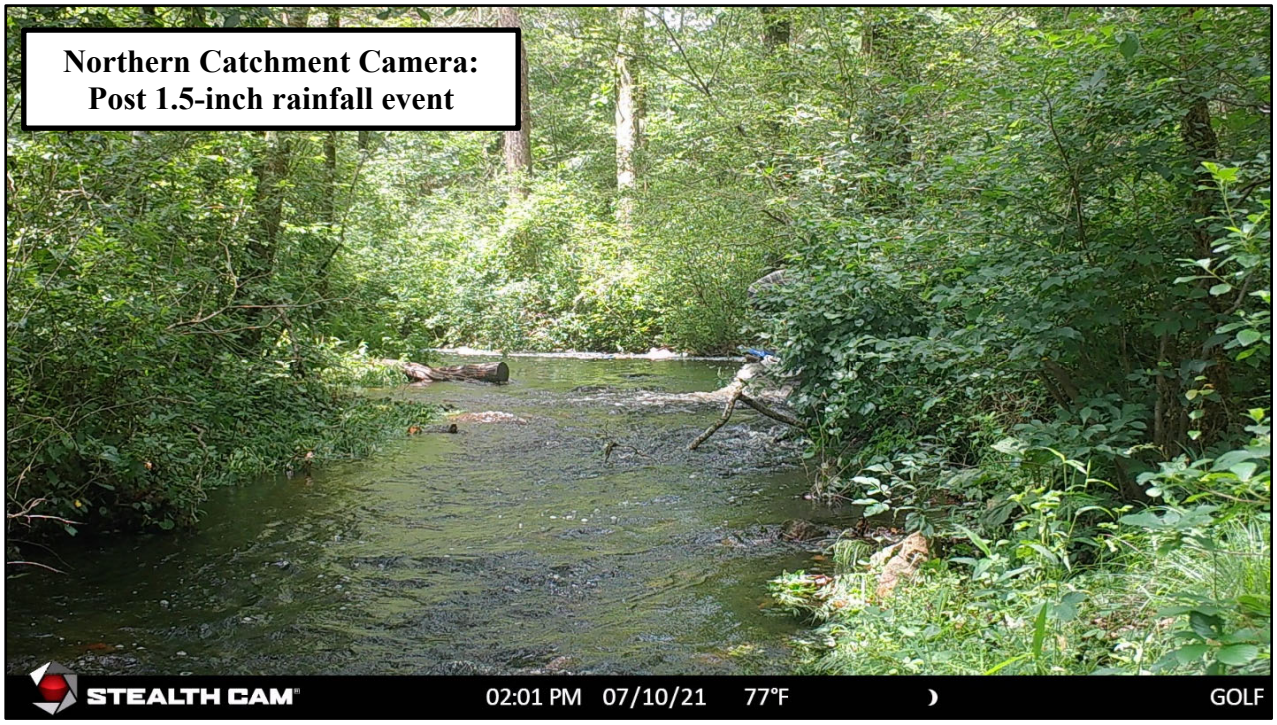
Northern Catchment Camera (Stream and Recreational Use Monitoring)

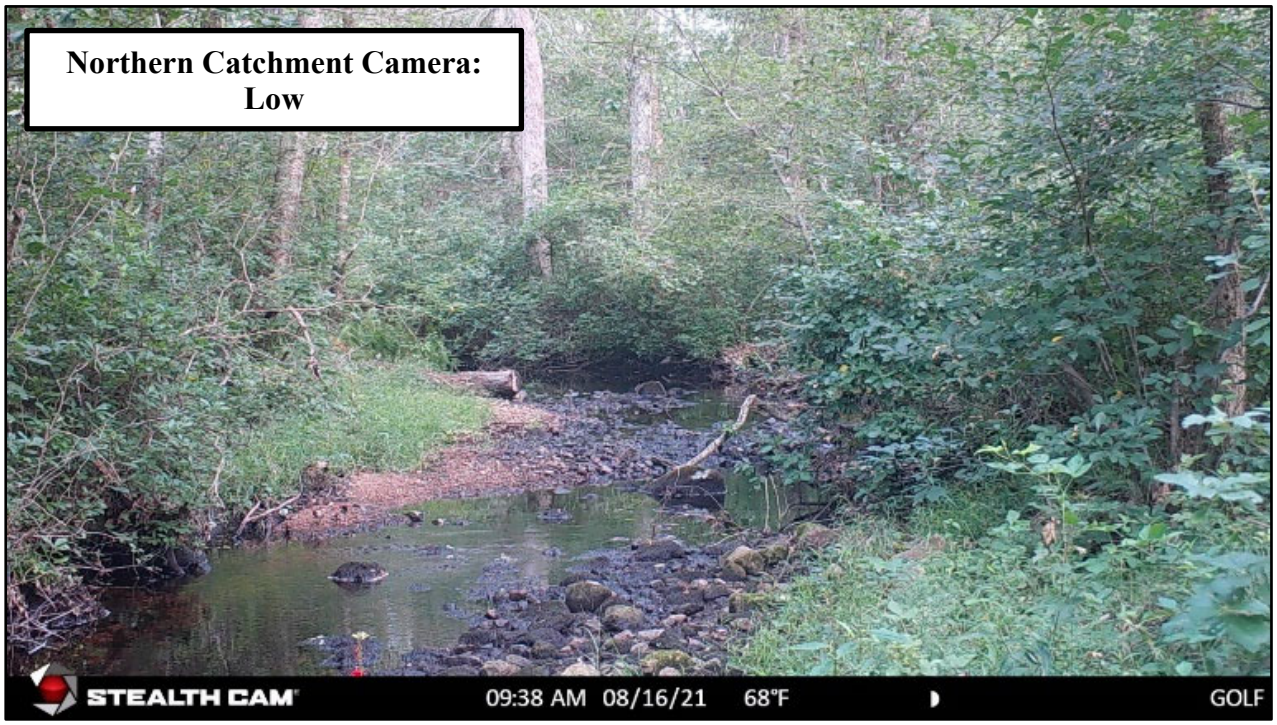
3.4.2 Findings and Discussion

3.4.2.1 Stream Monitoring

Significant water level changes occurred in all catchments during the deployment period. Capturing those changes was dependent on a moving item triggering the camera to take a picture, so not all heavy rainfall and subsequent high flow events were recorded during every occurrence. The eastern catchment camera captured the most substantial flow changes. Highest and lowest stream flows captured at each camera are depicted below with the accompanying rainfall data for each high flow observed. The western catchment camera was situated on a pond and the pond's water level did change in a noticeable manner in response to substantial rainfall events, albeit in a less dramatic manner than the small streams.

As stream depth changes, so too does habitat for aquatic organisms. Streams with higher depth generally flow faster than those with a lower depth. Some aquatic species require fast flowing water while others require quiet and slow pools. Fast flowing water carries more oxygen through a stream as well. However, fast flowing streams will also transport more sediment and can increase the turbidity of a stream more than a slower stream.


Northern Catchment Camera:
Post 1.5-inch rainfall event
STEALTH CAM
02:01 PM 07/10/21 77°F
GOLF

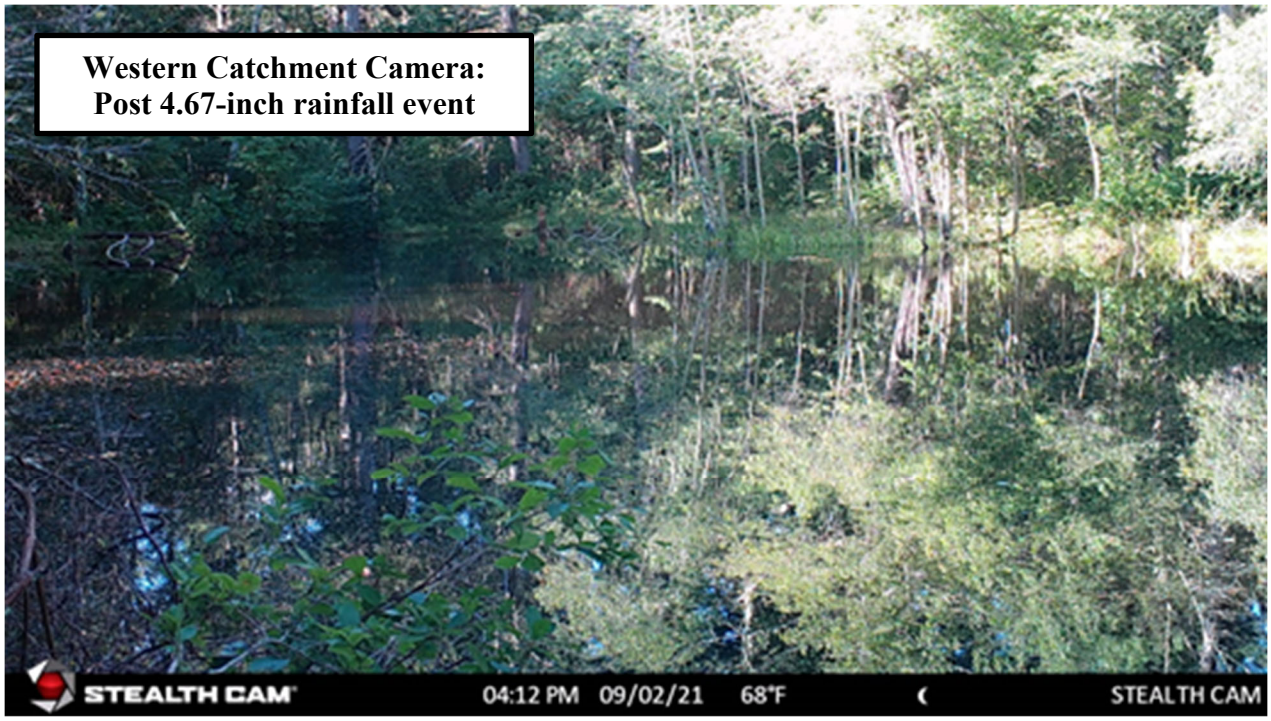

Northern Catchment Camera:
Low
STEALTH CAM
09:38 AM 08/16/21 68°F
GOLF


Central Catchment Camera:
Post 0.8-inch rainfall event
STEALTH CAM
05:52 PM 06/19/21 66°F
GRAVEL


Central Catchment Camera:
Low
STEALTH CAM
07:49 PM 06/18/21 71°F
GRAVEL


Eastern Catchment Camera:
Post 4.67-inch rainfall event
STEALTH CAM
10:14 AM 09/04/21 66°F
TARBOX


Eastern Catchment Camera:
Low
STEALTH CAM
04:10 PM 08/02/21 77°F
TARBOX


Western Catchment Camera:
Post 4.67-inch rainfall event
STEALTH CAM
04:12 PM 09/02/21 68°F
STEALTH CAM


Western Catchment Camera:
Low
STEALTH CAM
03:14 PM 06/18/21 84°F
STEALTH CAM

3.4.2.2 Wildlife Monitoring

A variety of wildlife species were captured by the trail cameras including white tailed deer, coyotes, racoons, cottontails, crows, foxes, great blue heron, ducks, bobcats, and hawks (see Exhibits 15-18). Deer were the most prominent animal observed on the trail cameras and were most often captured by the central catchment camera (see Exhibit 16). Both the eastern and northern catchment cameras captured deer as well. Deer were often observed grazing or crossing the stream.

Exhibit 15. Northern Catchment Camera Animal Occurrence Percentages out of 33 Observed Animals

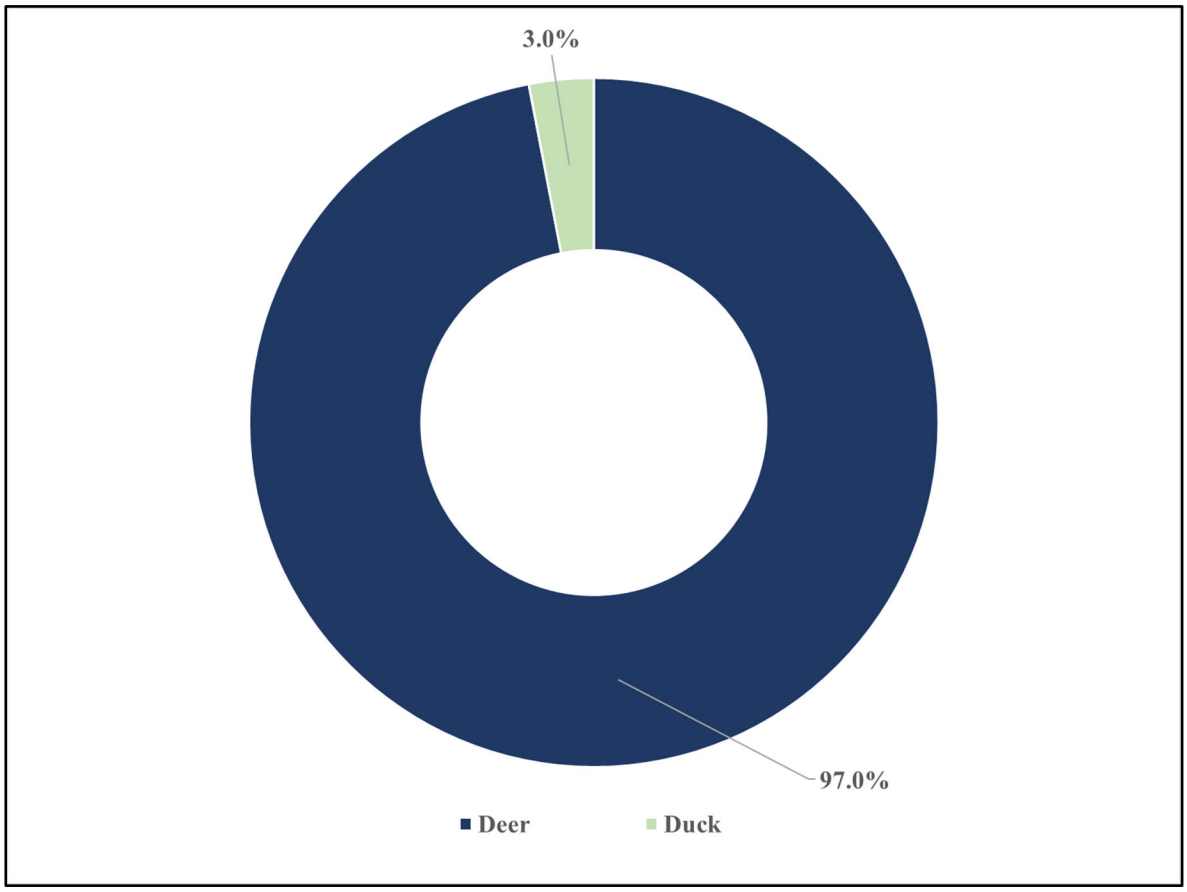


Exhibit 16. Central Catchment Camera Animal Occurrence Percentages out of 90 Observed Animals

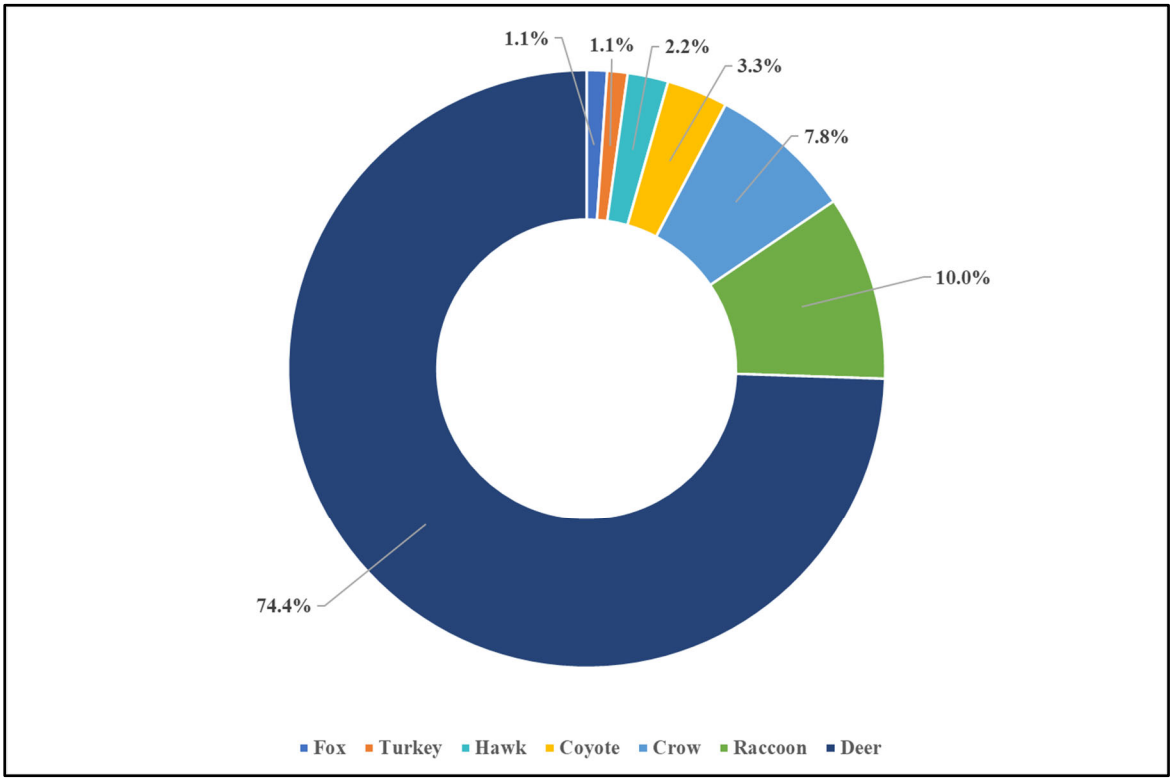


Exhibit 17. Eastern Catchment Camera Animal Occurrence Percentages out of 19 Observed Animals

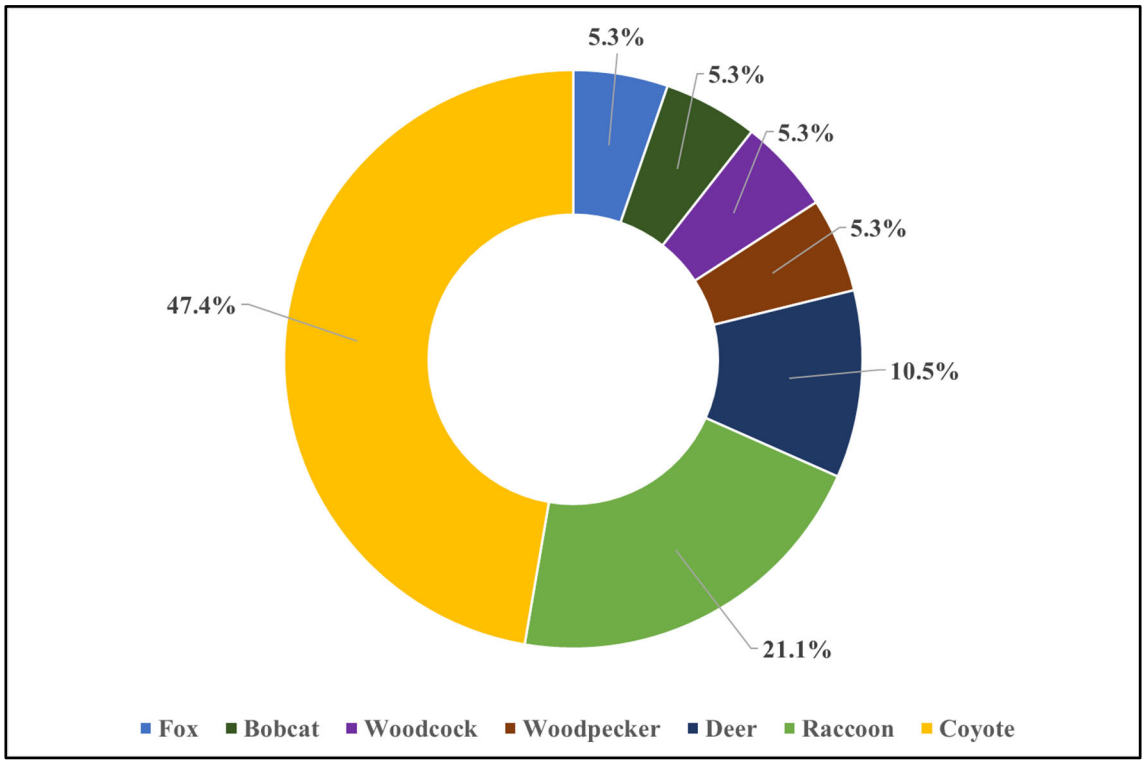
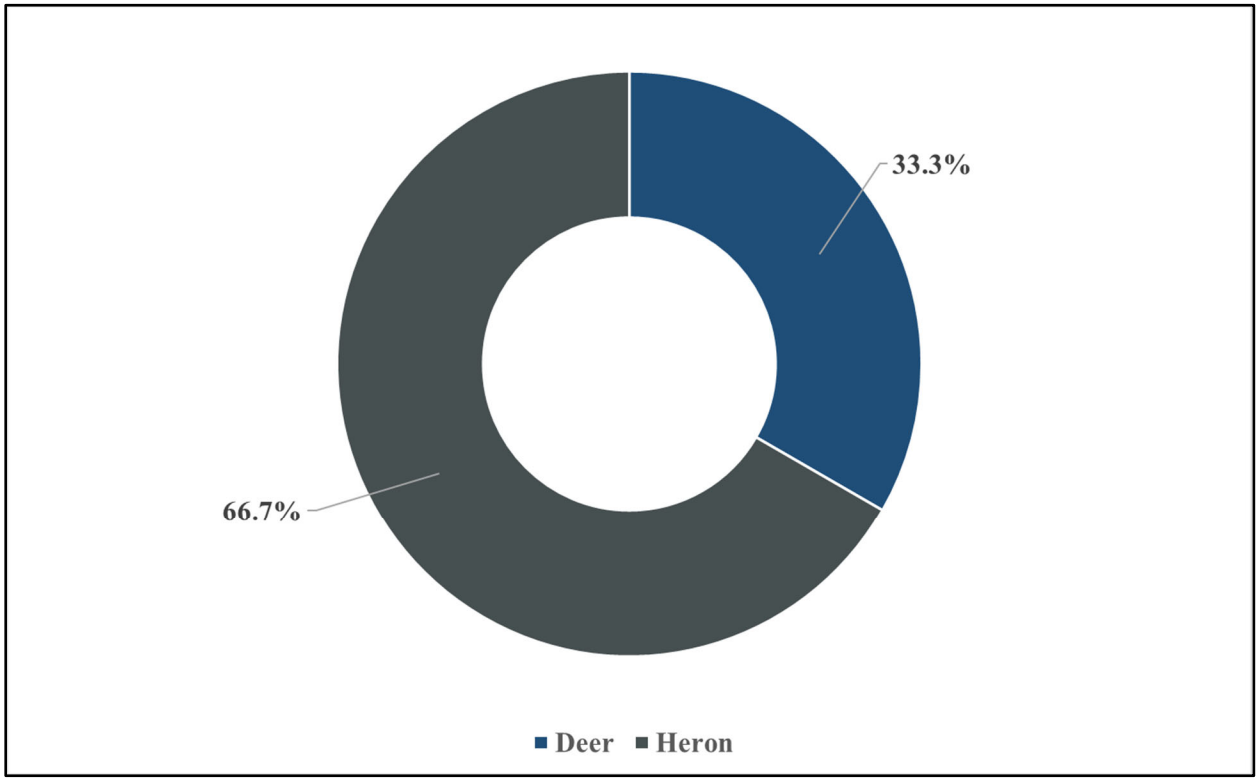


Exhibit 18. Western Catchment Camera Animal Occurrence Percentages out of 3 Observed Animals



3.4.2.3 Recreational Use Monitoring

The cameras captured a multitude of human activity (see Exhibits 19-22). The northern catchment in particular captured a number of examples of violations of BRMA rules (see Exhibit 19). Numerous people drove two- and four- wheeled motorized vehicles through the stream across the trail, many of whom were consistent repeat offenders based on clothing, helmets, or vehicle features. Other human activity captured by the cameras included fishing, hiking, running, hunting, bicycling, and driving trucks in the north, east, and western catchments. The trucks observed by the trail cameras were observed off of Old New London Turnpike and Congdon Mill Road. The cameras primarily recorded users during daytime hours, but about five percent of users were recorded at night (see Exhibit 23).

Exhibit 19. Northern Catchment Camera User Occurrence Percentages out of 65 Total Users

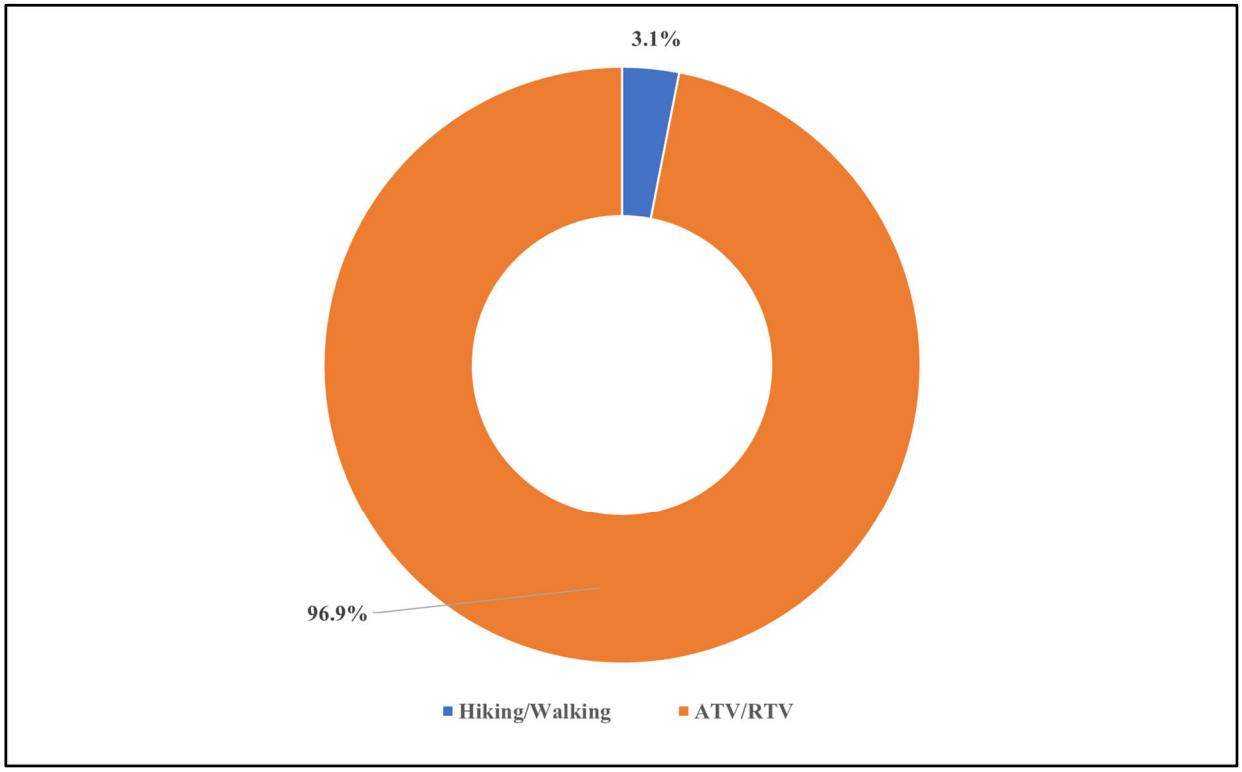


Exhibit 20. Off Weaver Hill Road User Occurrence Percentages out of 43 Total Users

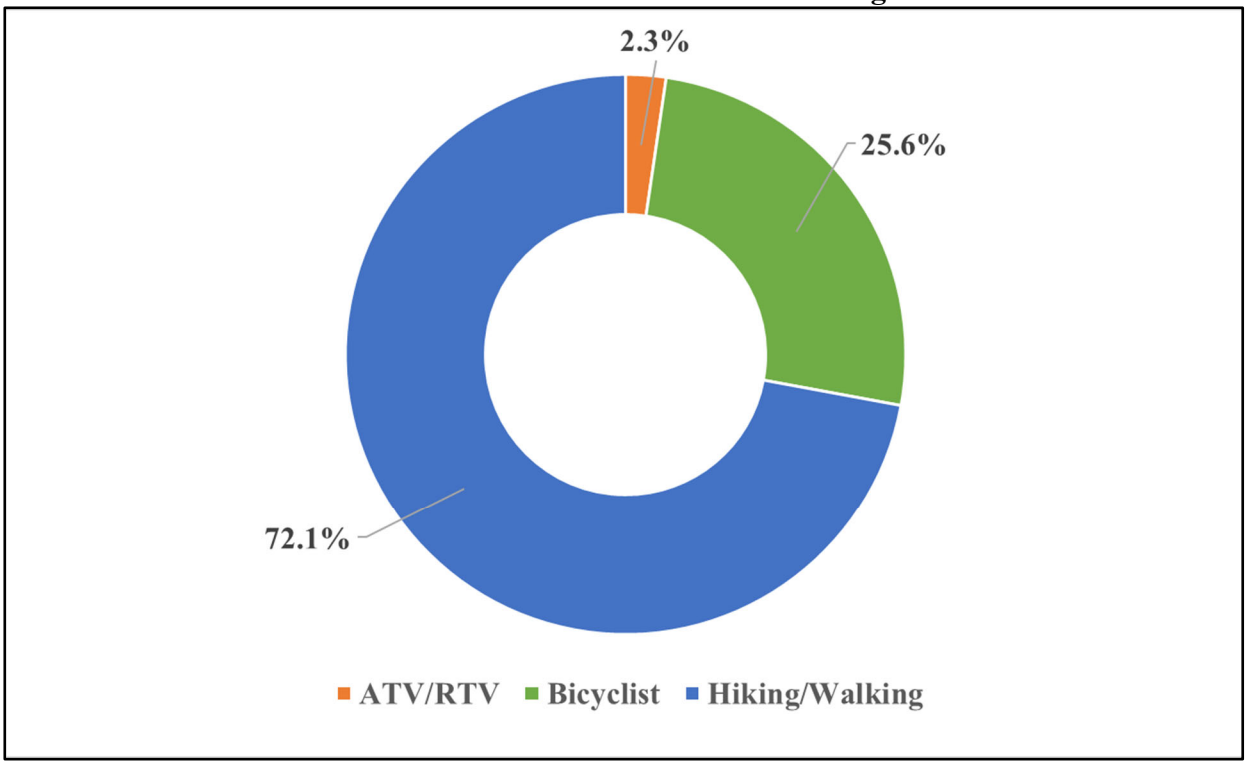


Exhibit 21. Old New London Turnpike User Occurrence Percentages out of 113 Total Users

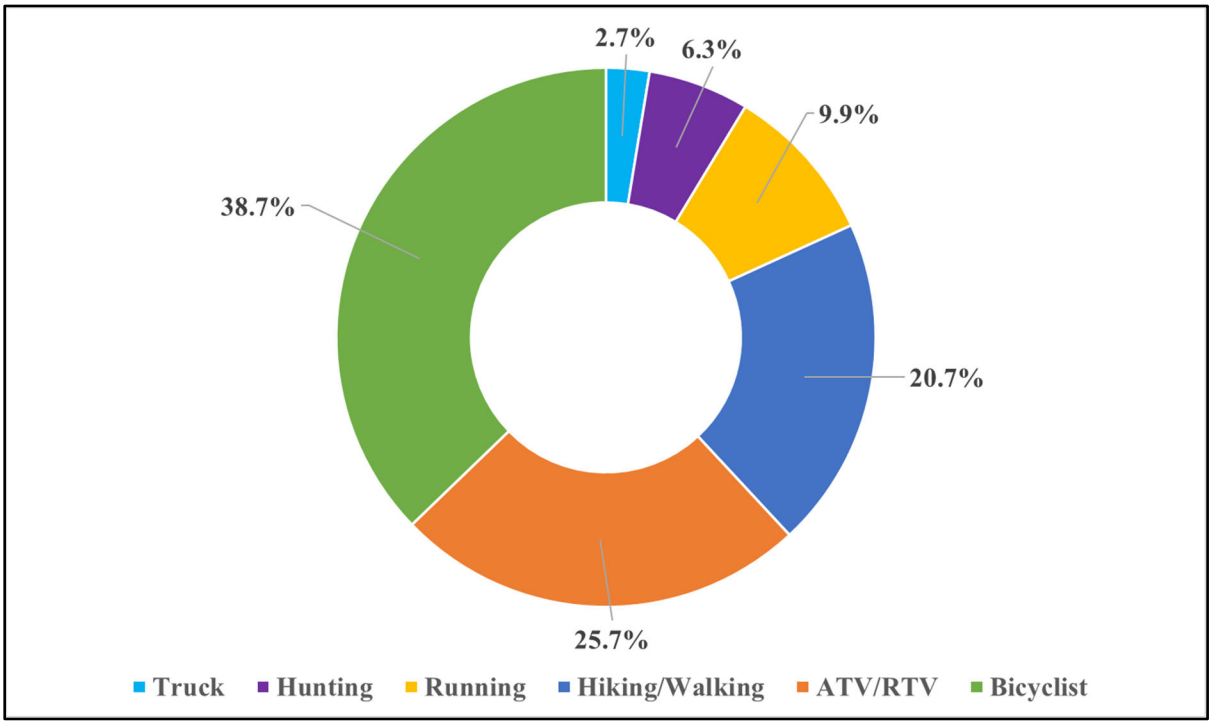


Exhibit 22. Congdon Mill Road User Occurrence Percentages out of 766 Total Users

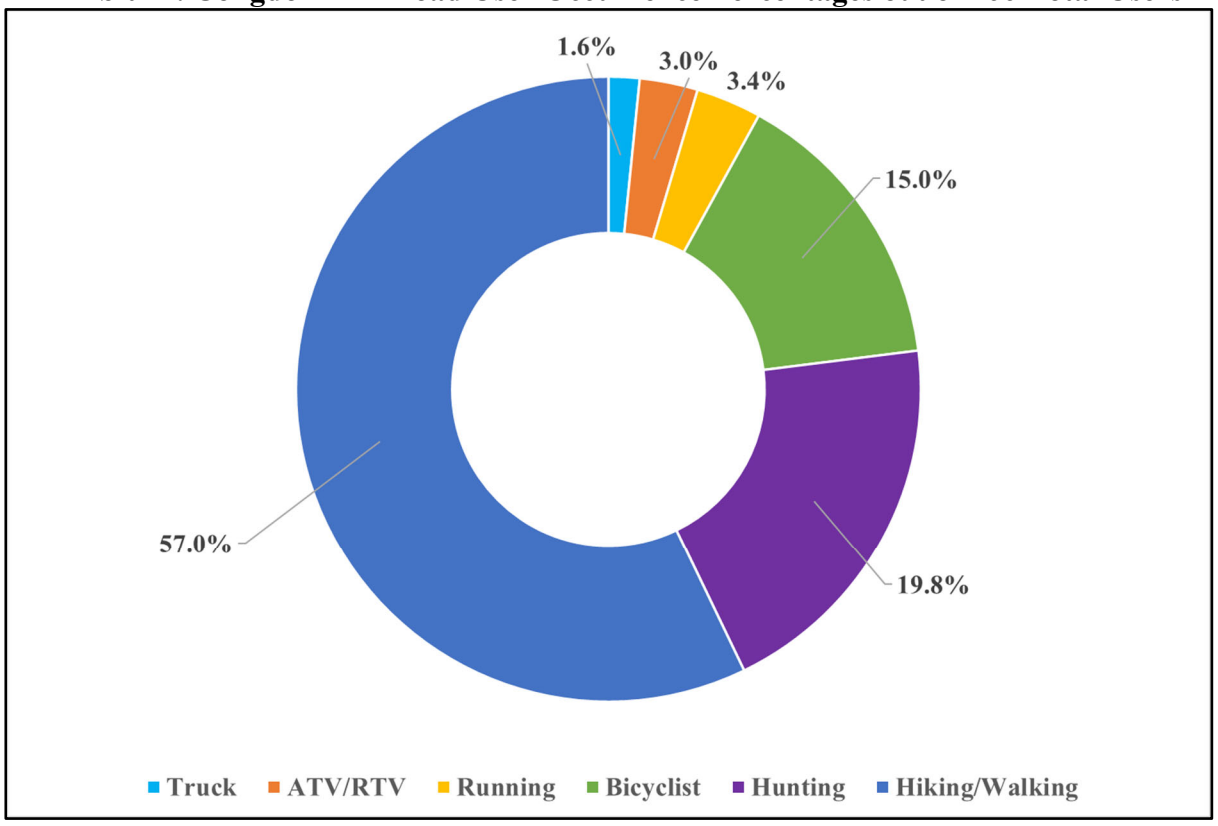
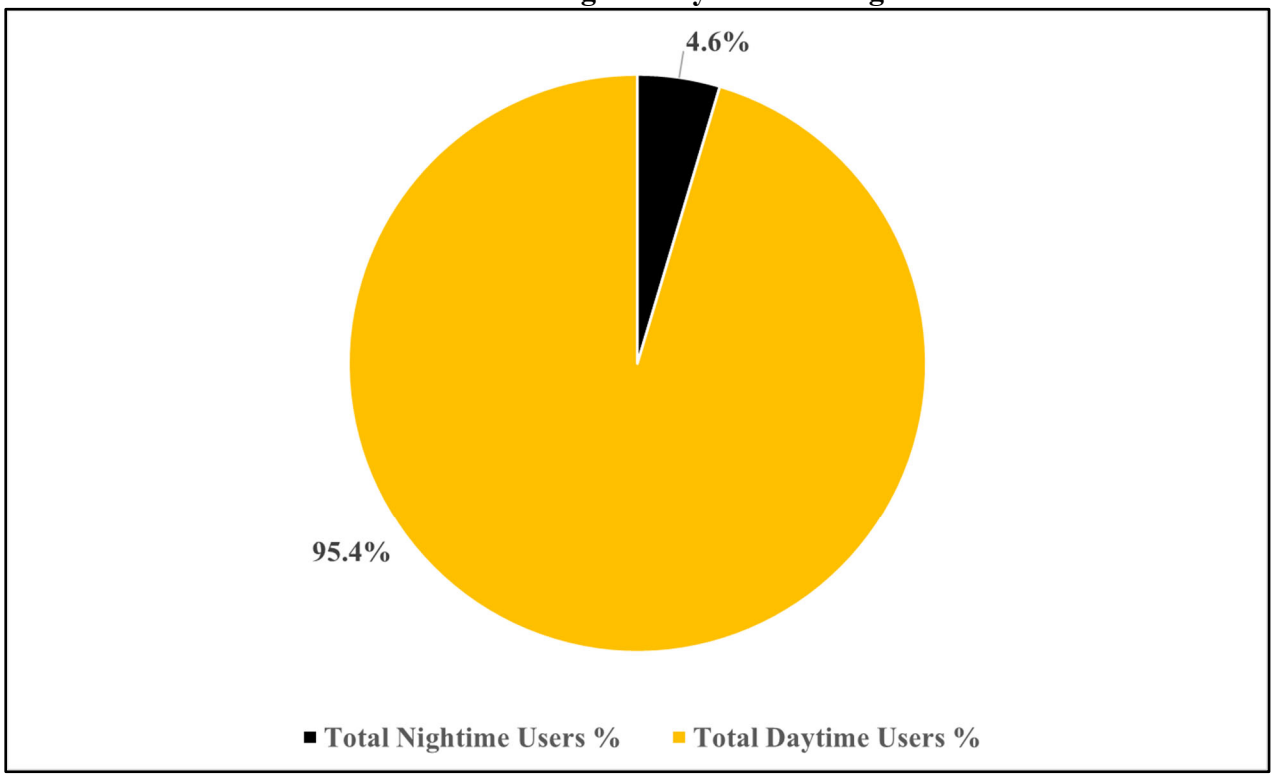


Exhibit 23. BRMA Percentage of Daytime and Nighttime Users



3.4.2.3.1 Trail Use

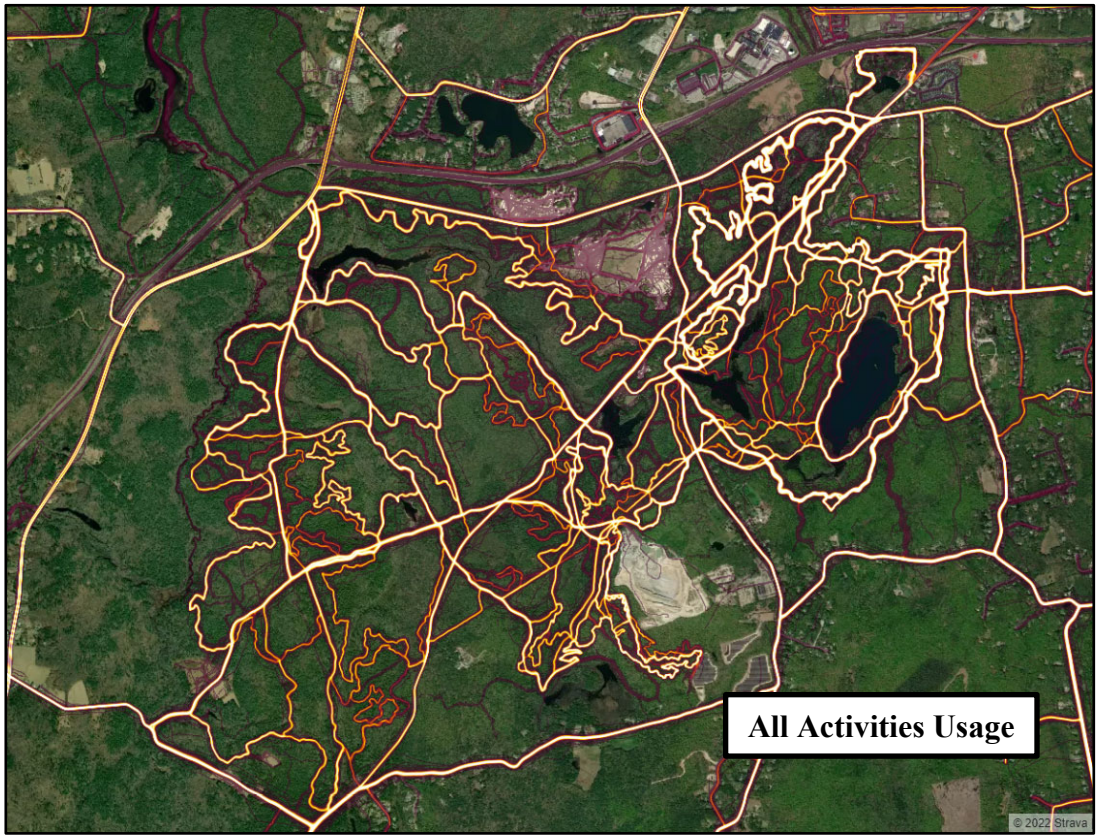
In addition to the 106 miles of mapped RIDEM trails in the BRMA, EA digitized an additional 32 miles of trails which were mapped from Open Street Maps (Figure 12). There are forty-seven trail crossings in the BRMA that intersect with rivers and streams.

As part of the analysis on recreational use, the Strava web application was used to identify trail and recreational usage in the BRMA. Strava publishes "heat maps" of trail usage on their website, free to access. The maps are generated by tracking users' movement via GPS on their mobile devices, as users' privacy settings allow. The heat maps display the past two years of data of all activities, including biking, hiking, water activities, and winter activities. The heat maps for all activities, biking, and hiking for the BRMA are shown below. Lighter colored lines indicate more trail usage while darker colored lines indicate less usage.

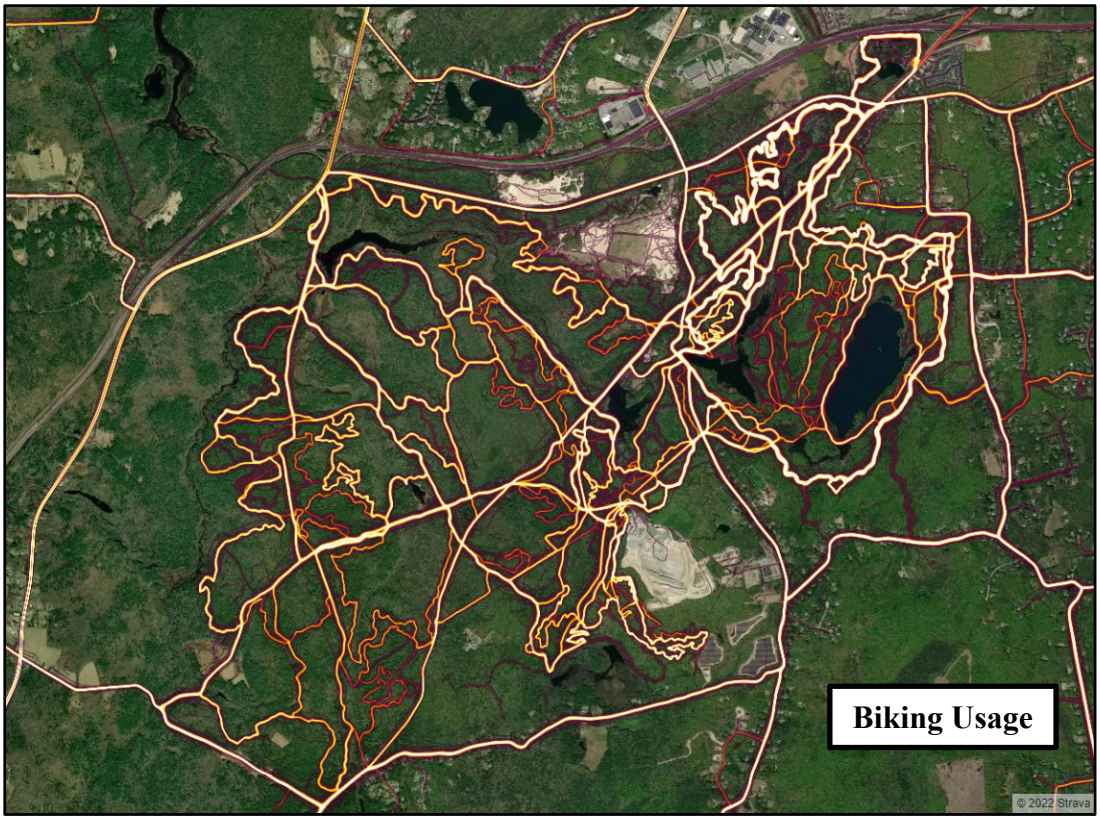
The heat maps indicate that trails in the eastern catchment of the BRMA around Tarbox Pond and Carr Pond are significantly more travelled by Strava users than trails in the western and central catchments. The trails in the northern catchments appear to be almost entirely untraveled by Strava users. According to the Strava data, the trails in the BRMA are more popular for biking than for hiking/walking (Strava 2022). However, that could also be a reflection of the user groups using the application with specific privacy settings.

Photographic documentation from the Congdon Mill Road camera logged the highest amount of recreation users, primarily hikers and walkers; however, the Strava heat maps showed significantly less usage of the trails in this section of the BRMA. The northern catchment camera also logged substantial recreational use, but the Strava heat maps displayed nearly no usage in the northern catchment. This is likely because recreational users in this area were primarily dirt bikers and ATV riders, who presumably do not use the Strava app to track these prohibited activities. No recreational use trail cameras were deployed east of Tarbox Pond for this project and thus the Strava data helped to fill this gap in trail camera observations. The qualitative trail usage data provided by Strava can be used in conjunction with the quantitative trail camera usage data to extrapolate rough trail usage statistics for additional areas throughout the BRMA.

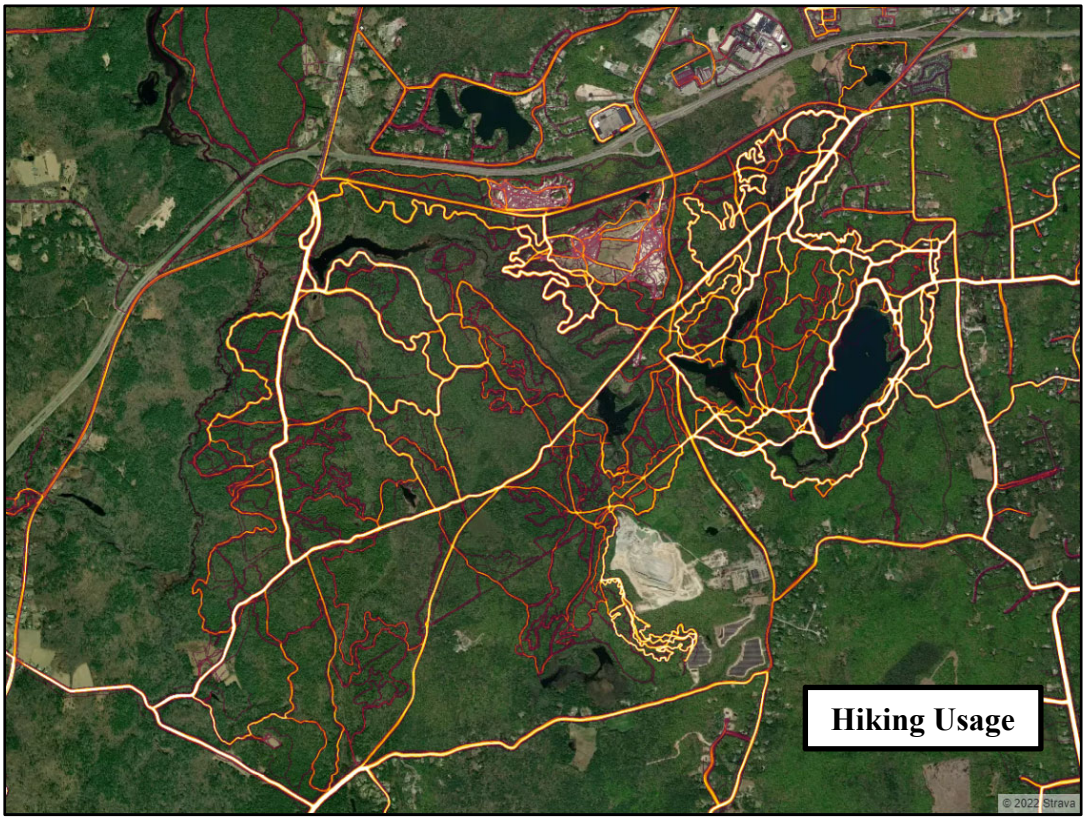
Overall, it is believed that this recreational data will be useful for the RIWRB as they develop future land use plans and try to mitigate conflicting recreational uses and their impacts, not only on the natural environment but also water quality within the BRMA.



Lighter colored lines indicate more trail usage and darker colored lines indicate less trail usage.



Lighter colored lines indicate more trail usage and darker colored lines indicate less trail usage.



Lighter colored lines indicate more trail usage and darker colored lines indicate less trail usage.

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4. IMPLEMENTATION ACTIONS

Based on the information provided in this report and hundreds of hours in the field assessing and collecting information on the BRMA, the following implementation actions have been developed.

4.1 ON-THE-GROUND IMPLEMENTATION PROJECTS

The on-the-ground implementation actions are separated into three primary categories: habitat, water quality, and infrastructure. Although there are some projects that will address multiple issues or have categorical overlap, the projects are categorized by their primary purpose/benefit and are list in Table 4-1.

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Table 4-1. On-the-Ground Implementation Projects

Ranking	Project Location	Project Name	Project Type	Reason/Justification	Benefits						Cost	Photo
					Reduce Water Temperature	Stream Connectivity	Stream Enhancement	Recreation	Infrastructure	Water Quality		
Primary Implementation Benefit: Coldwater Fisheries and Habitat Restoration												
1	41.62760, -71.59910	ED4 (Sweet Pond Dam)	Dam Removal	Blocked AOP / Stream Temperatures	X	X					$	See photo in Table 3-7
	Notes:	Removal of this dam could significantly impact water temperatures for this entire tributary of Capwell Mill Pond. This barrier removal will be of significant benefit to brook trout and other coldwater species which may inhabit the tributary. This removal should be able to be completed using manpower and hand tools, and not require any mechanical equipment. Brook trout were observed but not collected during electroshocking of this inlet.										
2	41.64324, -71.60764	ED1 (Capwell Mill Pond Dam)	Dam Removal	Blocked AOP / Stream Temperatures		X			X		$$$$$$	See photo in Table 3-7
	Notes:	Dam removal will reconnect approximately 11 miles of stream. The dam is in poor condition. Removal of the dam will significantly reduce thermal absorption of the impoundment, which causes significant increase of water temperatures downstream from the dam effluent.										
3	41.61326, -71.61824	WC5	Culvert Replacement	Stream Connectivity		X	X				$$$	See photo in Table 3-6
	Notes:	This stream segment had a significant number of brook trout (highest number sampled in Big River) above the culvert. The pond upstream of this culvert is fed by a significant source of groundwater allowing the pond to maintain cold water throughout the summer months and convey its cold water downstream (to the confluence with the Congdon River). This stream exhibits cold water year-round; however, these perched culverts are acting as a barrier to fish passage. These culverts should ideally be replaced with a bridge or bottomless culvert that will not restrict maintenance vehicle access or recreational use of the access road currently carried by these culverts.										
4	41.63389, -71.58061	EC13 (Big Beaver Pond Dam)	Dam Removal	Blocked AOP / Stream Temperatures	X	X	X			X	$$$$	See photo in Table 3-6
	Notes:	Big Beaver Pond Dam poses a significant barrier to fish. It also causes significant increases to downstream water temperatures. There is an upstream tributary which has documented occurrences of brook trout, as well as year-round water temperatures capable of supporting brook trout populations. Despite the downstream water temperatures exhibiting significant heating from the impoundment, a logger placed in the impoundment at a depth of approximately 4-feet in the upstream impoundment, demonstrated a summer average temperature of 6.4-14.5°F less than the logger below the dam. This project could prove to be fairly complicated because a dam/barrier removal at this location would need to still allow access to the Hopkins Hill Sand and Stone LLC. The road directly below the dam is the only access to this business and is currently a single lane road.										
5	41.67282, -71.63920	ND5	Dam Removal	Blocked AOP / Stream Temperatures	X	X					$$	See photo in Table 3-7
	Notes:	This “dam” is a combination of a dam which has been formed by a failed blocked culvert. Water is now flowing over the dam. This site has a documented warming impact on downstream water temperatures, which could be mitigated by the removal of this structure. If this structure is removed, consideration will need to be given on the level of access needed to be maintained at this site (i.e., pedestrian or vehicular). This is not a significant access point for BRMA recreation, but it is still used especially in the fall by hunters. This barrier removal may require the use of small machinery such as a backhoe or mini excavator, but there is easy access to the site to facilitate this barrier removal.										
6	41.63104, -71.57868	Tributary of Big Beaver Pond	Habitat Enhancement	Habitat Restoration		X	X			X	$$$$	See photo in Appendix D
	Notes:	This stream has documented brook trout populations and year-round water temperatures to support healthy brook trout populations. This stream appears to be filled with excessive sediment and material unique to this stream, which may have originated from upstream gravel and quarry operations. This stream is the receiving water for the settling pond discharge water from the upstream Hopkins Hill Sand and Stone LLC. There was evidence of silt fences blocking the stream in several locations indicating that sedimentation had been an issue in this stream in the past. There are also trail crossings along this stream that demonstrate additional point sources for erosion. This stream would greatly benefit from habitat improvement projects to increase habitat features including riffles, pools, runs, glides, and other features that would add cover depth and structure to this stream.										
7	41.64597, -71.62417	Weaver Hill Road Trail	Barrier Removal	Stream Connectivity		X	X	X		X	$	See photo in Appendix D
	Notes:	This stream crossing is regularly used by ATV/RTVs which are prohibited in the BRMA; however, their use has resulted in sedimentation of the stream and the formation of a barrier to fish. This stream was found to have brook trout present during the study. Because of the heavy ATV use in this area, it is recommended that a ford with an adjacent timber pedestrian bridge be installed at this location. A ford will also help maintain vehicle access for maintenance or enforcement.										

8	41.60097, -71.61376	WD1	Barrier Removal	Stream Connectivity	X	X					$	See photo in Table 3-7
	Notes:	Remnant of dam (partially breached) and culvert beneath old road. Partial dam breach is still blocking fish passage. Remaining dam portion is impounding water and likely resulting in thermal heating of stream segment below the dam. Access to the site is straight forward and could be completed quickly with a small excavator or backhoe.										

9	41.67132, -71.64900	ND2	Dam removal	Blocked AOP / Stream Temperatures	X	X	X				$$	See photo in Table 3-7
	Notes:	Small headwater dam with a small impoundment. Dam is in poor condition. Cold water is present in the impoundment and downstream. Removal of the dam will help maintain downstream water temperatures and restore stream connectivity.										

Ranking	Project Location	Project Name	Project Type	Reason/Justification	Benefits						Cost	Picture
					Reduce Water Temperature	Stream Connectivity	Stream Enhancement	Recreation	Infrastructure	Water Quality		
Primary Implementation Benefit: Water Quality Priorities												
1	41.64681, -71.56366	EC3 (Old New London Turnpike)	Culvert Replacement/Trail Repair	Stream Connectivity/Erosion		X				X	$$	See photo in Table 3-6
	Notes:	Culvert is not functioning (No AOP); culverts are completely blocked. There is a beaver dam impounding the adjacent wetland. Erosion is regularly occurring at the site at various points as new areas of water overtopping the dam form. This beaver dam impounds water approximately 3-4-feet above the adjacent trail surface. There are currently some wooden boards over sections of the flooded trail to help maintain recreational access. Future trail access needs will need to be assessed for this site if the culverts are removed. A partnership with the mountain bikers to repair and maintain the site should be explored.										
2	41.62701, -71.57763	Unnamed tributary to Carr River (south of Big Beaver Pond)	Stream crossing	Stream Connectivity/Erosion		X				X	$	See photo in Appendix D
	Notes:	Stream crossing causing erosion of soils into the stream causing a ford type crossing which can serve as a barrier to fish. Brook trout presence at site.										
3	41.63837, -71.60765	EC7 (Steeple Chase Trail)	Trail repair	Safety				X	X		$	See photo in Table 3-6
	Notes:	Wooden bridge over wetland that needs to be replaced. Substructure boards have failed. Brook trout presence in stream.										
4	41.63298, -71.60398	EC8 (Unnamed trail north of Sweet Pond)	Trail repair	Safety				X	X		$	See photo in Table 3-6
	Notes:	Wooden bridge over wetland that needs to be replaced. Substructure boards have failed. Brook trout presence in stream.										
5	41.62699, -71.59216	EC11 (Sweet Sawmill Road Trail)	Culvert Replacement	Stream Connectivity/Water Quality		X	X			X	$$$$$	See photo in Table 3-6
	Notes:	Culvert is blocked, buried, or failed. Road is completely flooded. Continuing recreational use by foot and by ATVs/RTVs causing additional trail erosion, as well as impacts to adjacent wetlands. This stream was sampled for brook trout, and none were found. However, data loggers indicate water temperatures capable of supporting brook trout.										
6	41.63069, -71.56253	ED3	Stream Crossing	Stream Connectivity/Water Quality	X			X	X	X	$$$$	See photo in Table 3-7
	Notes:	Culvert(s) failed or completely blocked. There is a concrete culvert adjacent to the crossing in the brush, but it is not known if that was the original crossing or if that was part of a past repair effort, which was never installed. Access to the site is complicated. ATV/RTVs might be an option to facilitate repairs to the site.										
7	41.67018, -71.63328	Golf Course	Flooding	Water Quality						X	$$$	See photo in Appendix D
	Notes:	The Coventry Pines Golf Club had a substantial amount of flooding across its fairways and greens following several rainfall events. This flooding likely adds excess nutrients from the golf course operations to the watercourse and watershed downstream. From discussions with the operators of the golf course, they would like to alleviate flooding at the course, but believe most of the flooding issues are a result of										

		beavers and other debris blocking the water course off their property. In addition to the nutrient impacts, the course flooding also impacts the golf course financially, as they cannot operate during these occurrences.	

Ranking	Project Location	Project Name	Project Type	Reason/Justification	Benefits						Cost	Picture
					Reduce Water Temperature	Stream Connectivity	Stream Enhancement	Recreation	Infrastructure	Water Quality		
Primary Implementation Benefit: Infrastructure												
1	41.66034, -71.62810	NC10	Culvert Replacement	Safety		Roads			X		$$$$$$	See photo in Table 3-6
	Notes:	The culvert at Fish Hill Road is extremely undersized, and there is very limited hydraulic capacity of the culverts when flows are at “normal” conditions. This results in the culvert regularly overtopping and flooding the road, in turn causing pavement delamination and impacts to emergency vehicle access. There is not currently enough height on site between the top of the culvert and the road surface, and the road will need to be raised in this area to accommodate a more hydraulically efficient structure. Any replacement of this structure should include a “fish friendly” design which will have no impact on aquatic connectivity or AOP. Brook trout were identified above and below this structure during the study. Water temperatures are also sufficient to support coldwater fisheries.										
2	41.63612, -71.57324	Tarbox Pond (EC14/ED2)	Structure Modification	Safety					X		$	See photos in Tables 3-6 and 3-7
	Notes:	Tarbox Pond is regularly impacted by woody debris especially from beavers. In addition, this stream regularly floods over Hopkins Hill Road causing a public safety concern. It is recommended that the upstream drop structure at this site remove 2 flashboards to increase the flood storage capacity of the impoundment before it overtops the road, and a trash rack should be installed to prevent debris from clogging the drop structure/culvert.										

Notes:
* $= $50,000
**All costs are rough order of magnitude estimates. Costs for smaller projects are based on implementation only. Larger project costs are based on an expedited design-build approach. All costs are estimates and will need to be refined during future budgeting and/or grant applications.
***All projects are ranked based on priority of significance. However, projects should be executed as time and funding allow, and are not required to be completed in order.

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4.2 POLICY

In addition to the on-the-ground implementation projects, other policy-related implementation actions have been developed. These are broader actions which could be recommended or implemented by the RIWRB and RIDEM.

- Eliminate stocking of trout in waters identified as containing wild brook trout populations.
- Regulate waters withing the BRMA as catch and release only for all brook trout.
- Facilitate relationships with RIDEM and the RIWRB to monitor and mitigate the impacts of dumping and illegal use withing the BRMA and its connected watercourses
- The elimination of stocking trout in waters identified as containing native brook trout populations is a priority for Trout Unlimited (TU) as specified by TU's North American Salmonid Policy: Science-Based Guidance for 21st Century Coldwater Conservation (1997). More specifically, Section D Hatcheries, Policy Recommendation D states: "Oppose stocking (or supplementation) in waters where healthy, self-sustaining salmonid populations or stocks exist." In addition, at the 2011 TU Annual Meeting, TU issued "Guidance Document for National Leadership Council Resolution on Stocking Non-Native Hatchery Trout Over Native Trout Populations." TU sees the succession of stocking trout over native trout as a critical component to conservation of coldwater species and their habitats.

4.3 FUTURE STUDY

In addition to the on-the-ground and policy-related implementation actions identified above, there are areas where additional study or analysis are recommended. These actions are intended to build upon the data collected in this report and fill in data gaps where additional information could help support the preservation and enhancement of coldwater habitats, brook trout, and water quality in the BRMA.

- Conduct more extensive data collection efforts in areas demonstrating thermal anomalies.
- Establish long-term monitoring locations to better understand the thermal response of the Big River Watershed and the BRMA over time.
- Monitor the Unnamed Tributary to the Carr River that is adjacent to Hopkins Hill Sand and Stone LLC to monitor effluent impacts on in-stream water temperatures and suspended sediments (i.e., turbidity).
- Annual monitoring of brook trout populations.

- Develop a method for using brook trout as a long-term indicator of water quality in the BRMA.
- Develop a water quality monitoring plan for the Big River and its tributaries within the BRMA to establish baseline water quality data and help inform future land use decisions.
- Collect water temperature and dissolved oxygen data for Carr Pond to explore the possibility of managing Carr Pond as a recreational resource, and for potential brook trout habitat.
- Develop a Long-Term Management Plan and BRMA Usage study to:
    - better define the recreational usage of BRMA;
    - develop user group areas;
    - identify an infrastructure management plan that outlines the goals and objectives of BRMA infrastructure, as well as identify repair, replacement, and maintenance needs to ensure infrastructure is safe and meeting the requirements of its intended usage goals and objectives;
    - plan for the sustainable usage of natural resources within the BRMA, which would avoid negative impacts to sensitive habitat and sensitive species (i.e., brook trout) while protecting and preserving the area as a future drinking water source.

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Appendix A

U.S. Department of Agriculture–Natural Resources Conservation Service Soil Resource Report and Table A1 Soils Table

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United States Department of Agriculture

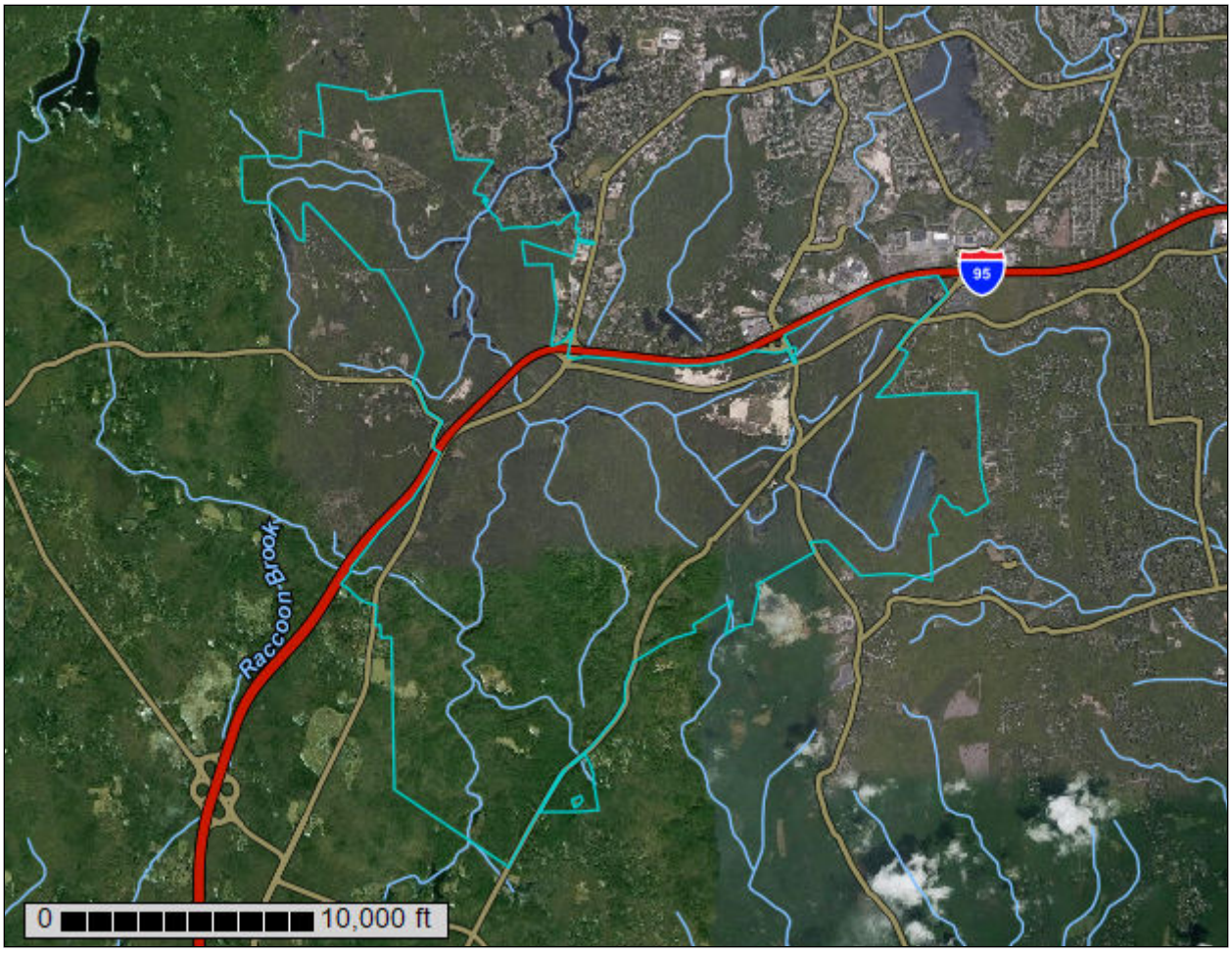
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties

Big River Management Area



August 13, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

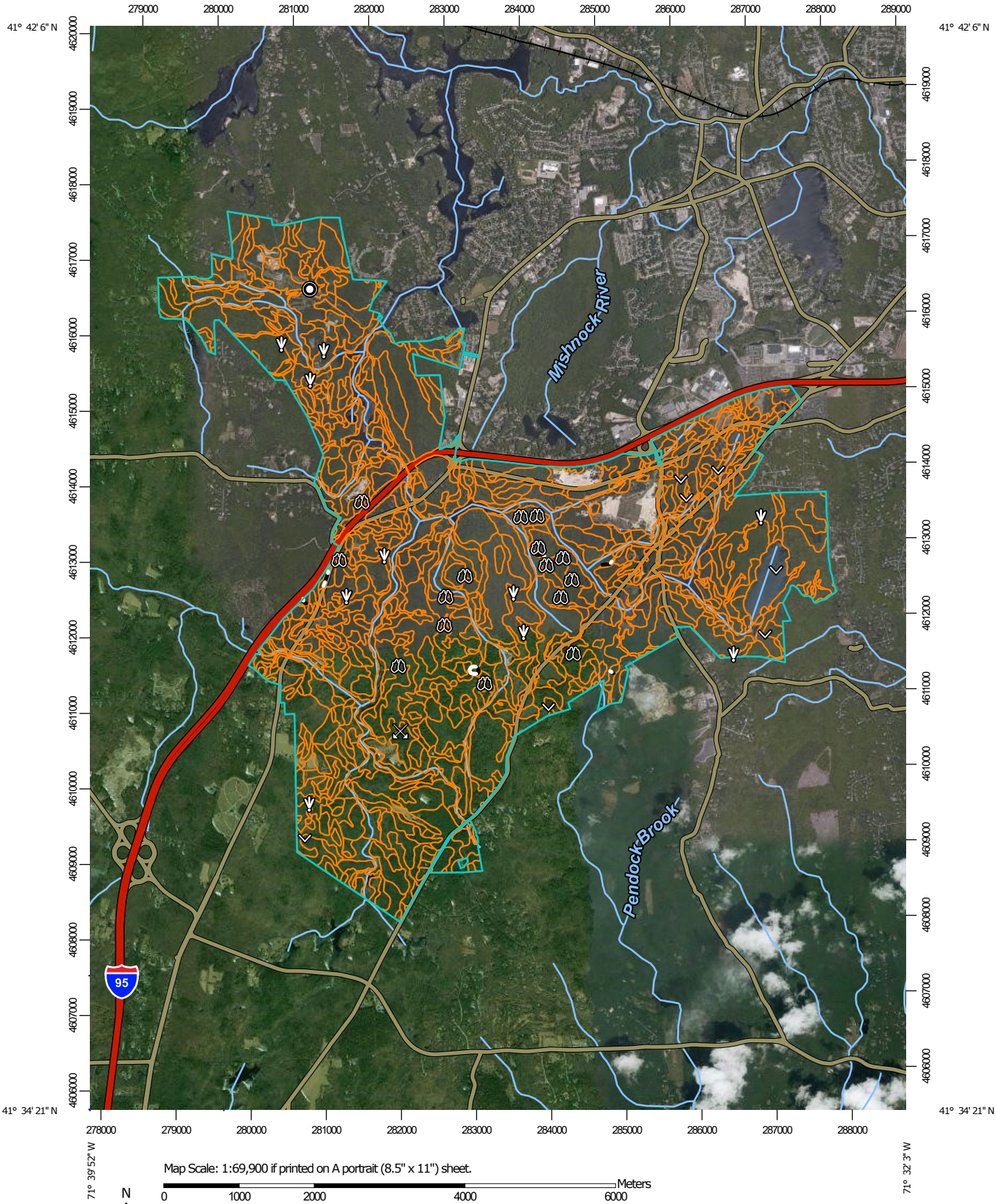
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Big River Management Area)



Map Scale: 1:69,900 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 1000 2000 4000 6000

Feet: 0 3000 6000 12000 18000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 14, 2010—Jul 18, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Big River Management Area)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AfA	Agawam fine sandy loam, 0 to 3 percent slopes	126.2	1.5%
AfB	Agawam fine sandy loam, 3 to 8 percent slopes	97.8	1.2%
BhA	Bridgehampton silt loam, 0 to 3 percent slopes	11.0	0.1%
BhB	Bridgehampton silt loam, 3 to 8 percent slopes	32.5	0.4%
BmA	Bridgehampton silt loam, till substratum, 0 to 3 percent slopes	36.2	0.4%
BmB	Bridgehampton silt loam, till substratum, 3 to 8 percent slopes	30.9	0.4%
BnB	Bridgehampton-Charlton complex, very stony, 0 to 8 percent slopes	145.2	1.7%
BnC	Bridgehampton-Charlton complex, very stony, 8 to 15 percent slopes	6.8	0.1%
BoC	Bridgehampton-Charlton complex, extremely stony, 3 to 15 percent slopes	143.8	1.7%
BsB	Broadbrook very stony silt loam, 0 to 8 percent slopes	20.8	0.2%
CaC	Canton-Charlton-Rock outcrop complex, 3 to 15 percent slopes	31.2	0.4%
CaD	Canton-Charlton-Rock outcrop complex, 15 to 35 percent slopes, very stony	116.1	1.4%
CdA	Canton and Charlton fine sandy loams, 0 to 3 percent slopes	46.3	0.5%
CdB	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	8.7	0.1%
CeC	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky	307.6	3.6%
ChB	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	885.7	10.5%
ChC	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	450.7	5.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ChD	Canton and Charlton very stony fine sandy loams, 15 to 25 percent slopes	147.2	1.7%
CkC	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	90.0	1.1%
Dc	Deerfield loamy fine sand, 0 to 3 percent slopes	79.8	0.9%
EfA	Enfield silt loam, 0 to 3 percent slopes	83.3	1.0%
EfB	Enfield silt loam, 3 to 8 percent slopes	49.8	0.6%
FeA	Freetown muck, 0 to 1 percent slopes	261.9	3.1%
GhC	Gloucester-Hinckley complex, 3 to 15 percent slopes, very stony	112.4	1.3%
GhD	Gloucester-Hinckley complex, 15 to 35 percent slopes, very stony	8.9	0.1%
HkA	Hinckley loamy sand, 0 to 3 percent slopes	177.8	2.1%
HkC	Hinckley loamy sand, 8 to 15 percent slopes	839.7	9.9%
HkD	Hinckley loamy sand, 15 to 25 percent slopes	378.7	4.5%
HnC	Hinckley-Enfield complex, 3 to 15 percent slopes	11.2	0.1%
LgC	Lippitt gravelly sandy loam, very rocky, 3 to 15 percent slopes	8.2	0.1%
MmA	Merrimac fine sandy loam, 0 to 3 percent slopes	89.1	1.1%
MmB	Merrimac fine sandy loam, 3 to 8 percent slopes	462.4	5.5%
NaA	Narragansett silt loam, 0 to 3 percent slopes	0.5	0.0%
NbB	Narragansett very stony silt loam, 0 to 8 percent slopes	52.5	0.6%
NbC	Narragansett very stony silt loam, 8 to 15 percent slopes	17.8	0.2%
NcC	Narragansett extremely stony silt loam, 3 to 15 percent slopes	25.4	0.3%
Nt	Ninigret fine sandy loam, 0 to 3 percent slopes	78.5	0.9%
PaA	Paxton fine sandy loam, 0 to 3 percent slopes	3.8	0.0%
PbB	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	56.9	0.7%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PbC	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	21.9	0.3%
Pg	Pits, gravel	227.3	2.7%
RbB	Rainbow very stony silt loam, 0 to 8 percent slopes	75.9	0.9%
Rc	Raypol silt loam	16.3	0.2%
Rf	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	471.8	5.6%
Rp	Rock outcrop-Canton complex, 0 to 35 percent slopes, very stony	0.1	0.0%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	179.3	2.1%
Ss	Sudbury sandy loam	173.0	2.0%
StA	Sutton fine sandy loam, 0 to 3 percent slopes	8.5	0.1%
StB	Sutton fine sandy loam, 3 to 8 percent slopes	1.3	0.0%
SuB	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	167.6	2.0%
SvB	Sutton fine sandy loam, 0 to 8 percent slopes, extremely stony	23.0	0.3%
SwA	Swansea muck, 0 to 1 percent slopes	286.6	3.4%
Tb	Tisbury silt loam	18.9	0.2%
UD	Udorthents-Urban land complex	112.8	1.3%
W	Water	233.9	2.8%
Wa	Walpole sandy loam, 0 to 3 percent slopes	287.8	3.4%
WcB	Wapping very stony silt loam, 0 to 8 percent slopes	23.2	0.3%
WdB	Wapping extremely stony silt loam, 0 to 8 percent slopes	13.2	0.2%
WgA	Windsor loamy sand, 0 to 3 percent slopes	126.4	1.5%
WgB	Windsor loamy sand, 3 to 8 percent slopes	298.6	3.5%
WhA	Woodbridge fine sandy loam, 0 to 3 percent slopes	4.5	0.1%
WhB	Woodbridge fine sandy loam, 3 to 8 percent slopes	8.7	0.1%
WoB	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	100.6	1.2%
WrB	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	29.0	0.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Totals for Area of Interest		**8,443.2**	**100.0%**

Map Unit Descriptions (Big River Management Area)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties

AfA—Agawam fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqw
Elevation: 0 to 1,040 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Agawam and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agawam

Setting

Landform: Kames, moraines, outwash terraces, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 39 inches: loamy fine sand
2C2 - 39 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B

Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Ninigret
Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Windsor
Percent of map unit: 4 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Walpole
Percent of map unit: 3 percent
Landform: Outwash plains, depressions, outwash terraces, depressions, deltas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Hinckley
Percent of map unit: 3 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

AfB—Agawam fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2tyqx
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Agawam and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agawam

Setting

Landform: Moraines, outwash terraces, kame terraces, kames, outwash plains
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 45 inches: loamy fine sand
2C2 - 45 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, eskers, kames

Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent
Landform: Kames, eskers, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Outwash terraces, deltas, outwash plains, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

BhA—Bridgehampton silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9ltj
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bridgehampton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting

Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and gravelly glaciofluvial deposits derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam

B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Minor Components

Agawam

Percent of map unit: 3 percent
Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Enfield

Percent of map unit: 3 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tisbury

Percent of map unit: 2 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Scio

Percent of map unit: 2 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

BhB—Bridgehampton silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9ltk
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bridgehampton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting

Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and gravelly glaciofluvial deposits derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Minor Components

Enfield
Percent of map unit: 3 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Agawam
Percent of map unit: 3 percent
Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tisbury
Percent of map unit: 2 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Scio
Percent of map unit: 2 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

BmA—Bridgehampton silt loam, till substratum, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9ltl
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Bridgehampton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting
Landform: Ground moraines
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and silty melt-out till derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 3 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Scio

Percent of map unit: 2 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Canton

Percent of map unit: 1 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

BmB—Bridgehampton silt loam, till substratum, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9ltm
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bridgehampton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and silty melt-out till derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 3 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Scio

Percent of map unit: 2 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Canton

Percent of map unit: 1 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

BnB—Bridgehampton-Charlton complex, very stony, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9ltn
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches

Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Bridgehampton and similar soils: 60 percent
Charlton and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and silty melt-out till derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam

Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 5 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 4 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Scio

Percent of map unit: 3 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Wapping

Percent of map unit: 3 percent
Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BnC—Bridgehampton-Charlton complex, very stony, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9ltp
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Bridgehampton and similar soils: 60 percent
Charlton and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and silty melt-out till derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 5 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 4 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 3 percent

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Scio

Percent of map unit: 3 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

BoC—Bridgehampton-Charlton complex, extremely stony, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9ltq
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Bridgehampton and similar soils: 60 percent
Charlton and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bridgehampton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty loess over sandy and silty melt-out till derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 41 inches: silt loam
2C - 41 to 60 inches: gravelly sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 5 percent
Landform: Hills, till plains
Down-slope shape: Linear

Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 4 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Scio

Percent of map unit: 2 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Sutton

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: No

BsB—Broadbrook very stony silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9ltt
Elevation: 50 to 510 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Broadbrook and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Broadbrook

Setting

Landform: Drumlins, hills

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over coarse-loamy lodgment till derived from granite and gneiss and/or schist and/or shale and siltstone

Typical profile

Ap - 0 to 8 inches: silt loam
Bw1 - 8 to 14 inches: silt loam
Bw2 - 14 to 25 inches: silt loam
2Cd - 25 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 3 percent
Landform: Drumlins, hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 2 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Narragansett

Percent of map unit: 2 percent
Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear

Across-slope shape: Convex
Hydric soil rating: No

Rainbow

Percent of map unit: 1 percent
Landform: Drumlins, hills
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

CaC—Canton-Charlton-Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9ltx
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 40 percent
Charlton and similar soils: 20 percent
Rock outcrop: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: gravelly fine sandy loam
Bw1 - 3 to 15 inches: gravelly loam
Bw2 - 15 to 24 inches: gravelly loam
Bw3 - 24 to 30 inches: gravelly loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Igneous, metamorphic and sedimentary rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Gloucester

Percent of map unit: 6 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Narragansett

Percent of map unit: 6 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Drumlins, hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Sutton

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: No

CaD—Canton-Charlton-Rock outcrop complex, 15 to 35 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w826
Elevation: 0 to 800 feet
Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 40 percent
Charlton, very stony, and similar soils: 20 percent
Rock outcrop: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Moraines, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges, hills
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Gloucester, very stony
Percent of map unit: 6 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Narragansett, very stony
Percent of map unit: 6 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Paxton, very stony
Percent of map unit: 5 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sutton, very stony
Percent of map unit: 3 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

CdA—Canton and Charlton fine sandy loams, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9ltz
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Canton and similar soils: 60 percent
Charlton and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: gravelly fine sandy loam
Bw1 - 3 to 15 inches: gravelly loam
Bw2 - 15 to 24 inches: gravelly loam
Bw3 - 24 to 30 inches: gravelly loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam

C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 4 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Sutton

Percent of map unit: 2 percent
Landform: Drainageways, depressions
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: No

Gloucester

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Paxton

Percent of map unit: 2 percent
Landform: Hills, drumlins
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

CdB—Canton and Charlton fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w81s
Elevation: 0 to 1,460 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Canton and similar soils: 50 percent
Charlton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Moraines, hills, ridges
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton

Percent of map unit: 5 percent
Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 5 percent
Landform: Hills, depressions, drainageways, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear

Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

CeC—Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w81y
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 55 percent
Charlton, very stony, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop
Percent of map unit: 5 percent
Landform: Hills, ridges
Hydric soil rating: Unranked

Gloucester, very stony
Percent of map unit: 4 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Sutton, very stony
Percent of map unit: 4 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Chatfield, very stony
Percent of map unit: 2 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

ChB—Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony

Map Unit Setting
National map unit symbol: 2w81v
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Canton, very stony, and similar soils: 50 percent
Charlton, very stony, and similar soils: 35 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Moraines, ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam

Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Leicester, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Chatfield, very stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Nose slope, crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

ChC—Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w820
Elevation: 0 to 1,540 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 50 percent
Charlton, very stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield, very stony

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 5 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

ChD—Canton and Charlton very stony fine sandy loams, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9lv5
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 60 percent
Charlton and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: gravelly fine sandy loam
Bw1 - 3 to 15 inches: gravelly loam

Bw2 - 15 to 24 inches: gravelly loam
Bw3 - 24 to 30 inches: gravelly loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B

Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Narragansett
Percent of map unit: 4 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Sutton
Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: No

Paxton
Percent of map unit: 2 percent
Landform: Drumlins, hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Gloucester
Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

CkC—Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony

Map Unit Setting
National map unit symbol: 2wks7
Elevation: 0 to 1,310 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Canton, extremely stony, and similar soils: 50 percent
Charlton, extremely stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Ridges, hills, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield, extremely stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sutton, extremely stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Leicester, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Dc—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Kame terraces, outwash plains, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash plains, outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Kame terraces, outwash plains, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Outwash terraces, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

EfA—Enfield silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lvb
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Enfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Enfield

Setting

Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Oi - 0 to 3 inches: slightly decomposed plant material
Oe - 3 to 4 inches: moderately decomposed plant material
Ap - 4 to 12 inches: silt loam
Bw1 - 12 to 20 inches: silt loam
Bw2 - 20 to 26 inches: silt loam
Bw3 - 26 to 30 inches: silt loam
2C - 30 to 37 inches: stratified coarse sand to very gravelly loamy sand
3C - 37 to 65 inches: stratified very gravelly coarse sand to loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 2 percent
Landform: Outwash plains, terraces, eskers, kames

Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 2 percent
Landform: Kames, outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tisbury

Percent of map unit: 1 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave, linear
Hydric soil rating: No

EfB—Enfield silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lvc
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Enfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Enfield

Setting

Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Oi - 0 to 3 inches: slightly decomposed plant material
Oe - 3 to 4 inches: moderately decomposed plant material
Ap - 4 to 12 inches: silt loam
Bw1 - 12 to 20 inches: silt loam
Bw2 - 20 to 26 inches: silt loam
Bw3 - 26 to 30 inches: silt loam
2C - 30 to 37 inches: stratified coarse sand to very gravelly loamy sand
3C - 37 to 65 inches: stratified very gravelly coarse sand to loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY023CT - Well Drained Outwash
Hydric soil rating: No

Minor Components

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Merrimac

Percent of map unit: 2 percent
Landform: Terraces, kames, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 2 percent
Landform: Outwash plains, terraces, eskers, kames
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tisbury

Percent of map unit: 1 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave, linear
Hydric soil rating: No

FeA—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Depressions, depressions, bogs, marshes, kettles, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Whitman

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 5 percent
Landform: Kettles, depressions, depressions, marshes, swamps, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

GhC—Gloucester-Hinckley complex, 3 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2svlm
Elevation: 0 to 670 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gloucester, very stony, and similar soils: 50 percent
Hinckley, very stony, and similar soils: 25 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gloucester, Very Stony

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit

Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material
A - 2 to 6 inches: sandy loam
Bw1 - 6 to 15 inches: gravelly sandy loam
Bw2 - 15 to 29 inches: very gravelly loamy coarse sand
C - 29 to 65 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Hinckley, Very Stony

Setting

Landform: Eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, shoulder, summit, toeslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser, tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Merrimac, very stony

Percent of map unit: 10 percent
Landform: Moraines, outwash terraces, outwash plains, kame terraces, kames, eskers
Landform position (two-dimensional): Backslope, footslope, shoulder, summit, toeslope
Landform position (three-dimensional): Side slope, head slope, nose slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Windsor, very stony

Percent of map unit: 10 percent
Landform: Eskers, moraines, outwash terraces, outwash plains, kames, outwash deltas, kame terraces
Landform position (two-dimensional): Backslope, footslope, shoulder, summit, toeslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser, tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Sudbury, very stony

Percent of map unit: 5 percent
Landform: Eskers, kames, outwash terraces, outwash deltas, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

GhD—Gloucester-Hinckley complex, 15 to 35 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2svlp
Elevation: 0 to 570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gloucester, very stony, and similar soils: 50 percent
Hinckley, very stony, and similar soils: 25 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gloucester, Very Stony

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material
A - 2 to 6 inches: sandy loam
Bw1 - 6 to 15 inches: gravelly sandy loam
Bw2 - 15 to 29 inches: very gravelly loamy coarse sand
C - 29 to 65 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Hinckley, Very Stony

Setting

Landform: Outwash deltas, kame terraces, outwash plains, kames, eskers, moraines, outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Merrimac, very stony

Percent of map unit: 10 percent
Landform: Eskers, moraines, outwash terraces, outwash plains, kames, kame terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser

Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Windsor, very stony

Percent of map unit: 10 percent
Landform: Kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, head slope, crest, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury, very stony

Percent of map unit: 5 percent
Landform: Kames, outwash terraces, outwash deltas, moraines, outwash plains, kame terraces, eskers
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

HkA—Hinckley loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svm7
Elevation: 0 to 1,420 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash plains, outwash terraces, outwash deltas, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Linear, convex, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Kame terraces, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Kame terraces, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

HkC—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (two-dimensional): Shoulder, toeslope, footslope, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Linear, concave, convex
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Kame terraces, outwash plains, moraines, outwash deltas, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Outwash terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash deltas, kames, eskers, moraines, kame terraces, outwash plains, outwash terraces
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

HkD—Hinckley loamy sand, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2svmc
Elevation: 0 to 1,460 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, kame terraces, kames, outwash plains, eskers, moraines, outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 8 percent
Landform: Eskers, moraines, outwash plains, kames, outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Convex
Across-slope shape: Convex

Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Kame terraces, kames, outwash plains, outwash terraces, outwash deltas, eskers, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent
Landform: Kame terraces, eskers, outwash terraces, outwash plains, moraines, outwash deltas
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear, convex
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

HnC—Hinckley-Enfield complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svlt
Elevation: 0 to 620 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 60 percent
Enfield and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, kame terraces, outwash plains, kames, eskers, moraines, outwash terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, tread, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex

Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

A - 0 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Enfield

Setting

Landform: Moraines, kame terraces, outwash plains, outwash terraces, kames
Landform position (two-dimensional): Shoulder, toeslope, footslope, backslope, summit
Landform position (three-dimensional): Crest, nose slope, side slope, head slope, tread, riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 7 inches: silt loam
Bw1 - 7 to 16 inches: silt loam
Bw2 - 16 to 25 inches: silt loam
2C - 25 to 60 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 22 to 43 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY023CT - Well Drained Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Tisbury

Percent of map unit: 2 percent
Landform: Valley trains, outwash deltas, depressions, outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Bridgehampton

Percent of map unit: 1 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

LgC—Lippitt gravelly sandy loam, very rocky, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9lvp
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 211 days
Farmland classification: Not prime farmland

Map Unit Composition

Lippitt and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lippitt

Setting

Landform: Ground moraines
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite and gneiss over gneiss

Typical profile

A - 0 to 5 inches: gravelly sandy loam
Bw - 5 to 16 inches: gravelly sandy loam
C - 16 to 26 inches: very gravelly sandy loam
Cr - 26 to 72 inches: weathered bedrock
R - 72 to 79 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches; 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F144AY032NH - Dry Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop
Percent of map unit: 7 percent
Hydric soil rating: No

Sutton
Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: No

Canton
Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Gloucester
Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Narragansett
Percent of map unit: 1 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton
Percent of map unit: 1 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

MmA—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, moraines, outwash terraces, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Eskers, moraines, outwash plains, outwash terraces, stream terraces, kames
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

MmB—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, kames, eskers, moraines, outwash terraces
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Kames, deltas, outwash plains, eskers
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Outwash terraces, outwash plains, deltas, dunes

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash terraces, outwash plains, kames, eskers, stream terraces, moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

NaA—Narragansett silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lvy
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Narragansett and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or granite

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 15 inches: silt loam
Bw2 - 15 to 24 inches: silt loam
Bw3 - 24 to 28 inches: gravelly silt loam
2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 2 percent
Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Woodbridge

Percent of map unit: 1 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

NbB—Narragansett very stony silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lw0
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or granite

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 15 inches: silt loam
Bw2 - 15 to 24 inches: silt loam
Bw3 - 24 to 28 inches: gravelly silt loam
2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Bridgehampton
Percent of map unit: 4 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Canton
Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Charlton
Percent of map unit: 1 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Wapping
Percent of map unit: 1 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Woodbridge
Percent of map unit: 1 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Scio
Percent of map unit: 1 percent
Landform: Terraces, lakebeds
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

NbC—Narragansett very stony silt loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9lw1
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches

Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or granite

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 15 inches: silt loam
Bw2 - 15 to 24 inches: silt loam
Bw3 - 24 to 28 inches: gravelly silt loam
2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 1 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Woodbridge

Percent of map unit: 1 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Scio

Percent of map unit: 1 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

NcC—Narragansett extremely stony silt loam, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9lw2
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or granite

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 15 inches: silt loam
Bw2 - 15 to 24 inches: silt loam
Bw3 - 24 to 28 inches: gravelly silt loam
2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Convex

Across-slope shape: Convex
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 1 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Nt—Ninigret fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyr6
Elevation: 0 to 1,250 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ninigret and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ninigret

Setting

Landform: Kame terraces, depressions, drainageways, outwash terraces, kames, moraines, outwash plains
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, dip, rise
Down-slope shape: Convex, concave, linear
Across-slope shape: Convex, concave
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 17 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Minor Components

Agawam

Percent of map unit: 5 percent
Landform: Moraines, kame terraces, kames, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, dunes, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

PaA—Paxton fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2t2r1
Elevation: 0 to 810 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands

Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 5 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton

Percent of map unit: 3 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Depressions, drumlins, drainageways, hills, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

PbB—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: Drainageways, drumlins, ground moraines, hills, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills

Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

PbC—Paxton fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w677
Elevation: 0 to 1,330 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony
Percent of map unit: 8 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, very stony
Percent of map unit: 2 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pg—Pits, gravel

Map Unit Setting
National map unit symbol: 9lwh
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Pits: 95 percent

Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits

Setting
Parent material: Sandy and gravelly glaciofluvial deposits derived from granite and gneiss

Minor Components

Water
Percent of map unit: 2 percent
Hydric soil rating: Unranked

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: No

Urban land
Percent of map unit: 1 percent
Hydric soil rating: No

Hinckley
Percent of map unit: 1 percent
Landform: Eskers, kames, outwash plains, terraces
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

RbB—Rainbow very stony silt loam, 0 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9lww
Elevation: 0 to 540 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Rainbow and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rainbow

Setting
Landform: Drumlins, hills
Down-slope shape: Linear
Across-slope shape: Concave

Parent material: Coarse-loamy eolian deposits over coarse-loamy lodgment till derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 18 inches: silt loam
Bw2 - 18 to 26 inches: silt loam
2Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Broadbrook

Percent of map unit: 3 percent
Landform: Drumlins, hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 2 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Paxton

Percent of map unit: 1 percent
Landform: Drumlins, hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Rc—Raypol silt loam

Map Unit Setting

National map unit symbol: 9lwx
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Raypol and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raypol

Setting

Landform: Outwash plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits

Typical profile

A - 0 to 4 inches: silt loam
Bw - 4 to 22 inches: silt loam
2C - 22 to 65 inches: stratified loamy fine sand to very gravelly coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Scio

Percent of map unit: 4 percent
Landform: Lakebeds, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Scarboro

Percent of map unit: 3 percent
Landform: Depressions, drainageways, terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Walpole

Percent of map unit: 3 percent
Landform: Depressions on terraces, drainageways on terraces
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Rf—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qt
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 40 percent
Leicester, extremely stony, and similar soils: 35 percent
Whitman, extremely stony, and similar soils: 17 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Depressions, drainageways, hills, ground moraines, drumlins
Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Description of Leicester, Extremely Stony

Setting

Landform: Depressions, drainageways, hills, ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 7 inches: fine sandy loam
Bg - 7 to 18 inches: fine sandy loam
BC - 18 to 24 inches: fine sandy loam
C1 - 24 to 39 inches: gravelly fine sandy loam
C2 - 39 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B/D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Description of Whitman, Extremely Stony

Setting

Landform: Drainageways, hills, ground moraines, drumlins, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 6 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Swansea

Percent of map unit: 2 percent
Landform: Swamps, bogs
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Rp—Rock outcrop-Canton complex, 0 to 35 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2wks3
Elevation: 0 to 710 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 50 percent
Canton, very stony, and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Hills, ridges
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 0 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Canton, Very Stony

Setting

Landform: Moraines, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton, very stony

Percent of map unit: 7 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave

Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony

Percent of map unit: 6 percent
Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 4 percent
Landform: Drainageways, ground moraines, hills, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Lippitt, very stony

Percent of map unit: 3 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Sb—Scarboro mucky fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svky
Elevation: 0 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Scarboro and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scarboro

Setting

Landform: Outwash terraces, outwash deltas, drainageways, depressions
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from schist and/or sandy glaciofluvial deposits derived from gneiss and/or sandy glaciofluvial deposits derived from granite

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 11 inches: mucky fine sandy loam
Cg1 - 11 to 21 inches: sand
Cg2 - 21 to 65 inches: gravelly coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.42 to 14.17 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Swansea

Percent of map unit: 10 percent
Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Walpole

Percent of map unit: 5 percent
Landform: Depressions, outwash terraces, depressions, deltas, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wareham

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

Ss—Sudbury sandy loam

Map Unit Setting

National map unit symbol: 9lx8
Elevation: 0 to 810 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 100 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sudbury and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sudbury

Setting

Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 5 inches: sandy loam
Bw1 - 5 to 17 inches: gravelly sandy loam
Bw2 - 17 to 25 inches: sandy loam
2C - 25 to 60 inches: Error

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 3 percent
Landform: Terraces, eskers, kames, outwash plains
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ninigret

Percent of map unit: 2 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions on terraces, drainageways on terraces
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Windsor

Percent of map unit: 1 percent
Landform: Kames, outwash plains, terraces
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Agawam

Percent of map unit: 1 percent
Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Deerfield

Percent of map unit: 1 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Merrimac

Percent of map unit: 1 percent
Landform: Kames, outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

StA—Sutton fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xffg
Elevation: 0 to 1,240 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sutton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sutton

Setting

Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 5 inches: fine sandy loam
Bw1 - 5 to 17 inches: fine sandy loam
Bw2 - 17 to 25 inches: sandy loam
C1 - 25 to 39 inches: gravelly sandy loam
C2 - 39 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 12 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D

Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Leicester
Percent of map unit: 5 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton
Percent of map unit: 5 percent
Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Canton
Percent of map unit: 4 percent
Landform: Ridges, moraines, hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Whitman
Percent of map unit: 1 percent
Landform: Drumlins, ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

StB—Sutton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2w69j
Elevation: 0 to 1,410 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sutton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sutton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 5 inches: fine sandy loam
Bw1 - 5 to 17 inches: fine sandy loam
Bw2 - 17 to 25 inches: sandy loam
C1 - 25 to 39 inches: gravelly sandy loam
C2 - 39 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 12 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 9 percent
Landform: Ridges, hills, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 5 percent

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 5 percent
Landform: Hills, ground moraines, depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 1 percent
Landform: Drumlins, depressions, drainageways, hills, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

SuB—Sutton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2xfff
Elevation: 0 to 1,410 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Sutton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sutton, Very Stony

Setting

Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: fine sandy loam
Bw1 - 7 to 19 inches: fine sandy loam
Bw2 - 19 to 27 inches: sandy loam
C1 - 27 to 41 inches: gravelly sandy loam
C2 - 41 to 62 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 12 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B/D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Charlton, very stony

Percent of map unit: 7 percent
Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Canton, very stony

Percent of map unit: 4 percent
Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 3 percent
Landform: Hills, drainageways, ground moraines, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave

Hydric soil rating: Yes

Whitman, very stony

Percent of map unit: 1 percent
Landform: Ground moraines, drumlins, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

SvB—Sutton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2xffh
Elevation: 10 to 760 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Sutton, extremely stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sutton, Extremely Stony

Setting

Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: fine sandy loam
Bw1 - 7 to 19 inches: fine sandy loam
Bw2 - 19 to 27 inches: sandy loam
C1 - 27 to 41 inches: gravelly sandy loam
C2 - 41 to 62 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 12 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B/D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Leicester, extremely stony

Percent of map unit: 4 percent
Landform: Ground moraines, depressions, hills, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Canton, extremely stony

Percent of map unit: 4 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 4 percent
Landform: Ground moraines, ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 3 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

SwA—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Tb—Tisbury silt loam

Map Unit Setting

National map unit symbol: 9lxf
Elevation: 0 to 520 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tisbury and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tisbury

Setting

Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear, concave

Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
Bw1 - 8 to 18 inches: silt loam
Bw2 - 18 to 26 inches: silt loam
2C - 26 to 60 inches: stratified very gravelly sand to loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F149BY007NY - Moist Outwash
Hydric soil rating: No

Minor Components

Enfield

Percent of map unit: 4 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Raypol

Percent of map unit: 3 percent
Landform: Outwash plains
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

UD—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9lxj
Elevation: 0 to 670 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 211 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 70 percent
Urban land: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Human transported material

Typical profile

A - 0 to 12 inches: sandy loam
C1 - 12 to 25 inches: sandy loam
C2 - 25 to 60 inches: stratified sand to very gravelly coarse sand

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 42 to 54 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Description of Urban Land

Setting

Parent material: Human transported material

Typical profile

R - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Quonset

Percent of map unit: 5 percent
Landform: Outwash terraces, terraces, outwash plains, eskers
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Kames, outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 9lxl
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Wa—Walpole sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkl
Elevation: 0 to 1,020 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Walpole and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Walpole

Setting

Landform: Deltas, depressions, outwash terraces, outwash plains, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Oe - 0 to 1 inches: mucky peat
A - 1 to 7 inches: sandy loam
Bg - 7 to 21 inches: sandy loam
BC - 21 to 25 inches: gravelly sandy loam
C - 25 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Scarboro

Percent of map unit: 10 percent
Landform: Deltas, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 10 percent
Landform: Terraces, deltas, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear

Hydric soil rating: No

WcB—Wapping very stony silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lxq
Elevation: 0 to 620 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Wapping and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapping

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 11 inches: very fine sandy loam
Bw1 - 11 to 16 inches: very fine sandy loam
Bw2 - 16 to 20 inches: very fine sandy loam
2C1 - 20 to 28 inches: gravelly sandy loam
2C2 - 28 to 36 inches: gravelly loamy sand
2C3 - 36 to 80 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 4 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Bridgehampton

Percent of map unit: 3 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

WdB—Wapping extremely stony silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lxr
Elevation: 0 to 570 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 115 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Wapping and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapping

Setting

Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 11 inches: very fine sandy loam
Bw1 - 11 to 16 inches: very fine sandy loam
Bw2 - 16 to 20 inches: very fine sandy loam
2C1 - 20 to 28 inches: gravelly sandy loam
2C2 - 28 to 36 inches: gravelly loamy sand
2C3 - 36 to 80 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Bridgehampton

Percent of map unit: 4 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Narragansett

Percent of map unit: 4 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Leicester

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

WgA—Windsor loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkg
Elevation: 0 to 990 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Deltas, outwash terraces, outwash plains, dunes
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Deerfield, loamy sand

Percent of map unit: 10 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley, loamy sand

Percent of map unit: 5 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

WgB—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,210 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Dunes, outwash terraces, deltas, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material

A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield, loamy sand

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

WhA—Woodbridge fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w686
Elevation: 0 to 1,420 feet
Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 7 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Depressions, hills, drumlins, drainageways, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, extremely stony

Percent of map unit: 1 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton

Percent of map unit: 1 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

WhB—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, base slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

WoB—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr

Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope

Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent
Landform: Drumlins, drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

WrB—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qs
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, extremely stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, extremely stony

Percent of map unit: 10 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 8 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

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Table A1. Soils in the BRMA

Name (Map, Unit)	Slope (%)	Acres in BRMA
Agawam Fine Sandy Loam	0–3	112
Agawam Fine Sandy Loam	3–8	97.7
Bridgehampton Silt Loam	0–3	11
Bridgehampton Silt Loam	3–8	32.5
Bridgehampton Silt Loam, till Substratum	0–3	36.2
Bridgehampton Silt Loam, till Substratum	3–8	30.9
Bridgehamption-Charlton complex, extremely stony	3–15	143.6
Bridgehamption-Charlton complex, very stony	0–8	151.8
Broadbrook very stony silt loam	0–8	20.8
Canton And Charlton fine sandy loams	0-3	46.3
Canton And Charlton fine sandy loams	3–8	8.7
Canton And Charlton fine sandy loams, very rocky	3-15	307.5
Canton And Charlton very stony fine sandy loams	3-8	880.3
Canton And Charlton very stony fine sandy loams	8–15	450.5
Canton And Charlton very stony fine sandy loams	15-25	147
Canton-Charlton-Rock outcrop complex	15–35	237.3
Deerfield loamy fine Sand	Not applicable	79.8
Enfield silt loam	0–3	133
Freetown, mucky peat	0–2	259.4
Gloucester-Hinckley very stony sandy loams, hilly	Not applicable	8.9
Gloucester-Hinckley very stony sandy loams, rolling	Not applicable	112.3
Hinckley gravelly sandy loam	0–3	177.3
Hinckley gravelly sandy loam, hilly	Not applicable	378.7
Hinckley gravelly sandy loam, rolling	Not applicable	837.3
Hinckley-Enfield complex, rolling	Not applicable	11.2
Lippitt gravelly sandy loams, very rocky	3–15	8.2
Merrimac sandy loam	0–3	89
Merrimac sandy loam	3–8	442.8
Narragansett extremely stony silt loam	3–15	25.3
Narragansett silt loam	0–3	0.5
Narragansett very stony silt loam	0–8	52.5
Narragansett very stony silt loam	8–15	17.8
Ninigret fine sandy loam	Not applicable	78.5
Paxton fine sandy loam	0–3	3.8
Paxton very stony fine sandy loam	0–8	56.8
Paxton very stony fine sandy loam	8–15	21.8
Pits, gravel	Not applicable	227.3
Rainbow very stony silt loam	0–8	75.8
Raypol silt loam	Not applicable	16.3
Ridgebury, Whitman, And Leicester extremely stony fine sandy loams	Not applicable	471.6
Rock outcrop-Canton complex	Not applicable	0.14
Scarboro mucky sandy loam	Not applicable	168.8

Name (Map, Unit)	Slope (%)	Acres in BRMA
Sudbury sandy loam	Not applicable	172.9
Sutton extremely stony fine sandy loam	0–8	23
Sutton fine sandy loam	0–3	8.5
Sutton Fine sandy loam	3–8	1.27
Sutton very stony fine sandy loam	0–8	165.1
Swansea Mucky peat	0–2	286.5
Tisbury silt loam	Not applicable	18.8
Udorthents Urban land complex	Not applicable	112.6
Walpole sandy loam	Not applicable	287.7
Wapping extremely stony silt loam	0–8	13.2
Wapping very stony silt loam	0–8	23.2
Water	Not applicable	233.8
Windsor loamy sand	0–3	126.4
Windsor loamy sand	3–8	285
Woodbridge extremely stony fine sandy loam	0–8	29
Woodbridge fine sandy loam	0–3	4.47
Woodbridge fine sandy loam	3–8	8.68
Woodbridge very stony fine sandy loam	0–8	100.6

Note: Soil data obtained from USDA NRCS Web Soil Survey.

Appendix B

U.S. Fish and Wildlife Service Information for Planning and Consultation List of Threatened and Endangered Species

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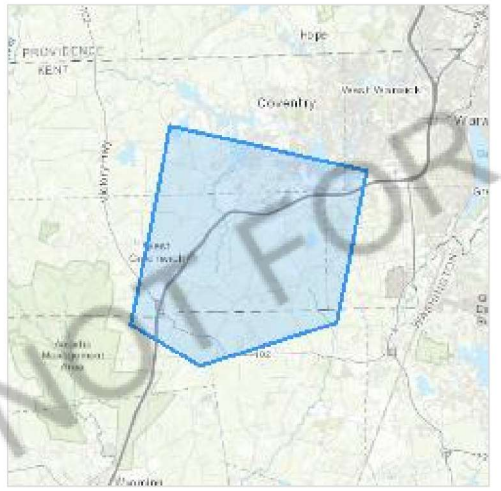
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Kent and Washington counties, Rhode Island



Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

http://www.fws.gov/newengland

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Small Whorled Pogonia Isotria medeoloides Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ

below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler *Vermivora pinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 1 to Jun 30
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10

Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler Protonotaria citrea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Purple Sandpiper Calidris maritima This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

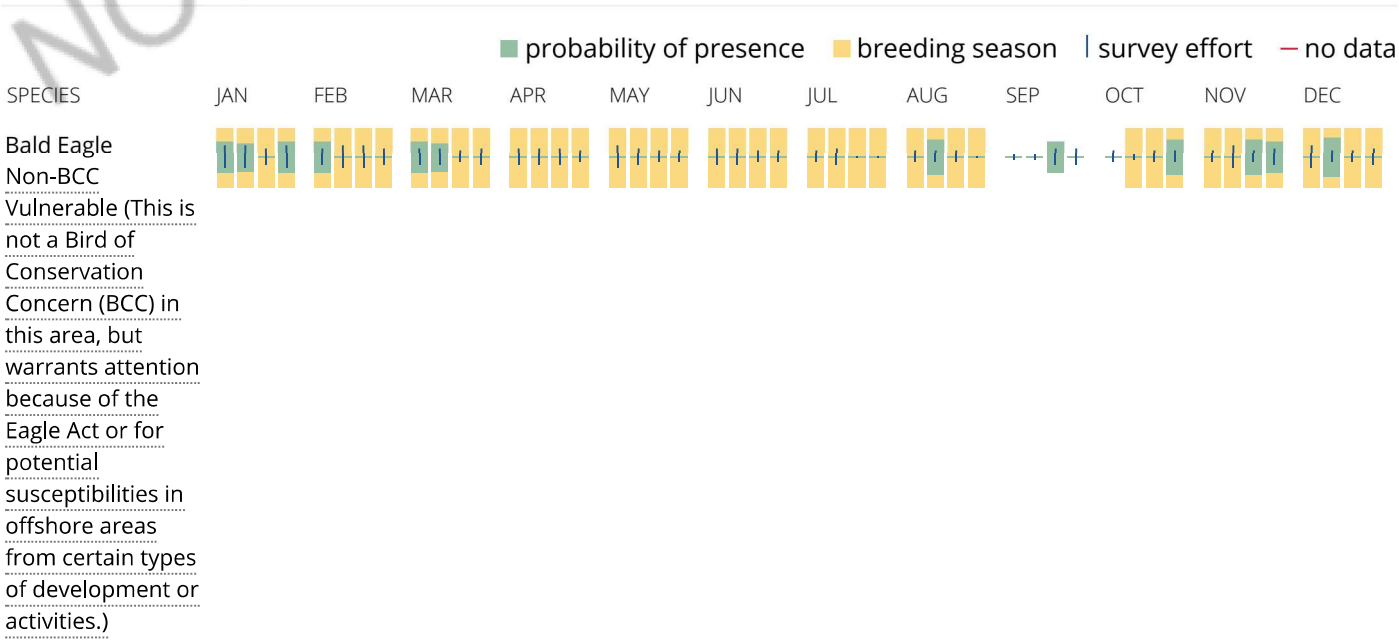
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

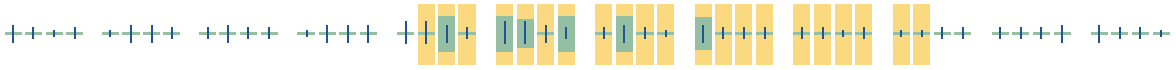
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

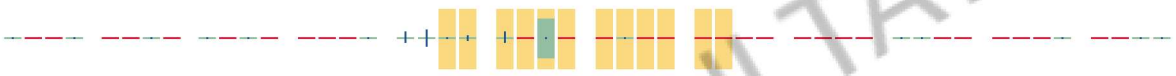


Black-billed Cuckoo BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

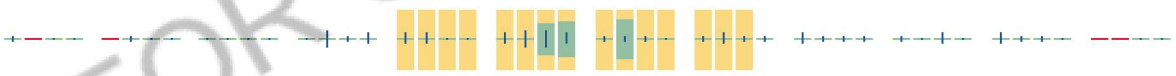


Blue-winged Warbler BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Canada Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

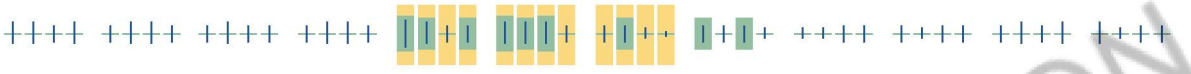


Eastern Whip-poor-will BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

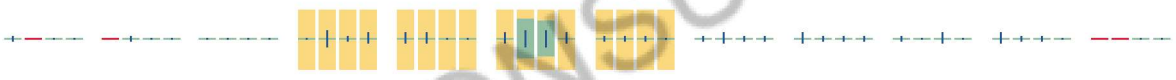


Golden Eagle Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Prairie Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



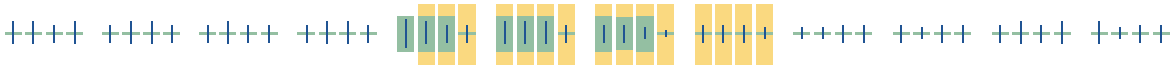
Prothonotary Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Purple Sandpiper BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Rusty Blackbird BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

Wildlife refuges and fish hatcheries

REFUGE AND FISH HATCHERY INFORMATION IS NOT AVAILABLE AT THIS TIME

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

> The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1E
- PEM1/SS1E
- PEM1F
- PEM1Fh
- PEM1/SS1F
- PEM1Eh
- PEM1Ch
- PEM1Fx
- PEM1C

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1E
- PFO1/4E
- PFO1/SS1E
- PSS1E
- PFO4/1E
- PSS1/EM1E
- PFO1A
- PFO4E
- PFO1/5F

- PFO1C
- PSS1Ed
- PFO5/UBH
- PFO1B
- PFO5Hh
- PSS1/3B
- PFO5F
- PFO1/4A
- PSS1/FO1E
- PFO4/1A
- PFO4Eh
- PSS1/EM1Eh
- PFO1Eh
- PSS1Ch
- PFO4/SS1E
- PSS5F
- PSS5Fb
- PFO1Ch

FRESHWATER POND

- PUBHh
- PUBH
- PUBFx
- PUB/FO5Hh
- PUBFb
- PUBF
- PUB/EM1Fh

LAKE

- L1UBHh

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix C

Temperature Logger Outlier Graphs

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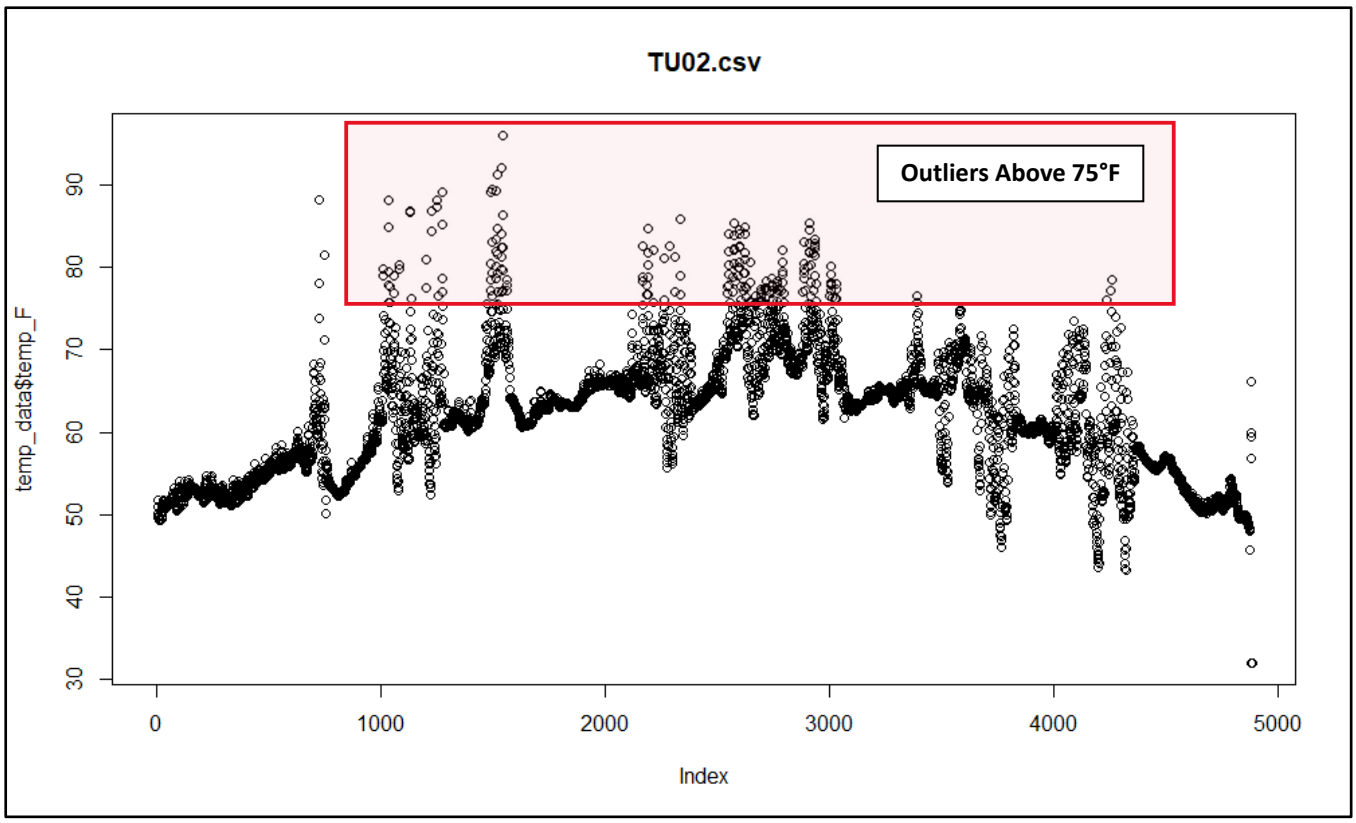
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90
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3000
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5000
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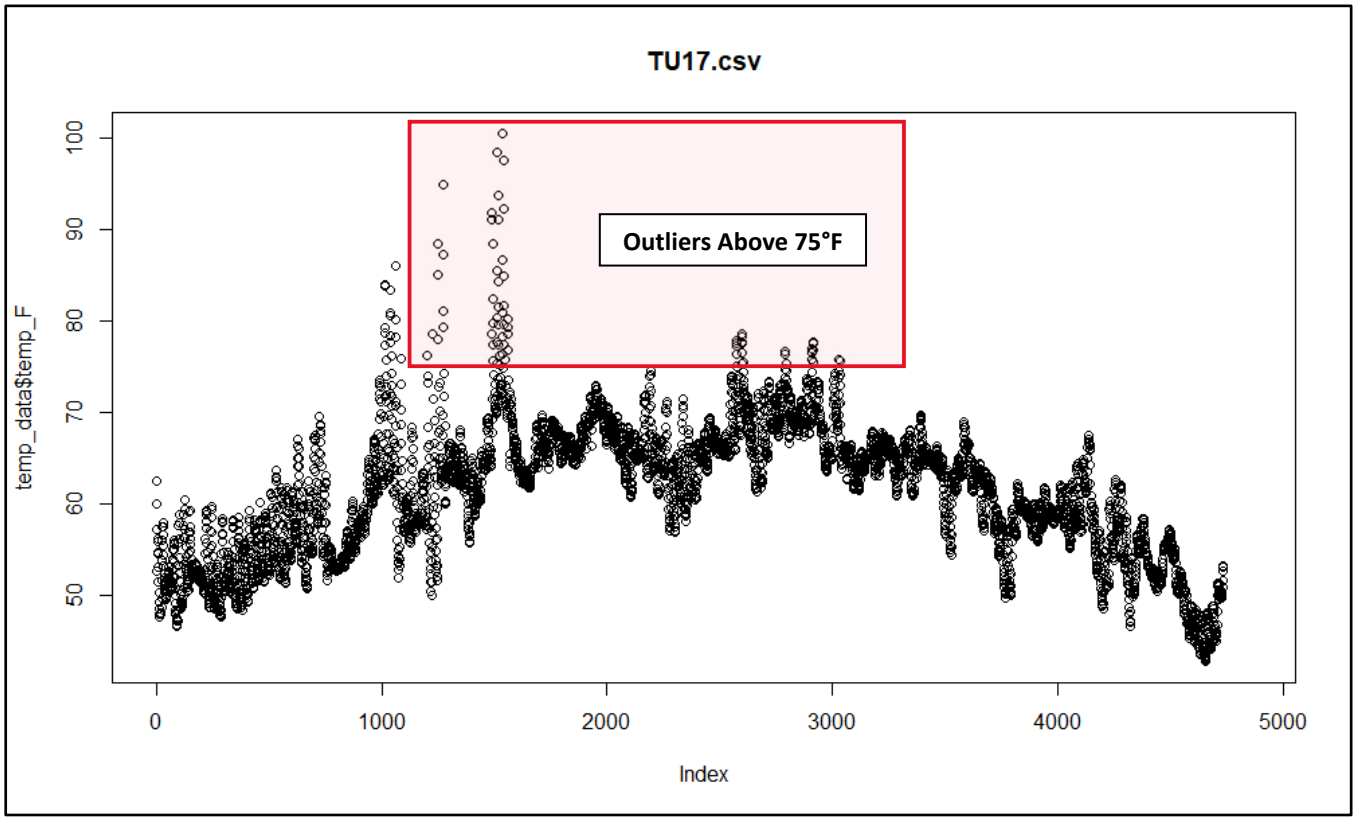
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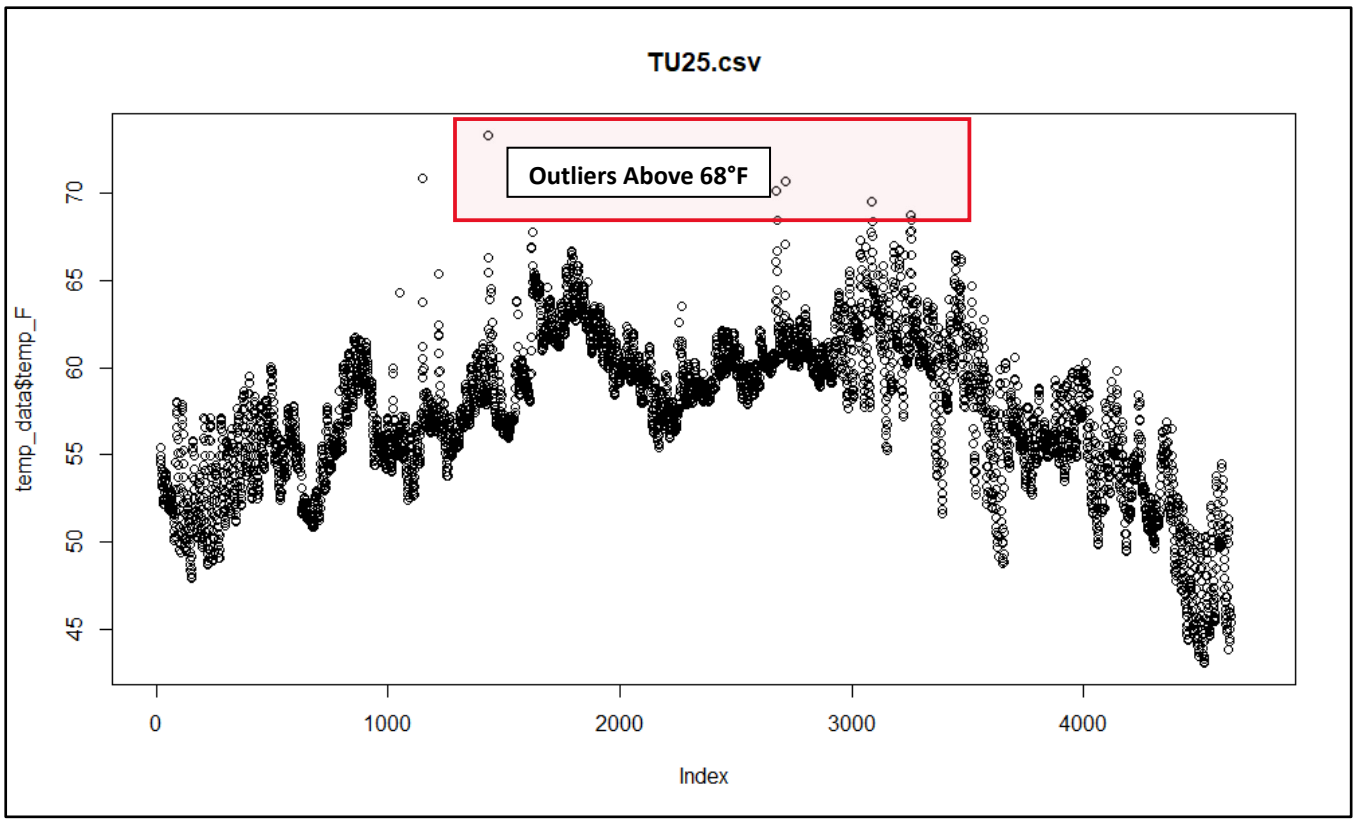
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65
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2000
3000
4000
Index

Appendix D

Implementation Project Photographs

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<u>On-the-Ground Implementation Project Photos</u>

Coldwater Fisheries and Habitat Restoration

#6 – Tributary of Big Beaver Pond – Habitat Enhancement

#7 – Weaver Hill Road Trail – Barrier Removal

Water Quality Priorities

#2 – Unnamed tributary of Carr River (adjacent to Big Beaver Pond) – Stream Crossing

#7 – Coventry Pines Golf Course – Flooding